Palmerston North Integrated Transport Initiative (PNITI)

Network Options Report

WAKA KOTAHI NZ TRANSPORT AGENCY

January 2021

APPROVAL

PREPARED BY	REVIEWED BY	ENDORSED BY	ENDORSED BY

REVISION STATUS

REVISION	DATE	SUMMARY OF REVISION
1	09 October 2019	Working Draft (Part A)
2	6 March 2020	Working Draft (Part A, B) – For Client Comment
3	18 May 2020	Working Draft (Part A, B, C) – For Client Comment
4	10 June 2020	Draft (Part A, B, C) – For Client Comment
5	30 November 2020	Updated following IQA and PNCC comments
6	21 December 2020	Updated following Waka Kotahi, IQA and PNCC comments
7	19 January 2021	Updated following Waka Kotahi comments (Management Case)

EXECUTIVE SUMMARY

With its many regional and national distribution centres plus strong road and rail transport connections, Palmerston North and the Manawatu Region is becoming an ever more important economic centre for New Zealand. Significant investment to the tune of $3-4 billion[1] over the next 10-15 years is planned for the region which will further cement the region's position as a critical part of New Zealand's distribution network.

These investments in Manawatu's future will spur further growth and development opportunities for a range of businesses looking to expand or diversify. There is evidence of this already occurring with increased business interest in the North East Industrial Zone, following the KiwiRail Freight Hub relocation announcement[2]. This means that Palmerston North is expected to see an increase in employment, and consequently, an increasing number of residents as people are attracted to live and work in the city.

Palmerston North's population is already growing at twice the rate of the early 2010's and employment growth (plus more affordable house prices) means that the city is expected to steadily grow by more than 23,000 people to over 110,000 in the next 25 years.

To help manage this growth, whilst maintaining efficient freight movements to and from the KiwiRail Freight Hub, North East Industrial Zone and other industrial areas within the city, there is a need to plan for the whole transport system. Having this plan will help maintain access and improve the liveability of residential areas and the city centre.

This **Network Options Report** responds to the above pressures, as well as a commitment made by Waka Kotahi, as part of the Te Ahu a Turanga project, to advance "investigations for a Regional Freight Ring Road, including a second road bridge across the Manawatū River"[3].

PROBLEMS AND INTERVENTIONS

As Palmerston North has grown, residential areas have developed in and around industrial areas resulting in access, safety, and amenity issues, particularly due to freight movements. The lack of a coherently implemented road hierarchy has worsened the issues. Although traffic volumes are relatively moderate, this situation is expected to change over time with growth and development, further exasperating the current issues.

Key stakeholders are aligned with the need to not only address the forecast problems, but capitalise on the significant opportunities that may be realised from transport investment, including:

- The stimulation of additional growth, particularly around the distribution and logistics function that has developed in the city
- Enabling and supporting strategic transport connections to KiwiRail's proposed Freight Hub
- Assisting to realise Council's vision of a creative place by creating liveable places
- Reducing carbon emissions within communities
- Creation of a cohesive land use plan to improve amenity and liveability while supporting population and economic growth
- Improving network resilience

Resolving the core safety and access problems, particularly for freight, also aligns very strongly with the Government Policy Statement for Transport (GPS), which sets out the Government's priorities for expenditure and its commitments to creating more liveable cities and thriving regions.

[1] This investment includes several high-profile projects including Te Ahu a Turanga, Linton and Ohakea regeneration, Turitea windfarm, Massey University expansion, MidCentral DHB investment and the KiwiRail Freight Hub.

2 This includes a new 38,000m2 Countdown distribution hub announced located within the North East Industrial Zone - expected to open in 2021. https://www.countdown.co.nz/news-and-media-releases/2020/june/construction-to-start-on-countdown-s-brand-new-distribution-centre-big-boost-to-local-jobs-during-construction-and-when-open

[3] 16 March 2018, https://www.nzta.govt.nz/media-releases/preferred-option-for-sh3-manawatu-gorge-replacement-announced/

Interventions

To address the problems and realise the opportunities, the project team considered a wide range of interventions which were collated into programmes of activities.

In collating the interventions, it was clear that improving freight access and movements in isolation would not realise all the benefits and opportunities available. Interventions to improve safety and amenity within the central city were included, along with land use and regional transport route planning interventions to provide balanced and effective programmes for further assessment.

The interventions and programmes were evaluated against the investment objectives, key principles, implementability, economics, effects and integration criteria to understand their performance and ability to create lasting positive change.

RECOMMENDED PROGRAMME

The recommended programme, designed with stakeholders, consists of a comprehensive package of improvements including online corridor and intersection upgrades for safety and access, as well as safer speeds, placemaking, and land use changes across the network. The package also includes longer term interventions to support the KiwiRail freight hub, such as improvements between Ashhurst and Bunnythorpe, and a future downstream bridge over the Manawatu River to reduce trips through the City and enable placemaking and amenity improvements.

Overall, the programme will:

- Reduce freight movements on residential and place-based streets by up to 50%
- Support and enable Urban Cycling Masterplan initiatives and investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractiveness of active modes across the study area.
- Reduce the number of congested intersections by 50% and improve journey times on key freight routes by up to 10 minutes
- Reduce deaths and serious injuries by 35-40% across the rural freight network
- Support economic development such as the KiwiRail Freight Hub and North East Industrial Zone which enables positive land use changes within the city
- Improves safety and access for new housing developments at Whakarongo, Aokautere and City West

The programme presents a blueprint for how the city's transport network can improve accessibility, safety and support growth over the long term. It is estimated to cost between $335 and $370M with a BCR of between 1.3 and 1.6 (0.9 to 1.1 excluding WEBS).

TAKING A STAGED APPROACH

Implementation of the programme can occur via a staged approach, in tune with the supporting investments and growth. Staging the delivery with planned developments and growth, including the KiwiRail Freight Hub, will assist with value for money. Before this programme can be adopted, additional engagement and consultation is needed with treaty partners, stakeholders and the wider community.

The short, medium and long term programmes are provided on the next pages as Figure 0-1, Figure 0-2 and Figure 0-3 respectively.

The details of these programmes will be investigated and development further as part of the next stages of business case development.

Short Term

The following activities are proposed in the short term. These have been chosen due to the high safety risk, the need to co-ordinate with the KiwiRail Freight Hub development and the long lead time of some activities whilst still enabling the city to realise the opportunities.

- Development of a Manawatū Transport System Plan to identify the core functions of key routes and significant places within Manawatū. By identifying the key strategic routes by mode and places of note, the existing Network Operating Plan can be refined with the key routes and interventions to support the routes and balance access, place, and transport amenity.
- Implementation of safety projects to address high risk sites (Safety Boost Programme, Safer Network Programme, Safer Speed Limits, Napier Road and SH 3/54 projects)
- Development of new land use strategy to better separate residential and industrial areas and reduce further amenity, safety and access issues
- Development of a programme of amenity, safety and access interventions within the central city to prioritise people over vehicles
- Further work around KiwiRail hub to ensure an integrated solution that works for both road and rail freight networks and the city

Medium and Long Term

The key longer term activities that will provide significant benefit and therefore need to be developed in the medium term are:

- Medium term ring road including interventions along Ashhurst Road, Kelvin Grove Road, Kairanga Bunnythorpe Road, Rongotea Road/No 1 Line, SH56 and SH57 to prioritise a ring route away from the city for freight movements. This should be considered for progression after the short term works have been completed and there is more certainty in the timing of the KiwiRail Freight Hub and residential developments.
- Long term ring road interventions including a new downstream crossing of the Manawatu River (between Longburn and Linton) to improve freight movement efficiency and remove freight traffic from the central city. The timing of these elements should be determined by a Detailed Business Case taking into account the long term maintenance and operational requirements of SH56 and SH57 and the success of other measures to remove traffic from the city centre (e.g. speed limits, de-tuning measures). A ring road would also help to shape the land use development over the long-term – i.e. encouraging industry to develop closer to arterial roads, and away from higher amenity local corridors.

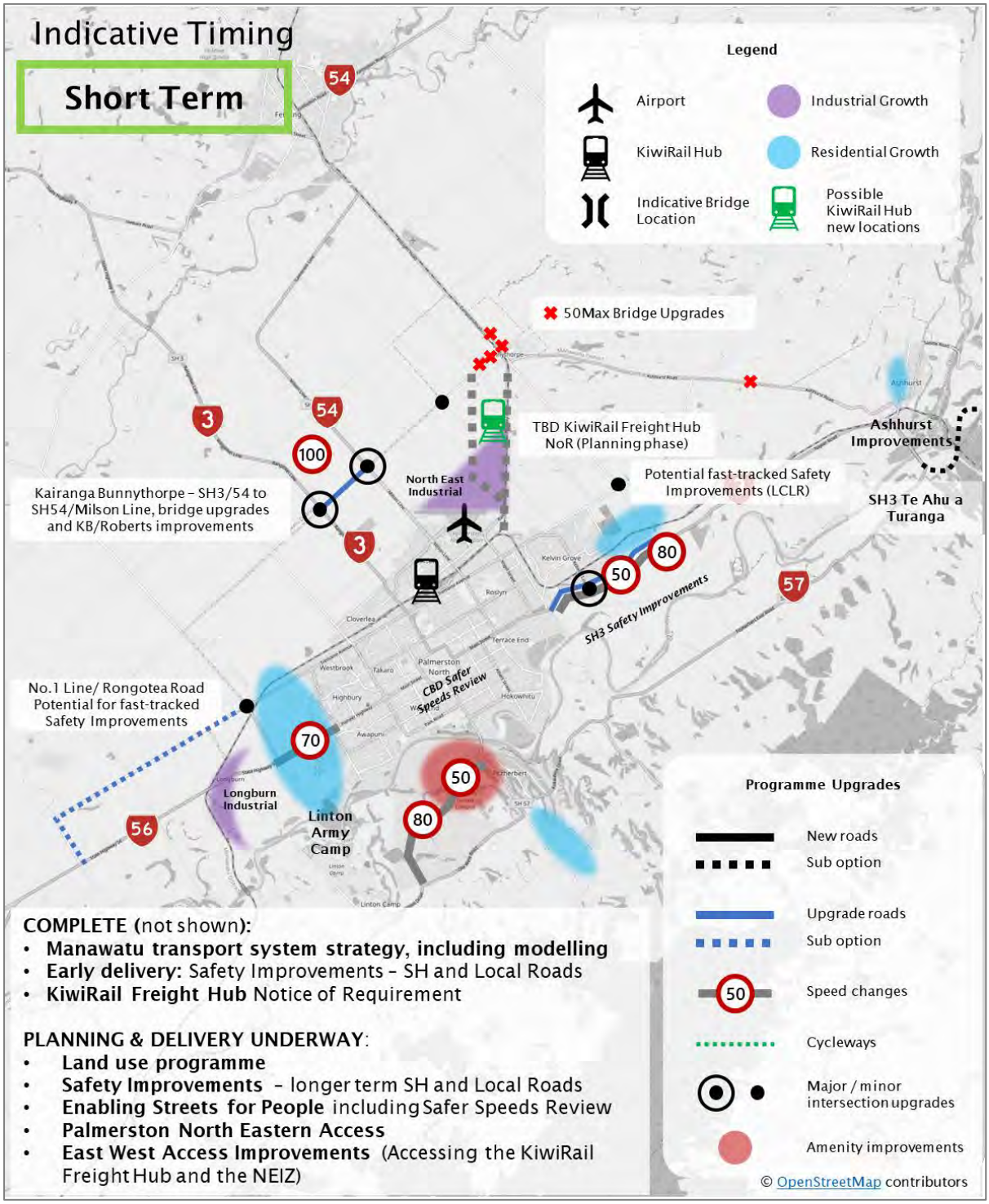


Figure 0-1: Short Term Programme

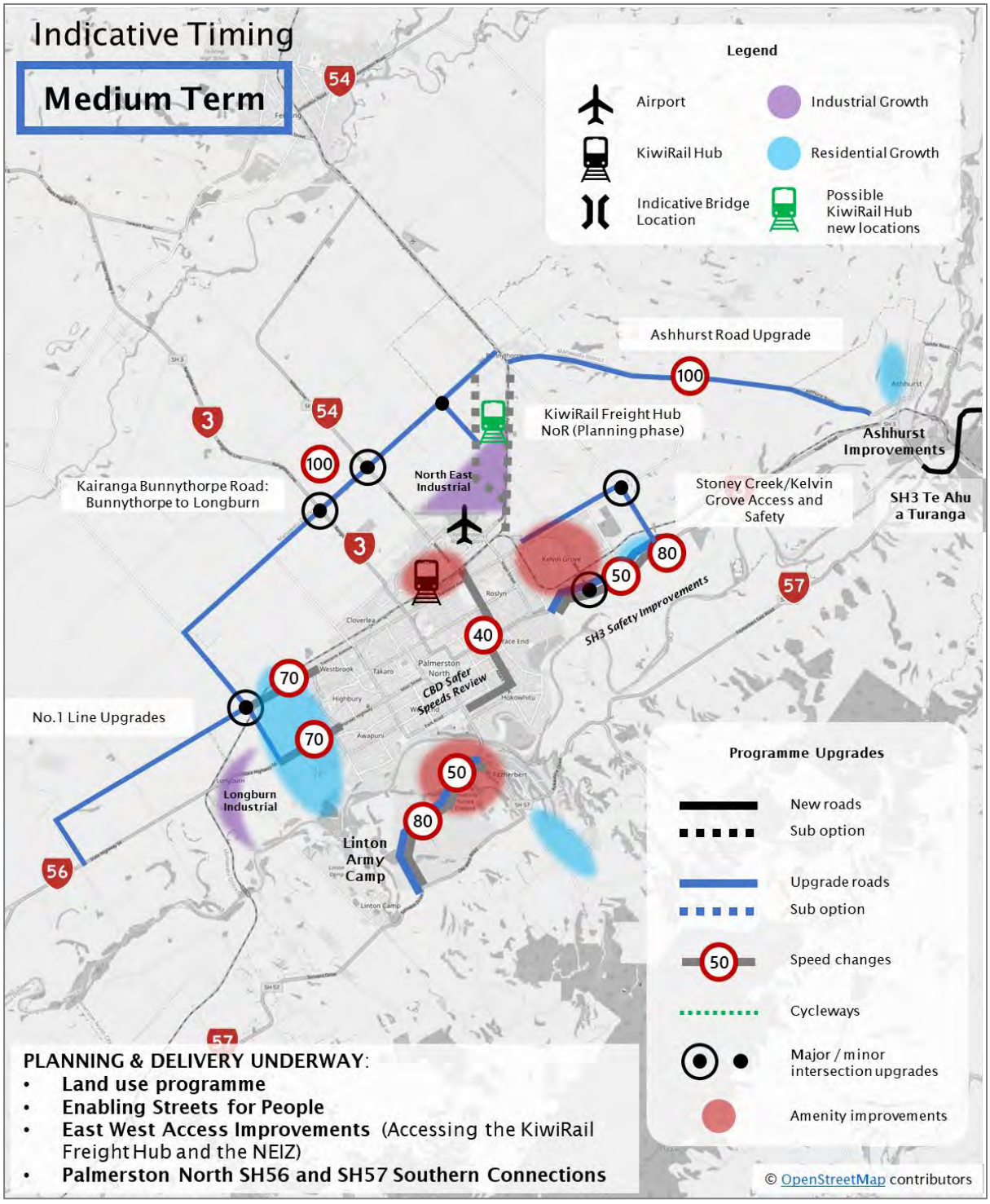


Figure 0-2: Medium Term Programme

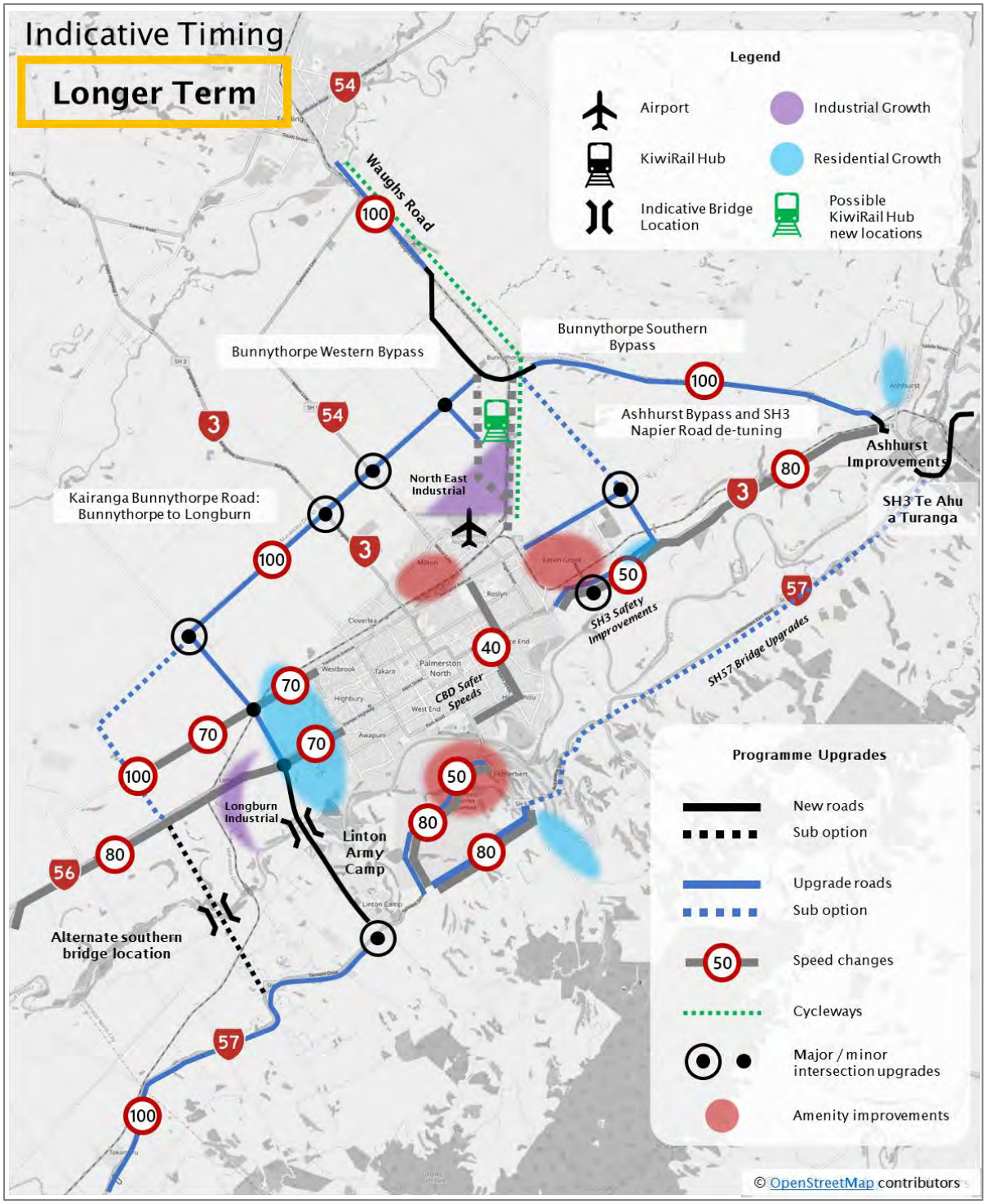


Figure 0-3: Longer Term Programme

Contents

Appendices

PART A: THE CASE FOR INVESTMENT

1 INTRODUCTION

1.1 OVERVIEW

Working with industry, local government, and local communities, Waka Kotahi and its partners are progressing the Palmerston North Integrated Transport Improvement (PNITI) project. PNITI is a package of interventions to manage planned economic growth, support the freight and distribution potential of the region, address identified safety issues and improve the liveability of the residential areas and city centre.

This Network Options Report (NOR) is the first stage of progressing the PNITI programme and documents the following:

- The case for investment, including Problem Statements and Investment Objectives.
- The development and assessment of a long list of programmes.
- The selection of a preferred programme and therefore a list of projects to be taken forward for detailed assessment as part of separate Business Cases.

1.2 PROJECT AREA

The project area is shown in Figure 1-1, with the city's freight routes highlighted in purple. The freight routes in the study area encompass both local roads and state highways, which together, provide access and linkages within Palmerston North City as well as to wider regional or national destinations.

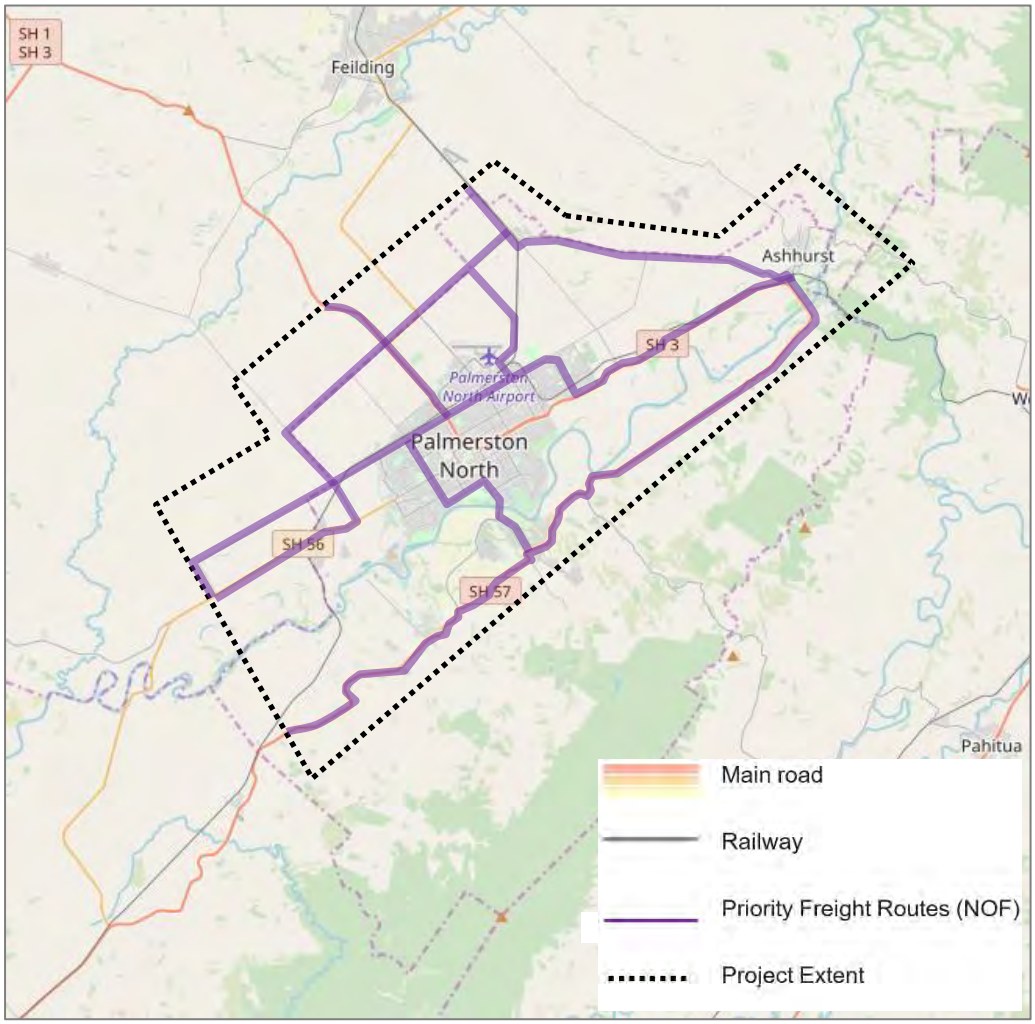


Figure 1-1: Project Area

1.3 BACKGROUND

The Accessing Central New Zealand (ACNZ) Governance Group was formed in 2015 to focus on ensuring a connected, safe, resilient, and cohesive transport network to, from, and within the Manawatū-Whanganui Region. The Accelerate25 Economic Action Plan, completed in 2017, included investigation into how better transport links could be provided between key industrial areas and the wider highway networks. A key outcome was the realisation that strategic connections within the Manawatū-Whanganui region are not just about the Manawatū Plains, but the supply chain of the lower North Island to and from key destinations.

The focus for Accessing Central New Zealand is presented in Figure 1-2 below.

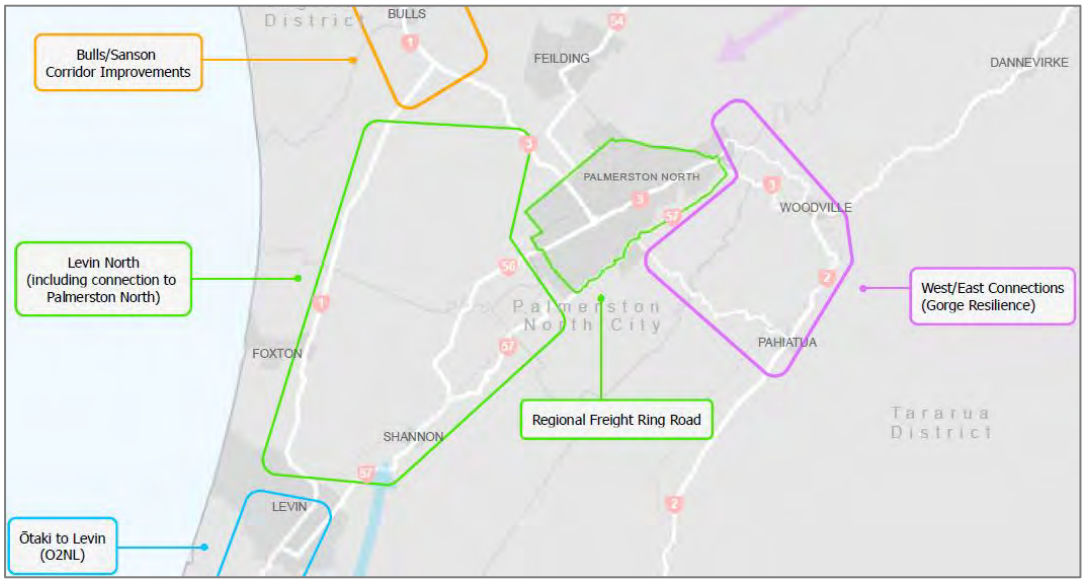


Figure 1-2: Accessing Central New Zealand Key Connections

In 2017 the strategic highway link through the Manawatu Gorge was also closed due to ongoing slips and investigation of alternate routes commenced soon afterwards. As part of the selection of the preferred route for the new Te Ahu a Turanga highway, Waka Kotahi agreed to advance "investigations for a Regional Freight Ring Road, including a second road bridge across the Manawatū River"[4].

PNITI responds to these drivers, whilst also being influenced by a range of other investigations and strategies as outlined in Table 1-1.

Table 1-1: Work Completed to Date

PROJECT	KEY FINDINGS	RELEVANCE TO PNITI
Accessing Central New Zealand Programme Business Case (2020)	The purpose of the Accessing Central New Zealand Programme Business Case (PBC) is to recommend a preferred programme of activities for investing in the transport system between Waiouru, Levin, and Ashhurst (connection with the Te Ahu a Turanga: Manawatū Tararua Highway) over the next 30 years.	The Accessing Central NZ PBC has been developed alongside PNITI, and together, the business cases will help guide transport investment in the Manawatu Region.
KiwiRail Palmerston North Regional Economic Growth Hub, 2019	KiwiRail is investigating a Regional Economic Growth Hub in Palmerston North, near the NEIZ. The NEIZ has been developed as a key location for New Zealand's freight in central New Zealand, supporting planned roading infrastructure in the area and its proximity to airfreight and complementing overall regional transport initiatives. Funding of $40 million was announced by the government in November 2018 to assist with land purchase and the designation process which is expected to begin in late 2020.	The KiwiRail Freight Hub development is a key opportunity for incentivizing investment in the region and is therefore a key interdependency for PNITI.
Palmerston North and Feilding Network Operating Framework, 2019	The road network hierarchy developed for Palmerston North as part of a wider Network Operating Framework (NOF) identified the priority routes for various transport modes.	This hierarchy and prioritized freight routes inform the study area for PNITI.

[4] 16 March 2018, https://www.nzta.govt.nz/media-releases/preferred-option-for-sh3-manawatu-gorge-replacement-announced/

PROJECT	KEY FINDINGS	RELEVANCE TO PNITI
Palmerston North- Manawatū Strategic Joint Transport Study (JTS), 2010/11	The Joint Transport Study summarised findings of previous studies, outlined relevant deficiencies and proposed a 30 year implementation plan. The main identified issues were: • There is a lack of a clearly defined road hierarchy, particularly north and east of Palmerston North, to provide good access to the North East industrial Zone (NEIZ) adjacent to the airport, the proposed eastern residential growth area and the proposed New Upstream Bridge. • SH3 between Sanson and the Manawatū Gorge passes through Palmerston North city centre. • The commuter route between Feilding and Palmerston North via Bunnythorpe requires traffic to use two level crossings of the NIMT railway line. • There is need for an additional crossing of the Manawatū River to improve resilience and service growth areas The JTS proposed a new road hierarchy, which was subsequently adopted with a programme of works developed and included in the RLTP. However, limited improvements have since been progressed through to implementation.	The PNITI project will respond to the issues previously identified in the JTS which are still current and re-consider the network options proposed.
Palmerston North Strategic Transport Plan, 2018	The plan shows how the Council will contribute to *Long Term Plan Goal 1: An Innovative and Growing City*. It states that: "*numerous strategic reports have stressed the need for a regional ring road that connects regional traffic with projected growth to the city's north-east and west, while also removing traffic from increasingly congested urban corridors*."	The PNITI project, by investigating freight network improvements around Palmerston North, aligns with the STP and directly responds to the Council's Long Term Plan goals.

1.4 PARTNERS AND STAKEHOLDERS

Table 1-2 provides a summary of the key stakeholders who have been involved during the development of the business case.

Table 1-2: Partners and Stakeholders

ORGANISATION	FOCUS AREA(S) / ROLE
PARTNERS	
Waka Kotahi NZ Transport Agency	Road controlling authority for the state highway network, a funder and a regulator of the road network. It is also responsible for funding the land transport network as well as regulating access onto the network. Waka Kotahi forms part of the strategic MOU for the project.
Palmerston North City Council (PNCC)	The territorial authority for Palmerston North City and road controlling authority for local road and active mode networks. The majority of the project area is within the PNCC area. Council forms part of the strategic MOU for the project.
Iwi	Iwi are treaty partners and therefore have a special relationship with the crown and a particular interest in both the benefits and impacts of transport investment.
STAKEHOLDERS	
KiwiRail (KR)	Owner and operator of the rail network and provides rail freight services. The North Island Main Trunk Line (NIMT), including the existing Palmerston North rail yard, and the Palmerston North to Gisborne (PNGL) line, are within the study area. KiwiRail forms part of the strategic MOU.
Manawatū District Council (MDC)	Territorial authority for the Manawatū District. It is the road controlling authority for local road and active mode networks. Sections of the study area are within the MDC area.
Horizons Regional Council (HRC)	Responsible for developing the Regional Land Transport Plan, which provides a 10-year strategic direction for transport to give effect to the Government Policy Statement on Land Transport (GPS).
NZ Defence Force (NZDF)	Located in Linton, east of Palmerston North. NZDF have future development plans which will need to be considered in the business case.
NZ Police (NZP)	Enforcement and road safety of all road users.
NZ Automobile Association (AA)	A key interest group that represents association members and brings knowledge of the regional transport network
Road Transport Association (RTA)	Represents the interests of road transport operators, primarily road freight.
Heavy Haulage Association (HHA)	Represents the interests of road transport operators, with a focus on overweight or over-dimensioned vehicles.

ORGANISATION	FOCUS AREA(S) / ROLE
Spearhead Manawatū	Works with HRC and Accelerate25 and is a partner of the Central Economic Development Agency[5]. They are "responsible for leading investment and economic development in the Manawatu and the lower North Island region"[6].
Food HQ	FoodHQ is a food science innovation hub located on the southern side of the Manawatū from Palmerston North, near Massey University. Food HQ have future growth and development plans which will need to be considered in the business case.[7]
Fonterra	Fonterra are NZ's leading dairy exporter, with a significant presence in Palmerston North with sites in Longburn, Kelvin Grove and FoodHQ. These sites are a key employer and result in significant associated heavy vehicle movements across the network (for example milk tankers)[8].

1.5 COVID-19 IMPACTS

COVID-19 is a worldwide event that is continuing to evolve. The full impacts of the pandemic are yet to be understood, however, based on recent recovery trends the following predictions have been made[9]:

- No significant changes are expected in the nature, scale, and location of transport demand over the medium to long-term for the Manawatu-Whanganui Region. The 10-year outlook remains largely unchanged.
- Palmerston North is seeing continued demand as a multi-modal distribution centre. Maintaining safe and reliable connections to the university, Wellington and Napier Port remain critical to supporting recovery across the lower North Island.
- There will be an ongoing need for transport services to support COVID-19 recovery by improving access to employment and essential services for vulnerable communities.

Further details around the economic and transport recovery trends for the region are presented within Section 10.3.

[5] https://ceda.nz/about/how-we-work/
[6] https://www.linkedin.com/company/spearhead-manawatu
[7] Further information can be found at https://www.foodhq.com/about-us
[8] Information can be found at: https://www.fonterra.com/nz/en/about.html
[9] Arataki, Waka Kotahi, August 2020 https://www.nzta.govt.nz/assets/planning-and-investment/arataki/docs/regional-summary-manawatu-whanganui-august-2020.pdf

2 CONTEXT

This section provides relevant transport, social and economic context and outlines the existing and future transport pressures and drivers.

2.1 OVERVIEW

Palmerston North has several inherent strengths which underpin the resilience of its economy and its ability to attract investment; namely:[10]

- The city is located centrally within the North Island and is recognised as a key road and rail distribution hub regionally and nationally (Refer Figure 2-1).
- It is the Lower North Islands centre for logistics, distribution and rail. It is also the largest freight hub outside of Auckland.
- The city is home to well-established large employers, including the head offices of major companies (such as Norwood, Motor Truck Distributors and Toyota), institutions such as Massey University and the New Zealand Defence Force's Linton Army Camp, FoodHQ (one of the world's leading clusters of food science expertise and facilities) as well as a large District Health Board and substantial regional offices of organisations such as Fonterra, FMG and Plumbing World.
- A decrease in housing and lifestyle affordability in larger cities makes the region increasingly attractive, which is set to bring about a rise in population.
- Significant investment to the tune of $3-4 billion over the next 10-15 years is planned for the region which will further cement the region's position as a critical part of New Zealand's distribution network. The scale and scope of these projects will boost jobs, encourage population growth, and create many new opportunities for the city.
- The Manawatū-Whanganui region has been identified as a surge region by the Government for investment in supporting regional development to address high unemployment rates and low household incomes. Council has projected an increase in employment rates by 31%, from 51,549 jobs in 2018 to 67,277 jobs in 2043.[11]

Figure 2-1: National Rail Network

As population and local industries grow, Palmerston North will have an increasingly important role in the Lower North Island and nationally.

[10] Palmerston North City Council. Leading the regional revolution: Palmerston North's transformation and growth, 2019.
[11] Infometrics workforce (employee and self-employed) projections for Palmerston North, March 2020

2.2 SOCIAL AND ECONOMIC CONTEXT

2.2.1 Increasing population

Palmerston North is the largest urban area in the Manawatū-Whanganui Region with 90,400 residents[12], accounting for over a third of the region's population.

The estimated annual average population growth over the past five years (2014 – 2018) for the Palmerston North urban area has been about 1.2%, which is double the growth rate of the preceding five-year period (2009 – 2013). Palmerston North is projected to have 110,700 people residing in the area by 2043[13]. Compared to other cities of a similar size, Palmerston North has grown faster than both Dunedin and Lower Hutt City, and slightly slower than Napier City from 2006 to 2020[14].

The centralised location of Palmerston North in the lower North Island and the presence of Massey University and other tertiary education providers, the city acts as an employment hub with up to 22,000 traffic movements per day into the city. A growing population means more pressure on transport infrastructure and customer levels of service, which pose challenges for Palmerston North's transport network[15]. In addition, as populations increase in nearby areas like Feilding and Levin, commuting demands in and out of Palmerston North will continue to increase.

2.2.2 Economic potential

The Manawatū-Whanganui economy is largely based on the production of primary industries, the region is therefore heavily dependent on a safe and reliable land transport network to transport product from its point of origin to its destination.

For example, the logistics earnings in the city increased by 177 per cent between 2000 and 2018, well ahead of the 121 per cent increase in logistics earnings nationally. Major distribution centres based in the city, including Toyota New Zealand, Foodstuffs and Woolworths, have contributed to this growth[16].

There is significant public and private sector investment planned in the Manawatu Region – to the tune $3-4 billion - with the majority occurring in or near Palmerston North. Several of the key projects are shown in Table 2-1 below.

Table 2-1: Selected regional construction projects to 2030[17]

PROJECT	ESTIMATED INVESTMENT
Te Ahu a Turanga: Manawatū Tararua Highway	$650+ million
MidCentral DHB investment plan	$426 million
Linton and Ohakea Defence Regeneration Plan	$397 million
Mercury Energy Turitea Wind Farm	$450 million
Wastewater Treatment Plant	$350 million
Massey University Capital Plan	$230 million
P8A Poseidon Aircraft facilities & infrastructure	$300 million
Powerco Growth, Security & Renewal Programme	$245 million
CBD EQ Building Upgrades	$150 million
Hokowhitu Campus Housing Development	$90-135 million
Countdown distribution Centre	$66 million
Te Manawa Museum Upgrade	$58 million
PNCC urban growth capital projects	$48+ million
KiwiRail Freight Hub (Land)	$40 million
BUPA Retirement Village	$40 million
Three waters infrastructure growth & renewal	$41 million
PNCC city centre streetscape upgrade	$29 million

[12] Stats NZ 2020 population estimates
[13] Long Term Projections for Palmerston North, 2020, PNCC
[14] Stats NZ population estimates, 2006 Census to 2020 June population growth. Palmerston North (90k pop): 17% growth from 2006 to 2020, Dunedin (134k pop): +11%, Lower Hutt City (112k pop): +13%, Napier (66k pop) +21%.
[15] Horizons 2015-2025 2018 RLTP Section 3.3 – which highlights that the transport impacts of growth are a key issue for the region, including PN.
[16] KiwiRail, 2020. www.kiwirail.co.nz/assets/Uploads/Projects/PN-freight-hub/September-2020-Regional-Freight-Hub-FAQs.pdf
[17] Palmerston North City Council. (2020). Long-Term Projections for Palmerston North, https://www.pncc.govt.nz/media/3132945/long-term-projections-2020.pdf, including revisions received from PNCC in December 2020.

The scale of these projects will be transformational for the city. It is expected that many jobs will be created by these projects over the next decade. For example, the Te Ahu a Turanga highway is expected to provide up to 350 jobs during construction while the Countdown distribution hub is expected to generate 100 jobs during construction (increasing the total permanent workforce to 150). This is in line with Council's Long-Term Plan goal to increase employment by 1.9% per annum over the next ten years. In addition, these investment commitments will likely spur further development and opportunities for a range of businesses looking to expand or diversify.

According to the Central Economic Development Agency (CEDA)[18], a key factor for Palmerston North's growth is high levels of investment in residential and non-residential construction. This is evidenced by consents for the construction of new houses in Palmerston North rising 186% (167 to 565) between June 2014 and 2020, a higher rate of growth compared to nearby districts such as Horowhenua and Manawatu. Between the same 2014 to 2020 period, Palmerston North has also had the highest growth in terms of dwellings consented per 1,000 residents[19] compared to other cities within NZ. Commercial, local, and central Government investment across the district and the region is also expected to boost employment and household spending.

It is essential that transport system deficiencies do not constrain potential development, which could affect the economic prosperity of the region and the lower north island.

2.3 TRANSPORT CONTEXT

2.3.1 Importance of Palmerston North as a regional freight hub

Figure 2-2 below shows the strategic connections of the lower north island for freight and tourism. The map highlights how Palmerston North acts as a key freight collection and distribution hub for products exported through the ports of Napier, New Plymouth, Wellington, Tauranga and Auckland through both road and rail. As a result, Palmerston North has become the centre for many of the inter-regional journeys occurring in the lower North Island. Palmerston North is also connected to Auckland and Christchurch through air freight with two services operating daily.

The region also acts as a hub for rail freight, with 2.55 m tonnes of freight passing through the city in 2019[20]. In terms of volumes moved, the main destination for rail freight from Manawatū-Wanganui is Hawke's Bay, followed by Wellington. In addition to rail freight loaded or unloaded directly at the Palmerston North rail terminal, there are also substantial volumes of rail through traffic which require marshalling at the terminal.

PNITI seeks to support the efficient movement of freight now and in the future.

Figure 2-2: Lower North Island Strategic Connections[21]

[18] ceda.nz/economic-updates/manawatu-quarterly-economic-update-september-2019/
[19] PNCC NPS, 2019 and Stats NZ. Analysis indicates that based on the number of dwellings consented per 1,000 residents since 2014, Palmerston North City has had the highest growth compared to other cities within NZ, from 2.3 dwellings per 1,000 residents in 2014 to over 6.2 dwellings per 1,000 in 2020.
[20] /www.kiwirail.co.nz/assets/Uploads/Projects/PN-freight-hub/September-2020-Regional-Freight-Hub-FAQs.pdf
[21] Source: Arataki, Waka Kotahi

2.3.2 Cross-city freight movements

The key freight routes are generally those that provide direct access between the industrial hubs and the state highways or major arterials. Figure 2-3 provides a representation of existing freight flows across Palmerston North (refer to **Appendix B** for the Freight Demand Study).

Figure 2-3: Existing Heavy Commercial Vehicle Flows (Schematic)

Key areas which see high volumes of freight include:

- **Tremaine Avenue**: While Tremaine Avenue is a key through route, it is also a destination itself due to its access to the KiwiRail rail yards and the large number of other industrial and commercial sites, including freight companies. The combination of general traffic and freight flows means that there is some congestion along this route during peak hours (Refer Section 6).
- **Kelvin Grove:** A mixed residential and industrial area that is home to several large businesses, including Countdown, Toyota, Turners & Growers, MG Marketing and Bidfoods distribution centres. It is located close to SH3, Tremaine Avenue and Palmerston North Airport.
- **North East Industrial Zone:** Located adjacent to Railway Road to the north of the City. This site supports both Foodstuffs, Provida Foods, Cable Price, Norwoods and Ezibuy's freight operations. Approximately 100 hectares of commercial/ industrial is underdevelopment with a further 126 hectares re-zoned. The site is also located close to the Palmerston North Airport. Both Freightways and New Zealand Post operate from the Airport.
- **Longburn Inland Port** This industrial area is located to the south of the City (just off SH56). The primary industrial users of this site are Fonterra, Ice Pack Cool Stores and Meadow Fresh.

There are also three other sites of regional significance:

- NZDF, Linton Camp (the main operational hub of the NZ Army). Located to the south-west of City. The Government has signalled the centralisation of defence forces in the country, including expected growth and consolidation at both Linton and Ohakea.
- Massey University and Food HQ campuses. Located to the east of the Manawatū River, on either side of Tennent Drive.
- Palmerston North Regional Hospital / Midcentral District Health Board. The Hospital, located between Ruahine St and Heretaunga St, is home to over 3,000 health workers and borders several schools and associated health facilities.

PNITI seeks to establish how best to ensure effective freight movement and safety outcomes, but without compromising liveability or access.

2.3.3 Network Operating Framework – Road Hierarchy

The road network hierarchy developed for Palmerston North as part of a wider Network Operating Framework (NOF) is shown in Figure 2-4 below. The NOF hierarchy builds on previous strategic planning work undertaken as part of the joint Palmerston North – Manawatū Strategic Transport Study (JTS) undertaken in 2010.

The hierarchy was designed so that freight (purple) and general traffic (black) are prioritised around the outside of Palmerston North's CBD and on key regional corridors, whilst public transport and walking are focused on the CBD and cycling has a wider coverage including recreational routes.

However, although the initial hierarchy was developed in 2010 and reconfirmed in 2019 as part of the NOF, several of the freight routes identified remain substandard, limiting their use (Refer Sections 4 to 6). Further, none of the improvements identified in the JTS have been progressed through to implementation.

PNITI aims to investigate options to help give effect to the NOF and develop a blueprint for how the city's transport network can support long term growth.

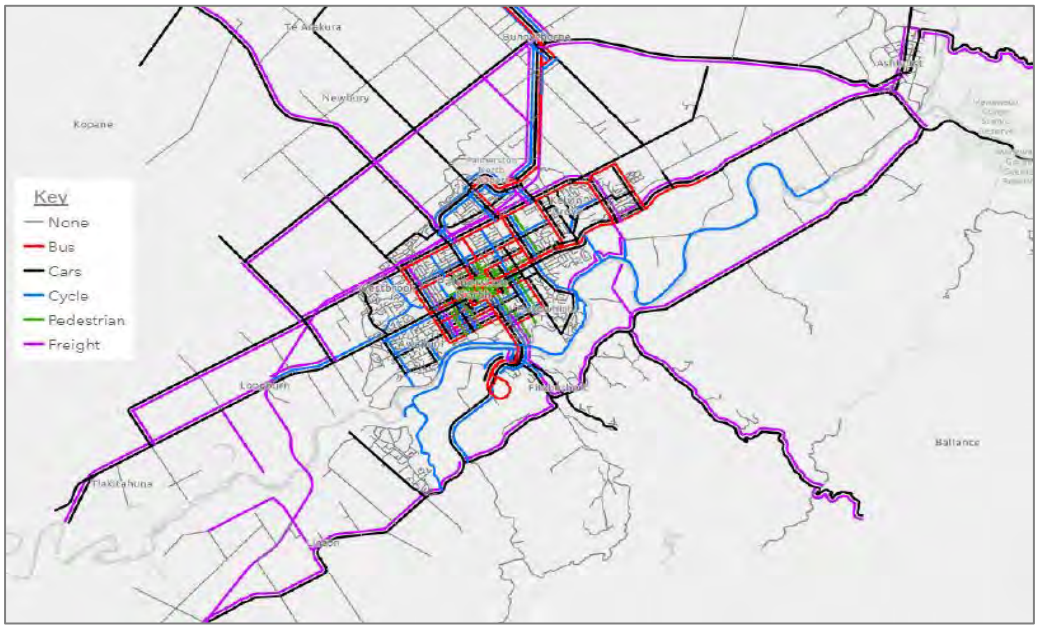


Figure 2-4: NOF Road Hierarchy[22]

2.3.4 Limited recent uptake in active or public transport

Walking and cycling

2018 census data indicated that active mode share (for journeys to work) for Palmerston North City is around 6.8% for walking and 3.4% for cycling. Cycling mode share in the city has been in decline for several Census periods, falling from 7.4% to 5.9% between 2001 and 2013 and reducing further to 3.4% in 2018. Walking mode share remained relatively stable between 2001 and 2013 at approximately 9% but has reduced to 6.8% in 2018.

Palmerston North has been experiencing strong growth in employment on the edge of the city's urban area, where cycling and walking facilities are limited or lacking, this could be a contributing factor to the recent decline (along with a reduction in tertiary student numbers of 3,000 between 2012 and 2020). Employee counts in the city increased by 13,500 between 2000 and 2020, an increase of 35%, with most of this growth occurring around the NEIZ/PN airport, Tremaine and Linton.

In June 2019, the first dedicated walking and cycling bridge in Palmerston north, He Ara Kotahi, was officially opened. The bridge and associated pathways connect the city with Massey University and Food HQ campuses, the neighbouring Fitzherbert Science Centre and Linton Military Camp. By 17th January 2020, over 333,000 people had crossed the bridge, exceeding forecasts[23].

This demonstrates that, if new active mode infrastructure is targeted in the right place and to a high standard, there is opportunity to deliver modal shift.

[22] Abley. (2019). Palmerston North and Feilding Network Operating Framework
[23] https://www.stuff.co.nz/manawatu-standard/news/118807353/he-ara-kotahi-bridge-is-pulling-the-punters

Public Transport

Palmerston North has several bus routes that provide access across the City, with a focus on services providing access to Massey University. Several of the priority bus routes overlap with priority freight routes as identified in the NOF above, which includes Botanical Road, Park Road, Fitzherbert Avenue, Tremaine Avenue, and SH3. Other public transport services include:

- Services which operate from regional centres to Palmerston North, including from Feilding, Ashhurst, Whanganui, Levin, Marton and Taihape.
- There are no passenger rail services provided within Palmerston North. There is however a passenger rail commuting service that operates with one daily return service between Palmerston North and Wellington (Capital Connection rail service).

Recent trends identify that patronage has been declining since 2012 across several routes and services. In response, PNCC and HRC developed a programme of improvements with several trials and improvements undertaken since 2016. HRC is currently reviewing the existing bus services to refine existing trials and identify other potential improvements, this is anticipated to be completed by the end of 2020[24]. Council is investigating improvements to the Main Street Bus Terminal with a view to preparing a business case to secure funding from Waka Kotahi.

PNITI seeks to investigate an integrated solution which will make travel by active and public transport modes more appealing.

2.3.5 Constraints to rail freight capacity and the planned new hub

Rail is currently under-utilised in the region, accounting for 5-10% of total freight tonnage[25], similar to national trends where the majority of freight is travels via road freight[26]. The Horizons Regional Land Transport Plan (RLTP) also highlights that the increased reliance on the region's roading network is putting pressure on a number the key journeys north, south, east and west of the region which could restrict anticipated growth in the freight distribution logistics chain.

This is not helped by the fact that there is limited opportunity to expand the existing Palmerston North Rail Terminal (due to physical constraints and the social impact on surrounding land uses). For this reason, KiwiRail have identified that remaining on this site will not allow for expansion to accommodate predicted national freight growth and does not align with Council's strategic rezoning plans or vision for the city. KiwiRail are therefore looking to develop an alternative site in the vicinity of Palmerston North, which is intended to allow distribution services to grow, while increasing efficiency and resilience. KiwiRail believe that the new hub could provide central New Zealand with a long term, dependable intermodal freight distribution solution[27].

KiwiRail envisions that the Regional Freight Hub could represent a new approach to integrated logistics for New Zealand. Once KiwiRail has identified a site to build the Regional Freight Hub, their current masterplan will be adapted to fit that specific location.

Should the Palmerston North Freight Yard be relocated, the benefits could be:

- To support various transport strategies seeking to move heavy vehicles away from urban roads; enabling PNCC's environmental, health and safety, and the city's future strategic development plans to be realised.
- An opportunity for the current facility to be enhanced from an urban infrastructure perspective, opening the potential for increased patronage and tourism connections.
- Grow the rail mode share in the region - Rail currently carries about 16 percent of New Zealand's freight task (16% by tonne-km, 7% by tonnes). To enable higher volumes to be carried by rail, investment is needed in the network infrastructure – particularly facilities that accommodate longer and heavier trains, which will contribute to operating efficiencies of scale. Future trains could be up to 1,500 metres long and comprise up to 40 wagons[28].

KiwiRail have progressed the planning associated with the Freight Hub and in October 2020 lodged a Notice of Requirement (NoR) for the land proposed to be purchased.

The proposed Hub could lead to the development of a 'Freight City' near Palmerston North.

[24] Horizons, Public Transport Services Report. https://www.horizons.govt.nz/HRC/media/Media/Agenda-Reports/Passenger-Transport-Committee-2020-18-02/2007%20Annex%20A%20Public%20Transport%20Services%20Report.pdf
[25] 2018 review of the Horizons Regional Land Transport Plan (RLTP) 2015 – 2025, 2018 Review
[26] National Freight Demand Study (NFDS), MOT, 2014.NZ Freight task (2012, Tonnes): 91% Road, 7% Rail, 2% Coastal shipping. Freight Task (Tonne-km): 70% Road, 16% Rail, 14% Coastal shipping.
[27] KiwiRail Palmerston North Regional Economic Growth Hub, https://www.kiwirail.co.nz/what-we-do/projects/regional-freight-hub/
[28] KiwiRail, 2020, https://www.kiwirail.co.nz/what-we-do/projects/regional-freight-hub/

3 PROBLEM STATEMENTS

A review of previous studies, stakeholder workshops[29], and desktop data analysis has allowed for the identification of key issues for the PNITI study area. This understanding was built upon through stakeholder inputs (via Workshop No.1), where the main causes, consequences, and effects were identified. Refer Appendix A for the Workshop 1 information.

Figure 3-1 provides an Investment Logic Map (ILM) that shows how the Problem Statements for the PNITI project have been developed.

The main problem themes relate to safety, amenity and improved access. As demonstrated in the Investment Logic Map below the problem themes are inter-related in terms of the contributing factors, effects, and consequences.

The predominant contributing factors are the historical land use planning decisions and the current road network deficiencies.

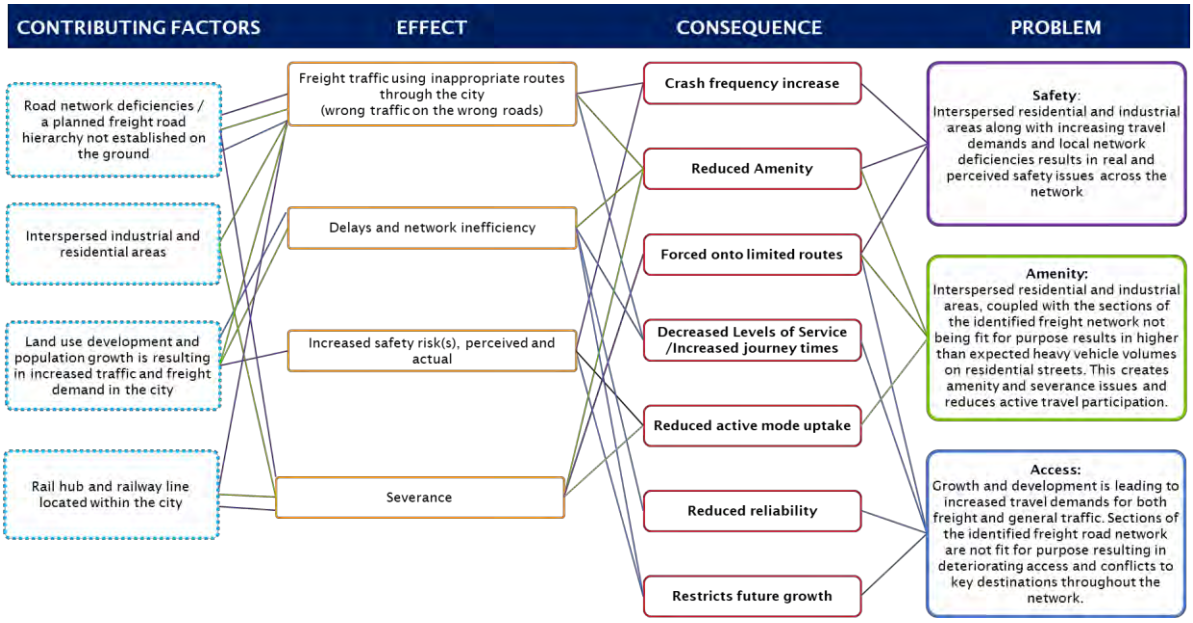


Figure 3-1: Investment Logic Map

The cause, effect, and consequences of issues across the network have been used as the building blocks for the following problem statements:

- **Amenity:** Interspersed residential and industrial areas, coupled with the sections of the identified freight network not being fit for purpose results in higher than expected heavy vehicle volumes on residential streets. This creates amenity and severance issues and reduces active travel participation.
- **Safety:** Interspersed residential and industrial areas along with increasing travel demands and local network deficiencies results in real and perceived safety issues across the network.
- **Access:** Growth and development is leading to increased travel demands for both freight and general traffic. Sections of the identified freight road network are not fit for purpose resulting in deteriorating access and conflicts to key destinations throughout the network.

[29] The Transport Agency commenced the Accessing Central New Zealand, and the Palmerston North Integrated Transport Improvements business cases in 2018, with an initial workshop held in August 2018. Since the initial workshop, KiwiRail began investigating a new rail freight hub which had a strong relationship to the NZTA business cases. As a result, there has been a longer than usual time between workshops whilst the programmes were brought into closer alignment so that the benefits of an integrated planning approach can be achieved.

4 PROBLEM 1: AMENITY

4.1 OVERVIEW

This section provides the evidence base that substantiates the 'amenity' problem, with information structured in the following manner:

- The **cause** of the problem – what are the main causes which contribute to the problem?
- The **effect** of the problem – to road users, ease of access, commercial activity, the surrounding environment etc.
- The **consequence** of the problem – the health, environmental and economic effects.

Table 4-1 provides a summary of the key causes, effects and consequences of the '**amenity'** problem.

Table 4-1: 'Amenity' Problem – Causes, Effects and Consequences Summary

INTERSPERSED RESIDENTIAL AND INDUSTRIAL AREAS, COUPLED WITH THE SECTIONS OF THE IDENTIFIED FREIGHT NETWORK NOT BEING FIT FOR PURPOSE RESULTS IN HIGHER THAN EXPECTED HEAVY VEHICLE VOLUMES ON RESIDENTIAL STREETS. THIS CREATES AMENITY AND SEVERANCE ISSUES AND REDUCES ACTIVE TRAVEL PARTICIPATION.	
Causes and contributing factors	• Interspersed industrial and residential areas • Rail yards and railway line located within the city • Road network deficiencies • Forecast growth resulting in increasing traffic and freight demands
Effects	• Heavy vehicles on high place value streets
Consequences	• Poor amenity values • Safety risk

4.2 CAUSES

4.2.1 Interspersed Industrial and Residential Areas

Over time, Palmerston North has developed with mixtures of land uses adjacent to one another, as evidenced by the District Plan zoning map provided as Figure 4-1.

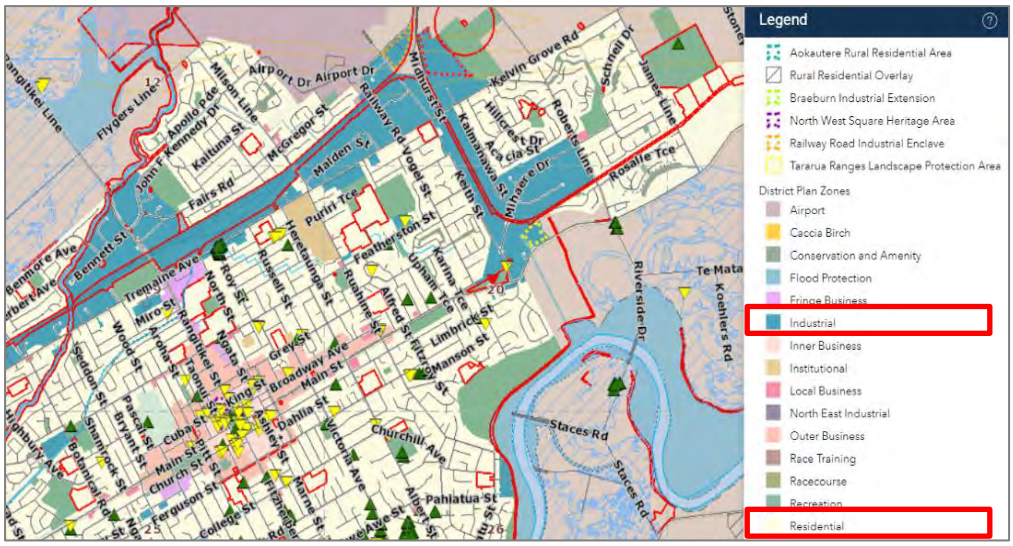


Figure 4-1: Palmerston North – Planning Maps[30]

From the zoning map, examples can be seen where industrial zones, historically on the city limits, are now surrounded by residential suburbs – particularly Tremaine Avenue and Kelvin Grove.

[30] https://geosite.Council.govt.nz/MapViewer/?map=8c372cd395c34ff5bd5b8038503bef36

The interspersed industrial and residential areas are an amenity problem because of the heavy traffic that travels to and from industrial areas increases the noise, severance and safety risk along primarily residential streets. Kelvin Grove Road, Keith Street and Kaimanawa Street are all examples of streets with mixed residential and industrial road frontage.

4.2.2 Rail Yards and Railway Line located within the City

The location of the rail yards relative to residential zones creates noise and severance issues for the surrounding neighbourhoods. The location of the yards also impacts on safety due to the amount of vehicle traffic that it generates.

KiwiRail's freight yard is located along Tremaine Avenue, an arterial road that carries over 15,000 vehicles per day with 10% heavy vehicles. The road link to the Tremaine Avenue rail terminal is under increasing pressure from high traffic flows and delays, with one of the main terminal intersections, North Street and Tremaine, having recently been upgraded to a signalised intersection to improve access and reduce delays.

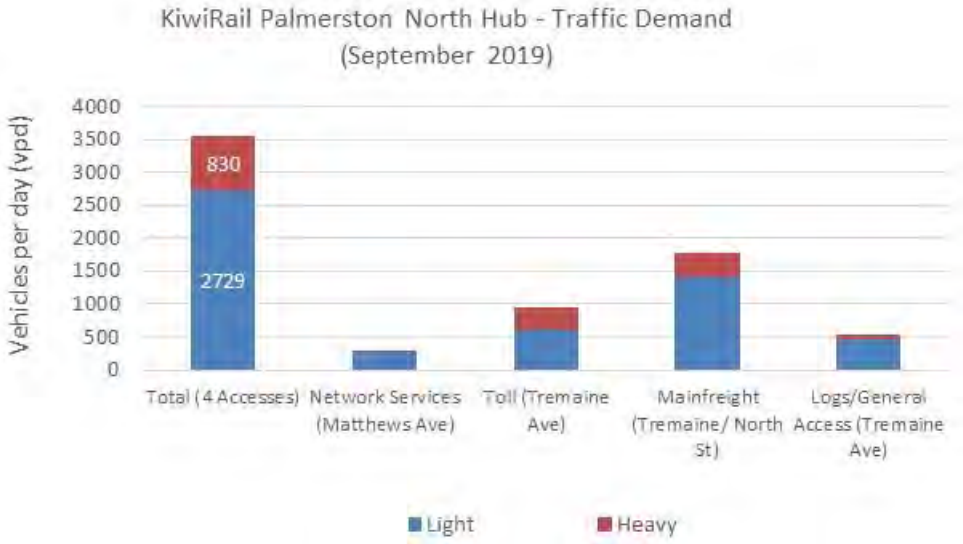


Figure 4-2: KiwiRail average daily flow by site access (September 2019)

KiwiRail surveyed the total traffic demand for the Palmerston North terminal across four access (Network Services, Toll, Mainfreight/Container Terminal and Logs/General Access) in September 2019. The survey showed that weekday movements in and out of all accesses totalled over 3,500 vpd with 23% heavy vehicles (Figure 4-2). It is noted that surveys were not completed during the peak period for rail, typically around November, and that peak season flows could be over 5,000 vpd.

The rail yards and surrounding industrial areas are constrained by residential and recreational areas. Whilst this limits the growth of KiwiRail and other industries within the industrial zone, it also negatively impacts surrounding neighbourhoods. The amenity of the surrounding residential areas is reduced due to the noise associated with the industrial zone (regular trains passing through, high number of heavy vehicles on the roads, machinery, etc), and the severance caused by the location of the railway and industrial area.

The severance is particularly relevant for Cloverlea and Milson as they are effectively cut off from the rest of Palmerston North and only have limited options when crossing the railway line into Palmerston North.

4.2.3 Road Network Deficiencies

Several sections of the identified freight network are deficient in terms of sufficiently providing for large freight vehicles; these issues primarily relate to narrow seal widths, bridge restrictions (weight and width), roadside hazards, poor or inappropriate intersection controls and level crossings.

As a result, freight vehicles often choose alternate routes, often through residential areas impacting on the amenity, safety and access of those communities.

Key examples are Kairanga Bunnythorpe Road and Longburn-Rongotea Road, which are both identified in the NOF as key strategic freight routes, but have the following deficiencies which limit their function (especially for freight, as indicated by the low volumes in Figure 4-4 below):

- Narrow six-metre-wide carriageway;

- Weight restricted bridges;
- Priority controlled intersections with high conflicting volumes; and
- Power poles and deep drainage ditches within the clear-zone.

Figure 4-3: Longburn Rongotea Road[31]

Figure 4-4: Existing Heavy Commercial Vehicle Flows (Schematic)

Weight restricted bridges across the network (Refer Figure 4-5), located on Kairanga Bunnythorpe Road, Ashhurst Road and Campbells Road, also pose further challenges as they require heavier vehicles to divert to other, frequently urban, routes.

There are also several level crossings (Refer Figure 4-5) along the preferred freight routes (as identified in the NOF). Between 18 and 32 trains pass through a day, which influences the efficiency and safety of the road network (particularly at peak times).

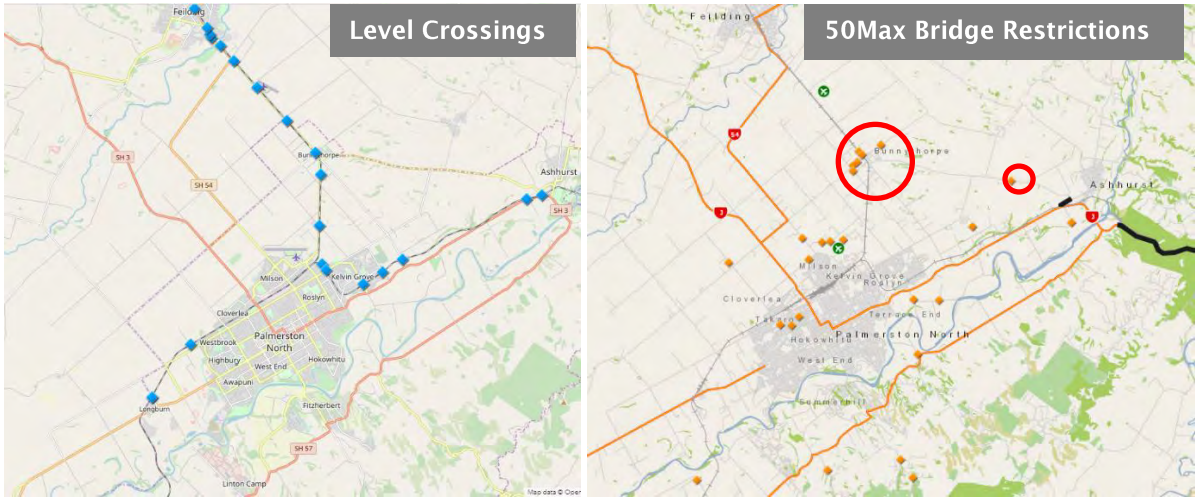


Figure 4-5: Level Crossings (Left) and 50Max Bridge restrictions (Right)

[31] Google StreetView

4.2.4 Forecast Growth and Demands

Palmerston North has experienced a step change in population growth over the last decade. This growth is expected to continue with growth of 7-12% forecasted between 2018 and 2028, based on Stats NZ Medium and High projections[32]. If these higher growth projections occur, Palmerston North City could be classified as a high growth urban area.

Overall, the medium and long-term household projections to cater for anticipated growth are summarised in Table 4-2 below.

Table 4-2: Medium and long term housing growth projections (Source: PNCC, Housing and Business Development Capacity Assessment, 2019)

TIMEFRAME		MEDIUM TERM (2018-2028)	LONG TERM (2028-2048)	30 YEAR TOTAL (2018-2048)
Household growth range (*Projected actual demand* to *Minimum National Policy Statement target for household growth*)		+4,600 - 5,520	+8,700 - 10,440	+13,300 - 15,960
Potential Transport Trip Generation (vehicles per day)[33]		Up to 57,000 additional trips per day	Up to 109,000 additional trips per day	Up to 166,000 additional trips per day
Residential Preference	Greenfield	2,760	5,220	7,980
	Infill	2,087	3,967	6,065
	Rural/ Rural-residential	662	1,253	1,915

In addition to urban infill and higher density development, the City's planned future residential development areas are shown in Figure 4-6, with growth areas to the east, west, and south of the city.

Figure 4-6: Future Residential Development Areas[34]

A growing population means increased general and freight traffic volumes, placing pressure on existing transport infrastructure and customer levels of service, which pose challenges for Palmerston North's transport network. In addition, as populations increase in nearby areas like Feilding and Levin, commuting demands into and out of Palmerston North will continue to increase.

Growing demands will exacerbate the impacts and effects of the mixed residential and industrial areas and road network deficiencies causes outlined above.

[32] Stats NZ. Medium Growth Projection: Urban area population projections, by age and sex, 2013(base)-2043 update. Source: http://nzdotstat.stats.govt.nz/wbos/Index.aspx#. Note that Sense Partners medium projections are roughly equivalent to StatsNZ high forecasts.
[33] Based on typical residential trip generation of 10.4 vpd per dwelling/household, Waka Kotahi Research Report 453: Trips and parking related to land use
[34] Palmerston North City Council NPS, 2019

General traffic growth

Figure 4-7 shows the growth in overall traffic volumes on key arterial routes over the last 10 years.

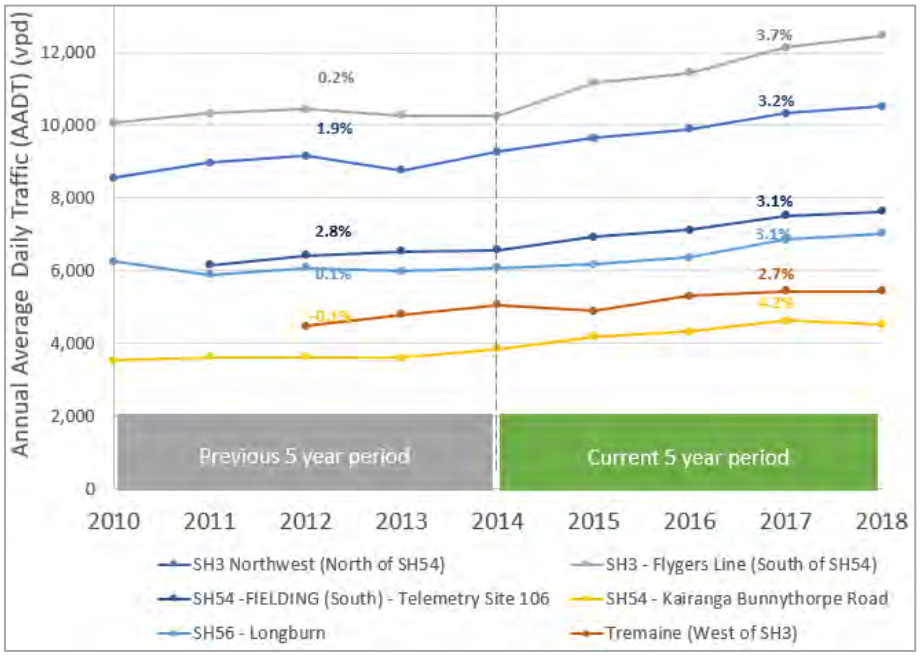


Figure 4-7: Network Traffic Volumes and Growth[35]

Since 2014 there has been a noticeable growth trend across all local state highway count sites and at Tremaine Avenue (west of SH3).

The more traffic on the roads, the more noise created and the higher the number of interactions between pedestrians, cyclists and vulnerable road users with cars and heavy vehicles. Therefore, without mitigation, the more traffic the lower the amenity values and higher safety risk.

Freight traffic growth

Overall, the total number of heavy vehicles traveling to and from Palmerston North increased by 10% between 2012 and 2017[36]. This growth is expected to increase and continue through to 2031, with about 2,000 vehicles per day - an increase of approximately 10%. However, this growth is currently forecast to be concentrated in three areas, with around 500 additional movements per day to and from each of:

- Tremaine Avenue/Kelvin Grove;
- Other urban north east areas (including the NEIZ); and
- The external north east sector (Feilding).

This means that the impacts on the residential suburbs surrounding these areas will be much greater.

Refer to **Appendix B** for further details around the calculations for future freight demands.

[35] Waka Kotahi TMS
[36] Using information from count stations: Tremaine west of SH, SH3 Northwest (North of SH54, SH3 Te Matai R, SH54 -FIELDING (South) - Telemetry Site 10, SH56 - Longburn, SH57 North of Linton, and SH57 Orrs Rd

4.3 EFFECTS

4.3.1 Heavy Vehicles on High Place Value Streets

Mixed residential and industrial areas, road network deficiencies on sections of the identified freight route, and a lack of freight routes for some key movements results in freight vehicles re-routing often through residential areas, resulting in higher than expected freight volumes on some streets.

Figure 4-8 shows the forecast 2021 HCV volumes for roads in Palmerston North Urban area.

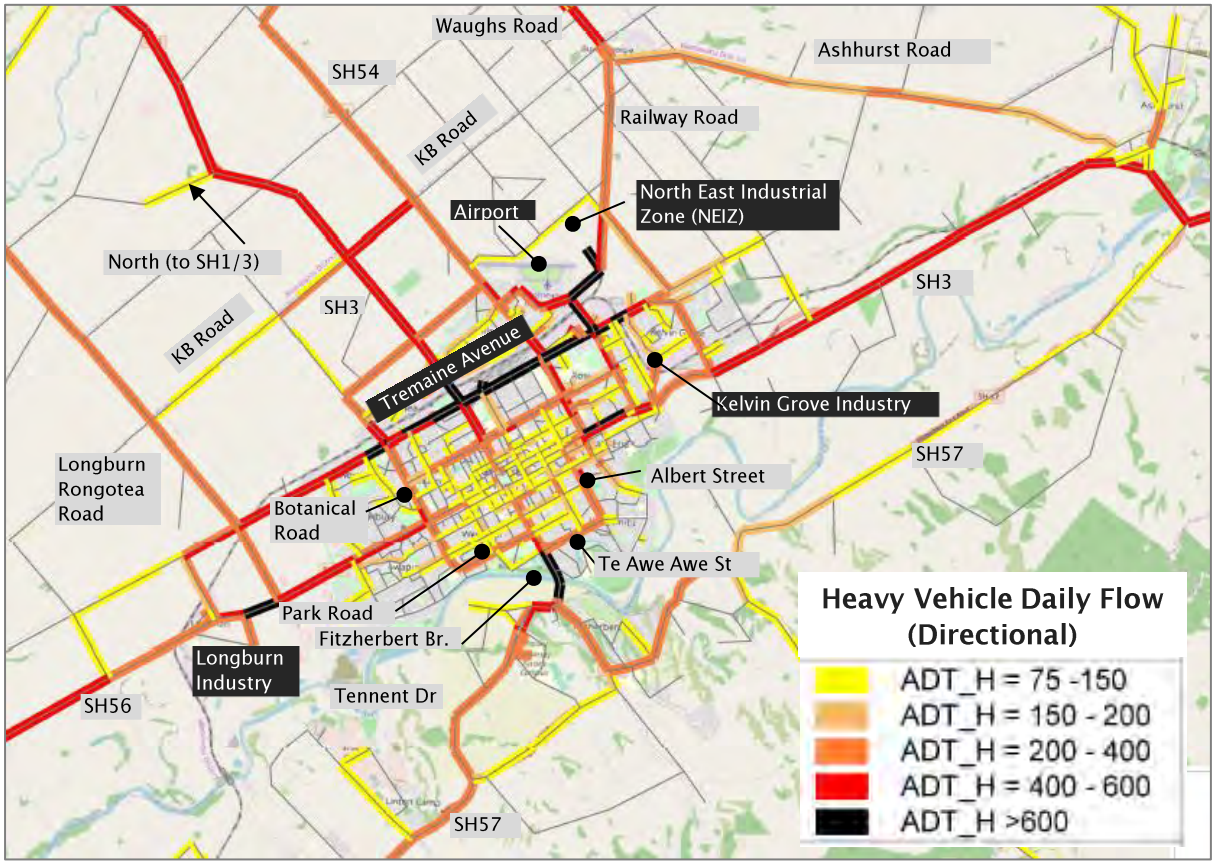


Figure 4-8: Weekday Heavy Vehicle Volumes by direction (2021 Modelled)

The modelling shows high volumes of expected truck movements through high value streets.

For example, heavy vehicle movements from Fitzherbert Bridge to Kelvin Grove, based on the NOF, are expected to take a route using Park Road, Botanical Road, and Tremaine Avenue. However, this is not the most direct route to access some distribution hubs and is therefore not attractive. Instead, heavy vehicles are choosing Te Awe Awe Street and Albert Street which are through principally residential areas.

One Network Road Classification (ONRC) Review

Table 4-3Table 4-3 identifies that several roads experience significantly higher HCV flows than expected for their ONRC rating[37]; these include Tremaine Avenue, Railway Road, Te Awe Awe Street and Vogel Street. The latter two are particularly relevant as they both have residential frontages.

Table 4-3: Existing ONRC compared to functioning freight level

ROAD NAME	CURRENT CLASSIFICATION	HEAVY VEHICLE VOLUME COMPARISON			
		HCV VOLUMES	CLASSIFICATION BASED ON HCV VOLUMES	DIFFERENCE IN HCV VOLUME (ACTUAL VS MINIMUM THRESHOLD)	DIFFERENCE IN ONRC (ACTUAL VS HCV ONRC)
Tremaine Avenue	Arterial (300-400 HCV/day)	1250	High Volume (1200+ HCV/day)	+950	+2
Railway Ave		950	National Strategic (800-1200 HCV/day)	+650	+2
Fitzherbert Avenue	Regional (400-800 HCV/day)	900	National Strategic	+500	+1
Te Awe Awe Street	Arterial (300-400 HCV/day)	800	National Strategic	+500	+2
Vogel Street		800	National Strategic	+500	+2
Ruahine Street		575	Regional	+275	+1
Featherston Street		550	Regional	+250	+1
Waughs Road		525	Regional	+225	+1
Botanical Road		525	Regional	+225	+1
Shelley Street	Primary Collector (150-300 HCV/day)	375	Arterial	+225	+1
Kaimanawa Street		350	Arterial	+200	+1
Railway Road	Arterial (300-400 HCV/day)	475	Regional	+175	+1
Keith Street	Primary Collector (150-300 HCV/day)	325	Arterial	+175	+1

Heavy vehicle flows are often a high-level proxy for economic productivity. Consequently, it can be seen that while roads like Tremaine Avenue do not satisfy a required economic and social threshold to achieve a higher classification, it currently carries HCV flows over four times that expected for an Arterial road when compared nationally. The KiwiRail intermodal rail hub located on Tremaine Avenue is a key contributing factor to these heavy vehicle volumes experienced.

4.3.2 Defence Force Routes

SH1 and SH3 are used by the NZDF travelling between the bases at Ohakea, Linton and Waiouru. To access the state highway NZDF utilise local streets due to network deficiencies.

The Government has also signalled the centralisation of defence forces in the country, which means that the Linton defence base, which is already the main operational hub of the New Zealand Army with over 2,000 personnel, will expand. A recent study of traffic movements in and out of the camp and surrounding Linton community showed volumes of 2,500-3,500vpd[38]. This is a significant volume of traffic that would only increase if forces are centralised and the base becomes larger. With the

[37] The One Network Road Classification is a method used nationally to categorise road types. Various metrics are used in combination to measure and categorise the roads, including heavy commercial vehicle (HCV) flows. Each road type has an HCV flow threshold listed to be used for classification. Measures of both movement of people and goods, and economic/social criteria need to be met in order to satisfy classifications of arterial and above (for example heavy vehicle flows alone do not dictate classification).
[38] 2018 review of the Horizons Regional Land Transport Plan (RLTP) 2015 – 2025

expected growth and consolidation at both Linton and Ohakea, an increase in movements with a corresponding negative impact on adjacent communities is likely without mitigation.

The NZDF preferred movements are shown in Figure 4-8.

Figure 4-9: NZ Defence Force typical inter-base heavy vehicle movements[39]

4.4 CONSEQUENCES

4.4.1 Heavy Vehicles and Amenity

Amenity relates to the qualities and attributes people value about a place that contribute to the experience of a high 'quality of life'. Transport networks can contribute to many areas of amenity, but not all. Of particular focus for this project is the impacts that large volumes of traffic, or large vehicles themselves have on the amenity of the existing street network where people live.

The Healthy Streets Approach is a way of determining the impact of vehicles on the way that people use the network. It acknowledges that the key elements necessary for public spaces to improve people's health are the same as those needed to make urban places socially and economically vibrant and environmentally sustainable.

The Healthy Street Indicators are shown in Figure 4-10.

Figure 4-10: Healthy Street Indicators

Poor amenity values, triggered by a high number of vehicles travelling along local roads can influence several of the key healthy street indicators - notably how many people choose to walk and cycle, the air quality, the ease to cross the road, the perception of safety and noise.

Complaints relating to heavy vehicles along residential streets, referring to noise (passing trucks and diesel motors being warmed up), smell (stock trucks), and overnight parking have been received by Council.[40]

Council's Annual Surveys show that residents' satisfaction with cycling in the city and footpaths is low. 11% of people also believe that more needs to be done regarding the safety and maintenance of footpaths and cycleways.[41] This is likely partly due to the decreased amenity caused by freight vehicles traveling on access streets, and those identified as cycle priority routes (NOF).

[39] Source: ACNZ PBC
[40] Rules around trucks parking in residential streets to be reviewed, https://www.stuff.co.nz/manawatu-standard/news/71801366/.
[41] Palmerston North City Council. (2019). *Annual Residents' Survey 2019*. Source: https://Council.govt.nz/media/3131991/annual-residents-survey-may-2019.pdf

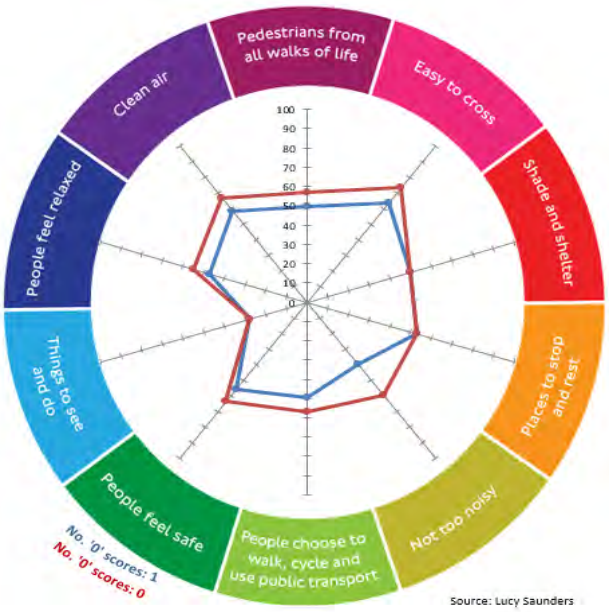


Figure 4-11: Te Awe Awe Street Healthy Streets Score

Te Awe Awe Street is just one of many streets where amenity has been impacted by freight. An assessment of the healthy street's indicators for this street is shown in Figure 4-11.

The blue line represents the existing situation, and red line the changes if heavy vehicle volumes reduced (coupled with a speed reduction[42]).

The assessment shows that a reduction in the number of heavy vehicles could result in reduced noise, improved perception of safety, people feeling relaxed, cleaner air, improved pedestrian levels of service and improved attractiveness of active modes and public transport (red line).

Figure 4-12 shows Te Awe Awe Street which is an arterial level street in the ONRC but is not a priority freight route identified in the NOF.

Figure 4-12: Te Awe Awe Street[43]

Te Awe Awe Street is just one of many streets that have been identified that have their amenity impacted by freight. Amenity benefits of reduced heavy vehicle volumes could also be achieved on:

- **Albert Street**, 450 HCV/day (+150 vs ONRC)
- **Shelley Street**, 375 HCV/day (+225 vs ONRC)
- **Kaimanawa Street**, 350 HCV/day (+200 vs ONRC)
- **Keith Street**, 325 HCV/day (+175 vs ONRC)
- **College Street**, 225 HCV/day (+75 vs ONRC)
- **Maxwells Line**, 375 HCV/day (+ 75 vs ONRC)
- **Te Awe Awe Street,** 800 HCV/day (+ 500 vs ONRC)

However, the benefits of removing heavy vehicles could be much wider than just these identified routes. Amenity benefits could be spread across much of the city centre if heavy vehicle movements were transferred to appropriate routes, helping to enable more people to choose to walk and cycle.

[42] Note that assessments with and without speed changes demonstrate that HCV reductions alone deliver improvements across the range of healthy streets criteria, particularly cleaner air and reduced noise. Including speed reductions however further improves the active mode related criteria (ease of crossing, people choose to walk, cycle and use PT).
[43] Google maps

4.4.2 Severance

Another key element of amenity is severance. Severance refers to the effect that some roads have on adjacent land use and access, where the road acts as, or feels like a barrier for pedestrians, cyclists, and those using any mode of transport who want to cross the road. Severance is more noticeable when traffic volumes are high, when there is a large percentage of heavy vehicles, or facilities for crossing the road offer a poor level of service (for any mode).

The following factors contribute towards severance in Palmerston North, in addition to the rail yard discussed in Section 4.2.2:

- The volumes of both heavy vehicles and general traffic traveling though the city centre, surrounding residential areas and nearby townships (e.g. Bunnythorpe and Feilding) create conflict between trips to local destinations and regional journeys.
- Tennent Drive vehicle demand and corridor form creates severance between the buildings of the Food HQ Campus (Massey University Campus and Fitzherbert Science Centre) and also the new dedicated walking and cycling bridge in Palmerston north, He Ara Kotahi. This severance hinders collaboration between partners and resulting in both safety risks and reduced uptake of active modes.
- SH 57 (Aokautere Drive) severs the community in Aokautere. This is a national state highway that passes through an area with residential land use on either side.

Refer Section 8.2 for further details on general and heavy vehicle traffic volumes along key links.

4.4.3 Walking and Cycling Mode Share

As outlined above, network improvements resulting in less traffic, particularly HCVs, and lower speeds on city streets are likely to increase the overall attractiveness of active modes on streets directly impacted, but also across the network.

Current journey to work by active modes is decreasing[44]. Compared to other major urban areas, Palmerston North was ranked number 1 in 1996[45], but has since fallen in every subsequent Census. Only 3.4% of people cycled to work in 2018, down from 5.9% in 2013. 6.8% of people walked to work in 2018, down from 8.9% in 2013, as shown in Figure 4-13.

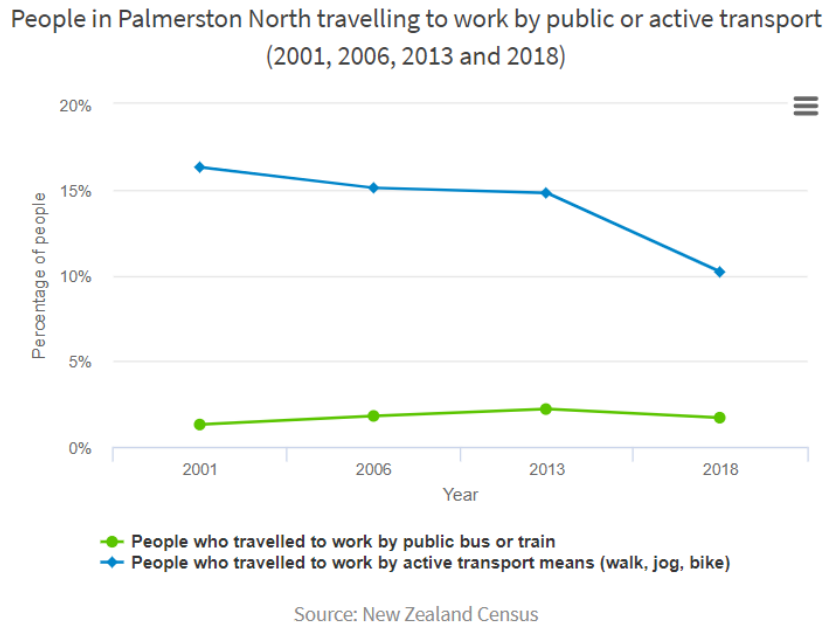


Figure 4-13: Palmerston North Active Mode Share

Cycling mode share numbers are particularly poor when benchmarked against other comparative areas such as Christchurch City which, with a similar flat topography and climate, had a 5.6% cycling mode share in 2018.

Absolute cycle numbers across the city are also down. A sum of 9 counts around the PNCC network in 2017 was 540 users, a reduction from 840 in 2013[46].

[44] Section 2.3.4 discusses contributing factors including growth in employment on the edge of the CBD and a decline in tertiary students.
[45] Palmerston North City Council, Urban Cycling Master Plan, October 2019
[46] https://performance.envisio.com/dashboard/Palmerston-north-city-dashboards/Goal-5139-Goal-5139-LongTermTarget-5478

4.4.4 Increased Crash Risk

Increased crash risk, because of growing freight volumes using primarily residential streets, is another key consequence.

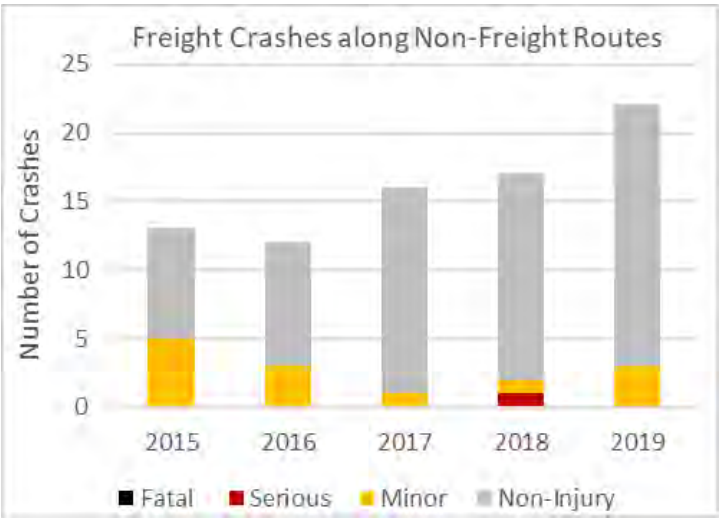


Figure 4-14: Freight Crashes on non-freight routes

The number of freight crashes within the study area, which occurred on a non-freight route[47], has increased by nearly 70% between 2015 and 2019 as shown in Figure 4-14.

While the overall magnitude of these crashes is currently low the trend is concerning, freight crashes along residential streets have impacts beyond just the social cost of crashes, impacting the wider perception of safety and uptake of active modes within communities.

Safety and freight crashes are discussed further in Section 5.

4.5 SUMMARY

This section has shown that Palmerston North currently has interspersed land use, with industrial areas and the rail hub located away from the strategic freight network and surrounded by residential suburbs. There are also significant deficiencies of the current freight network with many of the links having narrow carriageways, weight restricted bridges and poor intersections.

This means that heavy vehicles are using place-value and residential streets to access their destinations. Many streets are seeing up double the number of heavy vehicles expected for their road classification, with some up to four times.

Palmerston North is also expected to grow. It is already growing faster than previous expectations and there is significant investment planned which will spur greater growth leading to increased freight traffic on residential roads and a continually diminishing amenity and place value across the Palmerston North road network.

All the above means that there are significant impacts on people's way of life. Increasing numbers of heavy vehicles on non-freight routes is resulting in increased noise, reduced perception of safety, increased air pollution, reduced pedestrian levels of service and increased severance.

[47] Based on the Network Operating Framework

5 PROBLEM 2: SAFETY

5.1 OVERVIEW

Table 5-1: 'Safety' Problem – Causes, Effects and Consequences Summary

INTERSPERSED RESIDENTIAL AND INDUSTRIAL AREAS ALONG WITH INCREASING TRAVEL DEMANDS AND LOCAL NETWORK DEFICIENCIES RESULTS IN REAL AND PERCEIVED SAFETY ISSUES ACROSS THE NETWORK	
Causes and contributing factors	• Road network deficiencies • A land use mix that creates additional conflicts between trucks and vulnerable road users, e.g. Rail yards and railway line located within the city • Expected increases in traffic (including freight)
Effects	• Increased safety intersection and corridor risk – both perceived and actual
Consequences	• Increased number of total crashes and deaths and serious injuries (DSI) across the network • Several high risk rural roads and intersections along the prioritised freight routes

5.2 CAUSES

The primary causes and contributing factors to the safety problem relate to several aspects that have already been outlined under the 'Amenity' problem. These are:

- **Road network deficiencies** (Refer Section 4.2.3): Sections of the identified freight route are deficient for freight vehicles and large volumes of traffic with narrow carriageway widths, stop controlled intersections and bridge restrictions. As a result, drivers take alternate routes, often through residential areas increasing potential amenity, economic and social costs.
- **A land use mix** that creates additional conflicts between trucks and vulnerable road users, e.g. Rail yards and railway line located within the city (Refer 4.2.1 and Section 4.3.1).
- **Expected increases in traffic, including freight** (Refer Section 4.2.4). Growth and development is leading to increased travel demands for both freight and general traffic. Growing travel demands will exacerbate the impacts and effects of the mixed residential and industrial areas, road network deficiencies and crash risk.

5.2.1 Network Deficiencies

Specific road network deficiencies relating to safety, particularly on the freight network, are discussed below with the resulting impact on crashes presented in Section 5.3 below.

Intersection form and configuration

Rural crossroads intersections, which are numerous on this network, have the highest number of high-speed conflict points compared to other intersection types. Examples of rural cross-roads along identified freight routes include:

- SH3/ SH54 intersection
- SH54/Milson Line
- Roberts Line / Kairanga Bunnythorpe
- Kelvin Grove Road / Stoney Creek Road.

Safety risks at these locations are also compounded by the presence of roadside hazards. Furthermore, as these intersections become busier, the complexity of decision-making increases as several conflicts can occur at the same time. Due to the grid structure of Palmerston North, there are a relatively high number of intersections, resulting in an increased risk of turning conflicts.

High speed environments

Speed is an important factor which can affect the severity of a crash (higher speeds tend to be related to higher crash severity). The speed limits in the study area range from 50 – 100 km/h and many roads are not aligned with the recommended Safe and Appropriate Speed.

Some urban streets, which are primarily place based streets, have speed limits the same as roads with higher through movement functions. The higher speeds in these areas cause higher risk given potential conflict with non-motorised users. Examples of these include sections of The Square, College Street, and Ferguson Street.

Narrow carriageways, out of context curves and roadside hazards:

A narrow carriageway and lack of shoulder width means there is less room for recovery from loss of control crashes. A map showing the carriageway width of key rural roads around Palmerston North and Feilding is shown as Figure 5-1, highlighting that much of the network is 8.5m wide or less section (i.e. narrow or no road shoulder), well below the typical 10m cross section for strategic corridors.

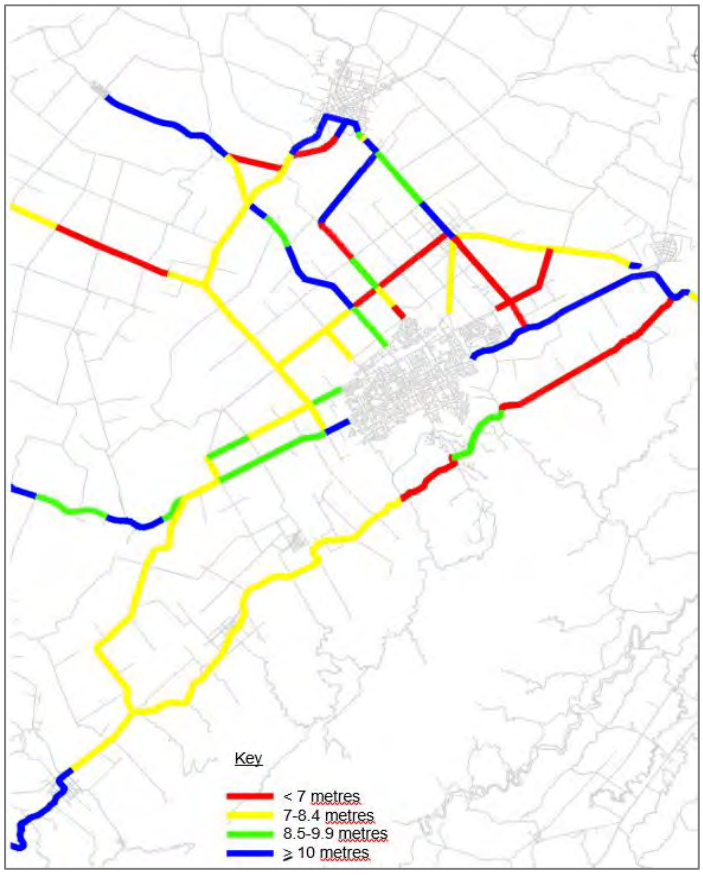


Figure 5-1: Rural Road Width[48]

In the event of a vehicle losing control and veering off the road, the roadside hazards (e.g. power poles, deep drainage ditches) mean the likely crash severity is high. Roadside hazards are also often involved in secondary impacts from other crash types (e.g. an intersection crash followed by a collision with a power pole).

A narrow carriageway may also promote motorists to position their vehicles closer to the centreline, increasing the risk of head-on conflicts. Kairanga Bunnythorpe Road and Ashhurst Road are examples of where there are narrow carriageways due in part to the lack of sealed shoulders. Kairanga Bunnythorpe Road and Longburn Rongotea Road also have several structures close to the carriageway, such as power poles on both sides of the road.

5.3 EFFECTS

5.3.1 Overall Crash History

The five-year crash history within the study area, including more recent crashes from 2019, is presented in Figure 5-2. The figure highlights that the overall number of crashes occurring within the study area is trending upwards, alongside increasing traffic volumes, with 2019 having the highest total number of crashes and the second highest number of injury crashes within the period assessed.

[48] Source: JTS(2010) /RAMM

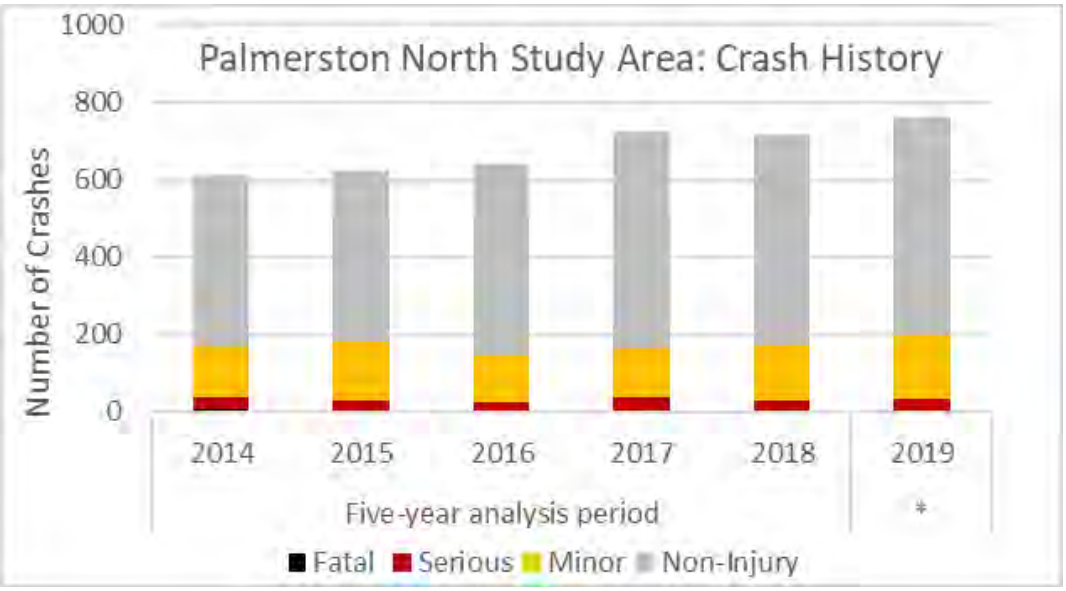


Figure 5-2: Palmerston North Study Area – Crash History

Crashes at intersections are more predominant than those at mid-blocks, which is likely a reflection of the city's grid layout (relative high number of intersections) and the associated number of turning movements that are created (i.e. the more intersections the more potential conflict points).

The two most prominent crash movements (JA: Right turn right side, and LB: Right turn against) involve right turning vehicles. The form and configuration of intersections are contributing factors, particularly for rural locations.

Overall High Severity Crash Locations

Figure 5-3 shows a heatmap of the location of fatal and serious injury crashes over the most recent five-year period (2014-2018), along with crashes from 2019 and 2020 to date.

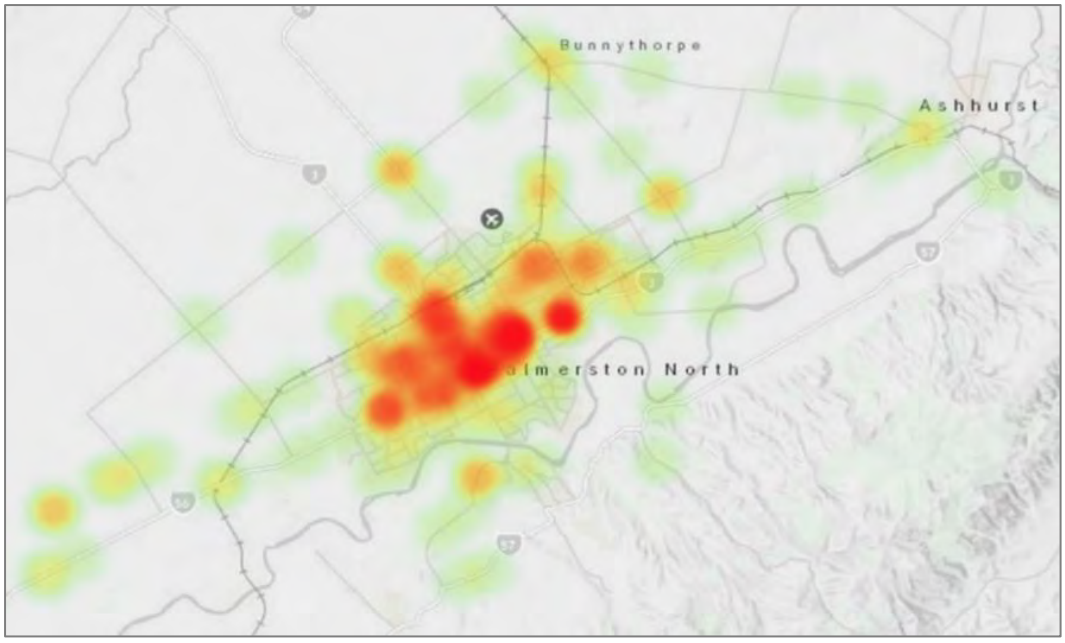


Figure 5-3: Palmerston North– Fatal and Serious Crash Heat Map, 2014-2020

Many high severity crashes within the study area occur in the urban environment of the city centre.

Rural Crashes occur on the Priority Freight Routes

An analysis of the rural crashes within the study area found that 73% of all crashes and 83% of the deaths and serious injuries occur on the freight route identified in the NOF. This highlights the need for targeted investment along these routes.

Figure 5-4 provides a heatmap of the fatal and serious crashes, and identifies rural high severity crash hotspots at:

- SH54/Milson Line (Priority crossroads intersection)
- Railway Road/Roberts Line (Priority crossroads intersection)
- No1 Line to Longburn corridor, including Longburn/Rongotea Intersection (Priority crossroad intersections, narrow carriageways and roadside hazards)
- SH3 Napier Road (Priority intersections with high turning and through traffic volumes)
- Ashhurst to Bunnythorpe (Narrow carriageways, roadside hazards)
- Kelvin Grove/Stoney Creek (Priority X-Roads)

Figure 5-4: Palmerston North– Fatal and Serious Crash Heat Maps (Rural), 2014-2020

The map provides evidence around how network deficiencies outlined above (e.g. high-speed environments, rural road widths and intersection form) contribute to both higher crash risk and actual recorded crashes – particularly in rural areas. Figure 5-4 also highlights that most of the network deficiencies, and resulting crashes, occur on the rural freight routes.

Figure 5-5 shows that the total number of rural crashes within the study area is also gradually increasing, with the 2015-2019 period having the highest number of overall crashes, a nearly 10% increase compared to 2009-2013.

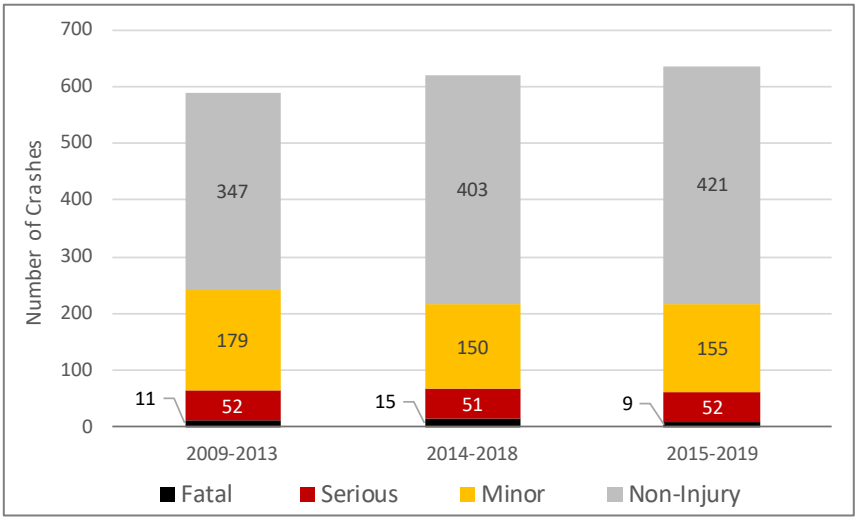


Figure 5-5: Rural Crashes by five-year period

5.3.2 Freight Crashes

Crashes within the study area which specifically involved heavy vehicles were also assessed. Overall, the number of crashes involving freight vehicles in the study area has increased by 7% between the two most recent five-year periods, while the number of deaths and serious injuries has also increased from nine to 14. A heat map showing the location of these crashes is presented in Figure 5-6.

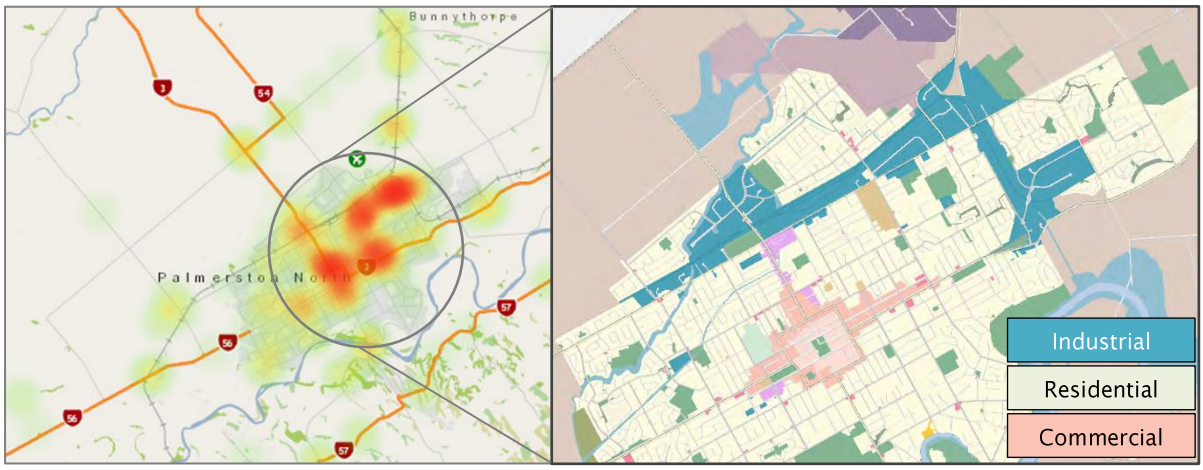


Figure 5-6: Freight Crashes, 2014-2020 (Inset: District Plan Land Use)

Figure 5-6 highlights that there is a strong alignment with where freight crashes have occurred and areas of the city where there are concentrations of mixed residential and industrial land uses.

Most freight crashes are within the urban area, clustered around either the CBD north-south spine or along the Ruahine Road to Tremaine Avenue spine, a route which notably does not form part of the identified freight route. Rural freight crash cluster locations include Ashhurst, Bunnythorpe, SH3/54 and SH54/Milson Line, No1 Line /Rongotea Road, Roberts Line /Railway Road.

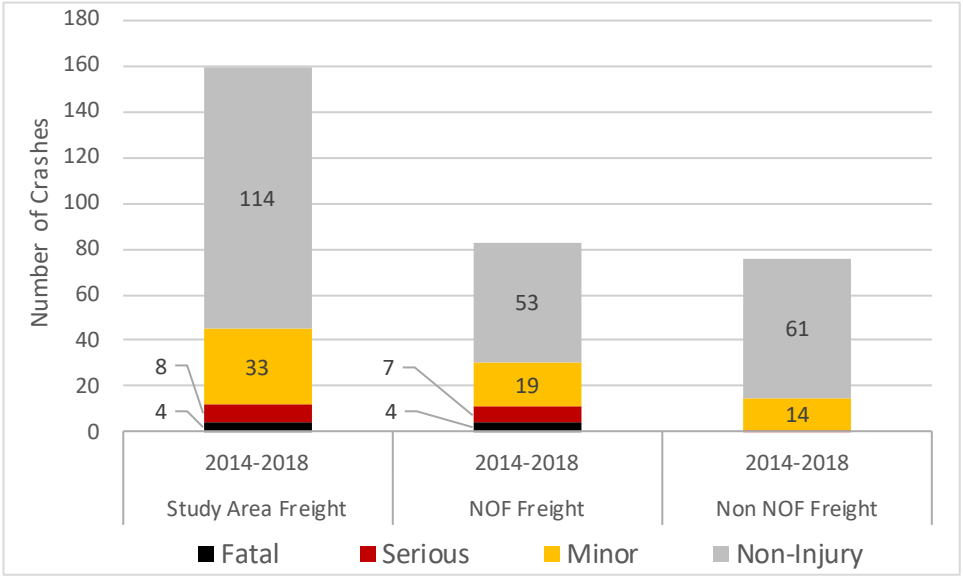


Figure 5-7: Freight Crash Route Breakdown

The breakdown of freight crashes by route is shown in Figure 5-7, highlighting that approximately half of the freight crashes within the study area occurred on a non-freight route.

The number of freight crashes within the study area which occurred on a non-freight route, has increased by nearly 70% between 2015 and 2019. However, Figure 5-7 also shows that the vast majority of injury and high severity freight crashes have occurred on the freight route identified by the NOF, again highlighting the need for targeted investment along these routes.

Higher freight volumes, as a consequence of commercial and industrial growth, presents an increased crash risk in these areas. It is noted that even if the expanded KiwiRail Freight hub eventuates and results in an increase in rail freight mode share regionally, locally, this is likely to be coupled with an increase in some road freight activity for first and last mile trips to and from the hub.

Active Mode vs Freight Crashes

As it is evident freight vehicles are using non-freight routes and contributing to the deterioration of the safety and amenity within the study area, crashes involving freight and vulnerable road users was also assessed.

There were nine crashes involving freight vehicles and cyclists between 2014 and 2018, resulting in two DSI, with three crashes occurring between Summerhill Drive/Ruapehu St and SH57 Aokautere Drive/Cashmere Drive. During the same period there were three crashes between pedestrians and freight, all resulting in injury, including 1 DSI.

These crashes are likely due to pedestrians and cyclists sharing routes and road space with freight vehicles. This could indicate that there are insufficient cycle paths in Palmerston North. It is worth noting that, as presented in Problem 1, cycle and walking mode share is dropping, which could be due to a perception of safety around heavy vehicles. In addition, a recent survey showed that only 50% of residents are satisfied when cycling in the city[49].

5.4 CONSEQUENCES

5.4.1 High Risk Corridors and Intersections

Communities at Risk

The NZ Transport Agency's Communities at Risk Register ranks communities against the national average to allow better targeting of resources to where they're most needed. Palmerston North City is identified in the 2019 Community at Risk Register as being high concern[50] in the following areas:

- Intersections (4th Worst TLA rural and urban, 5th Worst TLA for rural intersections nationally)
- Distraction (crash factor: attention diverted)
- Older road users (those aged 75 years and older)

High Risk Corridors and Intersections on the Priority Freight Route

Crash risk metrics also allow comparison of how safety performance of the Palmerston North network compares to the rest of the country. Figure 5-8 highlights there are 10 high risk intersections[51], 19 high risk corridors and five corridors with high risk curves within the study area based on the Transport Agency national risk metrics. Of these, seven high risk intersections, and 14 high risk corridors are on the preferred freight route (as per the NOF) highlighting the need for targeted investment along these routes.

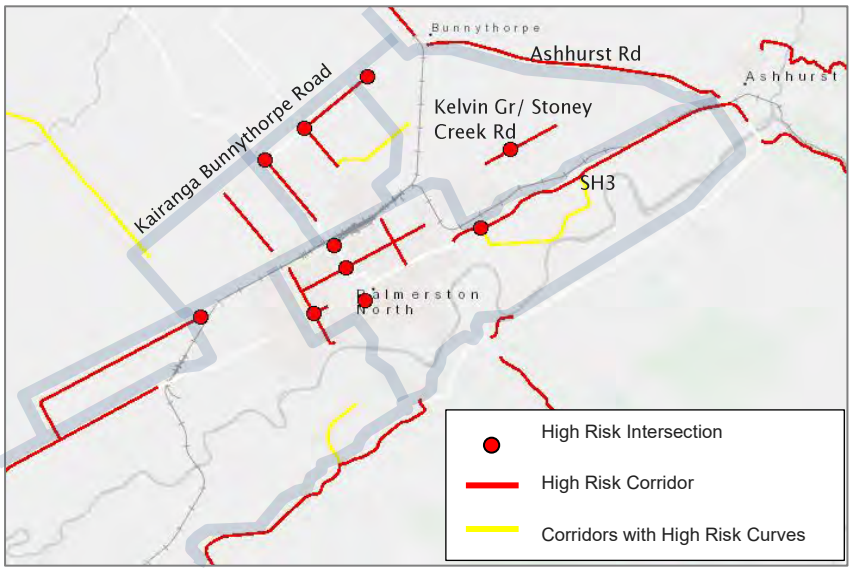


Figure 5-8: High-risk corridors and intersections within the study area[52]

[49] Annual Residents Survey 2019
[50] High concern is assigned to communities with personal risk profiles greater than one standard deviation from the mean.
[51] Note that a few intersections have had minor safety improvements over the last few years; these include rural intersection advance warning signs (RIAWS) at SH3/54 in 2013 and right turn bays at SH54/Milson Line in 2017. However, although crash severity has reduced at SH3/54, injury crashes still occur, SH54/Milson continues to have a poor safety record, with a fatal crash occurring in 2018. This highlights that while minor safety improvements do have an impact, transformational change with speed management is often required to address high risk intersections.
[52] New Zealand Transport Agency. Safer Journeys Assessment Tool: High risk roads. Source: https://megamaps.abley.com/Maps/

5.5 SUMMARY

Palmerston North is emerging as the primary freight distribution hub in the lower North Island, resulting in increased demand for heavy vehicle movements.

The increasing freight and general traffic volumes, coupled with road network deficiencies and mixed land use is resulting in conflicts and safety issues, including:

- An increase in both the overall number of crashes across the study area and crashes in the rural environments in the study area, with the majority (over 80%) of rural DSIs occurring along the identified freight route.
- An increasing amount of freight crashes are occurring on non-freight routes within the urban area.
- Crashes across the rural network, coupled with urban crashes along higher speed sections of the network, have resulted in 83 deaths and serious injuries within the study area between 2014 and 2018.
- Crash risk metrics show there are 13 high risk intersections and 19 high risk corridor sections within the study area (corresponding to 27 speed management sections), the majority of these are located on the identified freight route.

Overall, the safety evidence highlights that without targeted intervention along the rural freight network and within the urban area, the number of overall crashes and deaths and serious injuries will remain unacceptably high[53].

This will result in continued social and economic costs, including social trauma and lost productivity (e.g. supply chain impacts either from freight crashes or the crashes on key routes resulting in delays for goods).

[53] Note that during the development of this business case, the Safer Network Programme (SNP) improvements in the Manawatu region were limited to infrastructure improvements along SH1 Otaki to North of Levin and SH57/SH1 to Shannon with speed management on SH3 from Whanganui to Westmere. All of the sections are outside of the PNITI study area. In mid to late 2020, a draft SNP programme was developed for PNCC. These improvements will help address safety concerns presented above and will be considered in the management case of PNITI as a potential funding pathway.

6 PROBLEM 3: ACCESS

6.1 OVERVIEW

Table 6-1 provides a summary of the key causes, effects, and consequences of the **access** problem, as identified by the wider stakeholder group.

Table 6-1: 'Access' Problem – Causes, Effects and Consequences Summary

GROWTH AND DEVELOPMENT IS LEADING TO INCREASED TRAVEL DEMANDS FOR BOTH FREIGHT AND GENERAL TRAFFIC. SECTIONS OF THE IDENTIFIED FREIGHT ROAD NETWORK ARE NOT FIT FOR PURPOSE RESULTING IN DETERIORATING ACCESS AND CONFLICTS TO KEY DESTINATIONS THROUGHOUT THE NETWORK.	
Causes and contributing factors	• Planned development and population growth is resulting in growing travel demands • Road network deficiencies result in access issues for freight to and from key hubs
Effects	• Level of service deficiencies resulting in delays • Access issues and conflicts at key destinations
Consequences	• Restricted future growth and development • Reduced network resilience • Continued safety and severance issues

6.2 CAUSES

6.2.1 Access issues at and between key destinations

Access issues in Palmerston North between key destinations result from a combination of the following factors:

- **Demand for cross city freight movements** between key origins and destinations is growing (Refer Section 2.3.2)
- **A land use mix** that creates additional conflicts between trucks and vulnerable road users, e.g. Rail yards and railway line located within the city (Refer Section 4.2.1 and Section 4.3.1).
- **Road network deficiencies**: Sections of the identified freight route are deficient for freight vehicles and large volumes of traffic with narrow carriageway widths, stop controlled intersections and bridge restrictions. As a result, drivers take alternate routes, often through residential areas increasing potential amenity, economic and social costs (Refer 4.2.3)

Growing travel demands will exacerbate the impacts and effects of the mixed residential and industrial areas, road network deficiencies and crash risk.

In addition to highlighting the strategic movements, Table 6-2 summarises the issues related to accessing key hubs identified in Section 2.3.2 by different modes, and demonstrates that:

- Access to NEIZ, Kelvin Grove, Tremaine Avenue, Massey/ Food HQ, and Linton Army Camp is not available via strategic transport links, and without a functioning freight network hierarchy, traffic is dispersed and destinations are accessed primarily via local roads only (and often through residential areas)
- SH3 between Sanson and the Manawatū Gorge passes through Palmerston North city centre, creating conflicts between inter-regional state highway traffic, local traffic and active modes. Together, these conflicts hamper Council's 'place' vision for the CBD.
- There is no direct rail access to NEIZ, Kelvin Grove, Massey/ Food HQ, and Linton Army Camp.

Table 6-2 demonstrates that all first and last mile freight distribution trips need to be made by heavy vehicles as a multi-modal approach (rail, air and costal shipping) is not currently viable between many destinations. This is inefficient and causes access issues at key origins and destinations (in addition to amenity and safety issues as presented earlier).

Table 6-2: Access issues and constraints for key hubs by mode

HUB	PNCC IDENTIFIED GROWTH AREA	STRATEGIC ROAD CONNECTIONS	RAIL	AIR
North East Industrial Zone	Yes	SH: No direct access off the state highway network Arterial Road: Yes, but current access routes conflicts with residential land use. Other rural routes have restrictions or are of a low standard.	Rail: No, but opportunity exists through KiwiRail development	Air: Yes
Longburn	Yes	SH: Yes, direct access off SH56 Arterial Road: No, local bridges have weight restrictions	Rail: Yes	Air: No
Central Business District / "Inner Ring Road"	Yes	SH: Yes – but this is not what PNCC envisions for the square and conflicts with SH3 through traffic that wants to bypass PN Arterial Road: Yes	Rail: No, but indirect access is available via Tremaine Avenue	Air: No direct access, but close proximity
Kelvin Grove	No	SH: No direct access (indirect to SH3) Arterial Road: Yes, however there are conflicts with residential land use	Rail: No, Rail runs through the Kelvin Grove industrial zone, but there are no sidings	Air: No, but indirect access via residential streets
Tremaine Avenue	No	SH: No direct access (indirect to SH3) Arterial Road: Yes, however there are conflicts with residential land use	Rail: Yes, currently main KiwiRail yard – but growth is constrained due to adjacent residential land use	Air: No direct access, but close proximity
Massey/ Food HQ	Yes	SH: Indirect off SH57 Arterial Road: Yes	Rail: No	Air: No
Linton Army Camp	Yes	SH: Indirect off SH57 Arterial Road: Yes	Rail: No	Air: No

The table shows that most freight hubs do not currently have direct access to state highways or an arterial of sufficient standard which does not conflict with residential land use. The table also highlights that there may be opportunities to enable access for different modes, for example rail into the NEIZ, noting that not every freight mode needs to have direct access to every area of Palmerston North.

6.2.2 Growth and Development – Network Impacts

As presented above, Palmerston North is growing.

The Palmerston North Area Traffic Model (PNATM), developed in 2013/14, was used to test the implications of population and employment growth on the wider transport network.

The key findings from the forecasts of land use and employment on the do-minimum transport network, reproduced from the PNATM forecasting report, include[54]:

- Traffic volumes and delays are expected to increase on the main arterial routes reflecting increases in longer distance commuting and generally higher traffic volumes.
- The average travel times are also expected to gradually increase in future years for all peaks.
- The average trips lengths are projected to gradually increase in future years for all peaks. This is due to future developments (e.g. Whakarongo, City West, NEIZ etc.) which are located away from the City Centre which encourage longer travel distances.

[54] PNATM Forecasting Report, Beca, Jan 2015

2018 Model Review

Between 2013, when the model was developed, and 2018, population growth has been over 1.1% per annum - effectively double the modelled forecast.

An evaluation of how the model was tracking from when it was developed in 2013 to 2018 was therefore undertaken. Observed 2018 traffic counts and travel times were collated and compared to modelled estimates for both 2013 and 2021[55].

The review found that:

- The model was tracking behind actual observed counts, with 2021 modelled flows better reflecting 2018 actual flows - meaning that, unsurprisingly, **2021 forecasts were reached early with higher than expected growth in the city.**
- Travel times were also found to have increased across several routes by over 10% between 2013 and 2018.

The effects of growth on the network, in terms of Levels of Service (LOS), are presented in Section 6.3.1 below for the 2021, 2031 and 2041 future years.

6.3 EFFECTS

6.3.1 Future Levels of Service

LOS across the network in the critical afternoon peak for 2021, 2031 and 2041 are presented in Figure 6-1 to Figure 6-3 below, overlaid with the priority freight routes.

LOS E represents conditions at or near capacity, while LOS F represents conditions were demand exceeds capacity[56]. The LOS plots indicate how the existing network, without further improvements, responds as demands continue to increase.

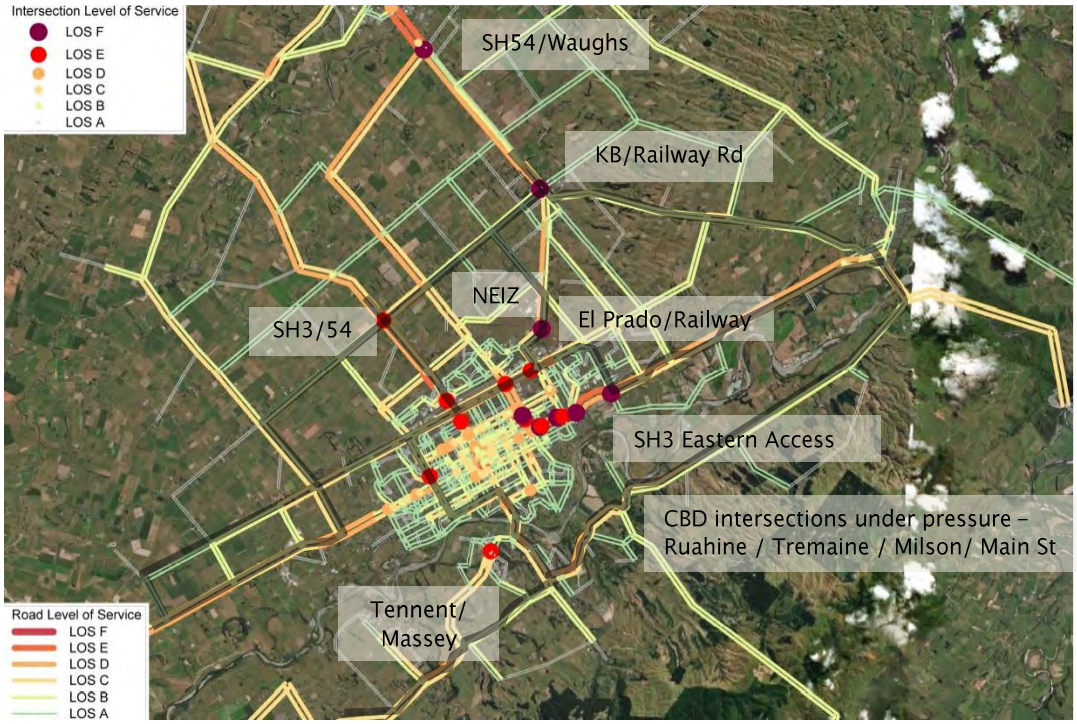


Figure 6-1: 2021 – Do Minimum LOS (PM)

[55] Stage 1 Model Evaluation Report, Stantec, 2019

[56] Levels of Service for intersections in the PNATM are based on a weighted average delay for signals and roundabouts, and the worst delay on a minor road at priority controlled intersections. LoS E reflects delays of up to 50 seconds for priority intersections and up to 80 seconds at signals or roundabouts.

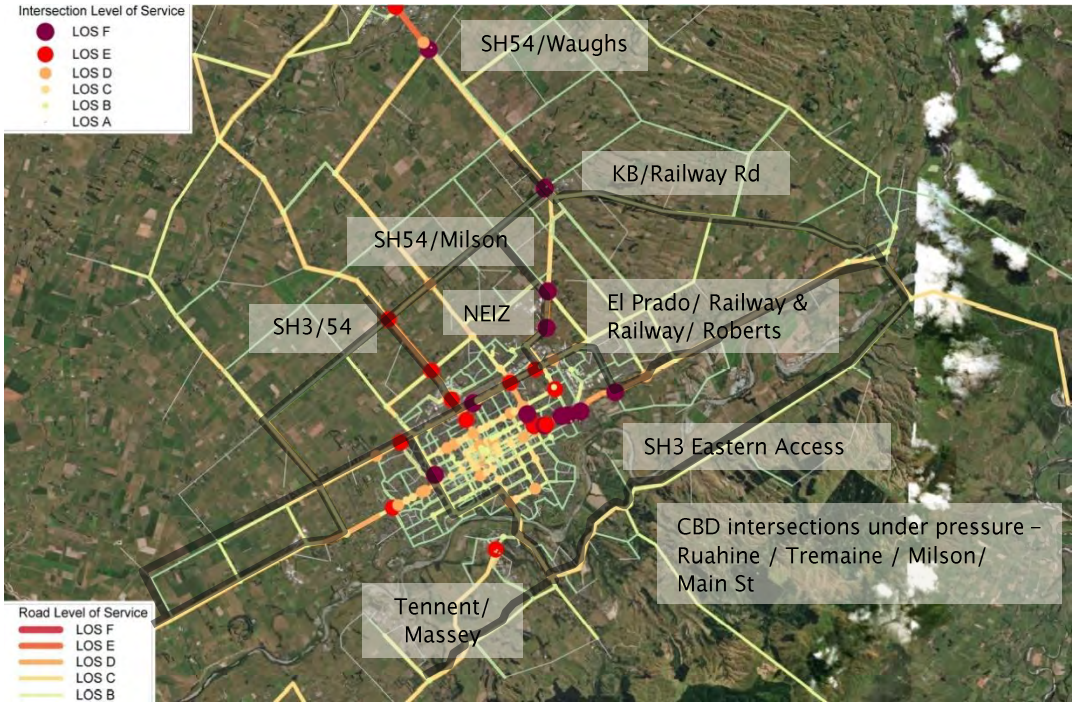


Figure 6-2: 2031 – Do Minimum LOS (PM)

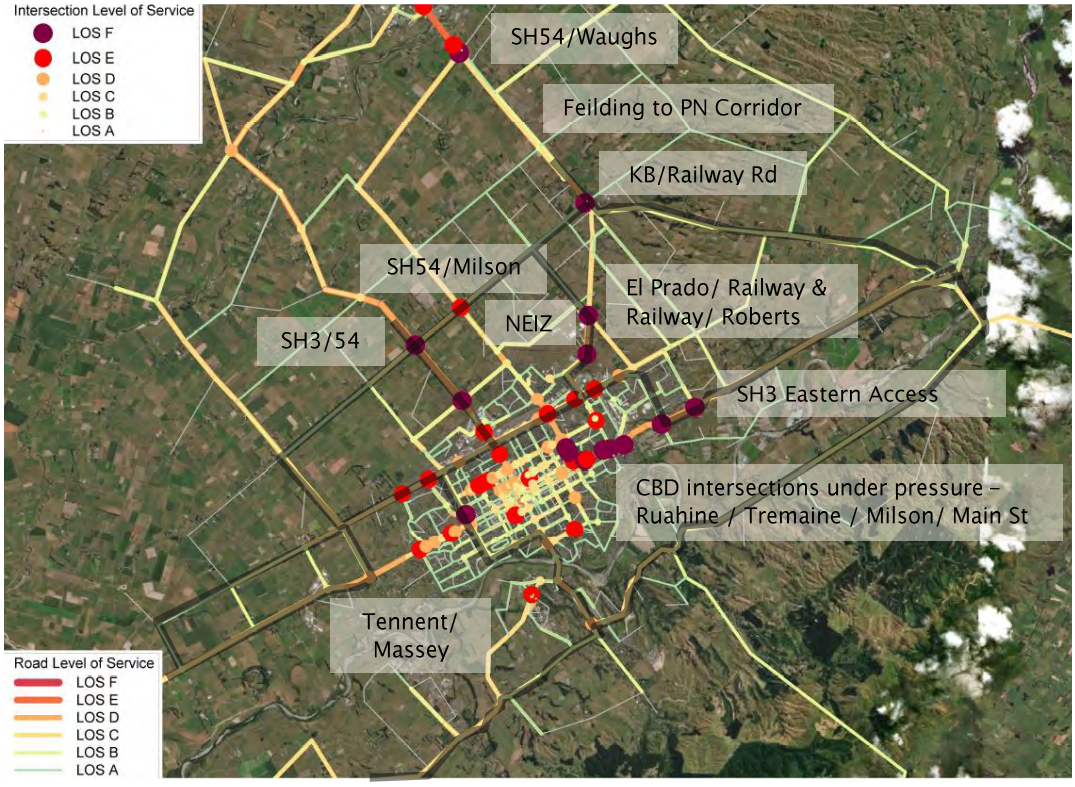


Figure 6-3: 2041 – Do Minimum LOS (PM)

The model highlights that the SH54/Waughs Road approach out of Fielding is likely to operate poorly even in 2021 with key intersections operating at LOS E or F (at or over capacity), impacting on commuter and freight journeys between Feilding and Palmerston North.

In contrast, the four-lane Fitzherbert Bridge, whilst carrying high traffic volumes, is expected to perform adequately with the midblock operating at LoS C and intersections operating at a LOS D or better even in 2041.

Intersection Levels of Service

The models identify significant intersection issues on all routes entering and leaving the City between 2031 and 2041 in the PM peak if no further investment in the roading network is undertaken.

Key intersections along across the identified freight routes with deteriorating levels of service are outlined in Table 6-3.

Table 6-3: Freight Network LoS Issues

INTERSECTION	SECTION	PM PEAK LOS		
		2021	2031	2041
Kairanga Bunnythorpe Rd / Railway Road	Rural Freight NOF	F	F	F
Railway Rd / El Prado Dr	Rural Freight NOF	F	F	F
SH3 Napier Road / Roberts Line	Rural Freight NOF	F	F	F
SH54 / Waughs Road / Camerons Line	Rural Freight NOF	F	F	F
SH54 Kimbolton/ Denbigh Sq	Rural Freight NOF	E	F	F
Botanical Rd / Highbury Ave	Urban Freight NOF	E	F	F
SH3/54 KB Road	Rural Freight NOF	E	E	F
Tremaine Ave / Milson Line	Rural Freight NOF	E	E	E
SH3 Rangitikei Line / Jasper Pl	Urban Freight NOF	E	E	E
Tremaine Ave / Malden St	Urban Freight NOF	E	E	E
SH56 Pioneer Highway / Maxwells Line	Rural Freight NOF	D	E	E
SH54 Kimbolton/ East St	Rural Freight NOF	D	E	E
SH54 Waughs Rd/ East St	Rural Freight NOF	D	E	E
SH3 Rangitikei Line / Flygers Line	Rural Freight NOF	C	E	F
Tremaine Ave / Highbury Ave	Rural Freight NOF	C	E	E
SH3 Napier Road / James Line	Urban Freight NOF	C	D	F
SH54 / Milson Line	Rural Freight NOF	C[57]	D	E
SH54 Waughs Rd / Campbell Rd	Rural Freight NOF	C	D	E
Tremaine Ave/ North St	Urban Freight NOF	C	C	C
Railway Rd / Roberts Rd	Rural Freight NOF	B	F	F
SH54 Kimbolton/ North St	Rural Freight NOF	B	D	F

Rural intersection access issues are a particular problem as alternatives routes are limited. This is because more people are rat-running to avoid the busier parts of the urban network.

Given that recent growth has outpaced modelled projections (and current forecasts do not include all of council's growth areas[58]), the 2041 forecasted issues could occur 5-10 years sooner than previously anticipated.

6.3.2 Key Issues

The traffic modelling shows that there are several key freight access issues in and around Palmerston North. They include:

- Access to the North East Industrial Zone Access
- Feilding to Palmerston North Corridor
- Eastern Access and City Centre Access (including Tremaine Avenue and Kelvin Grove)

Access to the North East Industrial Zone (NEIZ)

The level of service, safety and intersection performance of select intersections in the NEIZ are expected to deteriorate quickly as development continues, particularly as the El Prado/Railway

[57] LoS E/F based on SIDRA 2017 volumes
[58] It is recommended that the PNATM is updated with the latest Infometrics population and employment forecasts, when available, along with 2018 Census data to inform a model update of land use forecasts. Note that sensitivity testing using higher growth rates has been undertaken for the purposes of this report.

Avenue priority intersection is expected to operate at LOS F, severely limiting the safe and efficient access to and from this area[59]. Other intersections which will be impacted by future growth include Roberts Line/ Richardsons Line, Railway Road/ Roberts Line and Kairanga Bunnythorpe Road/ Roberts Line.

SH3/54 and SH54/Kairanga Bunnythorpe Road intersections have inadequate intersection form for the increasingly high volumes of conflicting movements which is resulting in escalating intersection delays and subsequent re-routing of traffic to urban corridors[60]. This severely impacts the access to destinations on the road and access to other destinations (such as NEIZ) for traffic traveling through, as highlighted in Figure 6-4. Both the SH3/54 and SH54/Milson Line intersections are already at or over capacity (LOS E/F) during the peak periods (further contributing to rat-running on local streets).

These issues will be exacerbated if the KiwiRail siting options near the NEIZ become preferred.

Route Travel Time Reliability – Longburn to the North East Industrial Zone (NEIZ)

Travel times between Longburn and the North East Industrial Zone, via either Tremaine Avenue or Kairanga Bunnythorpe Road, were assessed using TomTom to understand the level of journey variability experienced. The results are presented in Figure 6-4 below.

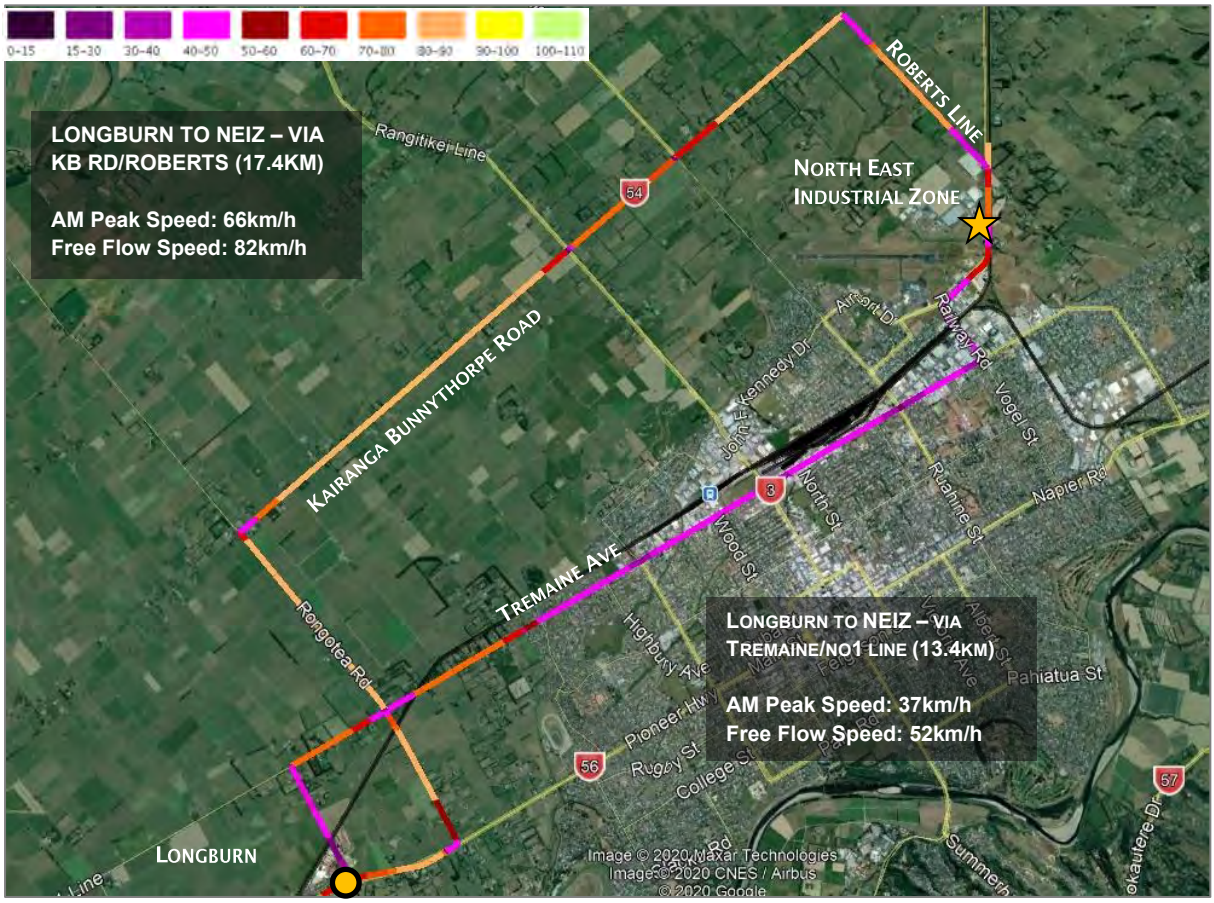


Figure 6-4: Travel Speeds - Longburn to NEIZ

The results show that:

- The Tremaine Avenue route is shorter in length but on average takes 5 minutes longer across all periods compared to the Kairanga Bunnythorpe Road route, a reflection of the lower speed limit and higher side friction (intersections, accessways).
- The Tremaine Avenue route has high travel time variability, particularly in the AM and PM peaks, where motorists or freight need to allow for additional 'buffer time' of up to 66% of average journey times (or an additional 14 minutes, on top of a typical 22 minute trip).
- In contrast, the longer Kairanga Bunnythorpe route has lower average and travel time variability across all time periods. The variability that does exist along the Kairanga Bunnythorpe Road route

[59] Traffic Design Group. 2014. *Intersection Assessment Report: Plan Change 15E: North East Industrial Zone Extension.*
[60] Stantec. 2019. *SH3/54 Kairanga Bunnythorpe Road Detailed Business Case.*

is likely to include the impacts of the stop controlled crossroads intersections at Kairanga, SH3/54 and SH54/Milson Line, as highlighted by Figure 6-4.

- However, as discussed in the sections above, road network deficiencies limit the use of the full Kairanga Bunnythorpe Road corridor by freight in its current form.

Feilding to Palmerston North

As highlighted in Figure 6-1 to Figure 6-3, access along the busy freight and commuter corridor from Feilding to Palmerston North is expected to deteriorate with several intersections along the route likely to operate at or over capacity in the afternoon peak by 2021, including in Bunnythorpe. Further, the high-volume midblock section of SH54 between Feilding and the SH54/Campbell/Waugh split, is expected to be approaching capacity by 2041.

Eastern and City Centre Access Issues – Kelvin Grove, Tremaine and SH3 Napier Road

Kelvin Grove is separated from the rest of Palmerston North by the rail corridor to the east and south. The rail corridor and Roberts Line isolates Kelvin Grove by restricting movement corridors to four locations: Tremaine Avenue/ Kelvin Grove in the northwest, Mihaere Drive/ Keith Street in the southwest, SH3/ Roberts Line to the south, and SH3/ James Line in the southeast. These intersections are highly utilised and the high growth the area is experiencing is contributing to constrained access[61].

Tremaine Avenue provides the only access to the existing KiwiRail yards, and access to many other industrial businesses. Tremaine Avenue is also a key arterial route for Palmerston North, so accessing these sites can be very difficult during certain periods due to high conflicting traffic flows. This is evidenced from the modelling results showing five intersection are expected to operate at LoS E by 2041.

Freight surveys[62] undertaken as part of PNITI identified significant delays on Tremaine Avenue and Kelvin Grove as key access issues for stakeholders. On further discussion it became clear that the issue is not necessarily midblock congestion, but the difficulty of accessing/or departing areas such as the rail yard, again this is supported by the modelling highlighting intersection, rather than midblock, LoS issues.

Further, in the 2019 Council customer survey the "*ease of moving around the city at peak times*" was identified as an area for improvement as it was relatively low scoring, and significantly lower than the previous survey.

6.4 CONSEQUENCES

6.4.1 Restricted Future Growth and Development

There is anecdotal evidence that the transport system deficiencies identified above are starting to constrain potential development, which could affect the economic prosperity of the region and the supply chain of the lower North Island. During the freight company surveys undertaken as part of this project, at least one company said that they are waiting for improved links to the NEIZ before relocating and expanding.

Not investing in addressing the identified access issues and deficiencies will limit the ability of the network to respond to future growth demands and further increase rat-running and travel time variability during peak periods.

This will impact negatively on the reliability of the system to get people to their destinations on time, leading to losses in productivity and reduced leisure and personal time. It will also reduce the reliability of goods reaching the distribution hubs across the city, the freight rail yard, airport and other destinations on time.

It also means that it will be unlikely that the Council will be able to deliver on key aims of the:

- **Palmerston North City Council Strategic Transport Plan**
    - Provide infrastructure to enable growth and a transport system that links people and opportunities, and provides amenity, safety, interconnectivity, accessibility, resilience and reliability

[61] GHD. 2019. *Accessing Central New Zealand Strategic Case.*
[62] Source: Richard Paling Consulting. (2019). Palmerston North Ring Road: Freight Related Issues

- **Accelerate 25**
    - Efficient and well-serviced hubbing
    - Regional Freight Ring Road
    - Multi-modal freight movement package (rail)

6.4.2 Continued Safety and Severance Issues

Access constraints and increased delays can often result in an increased crash risk due to more vehicles on roads and intersections which were not designed to carry such traffic – resulting in high conflicting turning movements, and conflicting user groups, reducing safety and amenity.

These effects are further exacerbated in high speed zones, with higher speeds reducing gaps in traffic and resulting in more severe outcomes, should a crash occur, this is presented in flow chart below.

Examples of intersections with both poor access levels of service and high crash risk include; SH3/Roberts Line, along Kairanga Bunnythorpe Road (SH3/54, SH54/Milson Line, Roberts Line) and Longburn/Rongotea Road.

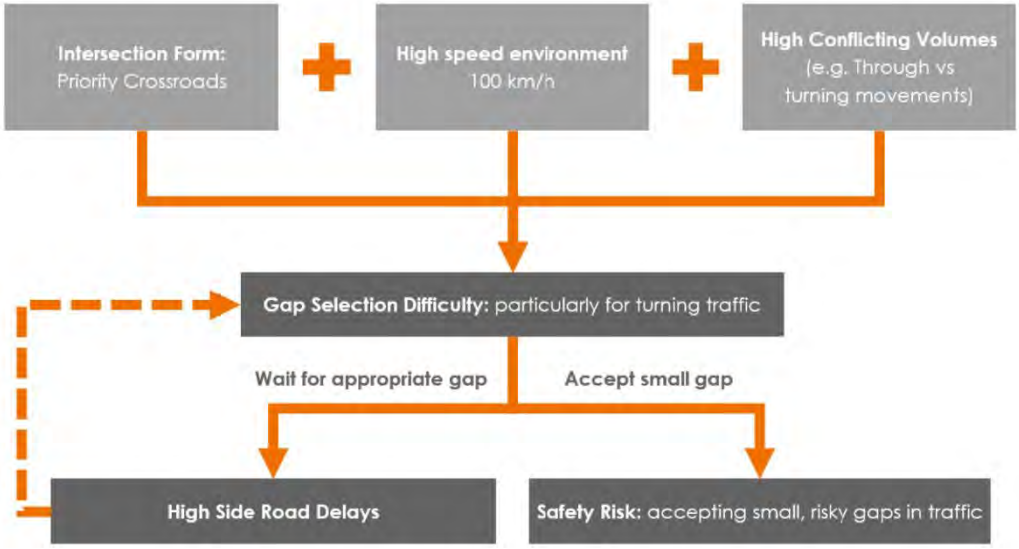


Figure 6-5: Relationship between delays and safety risk at intersections

Severance

Severance is also an issue that will be a compounded by access constraints. Further discussion on severance has been presented in Section 4.4.2 above, where it is noted that high volumes of general traffic and heavy vehicles impact on townships and other main streets and become a barrier for pedestrians, cyclists or people wanting to cross the road.

Severance is potentially an issue on the main roads in the City Centre as well as Tennent Drive, Aokautere, Feilding, Ashhurst and Bunnythorpe.

Overall, the issues and constraints related to accessing key hubs around Palmerston North, coupled with growing demands across the wider network, will compound the amenity and safety consequences as discussed in Section 4.4 and Section 5.4.

6.5 SUMMARY

There is significant planned investment in the region that will result in both general traffic and freight growth. However, as presented in the sections above:

- Growth is resulting in the demand for cross city freight movements to increase.
- Sections of the identified freight route are deficient for freight vehicles and large volumes of traffic with narrow carriageway widths, stop controlled intersections and bridge restrictions. As a result, drivers take alternate routes, often through residential areas increasing potential amenity, economic and social costs.
- Network deficiencies, coupled with the majority of first and last mile freight distribution trips being road based, results in poor strategic access between key commercial and industrial hubs within Palmerston North. For example, key growth hubs like the NEIZ have no direct rail access and limited access to strategic road connections which do not pass through sensitive urban areas.
- Transport modelling indicates significant intersection issues on all routes entering and leaving the City between 2031 and 2041 in the afternoon peak if no further investment in the roading network is undertaken to respond to anticipated growth.
    - 16 intersections along the identified freight network are forecast to be operating at LOS E or F (at or over capacity) by 2031 in the PM peak, increasing to 20 intersections by 2041.
    - The majority of these intersections (12) are along the rural network, with limited alternate routes available to access destinations without re-routing through urban areas.
    - Particular access issues are forecast for the commuter and freight journeys between Feilding and Palmerston North, access into the North East Industrial Zone, along Tremaine Avenue and the eastern access into Palmerston North via SH3 Napier Road. Tremaine Road currently experiences travel time variability of up to 14 minutes (or 66% of average travel time) in peak periods and this will only deteriorate.

If no investment is made, then there is a significant risk to ongoing investment in freight and distribution within Palmerston North. Noting that ‘improving freight connections’ is a key strategic priority of the 2021 GPS.

A lack of investment will also mean it will also be very unlikely for Palmerston North to meet the strategic vision of the Transport Plan or the Accelerate 25 strategy.

In addition, the current access and severance issues of the current network will remain and worsen.

7 KEY OPPORTUNITIES

During the stakeholder workshops it was identified that, in addition to the problem statements, there are several areas of opportunity that should be considered when developing and evaluating interventions and programmes.

Many of these opportunities relate to current strategies for Palmerston North, leveraging off its current status as an economic hub, and striving to achieve its vision for the future.

The sections below outline the key opportunities. These have been translated in Section 8.3 into Key Principles which form part of the option development process.

7.1 ECONOMIC GROWTH, DEVELOPMENT AND INVESTMENT

There is an opportunity to support the recent growth of Palmerston North and stimulate further growth, by improving connectivity, and separating movements.

7.1.1 Grow population and employment

Palmerston North is projected to grow, both in population and employment. Significant investment is planned over the coming years which will only add to that growth. This growth provides Palmerston North with an opportunity to increase its importance as a key city in the south of New Zealand's North Island.

To ensure that the ambitions of Council are achieved, it is crucial that the City is suitably connected to:

- Attract enough interest from investment stakeholders to realise their and the city's ambitions; and
- Provide a road and rail network that is reliable and efficient at the local, regional and national level to ensure that any investment that is realised can be sufficiently accommodated.

7.1.2 Grow distribution and transport

The Accelerate 25 Growth Study[63] identified transport as an enabler of economic growth:

"Palmerston North is a major intersection requiring more investment in streamlined transport movement. Palmerston North is at the centre of rail and road networks which go toward all four points of the compass. This intersection of multiple modes, large product volumes and traffic volumes must be as well designed and efficient as possible."

The Accelerate 25 Growth Study also recognized the importance of growing rail connectivity and mode share: "*The importance of rail connections for this region is vital if we are to offer a multi-modal freight movement package to potential investors and existing business. While much of the recent effort has been around planning for a well-connected roading network, the role rail plays, and could potentially play, is seen as significant. As such, there is a strong desire for central government to support and invest in rail to realise this vision. Given the strategic location of the Manawatū-Whanganui region, and the NIMT line having its crossroads in the centre of our region, we believe there is a real opportunity and significant benefits to be realised if this mode of freight movement was unlocked."*

The transport distribution function of Palmerston North is growing and there is an ability to extend this further due to the city's location on primary road, rail and air routes.

In order to understand the baseline connectivity and the impact of any future improvements, journey times were collated between several key origins and destinations within the study area. These are outlined in Figure 7-1 below and include; the Square, Ashhurst, Tremaine Avenue, Longburn, Feilding, NEIZ, SH56/57, Kelvin Grove, SH3/Mt Stewart and the Linton Defence Base.

Refer Appendix C for further information on travel times between each origin and destination pair for 2031 in the PM peak.

[63] https://www.accelerate25.co.nz/distribution-and-transport.html

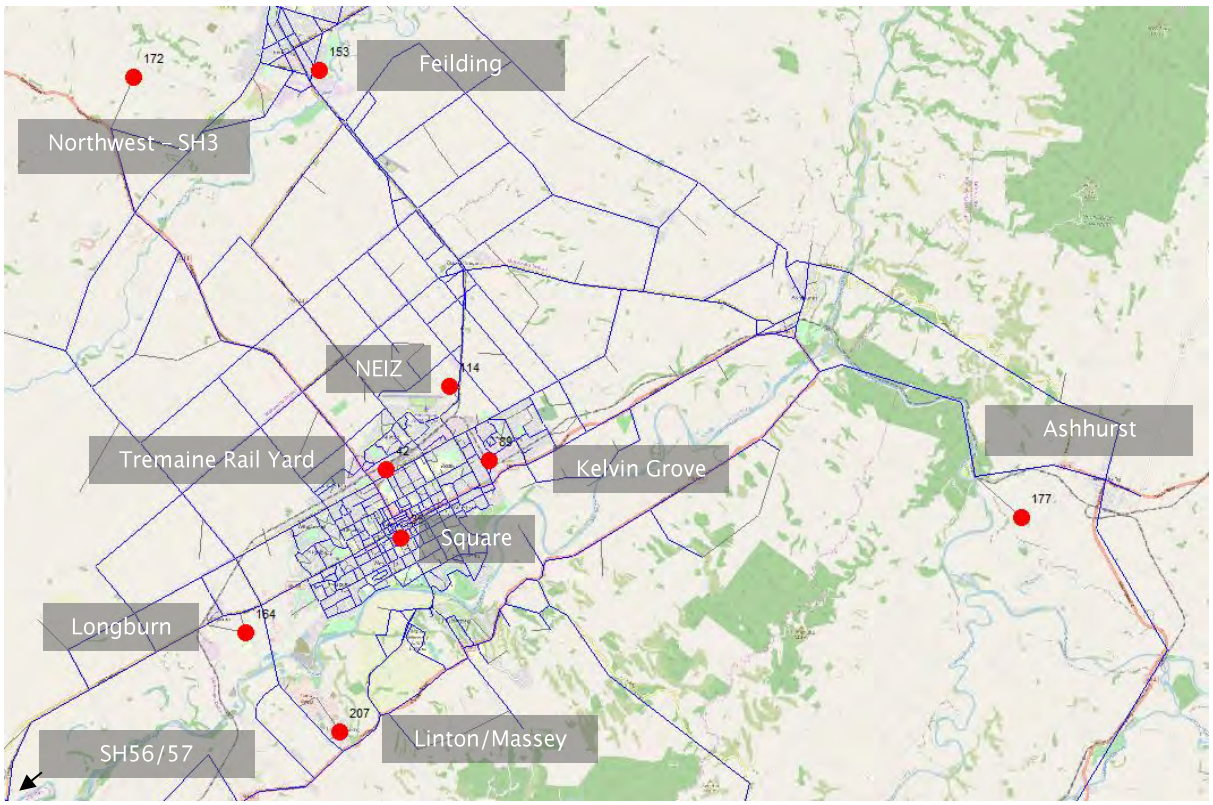


Figure 7-1: Key Origins and Destinations

7.1.3 Rail connectivity / KiwiRail freight hub

The potential development of a freight hub in the north-east would enable rail to play a greater role in the movement of freight and for the growth of distribution industries around such an important node in NZ's transport network.

The Horizons RLTP (2018 Review) recognized the value of such integration:

"The potential benefits of rail assisting in integrating land use development by ensuring there is multimodal access remain unrealised. Council sees great benefit in securing a rail spur into the growing North-East Industrial Zone in Palmerston North to provide relief to the road network similar to what was seen with the re-opening of the Castlecliff spur line in Whanganui.

Encouraging a shift of freight from road to rail would also have positive road safety outcomes as this lessens the conflicts between heavy vehicles, private vehicles and cyclists. For these reasons, encouraging a greater share of freight from commodities that are not time critical such as; forestry, pastoral agricultural and dairy will be a key output of this Plan."

7.2 PLACEMAKING

Council has a vision presented in the Creative and Liveable Strategy 2018. Their goal is to "*build Palmerston North's national and international reputation as a creative and exciting place to live, work and study. A creative city renowned for its visual and performing arts, events, food, festivals, sporting events and great cultural institutions. A city that has great places for people, and the attractions, recreation options and experiences of a big city without the hassle and cost"*

By getting the right traffic on the right roads, particularly removing heavy or through traffic from key urban streets, there is an opportunity create those "great places". This will also help promote public transport and active modes, and improve liveability and community cohesion, as envisaged in the strategy. The strategy particularly focuses on making the city centre a *"vibrant place"* which is hard if there are high levels of through traffic and heavy vehicles.

7.3 SUSTAINABLE ENVIRONMENT

There is an opportunity to align with the Government's GPS supporting strategic priority of "reducing greenhouse gas emissions, as well as adverse effects on the local environment and public health". Also, Palmerston North's own Eco City Strategy 2018 targets a 25% reduction in emissions by 2028.

7.4 RESILIENCE

Whilst no major resilience issues have been identified as part of this study, there are opportunities for improvement.

Palmerston North is a nationally significant food and grocery distribution centre and many of these groceries have a short shelf life. The food and grocery sector is heavily dependent on road and rail for the movement of goods which makes Palmerston North's network resilience even more crucial. This is particularly relevant for Wellington which has the potential to be isolated from the main supply chain in Palmerston North and this is a major vulnerability for the region.[64]

The existing Tremaine Avenue has limited network capacity but connects the critical rail hub. The transport network and land use effectively cap the rail mode share and forces vehicle traffic onto already limited routes.

The Fitzherbert Bridge is currently the only road link across the Manawatū River in Palmerston North and includes key infrastructure for other essential services such as sewerage, water, electricity and telecommunications. Fitzherbert Bridge is therefore a key lifeline for the region with high consequences of failure. However, the bridge has been identified as relatively resilient to hazards, with the ability to withstand a one-in-500-year flood and one-in-1,700-year earthquake. Nevertheless, it is estimated that the destruction of or severe damage to the bridge by an adverse event could lead to a social-economic loss of between $250,000-$430,000 per day depending on if services were shared with an additional bridge[6566].

Further consideration of other resilience issues across the study area, including earthquake risk, liquefaction, flooding and crashes have been considered as part of the programme development, refer Section 10.1 and **Appendix G** Resilience Assessment[67]**.**

In general, outages are typically short term and alternate routes are available. As a result, overall resilience risks are not a major driver for investment, rather resilience risks have the opportunity to be addressed as part of a wider programme of investment.

[64] New Zealand Lifelines Council. 2017. *New Zealand Lifelines Infrastructure Vulnerability Assessment: Stage 1.* https://www.civildefence.govt.nz/assets/Uploads/lifelines/National-Vulnerability-Assessment-Stage-1-September-2017.pdf

[65] Note that the business case for the He Ara Kotahi walking and cycling bridge included the provision of carrying services. Therefore, the revised social-economic losses of the Fitzherbert Bridge are likely to be a on the lower end of the range.

[66] Massey University, Measuring Transport Resilience, A Manawatu-Wanganui Region Case Study, 2014. http://www.stuff.co.nz/manawatu-standard/news/7322520/Bridge-the-only-lifeline-for-Palmerston-North

[67] Other network resilience risk areas discussed further in Appendix G include; SH56 Opiki (medium EQ risk, flooding), SH3 Ashhurst Bridge (medium EQ Risk), SH56 Mangaone Bridge (significant EQ risk), SH57 Bridges with storm/scour risk and area wide flooding issues, particularly to the south west of Palmerston North. However, as outlined above, the urban network has redundancy due to the grid road network layout. The rural network has several risk areas; however, the outage states are typically minor to moderate (less than 3 days) with alternate routes available (e.g. SH56 and SH57 are parallel routes for access to the south of PN, while SH3 and SH57 provide alternate routes for access to the northeast of PN).

8 INVESTMENT OBJECTIVES

8.1 BENEFITS OF INVESTMENT

The benefits of investment were identified during the facilitated workshop and further developed by the project team after consideration of the problem statements and benefits. Figure 8-1 shows an ILM which outlines how the project benefits were derived.

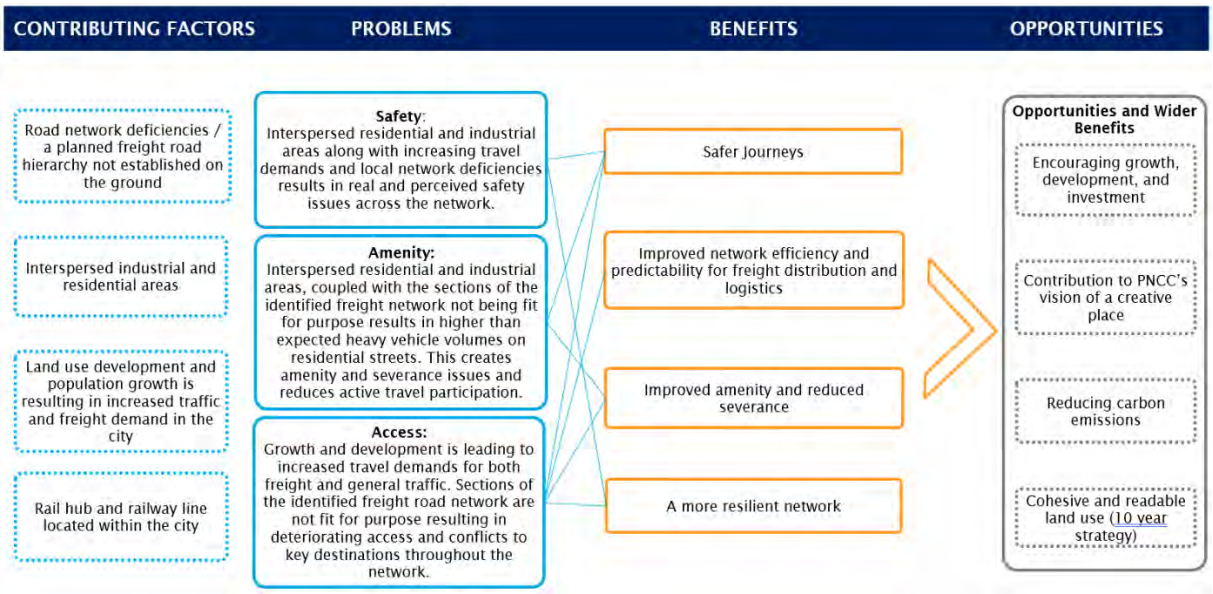


Figure 8-1: Benefit Map

Further benefits and outcomes of implementing a prioritised freight network have been identified as a part of the Council's Strategic Direction and Vision, these include:

- Reduction of heavy traffic in residential areas
- Divert traffic out of the city centre and reduce traffic delays around the east of the city
- Improve the safety, efficiency and effectiveness of the transport network
- Improving safety and access to planned developments (E.g. Whakarongo, Aokautere and City West)
- Free up capacity for, and link, with alternative transport modes including rail, air, walking and cycling
- Support existing activity and economic development opportunities at the airport, Food HQ and Linton Military Camp
- Promote regional economic development

8.2 INVESTMENT OBJECTIVES AND KEY PERFORMANCE INDICATORS

The investment objectives are a vital part of the business case process. They:

- Express the outcomes sought from investment.
- Help direct and guide the study process.
- Provide the basis for appraisal of alternatives and options.

Themes for the investment objectives were discussed and confirmed with project partners and investors during Workshop No.1.

The key performance measures by way of investment objectives, measures and KPI's for this project are outlined in Table 8-1. The measures and baselines have been developed based on responding to both the problems and opportunities to help realise the delivery of a wide range of benefits. As a

result, the baseline locations for the KPIs include sections along the identified freight routes as well as locations relating to the key problem or opportunity areas within the city.

The baselines for these measures, where available, are provided in Appendix C.

Table 8-1: Investment Objectives, KPIs and Measures

INVESTMENT OBJECTIVE	KEY PERFORMANCE INDICATOR	MEASURES	BASELINE
Reduction in severance and increase in amenity	Reduce freight on residential and place-based streets	Reduction in heavy vehicles through the CBD and along local streets	As presented in Section 4.4, Amenity benefits of reduced heavy vehicle volumes be achieved on: 2031 Modelled heavy vehicles per day[68]: • Te Awe St 800 vpd • Albert Street 900 vpd • Kaimanawa Street 340 vpd • Keith Street 270 vpd • College St 211 vpd • Kelvin Grove Road 965 vpd • Maxwells Line 420 vpd • City Centre Access (Fitzherbert Br): 1,700vpd – proxy for reductions across the wider city
		Reduction of general traffic through townships or key places	In order to improve amenity, reduce severance and help enable placemaking opportunities the following locations have been identified (refer Sections 0, 6.4.2 and 6.5). 2031 Modelled vehicles per day: • City Centre Access over 30,000 vpd • SH3 Napier Road over 12,000 vpd • Tennent Drive 8,000 vpd • Bunnythorpe 12,000 vpd • Feilding up to 21,000 vpd • Ashhurst over 7,000 vpd
		Increase the number of heavy vehicles on the priority freight routes identified in the NOF	As presented in Sections 4.2.3 and 6.2.1, the identified freight route has sections with deficiencies limiting their use. Opportunities therefore exist to increase the number of HCVs along the NOF freight routes, helping to alleviate pressure on local streets. 2031 Modelled heavy vehicles per day: • Kairanga Bunnythorpe Road 135 -1,000 vpd • Longburn Rongotea Road 600 vpd • Ashhurst Bunnythorpe Road 500vpd • SH54 (Milsons Line to Newbury Line) 840 vpd • SH3 North of KB Road 1000 vpd • SH57 South of PN 600vpd • SH56 South of PN 105vpd
	Increased uptake and attractiveness of active modes	Census Journey to Work by mode (cycling, walking)	As outlined in Problem 1: Amenity Section 4.4, network improvements resulting in less traffic, particularly HCVs and lower speeds on city streets is likely to increase the overall attractiveness of active modes on streets directly impacted, but also across the network. Pedestrian and cyclist measures to be considered under existing Council metrics in parallel project (Urban Cycleway Masterplan) Baseline[69]: • Journey to work (cycle): 5.9% (2013) reducing to 3.4% (2018 Census) • Journey to work (walk): 9% (2013) reducing to 6.8% (2018 Census) • Cycling Counts (PNCC): 540 across 9 sites (2017) - a reduction from 840 in 2013
		Numbers of pedestrians and cyclists at key locations	

[68] Modelled 2031 do-min volumes for general traffic and heavy vehicles have been adopted as baseline measures for comparison purposes to option scenarios. Noting that observed HCV volumes for several local streets are higher than currently modelled.
[69] Palmerston North City Council, Urban Cycling Master Plan, October 2019

INVESTMENT OBJECTIVE	KEY PERFORMANCE INDICATOR	MEASURES	BASELINE
Improve safety in the network	Reduction in Deaths and Serious Injuries (DSI)	Number of DSI casualties Number of DSI equivalents	Study Area, excluding urban crashes/ CBD network, Primarily rural freight routes: • 83 DSI, 82 DSI Equivalents (2014-2018) Wider Study Area, excluding urban crashes (i.e. to include the impacts of modelled volume reductions outside of the immediate area along SH3/ to Feilding): 103 DSI, 100 DSI Equivalents (2014-2018)
	Reduce Intersection Crash Risk	High Risk intersection guide, Reduce Collective / Personal Risk	Number of high-risk intersections treated: • Baseline = **13** intersections identified with a High of medium-high collective risk within the study area, principally on the identified freight routes. Refer Safety Problem Section 5.4 and **Appendix C** for further information on the intersections identified.
	Safe and appropriate speeds	Number of high risk speed management corridors treated:	Number of high risk speed management corridors identified with a difference between the existing speed limit and the safe and appropriate speeds (SAAS). • Baseline = **27** SAAS corridors identified for treatment within the study area Refer Safety Problem Section 5.4 and **Appendix C** for further information on the corridors identified.
Improve access to and from key destinations	Intersection levels of service at key origins and destinations	Intersection LoS	Reduction in the number of intersections operating at capacity (LoS E/F) in the PM peak in 2031. • Baseline = **16** key intersections along, principally along the identified freight routes with LoS E or LoS F in the 2031 PM Peak. Refer Problem 3: Access Section 6.3 and **Appendix C** for further information on the intersections identified.
	Reduce journey time between key destinations	Journey times between key locations	Journey times between each of the 10 key destinations were collated. The key destinations, based on Problem 3: Access and responding to the opportunities around economic growth, include: • PN Square, Ashhurst, Tremaine Avenue, Longburn, Feilding, NEIZ, SH56/57, Kelvin Grove, Northwest (SH3/Mt Stewart), Linton Defence Base. **Refer Appendix C** for further information on travel times between each origin and destination pair for 2031 in the PM peak.

8.3 KEY PRINCIPLES

In addition to the investment objectives, several key principles for investment in PNITI were discussed during Workshop No.1. These factors are based on the opportunities presented earlier and can be summarised as follows:

- **Economic Growth:** This refers to the ability to tie in with other investments around the city and comply with the Council growth strategy. It also refers to the ability to react to changes in growth and how things may be staged.
- **Placemaking:** This relates to how well options align with the overarching Council Placemaking Plan principles.
- **Sustainable Environment:** Considering all modes when developing strategy through to delivery in order to reduce carbon emissions. Seeking to allow customers the choice of walking and cycling, while allowing for freight operators to select the most appropriate mode for their movements.
- **Resilience**. This refers to the desire to ensure that the transport network is flexible to endure and respond to both planned and unplanned events.

The principles identified at the workshop align with the Government's GPS. That is, improving the accessibility to places, through various modes, while improving resilience, and reducing environmental impact are all represented.

These key principles have been integrated into the Multi Criteria Analysis to ensure they are taken into account in the selection of the preferred programme of activities.

9 STRATEGIC ALIGNMENT

This section outlines relevant information from national, regional and local transport strategies, and provides a high-level analysis of their alignment to the identified problems and investment objectives of PNITI.

9.1 NATIONAL

9.1.1 Government Policy Statement on Land Transport (2018-2028)

The Government is committed to creating more liveable cities and thriving regions. To help achieve this they are seeking to create an efficient, modern and resilient transport system that will improve safety, decrease congestion and increase economic growth. The two key areas of focus are **safety** and **access**, with value for money and environment as supporting priorities.

This is reflected in the Government Policy Statement for Transport (GPS), which sets out the Government's priorities for expenditure from the National Land Transport Fund over the next 10 years. The priorities and objectives relevant to this project are shown in Table 9-1.

Table 9-1: GPS Priorities and Objectives

PRIORITIES	OBJECTIVES	RELEVANCE TO PNITI
Safety	A safe system that is free of death and serious injury.	Strong alignment with the safety priority. Ensuring the freight priority routes are functional and well used will help remove heavy vehicles from the city centre and reduce the real and perceived safety risks.
Access	Provides increased access to economic and social opportunities.	Strong alignment with this priority. The road hierarchy is not established on the ground and is resulting in inefficient or inappropriate freight movements to and from key destinations. Establishing the network on the ground will enable access to growth hubs (e.g. NEIZ) and other key areas.
	Is resilient.	Aligned with this priority. Improvements to freight priority routes will improve the resilience of the network and provide alternate route options, if required, providing transport network resilience.
	Enables transport choice and access.	Aligned with the 'transport choice and access' priority, improvements will help remove heavy vehicles from unsuitable routes, making them more attractive for active modes and promote a feeling of place.
Environment	Reduces greenhouse gas emissions, as well as adverse effects on the local environment and public health	Some alignment with this priority as project could result in more efficient vehicle movements thus reducing emissions.
Value for Money	Delivers the right infrastructure and services to the right level at the best cost.	Strong alignment with this priority by using the evidence-based business case approach to decision making, and by collaborating with investment partners to realise efficiencies.

The draft 2021/22 GPS sees a slight change to the strategic priorities:

- **Safety**: Developing a transport system where no-one is killed or seriously injured.
- **Better Travel Options**: Providing people with better transport options to access social and economic opportunities.
- **Improving Freight Connections**: Improving freight connections for economic development.
- **Climate Change**: Developing a low carbon transport system that supports emission reductions, while improving safety and inclusive access.

PNITI is most aligned with the improving freight connections priority, but will also improve the safety of the Palmerston North transport network and help provide more transport options by removing heavy vehicles from unsuitable routes, making them more attractive for active modes.

9.1.2 Road to Zero Action Plan 2020-2022

OVERVIEW	RELEVANCE TO PNITI
The Road to Zero Action Plan identifies five focus areas to help achieve the vision of *"a New Zealand where no one is killed or seriously injured in road crashes. This means that no death or serious injury while travelling on our roads is acceptable."*	Focus Area One, infrastructure and speed management improvements, is considered particularly relevant for this project. The objective of this focus area is to improve road safety in our cities and regions through investing more in safety treatments and infrastructure improvements, tackling unsafe speeds, and enhancing the safety and accessibility of footpaths, bike lanes and cycleways.

9.1.3 Arataki

Arataki presents the Transport Agency's 10-year view of what is needed to deliver on the government's current priorities and long-term outcomes for the land transport system. A new version is anticipated to be released in August 2020.

Arataki identifies five transport system step changes to help achieve long-term government outcomes. The step changes and their relevance to PNITI are outlined in the table below:

STEP CHANGE	RELEVANCE TO PNITI
Improve urban form – this step change seeks to improve connections between people, product and places by using planned land-use and an integrated transport system.	The majority of growth in the Manawatū-Whanganui region is expected to be in Palmerston North, Feilding, and Levin – places where land-use and integrated transport system planning may be effective.
Transform urban mobility shift reliance on private vehicles to more sustainable transport solutions for the movement of people and freight.	Palmerston North City Council are currently planning cycle treatments to improve the network. Note, Palmerston North is not included in the cities identified as relevant to this step change.
Significantly reduce harms - transition to a transport system that reduces deaths and serious injuries and improves public health.	Palmerston North City is identified in the 2019 Community Risk Register as an area of high concern for all intersections, rural intersections, distraction, and older road users.
Tackle climate change – enhance communities' long-term resilience to the impacts of climate change and support the transition to a low-emissions economy.	Investment to transition more freight to rail (such as intermodal freight hubs) and improved walking and cycling facilities will result in environmental benefits.
Support regional development - optimise transport's role in enabling regional communities to thrive socially and economically.	The Manawatū Whanganui Region is identified as surge region which also has one of the highest unemployment rates.

This project is highly aligned with Arataki as Step Change 1, 3, and 5 directly relate to the Problems that need to be address (see Section **3** for more details).

Improvements on key corridors in and out of Palmerston North are also identified as key strategic areas of focus for 2021-2031 in the Arataki for the Lower North Island, as presented in Figure 9-1 below. Improvements to the Palmerston North area as part of PNITI align to priorities 1,4 and directly to 5.

STRATEGIC AREAS OF FOCUS: 2021-31 (Numbers relate to locations shown on following map)

	LOCATION	KEY INSIGHT	WHY IT'S IMPORTANT	FOCUS
1	**Palmerston North to Wellington** (SH1, SH56 & SH57, rail)	Forecast growth in population, freight and tourism will place increasing pressure on the ro orridors. The road corridor has existing safety and resilience issues, particularly in the section between Ōtaki and Levin.	Palmerston North is the primary distribution hub for the LNI, while Wellington is the largest market and also the northern terminus for Cook Strait ferry connections to the South Island. The connections between the two are critical.	Deliver safe and reliable road and rail journeys between Palmerston North and Wellington.
2	**Urban Wellington** (multi-modal)	The Wellington strategic road network experiences significant congestion at peak periods, negatively impacting the predictability of travel time. Forecast growth in population and freight will worsen these issues.	Unpredictable journey times on Wellington's strategic urban road network impacts on inter-regional journeys of people and goods to key hubs including the Cook Strait ferries and airport.	Support inter-regional movement of people and goods to key hubs, through improved journey time reliability within urban Wellington, with a primary focus on increased use of public transport (road and rail), walking and cycling.
3	**Gisborne to Hawke's Bay/ Bay of Plenty** (SH2)	The corridors linking Gisborne region to the rest of the country are subject to regular disruptions and significant resilience challenges, and these are expected to increase over time because of the impacts of climate change.	Gisborne region is relatively remote with an export-oriented economy. It relies heavily on connections to the Bay of Plenty and Hawke's Bay to supporting economic and social outcomes in the region.	Deliver safe and reliable connections between Gisborne and Bay of Plenty/ Hawke's Bay, to support regional development in the Gisborne region.
4	**Palmerston North to the upper North Island (road and rail** (SH1 & SH3, rail)	Forecast growth in freight and tourism will place increasing pressure on the road and rail corridors between the upper and lower North Island. The SH1 corridor has existing safety and resilience issues, including closures of SH1 at Desert Road due to snow, and capacity issues on parts of the Desert Road and sections of the route beside Lake Taupō.	This is an important corridor and supports the movement of people and freight between the UNI and LNI, including journeys that continue on to Wellington. It also provides access to multiple visitor destinations in the central North Island. Palmerston North hosts a university and is the primary distribution hub for the LNI, including for goods travelling southwards from Auckland and Port of Tauranga.	Deliver safe and reliable journeys between Palmerston North and the UNI.
5	**Urban Palmerston North** (road and rail freight)	Palmerston North is emerging as the primary freight distribution hub in the LNI, resulting in increased heavy vehicle movements on local roads in and around Palmerston North.	The majority of freight movements into Palmerston North are required to travel on local roads to access distribution hubs. Increasing freight volumes are creating safety challenges on local road networks, amenity issues for adjacent communities, and reducing the efficiency of freight movements. The potential development of a direct rail siding into the distribution area in the north-east would enable rail to play a greater role in the movement of freight.	Work with partners, through development of Palmerston North Integrate Transport Improvements Programme, to agree the sequencing and timing of investment required to support Palmerston North as the primary distribution hub in the LNI.

Figure 9-1: Arataki Lower North Island, Strategic Areas of Focus 2021-2031 (Source: NZTA)

9.2 REGIONAL

The following table provides a summary of the relevant regional strategies and plans and their alignment to PNITI.

Table 9-2: Strategic Alignment - Regional

DOCUMENT	DESCRIPTION	RELEVANCE TO PNITI
Horizons Regional Land Transport Plan 2015-2025 (2018)	The RLTP sets out the strategic direction for land transport in the Manawatū-Whanganui Region over the next 10 years. It outlines six objectives, and five strategic priorities.	The objectives and priorities related to this project are: • Objectives: • An optimised road, rail and public transport network that provides efficient, reliable access and movement for people and freight to and from key destinations, within and outside the region. • Maximise the strategic advantage of central New Zealand through efficient and well-serviced freight distribution hubs, including better utilisation of rail corridors. • A safe land transport system increasingly free of death and serious injury. • A reliable multi-modal transport system with less modal conflict, including walking and cycling, that improves environmental outcomes. • Strategic Priorities: • Improve connectivity, resilience and the safety of strategic routes to and from key destinations linking north-south and east-west, while factoring in demographic changes and impacts on land use.
Accelerate 25 Manawatū-Whanganui Economic Action Plan	This Economic Action Plan (EAP) is a road map to accelerate social and economic growth in the Horizons Region through to 2025. The plan identifies distribution and transport as a key enabler to achieve its recommended	The plan identifies the ring road project as an immediate priority in order to achieve the EAP's vision and will contribute towards reaching the identified future requirements.

DOCUMENT	DESCRIPTION	RELEVANCE TO PNITI
	actions. The EAP states that the transport network has the following future requirements: • Efficient and well-serviced hubs. • Scalability of operations. • Importance of the primary sector. • Palmerston North is a major intersection requiring more investment in streamlined transport movement.	

9.3 LOCAL

The following table provides a summary of the relevant local strategies and plans and their alignment to PNITI.

Table 9-3: Strategic Alignment - Local

DOCUMENT	DESCRIPTION	RELEVANCE TO PNITI
Palmerston North 2028: 10 Year Plan 2018-28	The guiding vision for this plan is "*Palmerston North: Small city benefits, big city ambition.*" There are five strategic goals to achieve this vision: 1. An innovative and growing city. 2. A creative and exciting city. 3. A connected and safe community. 4. An eco-city. 5. A driven and enabling Council.	This project is most aligned with Goal 1 but also contributes to the others. The integrated plan for the City is shown in Figure 9-2, and highlights how transport investment could help shape the city and provide access to key growth areas.
Palmerston North Strategic Transport Plan 2018/21	The Strategic Transport Plan outlines Council's goal to support the growth of transport. The purpose of the plan is to provide infrastructure to enable growth and a transport system that links people and opportunities, and provides amenity, safety, interconnectivity, accessibility, resilience and reliability. It looks to improve regional transport links and clearly states the importance of areas like the NEIZ and Longburn as key logistical locations.	The regional ring road project is a key aspect of the Strategic Transport Plan and contributes to many of the plan's future goals.
Palmerston North Creative and Liveable Strategy (2018)	This strategy was developed to help Palmerston North achieve its vision of *small city benefits, big city ambition* through making Palmerston North a creative and exciting city. In terms of transport, it mentions the role that public and active transport play and the need to continue to consider the space and safety needs of cyclists and pedestrians. It also states that strong public transport networks make a significant contribution to city liveability scores.	Amenity and safety have been identified as problem statements for PNITI.

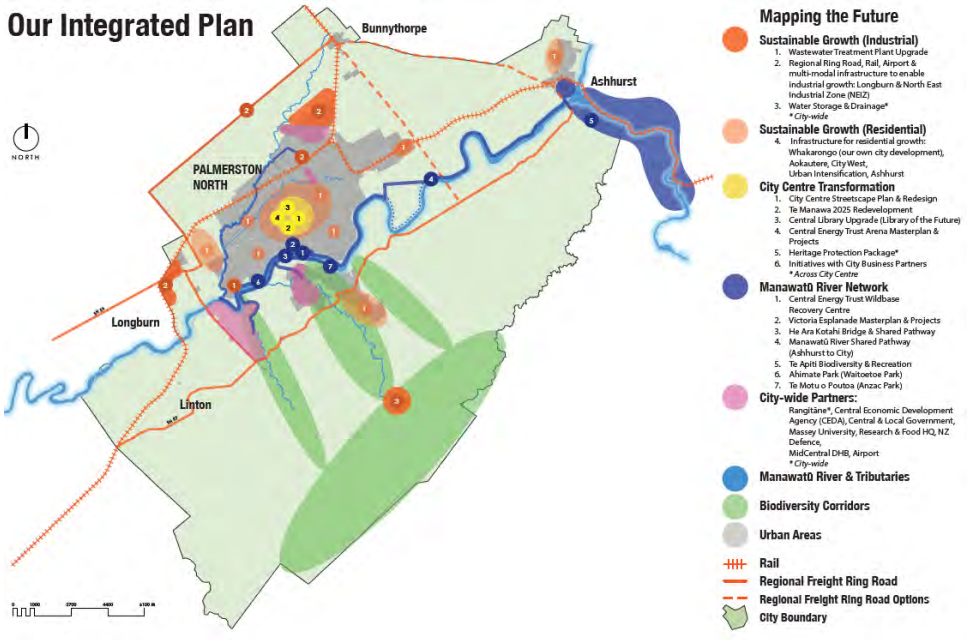


Figure 9-2: Our Integrated Plan (Source: Palmerston North City Council)

10 CONSTRAINTS AND UNCERTAINTIES

10.1 CONSTRAINTS

Table 10-1 sets out all the constraints investigated and identifies possible constraints that should be taken into consideration when assessing options, and constraints that require further investigation.

These constraints were collated from a range of sources, including Workshop 1. Workshop 1 included group breakout sessions using large aerial long plots and a range of background information to help identify the constraints that are present within the study area which could influence options and alternatives.

Refer to Appendix D for a range of maps outlining the various potential constraints, an example map highlighting flooding risks and power pylons constraints is shown in Figure 10-1 below.

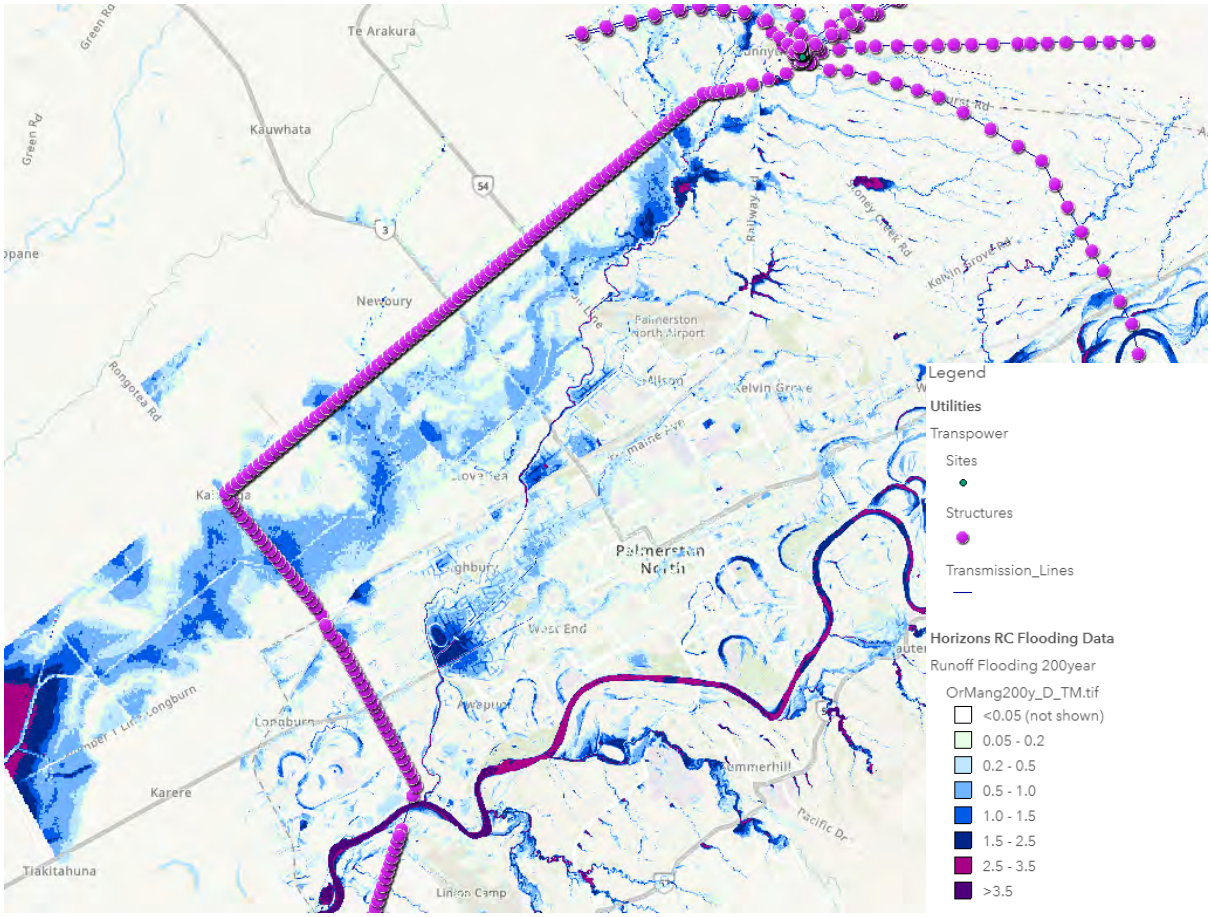


Figure 10-1: Example Constraint Map – Flooding Risks and Transpower Utilities

Table 10-1: Constraints

CATEGORY	CONSTRAINT IDENTIFICATION	ACTIONS
Hazards	• Flooding – large areas within the project area are located within Flood Prone Areas as identified on Council's District Plan Planning Maps. Refer Appendix D. • Ground Conditions – Refer Appendix D map titled *Natural Hazards.* Most of the land within the project area has a Low to Severe risk of natural hazards. In the north-eastern portion of the subject area, a fault line is located, with areas in close proximity also subject to Moderate to Very High risk of Natural Hazards. • Sections of potentially contaminated land	• Areas of contaminated land will need to be investigated with Horizons Regional Council.

CATEGORY	CONSTRAINT IDENTIFICATION	ACTIONS
Natural Environment	• Manawatū River corridor • Refer Appendix D Map titled *Landcover Only.* Various environmentally protected areas, including (but not limited to), Urban Parkland/Open Space, Productive Grassland, Cropland, Surface Mines and Dumps, Built-up Areas, Indigenous Forest, Native Scrub or Shrubland • There are several Notable Trees within the project area. • Refer Appendix D map titled *Freshwater only* – identification of current wetland sites and lakes, and rivers and streams within the project area – of which there are a number. • Amenity values. • Savage Crescent Conservation Area.	
Cultural and Historic Heritage	• There are numerous sites of cultural significance within, or just beyond the project area. There are many sites within Palmerston North City, and along the Manawatū River. It is noted there are several sites around Bunnythorpe and Ashhurst – Refer Appendix D map titled *Culture*. • There are several historic structures within the project area. • There are several Designated sites located within the project area.	• Engagement with local iwi and hapu needs to be undertaken to identify any other sites of significance/ value to tangata whenua.
Land Use	• Zoning (Refer Appendix D*)* – Within the project area there are numerous zonings, including (but not limited to) Residential, Rural, Airport, Conservation, Flood Protection, Fringe Business, Industrial, Inner Business, Institutional, Local Business, Recreation, Water Recreation • Sensitive Land Uses, including Conservation and Heritage Protection Areas. • Refer Appendix D Map titled *Palmerston North-Manawatū Strategic Transport Study – Potential Residential Growth Options* identifying Kelvin Grove, Anders Road and the Racecourse as potential future growth areas (2009) • Several Rural Residential Areas are located on the southern side of the Manawatū River.	
Future Growth	• Refer Appendix D map titled Our Integrated Plan which identifies Sustainable Growth (Residential) areas, in particular proposed infrastructure for residential growth: Whakarongo, Aokautere, City West, Urban Intensification, Ashhurst. • Refer Appendix D map titled Urban Growth. Residential Growth is identified as being on the western outskirts of Palmerston North, whilst a small area is identified along the rail line to Ashhurst on the eastern outskirts. Two pockets of Industrial growth are identified on the map. A small area beyond the projected Residential Growth to the west, and a larger area around the Airport. • Refer Appendix D map titled Industrial and Residential Development. • Refer Appendix D map titled Our Integrated Plan which identifies Sustainable Growth (Industrial) areas. Specifically, Regional Ring Road, Airport & multi-modal infrastructure to enable industrial growth: Longburn and NEIZ	
Infrastructure	• Refer Appendix D: • Several State Highways are located within the project area, including SH3, SH54, SH56, SH57. • Roading hierarchy within the project area (and within the different District Authorities) includes State Highways, Principal Road, Collector Roads. • Narrow road corridors. • Power Lines and power poles • Drainage corridors on side of roads. • Palmerston North Airport and associated Airport Noise Contour. • Rail – the railway line extends through the project area from Linton on the southern side of the Manawatū River, through Longburn on the northern side of the River, into Palmerton	• Information required on the location of underground services. • Information required on how the current stormwater from the State Highways is managed and whether the Transport Agency holds consents for any discharges of stormwater from the highway.

CATEGORY	CONSTRAINT IDENTIFICATION	ACTIONS
	North city, before extending out to both Bunnythorpe and Ashhurst. • Rail level crossings	
Social / Recreation	• Manawatū River • Sports fields and golf clubs • Tararua Range • Refer Appendix D map titled *Our Integrated Plan* which identifies the Manawatū River Network, including the Manawatū River Shared Pathway (Ashhurst to City) and the Te Apiti Biodiversity and Recreation.	•

Manawatū River Corridor

A key constraint is the Manawatū River Corridor as it creates severance and is environmentally significant. Many previous studies have identified the need for an additional crossing as part of a future transport network. However, any works in the vicinity, and within the river will be of interest to local iwi and hapu as well as other government departments and interest groups such as DOC and Fish and Game. As such, any works that intersect, encroach or cross the river will need to be carefully considered and managed.

Once the preferred programme has been identified, a more detailed analysis of all constraints can be undertaken along with options to avoid, remedy or mitigate effects on activities and the environment. All findings need to be confirmed through site visits and stakeholder, iwi and hapu and community engagement.

10.2 UNCERTAINTIES

As outlined within Table 10-2, uncertainties are categorised under the headings: factors that will affect demand, factors that will affect supply, and factors that affect cost.

The general uncertainty log for the project is summarised in Table 10-3 below.

Covid 19 impacts are outlined below and discussed in Section 10.3.

Table 10-2: Probability Categories

PROBABILITY	STATUS
Near certain: The outcome will happen or there is a high probability that it will happen	• Policy or funding approval • Tenders let • Under construction
More than likely: The outcome is likely to happen but there is some uncertainty	• Submission of planning consent application imminent • Adopted plans
Reasonably foreseeable: The outcome may happen, but there is significant uncertainty	• Adopted plans • Draft plans • Development conditional upon interventions going ahead
Hypothetical: There is considerable uncertainty whether the outcome will ever happen	• A policy aspiration

Table 10-3: Uncertainty Log

FACTOR	TIME	PROBABILITY	IMPACT	COMMENTS
FACTORS AFFECTING DEMAND				
KiwiRail Terminal Relocation	10-20 years	Reasonably foreseeable	Very High	The potential re-location of the existing KiwiRail terminal from Tremaine Avenue to another site will have a significant impact on the form and function of the transport network. While Provincial Growth Fund funding is available for land purchase, the timing and specific location of the hub relocation is uncertain. For the purposes of this report we have assumed that the terminal will be relocated at some point in the future. The timing of this relocation will impact on the timing of the projects that are recommended in this report. If KiwiRail ultimately decide not to relocate, a review of the preferred programme will need to be undertaken to address the increasing pressures near the central city. Refer Section 14 and Part C for further discussion on KiwiRail hub programme influences and potential mitigation.
Linton and Ohakea Defence Regeneration Plan[70]	2016 – 2030	Near certain	Medium	The Government has signalled the centralisation of defence forces in the country. This means that the Linton defence bases may increase in size. Impact anticipated to be related to construction of facility upgrades, and possibly in terms of increased ongoing movements. A recent study of movements in and out of the camp showed volumes of 2,500-3,500vpd. This is a significant volume of traffic that would only increase if forces are centralised and the base becomes bigger
Redevelopment of Hokowhitu Campus[71]	Within 10 years	Near certain	Medium	Residential subdivision. Additional network trips likely.
North East Industrial Zone	Within 10 years	Near certain	Medium	Located adjacent to Railway Road this 226 hectares site supports both Foodstuff NI, DKSH, Norwood and Ezibuy's freight operations. 100 hectares of development is currently zoned and under construction with a further 126 hectares under consideration as part of Acclerate25. The NEIZ will see an increase and/or redistribution of freight trips.
Housing developments (Aokautere, City West, Urban Intensification, Ashhurst)	Within 10 years	Reasonably foreseeable	Medium	This development will create additional, or reallocate some existing, trips on the network. In the medium term (2018-2028) Palmerston North are planning for: • 2,760 greenfield • 2,098 infill • 662 rural/ rural-residential In the long term (2028-2048) they are planning for: • 5,220 greenfield

[70] https://www.manawatuchamber.co.nz/wp-content/uploads/2018/11/Consents-Major-Construction-Projects-2018-2030.pdf
[71] AS above

FACTOR	TIME	PROBABILITY	IMPACT	COMMENTS
				• 3,967 infill • 1,253 rural/ rural-residential Covid 19 impacts are outlined in Section 10.3.
Longburn Industrial Development	Within 10 years	Near certain	Medium	This industrial area is located off SH56 the primary industrial user is Fonterra with Meadow Fresh also in situ to the north. The area is identified as a potential growth point for 'wet' industry as well as for general industrial. Development would see an increase in freight trips.
Kelvin Grove Industrial Area	Within 10 years	Near certain	Medium	This industrial area is home to several smaller local business units but also contains the large Countdown, Toyota and Bidfoods distribution centres. Kelvin Grove is surrounded by residential development but is well located for access to SH3 if travelling east, Tremaine Avenue and Palmerston North Airport. There is poor connection to SH56 and SH57.
Airport development	Within 10 years	Near certain	Medium	An increase in activity at the airport (i.e. more flights) would have knock-on implications to traffic volume growth. Proposed development and airport expansion will also impact the transport network. The impact of the COVID-19 pandemic has significantly reduced the commuter and visitor activity at the airport. The reduced volumes will likely continue for the short term.
Hospital growth	Within 10 years??	Near certain?	Medium?	There has been a trend towards more regional specialisation in Palmerston North. This is expected to continue as will the associated growth. Ruahine Street is the key access route for the hospital and is becoming more congested. This will only be exacerbated as the hospital grows. Ruahine Street is also a key route for traffic moving through the city.
Future growth of FoodHQ, i.e. more jobs at the Campus resulting in trip generation.	Within 10 years	Near certain	Medium – Low	FoodHQ has substantial growth aspirations to boost contribution to food sector GDP and the New Zealand economy overall. [72]
FACTORS AFFECTING SUPPLY				
Manawatu Tararua Highway opening[73]	Completion 2024 (Expected)	Near certain	Low	Pre-implementation/ Implementation. Will attract some of the current movements away from the Pahiatua Aokautere Track and Saddle Road route.
Centreport Wellington		Reasonably foreseeable	Medium	There is uncertainty around Centreport land use plans. Centreport land could be utilised for higher value land uses which would mean increased volumes into the Palmerston North inland port.
FACTORS AFFECTING COST				
Rates[74]	2019 (and each following)	Reasonably foreseeable	Low	Palmerston North City Council is proposing that total rates for 2019-20 will increase by 4.4 % – lower than the 5.5% assumed in the 10-Year Plan

[72] Beca. (2019). Tennent Drive: Indicative Business Case
[73] https://nzta.govt.nz/projects/sh3-manawatu/?stage=Live
[74] https://www.Council.govt.nz/news-events/news/proposed-rates-increase-lower-than-forecast/

FACTOR	TIME	PROBABILITY	IMPACT	COMMENTS
				adopted last year. This may have an impact on the allocation of funds for transport projects.
Maintenance of roads	2019 - 2049	Hypothetical	Low	A long-term reduction in LOS for road condition "sweating the asset" will result in reduced ride and surface quality with an increase in temporary speed restrictions and sections undergoing maintenance, this could impact on the efficiency of freight transport
STAKEHOLDERS				
Stakeholders may not represent the full spectrum of stakeholders that will be impacted by the programme.		Reasonably foreseeable	Low/Medium	Some stakeholders are proxy representatives. Depending on programme development specific engagement may be required with some stakeholders.
Impact of perceived problems compared to reality		Near certain	Medium	Imbalance between actual (as determined by evidence base) and perceived (by stakeholders) issues which need to be continually monitored.
ENVIRONMENTAL				
Utilising adjacent environmentally sensitive land		Reasonably foreseeable	Low	There may be some areas of environmental and sensitive land, however at this time the likelihood of impacts is deemed to be low.
Likelihood of a major event impacting the study area and/or alternative routes		More than likely	Low/Medium	SH56 sits within a flood plain for the Manawatu River. The road typically closes 2 to 3 times a year and can be closed for up to 1 to 2 days. SH57 is the main detour route when SH56 is closed, and Fitzherbert Street bridge utilised for access for heavy vehicle traffic. If Fitzherbert Street bridge is also closed the detours required would be significant but this bridge is more resilient to both flooding and earthquake events.
ECONOMY				
Uncertain national and global economic future during, and following the Covid 19 pandemic	Current event. Timeframes unknown. Potential for impact to be medium to long term.	Currently happening, ongoing consequence Near Certain	Medium (Revised down from High as of December 2020)	The COVID-19 event, and its impacts, are still evolving. The duration and ultimate impact may not be known for some time. In terms of programme triggers Covid 19 has the potential to either accelerate or delay programme delivery. Growth related interventions may be delayed if expected residential or commercial development is negatively impacted by the pandemic in the longer term. However, opportunities may arise to accelerate some interventions or packages if they align with economic stimulus funding. Refer Section 10.3 below for further discussion on Covid19 impacts.
Competitiveness of port operations in Wellington and Napier		Reasonably foreseeable	Medium	Uncertain outcomes of competition between ports and future developments and capacities at Centreport.
Global demand for primary industry (agriculture, forestry and others) varies freight volumes on state highways.		Reasonably foreseeable	Low	These may be impacted by world demand and commodity prices.

10.3 COVID-19 IMPACTS

Waka Kotahi have been monitoring the impacts of the COVID-19 pandemic across different regions of New Zealand, including Manawatū-Whanganui. This section provides the summary of the impacts to this region[75].

10.3.1 Social and Economic

Economically, the forecast for the Manawatū-Whanganui region is relatively positive. The main reasons provided for this are:

- The scale of government services, healthcare and social assistance, and manufacturing sectors
- The region is also the country's least reliant on international tourism, with only 17% of tourism spend in the region coming from international visitors. Electronic card spending data, comparing 2019 to 2020, shows that the Manawatu Region and Palmerston North have outperformed national trends[76].
- The proximity of the region to Wellington, whose economy is forecast as relatively stable.

Socially, the commentary indicates that there are (and will be) impacts on employment and communities in the region resulting from the pandemic. These impacts were summarised as:

- Under a *'slower recovery'* scenario the region's employment in 2021 will fall to -5.3%, notably lower than the national average of -6.7%.
- Population growth is expected to slow, at least in the short to medium-term, given the region's reliance on net migration. The region's economic performance comparative to other regions may lead to increased inward internal migration.

10.3.2 Transport

Traffic movements for the year at three surveyed sites[77] all follow a similar pattern – beginning the year with similar volumes to 2019, a significant decrease during the level 4 lockdown and progressive increases in volumes as lockdown levels descended. Since mid May 2020 volumes have generally recovered back to the 2019 levels.

Figure 10-2 demonstrates these trends with a representation of the traffic volumes at the telemetry station on SH57 near Shannon.

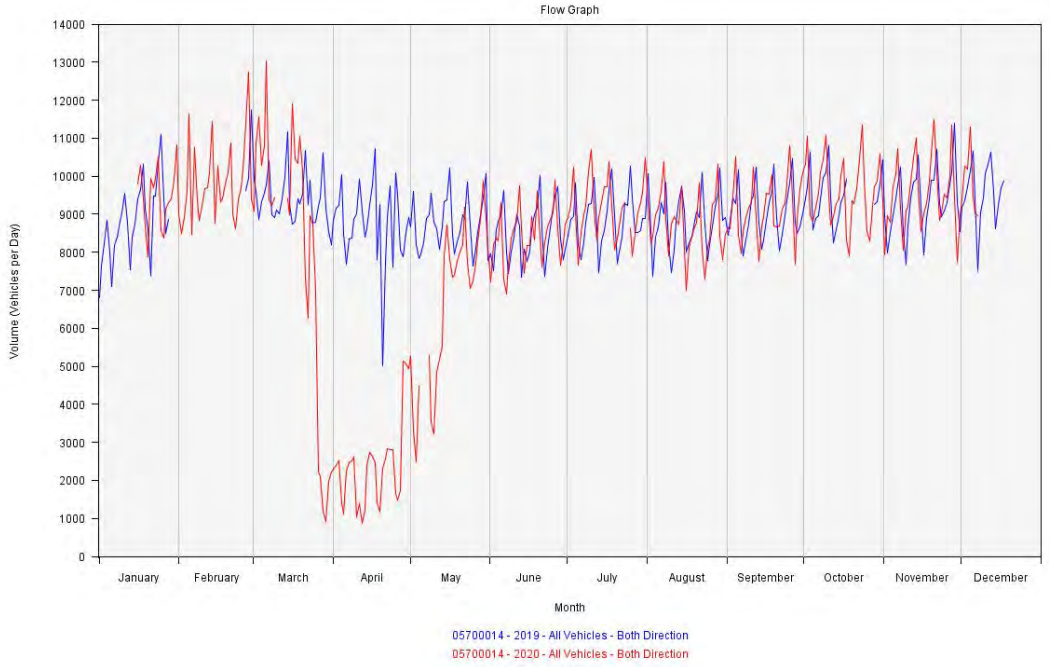


Figure 10-2: Traffic Flow Comparison of 2019 vs 2020 SH57 Shannon Telemetry

[75] Arataki, Waka Kotahi, https://www.nzta.govt.nz/assets/planning-and-investment/arataki/docs/regional-summary-manawatu-whanganui-august-2020.pdf

[76] https://ceda.nz/covid-19-business-support/covid-19-impact-dashboard/

[77] SH57 Shannon Telemetry, SH1/3 Sanson Telemetry, and SH3 Rangitikei Line, Near Flygers Line.

PART B1: PROGRAMME DEVELOPMENT

11 PART B OVERVIEW

Part B of this report maps the path from identifying a broad range of interventions in response to these problems and opportunities through to considering a range of programmes, to identifying a recommended programme.

A process overview flowchart is graphically represented below.

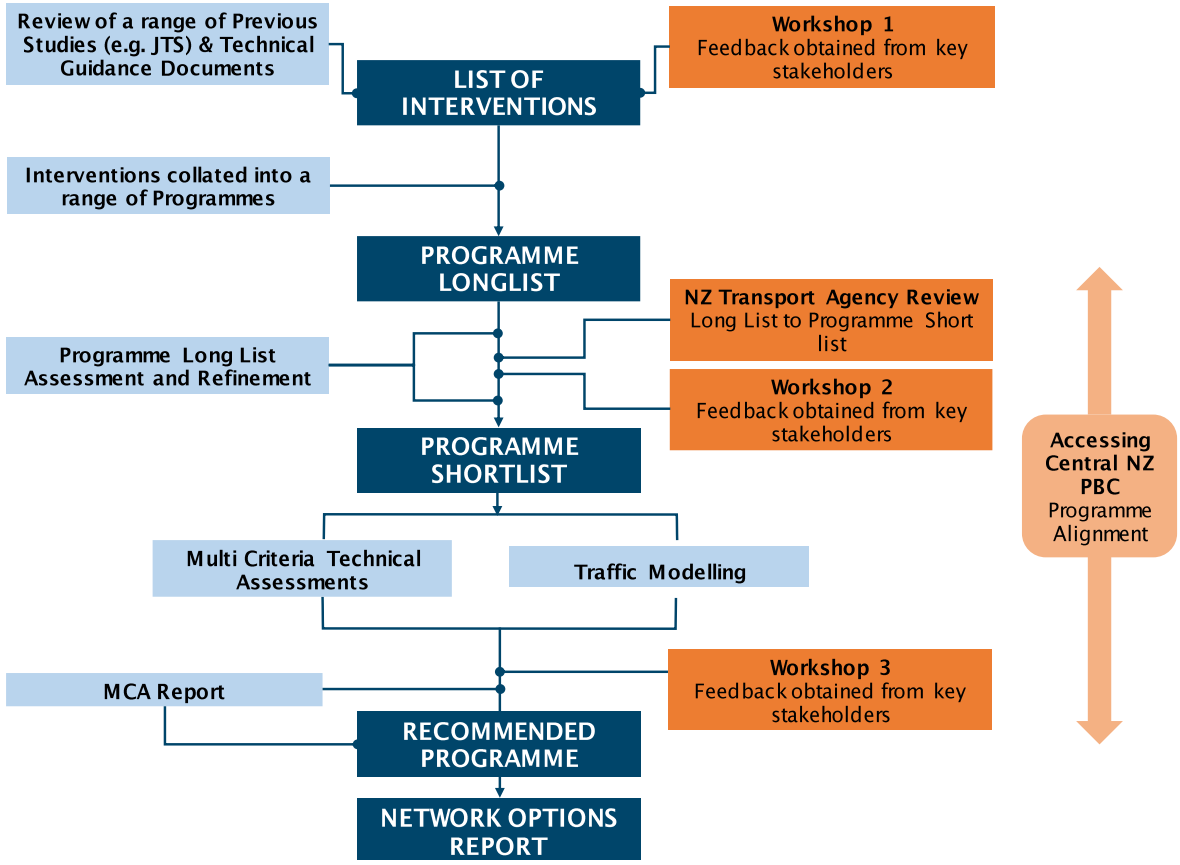


Figure 11-1: Programme Development Process

12 PROGRAMME DEVELOPMENT

12.1 INTERVENTION GENERATION AND ASSESSMENT

In addition to the identification of problems and opportunities, Workshop 1 involved group breakout sessions using large aerial long plots and a range of background information to help identify interventions to address the problems and realise the opportunities.

Interventions identified by stakeholders and workshop attendees included a range of infrastructure and non-infrastructure options and alternatives.

Figure 12-1 and Figure 12-2 below show examples of interventions and constraints identified at the workshop.

Figure 12-1: Workshop 1 Intervention and Constraint Mapping

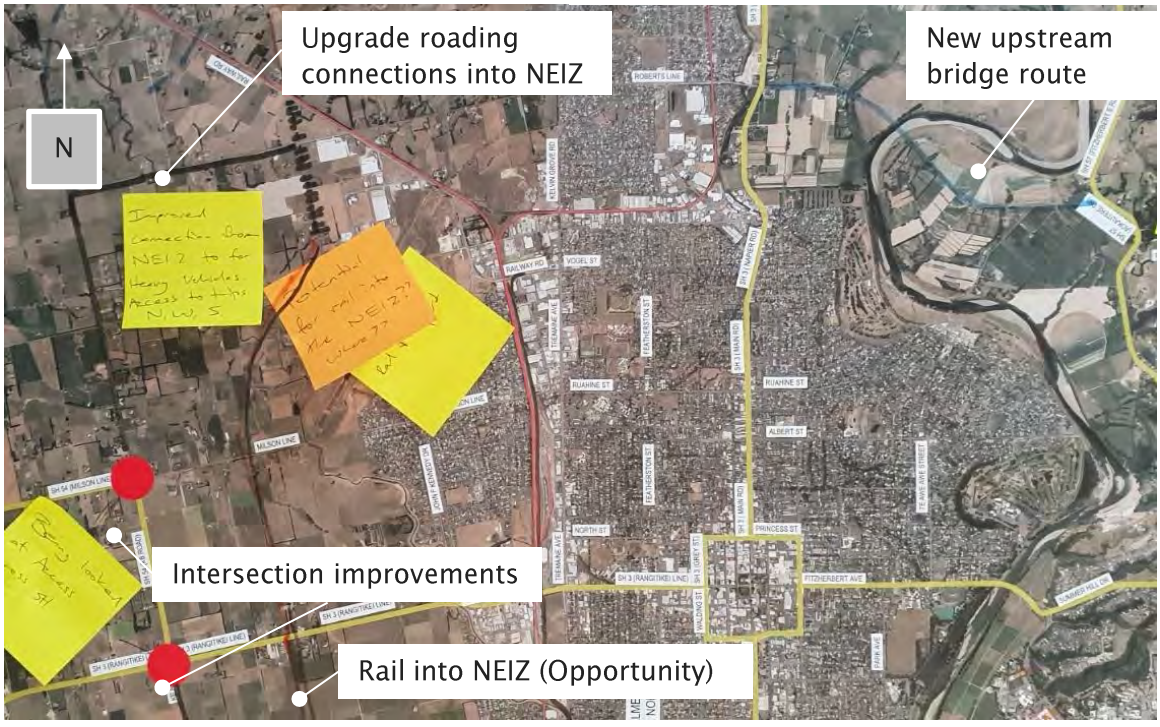


Figure 12-2: Identification of Interventions ranging from upgrading intersections to new road and rail links

Intervention Consolidation and Assessment

Following Workshop 1, the project team began consolidating a longlist of interventions by considering a range of potential alternatives (e.g. road, rail, travel demand management, Intelligent Transport Systems, land use) and options within the alternatives, such as overall road network layouts.

This process was based on ideas from the workshop supplemented with a range of interventions from previous studies, particularly the 2010 Palmerston North-Manawatu Strategic Joint Transport Study (JTS) and more recent business cases[78]. The team also drew on knowledge obtained from discussions with key stakeholders and a range of technical documents and engineering judgement.

Overall, a total of over 150 interventions were identified, ranging from the aspirational (a North Island Main Trunk Line bypass of Palmerston North), through to less ambitious (Speed Management). To capture the widest scope of possibilities the philosophy of "no wrong answers" was adopted; therefore, no matter how unlikely, all interventions identified were listed.

The identified interventions were then arranged into broad intervention categories presented in Table 12-1 and screened by the project team against alignment and potential contribution to addressing the problem areas of Safety, Amenity and Access.

Refer to Appendix E for further detail on the development and initial filter of the interventions.

This process is shown graphically below:

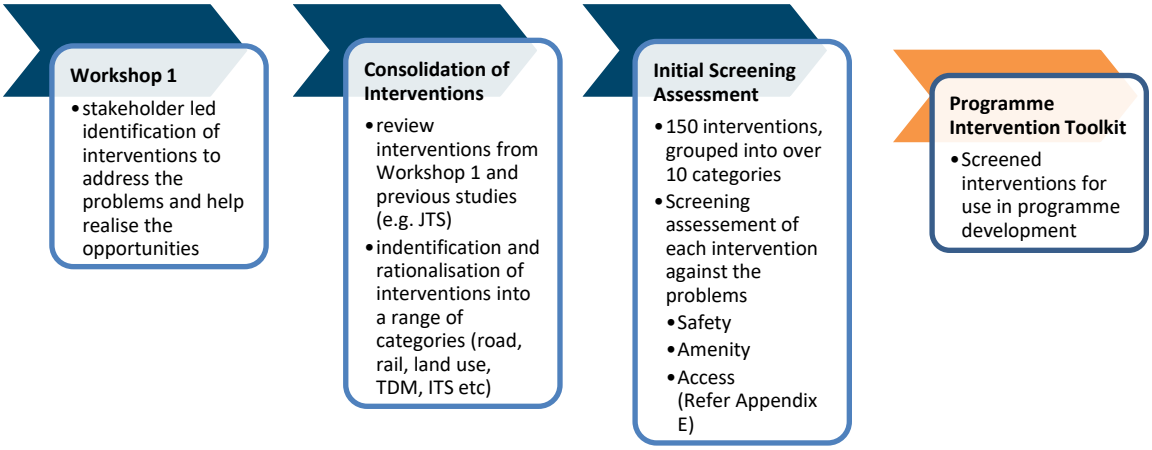


Table 12-1: Interventions Categories

INTERVENTION CATEGORY	EXAMPLE INTERVENTIONS
Physical Works – Road	Intersection works, online upgrades, new roads
Physical Works – Rail	Realignment, new tracks, level crossing improvements
Active Modes	On road and off-road cycle facilities, pedestrian crossing facilities
Public Transport	Bus lanes, incentivisation
Freight	Signage
Intelligent Transport Systems	Adaptive signage control, variable speed limits
Traffic Management	Speed management, enforcement
Trip Management	Communicating multi-modal status
Optimise Capacity	Aid travel planning, manage road space dynamically
Operate Effectively	Supply and demand: manage events
Behaviour Change	Tolling, substitute travel
Land-use Planning / Resource Management	Re-Zoning, structure plans
Other	Air, pipe, water transport

[78] SH3/54 Kairanga Bunnythorpe Road DBC (2018), SH3 Napier Road DBC (2018)

12.2 PROGRAMME THEME DEVELOPMENT

Interventions are less likely to be progressed on their own and are frequently dependent on other interventions, with a multi-modal mix infrastructure and non-infrastructure interventions often required to deliver on outcomes sought.

Based on the outputs of Workshop 1, and consideration of a range of previous work, several programmes to respond to both the identified problems and opportunities were developed, typically arranged around a theme utilising the options in the programme intervention toolkit.

The purpose of this process was to identify a list of programmes for further development and more detailed assessment in the next stage (e.g. traffic modelling).

A range of programmes were developed to ensure that an appropriate range of alternatives were considered (i.e. land use, rail focus, road focus) as well as a range of investment levels. The following paragraphs outline the programme development process:

- **Addressing the problems and responding to the opportunities:**

  First and foremost, it was important to ensure that the programmes address the problems and opportunities. To achieve this each programme was developed to address these issues, and capitalise of opportunities; PNITI seeks to:

  - Investigate options to help give effect to the NOF freight route and develop a blueprint for how the city's transport network can support long term growth.
  - Support the efficient movement of freight now and in the future, including helping to enable the proposed KiwiRail Freight Hub.
  - Establish how best the strike that balance between ensuring that freight can move effectively across the city, without compromising on the liveability of the local streets.
  - Make travel by active and public transport modes more appealing.

- **Thematic and Balanced Programmes**

  Programmes were developed through either a 'top down' and 'bottom up' approach, with each approach including consideration of how investment in certain areas would address the problems and achieve the investment objectives.

  - Top down (or thematic) programmes included the non-infrastructure focussed 'Land Use' and 'Safer Speeds' programmes, where a selection of interventions was chosen (from the pool of over 150 interventions) based on their fit and contribution to the overall programme theme.
  - In contrast, the 'bottom up' approach considered which interventions, across the range of intervention categories, would collectively address one or more of the problems or achieve the investment objectives (for example, the 'targeted infrastructure' and 'access and accessibility' programmes).

- **Regional Freight Ring Road Programmes**

  In addition, based on a range of previous studies, principally the JTS, several 'Ring Road' programmes were also developed, focusing on largely on on-line roading infrastructure improvements to form a partial or full ring road around Palmerston North. These programmes respond to above pressures, as well as a commitment made by Waka Kotahi, as part of the Te Ahu a Turanga project, to advance "investigations for a Regional Freight Ring Road, including a second road bridge across the Manawatū River"[79].

- **Programme Assumptions**

  - The programmes were developed to show future state. The timing and staging of interventions were not considered at the long list programme stage.
  - The programmes and content were indicative only; for example, new routes and bridge locations were indicative and to be determined at a later stage.

[79] 16 March 2018, https://www.nzta.govt.nz/media-releases/preferred-option-for-sh3-manawatu-gorge-replacement-announced/

- The programmes did not include interventions that are covered by other investments (and therefore the costs and benefits of these are allocated elsewhere). These items, along with the rationale, is discussed further in Section 12.3 Other Interventions .

It is noted that there are almost limitless programme combinations due to the number of interventions identified. Therefore, programme themes and interventions were circulated to stakeholders for comment in advance of Workshop 2, noting that the programmes were able to be reviewed, challenged and adapted by stakeholders at the workshop.

Programme Long List

A summary of the programmes is presented in the following sections. Table 12-2 presents the programme themes, the types of interventions included in each programme along with the level of investment/ focus required for each intervention.

A visual summary of each of the programmes, outlining scope and key interventions, is provided in Table 12-3.

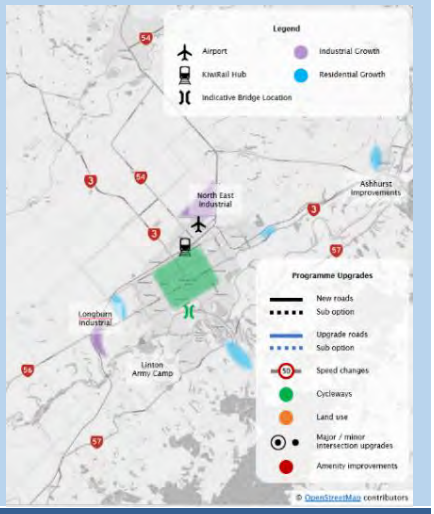
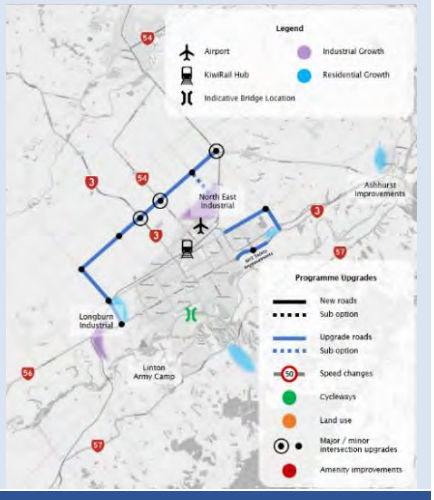
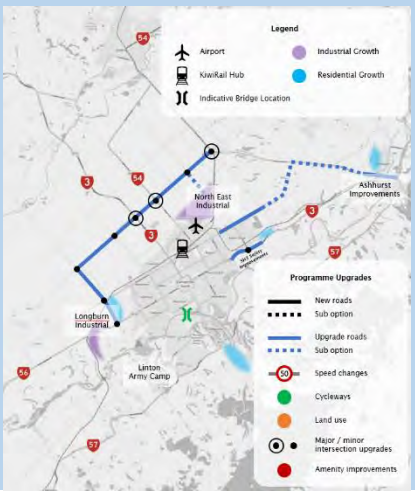
Further detailed information on each of the programmes is provided in **Appendix E**. This appendix contains the one-pagers that were provided to stakeholders and included a visual summary of the programme contents along with a summary of the risks, constraints and dependencies.

Level of Investment /Focus	Key
No Investment	×
Minor	e.g. LCLR
Moderate	✓
Significant	✓✓

Table 12-2: Programme Intervention Summary

Intervention Category	Do Min	Immediate Problems	Non-Infrastructure Focus		Regional Freight Ring Road Focus			Investment Objective focus		
		Targeted Infrastructure	Land Use	Safer Speeds	Partial Ring Road with Upstream Bridge	Partial Ring Road with Downstream Bridge	Full Ring Road with Two Bridges	Access and Accessibility	Safety	Amenity
	1	2A / 2B	3	4	5	6	7	8	9	10
Land Use	×	×	✓✓	×	×	×	×	×	×	×
Rail Infrastructure	KiwiRail parallel investigations									
Public Transport	✓	Included in DM e.g. Horizons/PNCC Bus Review improvements								
Safety Infrastructure	LCLR	✓	LCLR	✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓
Speed Management	PNCC	PNCC	PNCC	✓✓	PNCC	PNCC	PNCC	PNCC	✓	✓
Walking and Cycling	✓	Included in DM e.g. Urban Cycling Master Plan implementation								
Amenity Improvements	×	×	×	×	×	×	×	✓	×	✓✓
Network Online Upgrades	×	✓	×	✓	✓	✓✓	✓✓	✓✓	✓✓	×
New links/ bypasses Infrastructure	×	×	×	×	✓	✓	✓✓	✓	×	✓

Table 12-3: Programme Long List Summary

#	PROGRAMME /SCOPE		SCHEMATIC
1	**Do Minimum / Programme 1**		
	Purpose • Continued maintenance and operations • Committed and funded projects	**Key Projects** • Committed projects such as a staged roll out of the Palmerston North City cycle improvements • Ashhurst improvements • Manawatu Gorge tie-in (est. 2024/25 opening) • Ongoing low-cost low-risk (LCLR) improvements • Improved connections to the new walking and cycling bridge near Massey	
2A	**Targeted Infrastructure**		
	Purpose This programme improves selected infrastructure in a targeted manner that addresses existing online issues such as narrow bridges and carriageways on key sections of the existing freight network which contribute to the Safety, Access and Amenity issues.	**Key Projects** • Programme includes Do-Min elements. **Online upgrade** (seal widening and bridge replacements) of: • Kairanga Bunnythorpe Road, including intersection improvements at SH3/54 and SH54/Milson Line • No 1 Line, Longburn Rongotea Road (from SH56 to Bunnythorpe) • Upgrade of Kelvin Grove and connecting roads (via Stoney Creek Road). • SH3 Napier Road Safety improvements	
2B	**Targeted Infrastructure**		
	Purpose Similar to 2A, this programme also improves selected infrastructure in a targeted manner but includes a different access to the city from the east.	**Key Projects and Differences** • This programme differs from Programme 2A in that it upgrades the eastern access via Ashhurst Road rather than via SH3 to reduce pressure on side road access to SH3.	

3 LAND USE (NON-INFRASTRUCTURE)

Purpose

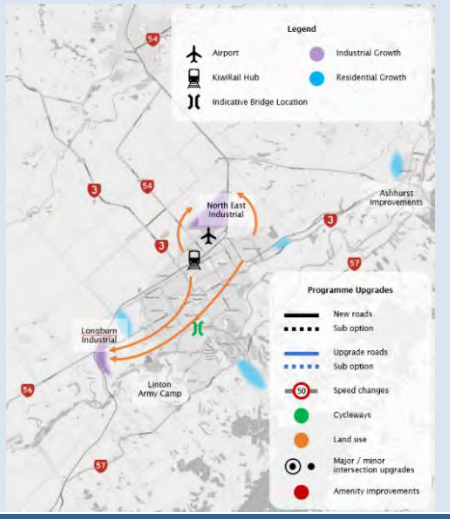
This programme is aimed at shifting industrial land uses into areas which can be more easily serviced by existing and future transport connections.

Key Projects and Differences

- Programme includes Do-Min elements.
- Programme does not include any specific infrastructure elements

Land use changes over time include;

- Kelvin Grove changes to residential
- Tremaine retains commercial but transitions away from industrial
- NEIZ and Longburn expanded



4 Safer Speeds

Purpose

This programme adopts an approach of using safer speed tools to improve safety and encourage freight to use identified routes rather than residential areas.

Key Projects and Differences

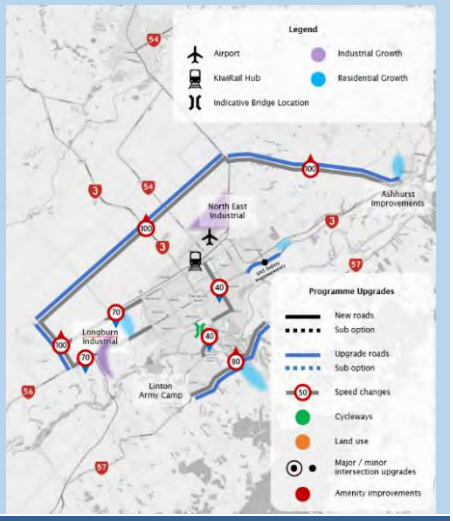
- Programme includes Do-Min elements but doesn't include land use changes

Online upgrades (Engineering up to arterial standard) on:

- Kairanga Bunnythorpe Road and No1/Rongotea Road between Longburn and Bunnythorpe
- Ashhurst Road
- SH57

Reducing speed limits on:

- Number 1 Line,
- Pioneer Highway;
- Residential streets such as Te Awe Street.



5 Partial Ring Road with Upstream Bridge

Purpose

This programme is based on providing a partial ring road that connects SH3 and Bunnythorpe with SH57 via an upstream bridge.

Key Projects and Differences

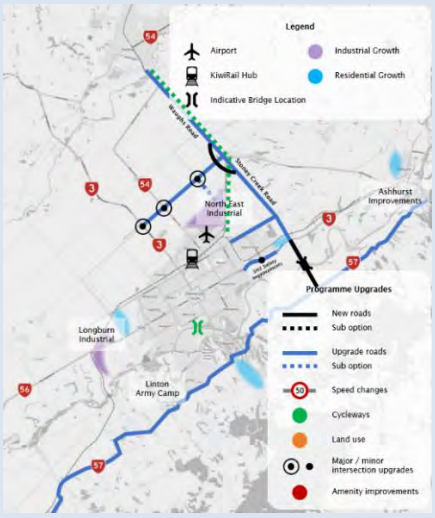
- Programme includes Do-Min elements but doesn't include land use or speed reductions.

Online upgrades

- Online upgrades (widening, bridge replacements and intersection imp) on Kairanga Bunnythorpe Rd, Waughs Rd, Stoney Creek Rd and SH57 to arterial standard, including intersection upgrades KB Road.
- Off-road shared path between Feilding and Palmerston North

Bypasses/New Links

- Bunnythorpe bypass
- New upstream crossing of the Manawatu River connecting SH57 to Bunnythorpe



6 Partial Ring Road with Downstream Bridge

Purpose

This programme is based on providing a partial ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and SH57 via a downstream bridge

Key Projects and Differences

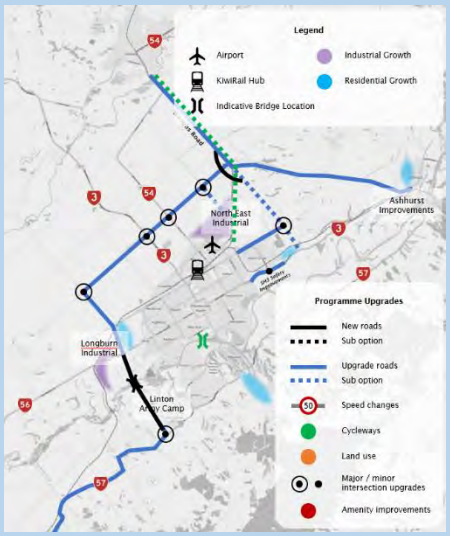
- Programme includes Do-Min elements but doesn't include land use or speed reductions.
- Similar to Programme 5, but different bridge location

Online upgrades

- Online upgrades (widening, bridge replacements and intersection improvements) on Kairanga Bunnythorpe Rd/ Longburn Rongotea Rd between Bunnythorpe and SH56, Ashhurst Road, Waughs Rd and SH57 south of Linton.
- Off-road shared path between Feilding and Palmerston North

Bypasses/New Links

- Bunnythorpe bypass
- New downstream crossing of the Manawatu River connecting SH57 to Bunnythorpe



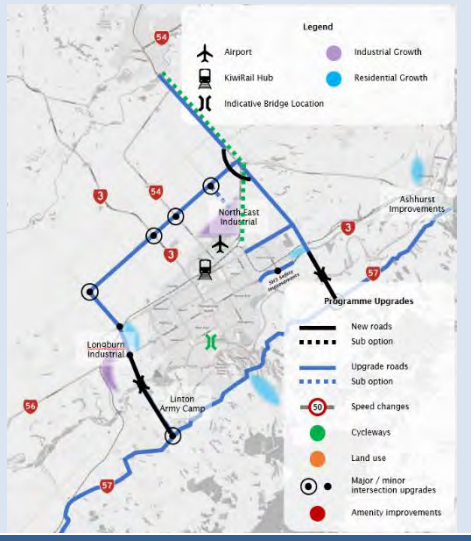
7 Full Ring Road with Two Bridges

Purpose

This programme includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city

Key Projects and Differences

- Programme includes Do-Min elements but doesn't include land use or speed reductions.
- This programme combines the improvements from Programmes 5 and 6 with network wide upgrades including two additional crossings of the Manawatu River.



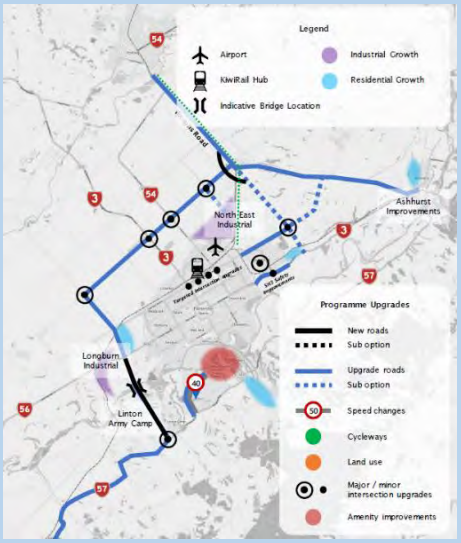
8 Access and Accessibility

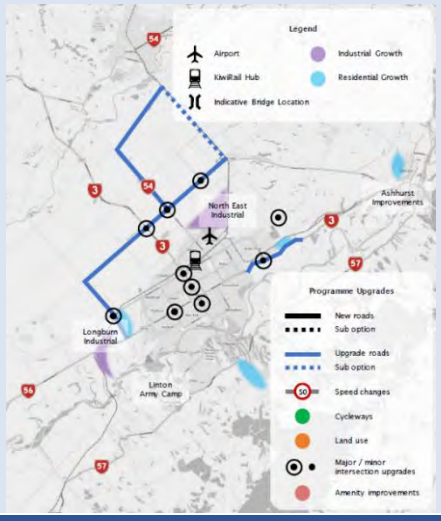
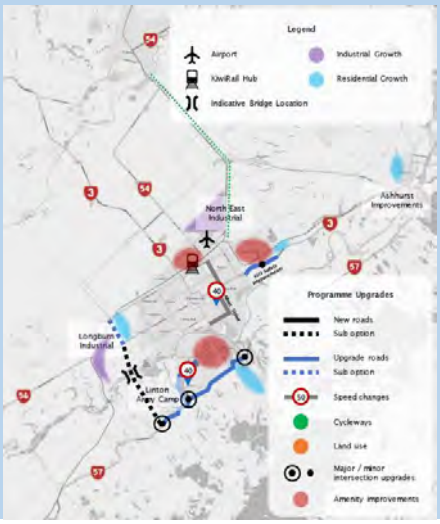
Purpose

A programme that focusses investment on achieving the access and accessibility investment objective

Key Projects and Differences

- Programme includes Do-Min elements but doesn't include land use or speed reductions.
- Similar to programme 6 (Partial ring road with downstream bridge) but with additional treatments at key freight intersections.



9	SAFETY		
Purpose • A programme that focusses investment on achieving the safety investment objective • The programme addresses High Risk Rural Roads, High Risk Intersections, known pinch points and implements safer speeds.	**Key Projects and Differences** • Programme includes Do-Min elements and safer speeds (building on Programme 4) but doesn't include land use changes. • Intersection safety improvements at e.g. SH3/Kairanga Bunnythorpe Road, Stoney Creek / Kelvin Grove, No 1 Line / Longburn Rongotea Road • Corridor safety improvement at e.g. Ashhurst Road and SH57. • Addresses pinch points • Safer speed tools such as reducing speed in urban streets such as Te Awe Awe Street	
10	**Amenity**		
Purpose • A programme that focusses investment on achieving the amenity investment objective by focussing on land use, safer speeds and a downstream bridge.	**Key Projects and Differences** • Programme includes Do-Min elements with some land use changes and safer speeds • Changing Kelvin Grove from industrial to residential, expanding NEIZ and Longburn, and Tremaine Avenue to become commercial but not industrial (or possibly residential) • Reducing the speed limit at Te Awe Awe Street and Albert Street. • Downstream bridge to remove traffic from the CBD	

12.3 OTHER INTERVENTIONS

The programmes were developed to respond to the access, safety and amenity issues which primarily relate to freight access in and around Palmerston North.

Interventions that were found to have limited alignment to achieving the investment objectives or the programme themes were not included in the programmes.

Many other interventions are already being investigated or implemented through separate but inter-related packages or initiatives across the key investment partners, and therefore the benefits cannot be claimed here. Accordingly, these were also not directly included in the programmes.

However, it is recognised that some of these elements will be essential to the overall success of any programmes developed as part of PNITI (and a wider an integrated multi-modal network). These important inter-relationships are discussed further in Part C of this report.

Rail Infrastructure and Service Improvements (KiwiRail, Horizons Regional Council, Greater Wellington Regional Council)

- **KiwiRail Freight hub** – as discussed in Section 2.3.5, KiwiRail are investigating the re-location of the current freight terminal from Tremaine Avenue to the outskirts of the city to cater for, and drive, future growth in rail freight mode share. The freight hub relocation includes consideration of both road and rail network infrastructure changes and is therefore both a significant opportunity and key dependency for the PNITI programme.
- **Long distance rolling stock** – considered under a separate business case undertaken by Greater Wellington Regional Council. Additional rolling stock would improve public transport capacity and inter-regional connectivity.

Public Transport improvements

- A number of different activities are occurring in this space, including, but not limited to the Horizons bus review, Feilding to Palmerston North review, long distance rolling stock business case, Wellington Regional Rail Plan, Capital connection review, Main street terminal. All of these are currently underway and none of them are expected to have a significant impact on addressing the problems identified.
- As stated by the Joint Transport Study “even with the prospect of a 50% increase in bus passenger numbers, the resulting change to traffic volumes would be modest and of the order of 1-2%, and not of a level to influence the strategic preferences and recommendations of this study.”

Walking and Cycling

- The Council’s Urban Cycling Masterplan rollout is included in the do-minimum programme.
- Any further specific projects are unlikely to significantly address the identified problems.
- Nevertheless, many of the individual projects identified should include widened road corridors to improve provision for cyclists

Signage/Intelligent Transport Systems/Technology

- It is important that these elements are considered under each individual intervention, however there is no perceived need to have a wider roll out. Nevertheless, this should be reviewed in five years’ time due to rate of technological change and potential for disruption.

Council’s existing programmes

- Council have existing programmes of work which have not looked to be replicated as part of this study; however, the development of the recommended programme will be cognisant of existing programmes in the Long Term Plan and 2018 AMP (for example, the Primary Freight Route Programme).

Travel Demand Management, Parking and Travel Planning

- A number of TDM, parking and travel planning activities are already being undertaken by Horizons and Council. Whilst a vital part of any city’s transport programme, many TDM elements

are not appropriate tools to manage the freight issue this study is looking to address. However, some elements are included such as Land Use changes.

The above interdependencies and wider considerations will be reviewed and re-visited during the recommended programme development and assessment.

12.4 LONG LIST PROGRAMME EVALUATION

The ten programmes were assessed against a range of criteria consistent with the intervention screening. The longlist criteria are outlined below and also presented in Figure 12-3:

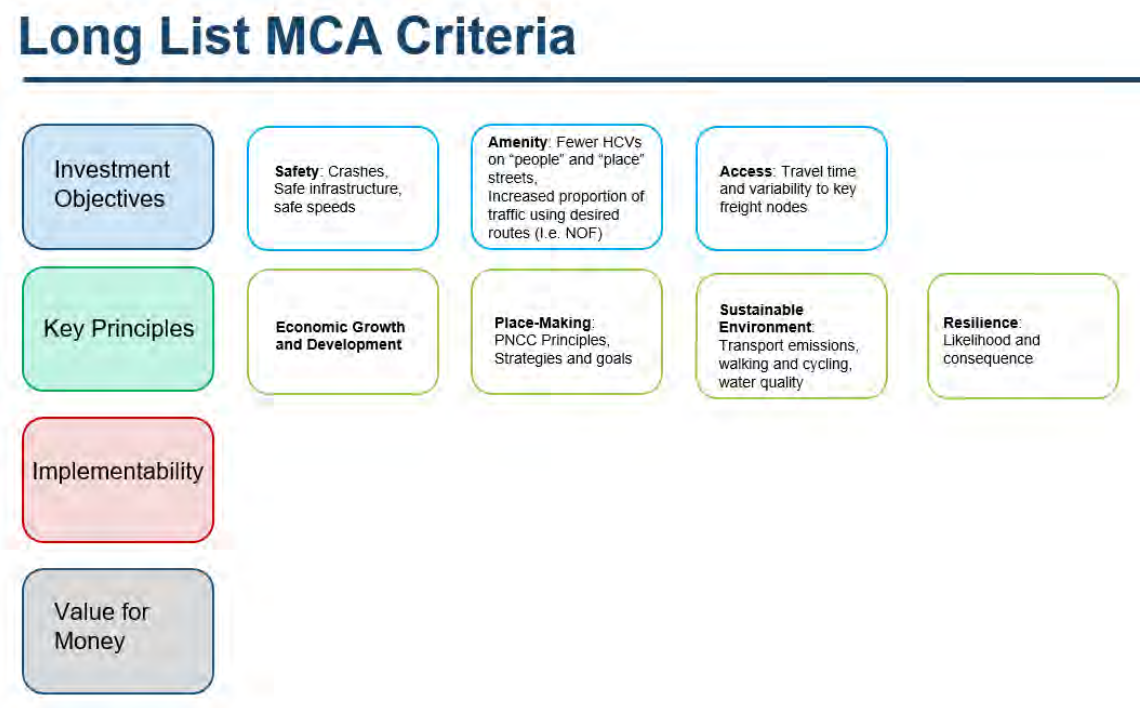


Figure 12-3: Long List MCA Criteria

The programme level assessment was carried out for above criteria based on both an 'engineering judgement' and 'sum-of-the-parts' approach. The 'engineering judgement' approach consisted of each programme being assessed holistically by the project team, while the 'sum-of the-parts' assessment approach was based on the aggregate, range or weighted performance of each of the constituent interventions against the various criteria (for example, 'Safety' considered crashes, safe infrastructure and safe speeds as separate sub-criteria).

The Do Minimum was used as the baseline for the programme assessment i.e. a neutral score for the majority of the criteria. Programme scoring was undertaken using a 7-point scale, ranging from +3 (major benefit) to -3 (major disbenefit). This scoring system is consistent with Transport Agency guidance and the parallel ACNZ PBC MCA process.

During the programme level assessment, several additional considerations for each programme were collated and evaluated as appropriate, including:

- Alignment with the KiwiRail Freight Hub: based on the three emerging potential sites of Longburn, NEIZ and North of Bunnythorpe
- Alignment with the emerging Accessing Central NZ PBC programme options
- Other inter-dependencies (e.g. Council business cases)
- Other key impacts, risks and constraints (e.g. transmission line infrastructure)

12.4.1 Programme Assessment Outcomes

The 10 programmes were assessed by the project team using the criteria presented above, with the results of the evaluation presented in Table 12-4 below.

Table 12-4: Programme Long List Evaluation

	INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
	Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
P1 Do Min	0	-1	-1	0	1	1	-1	0	2
P2A Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P2B Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P3 Land Use	0	1	1	1	1	0	-1	-1	0
P4 Safer Speeds	2	1	1	1	1	1	1	-1	2
P5 Partial RR - Upstream	2	1	1	2	1	0	3	-2	1
P6 Partial RR - Downstream	2	2	2	3	2	1	3	-2	2
P7 Full RR inc. two bridges	2	2	2	3	2	1	3	-3	1
P8 Access & Accessibility	2	2	3	3	2	1	3	-2	2
P9 Safety	3	1	1	1	1	1	1	-2	3
P10 Amenity	1	2	1	1	2	1	3	-2	2

The assessment showed that:

- Alignment to the Investment Objectives and Key Principles:
  - Programmes 1-5 result in limited performance against the amenity and access investment objectives and the majority of the key principles – scoring a 1 or less (minor benefit).
  - Programme 6,7 and 8 demonstrate that significant access improvements, enable better amenity outcomes (i.e. providing network upgrades to enable route choice, results in de-tuning opportunities for amenity benefits)
  - The majority of programmes, with the exception of the Do Min programme and Land Use, performed well against the safety investment objective – demonstrating that improvements in safety outcomes can be delivered through a range of approaches (i.e. speed management or network infrastructure upgrades)
  - All programmes were assessed to have limited overall sustainable environment benefits, which considered a reduction in transport emissions, improvements to water quality and improvements to walking and cycling. Although several programmes would help enable growth in active modes by removing traffic from city streets.
  - Economic growth and resilience outcomes were achieved by programmes with a focus on improving access, typically including a range of network online upgrades and new bridges to unlock benefits.
- Implementability and Value for Money
  - The Implementability criteria considered three sub criteria: affordability, consentability and construction. Programmes with significant online upgrades, bypasses and new bridges scored poorly while programmes with lower levels of construction scored better.
  - Value for money was assessed qualitatively on a relative programme-to-programme basis, as BCRs were not developed. Lower cost programmes targeting key access issues or safety issues were considered to score well in terms of return on investment whist programmes including lead infrastructure were scored lower.

In addition to the criteria above, each of the programmes was also assessed in terms of their alignment with parallel projects; KiwiRail hub location and Accessing Central New Zealand Programme Business Case.

The results of this assessment are provided in Table 12-5.

Table 12-5: Programme Alignment Evaluation

	KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
	LONG-BURN	NORTH EAST INDUS-TRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORI-TISATION	P5 SAFE AND PREDICT-ABLE TRAVEL	P6 MAJOR NETWORK IMPROVE-MENTS
P1	L	L	L	L	L	L	L	L	L
P2 A	M	M	L	M	M	M	M	M	M
P2 B	M	M	L	M	M	M	M	M	M
P3	L	L	L	L	L	M	M	M	M
P4	L	L	L	M	M	M	M	M	M
P5	L	H	H	M	M	M	M	M	M
P6	H	H	H	M	H	H	H	H	H
P7	H	H	H	M	H	H	H	H	H
P8	H	H	H	M	H	H	H	H	H
P9	L	L	L	M	M	M	M	M	M
P10	M	L	L	L	L	M	M	M	M

- **Accessing Central NZ PBC**: The majority of programmes, apart from the do-minimum, had at least a medium alignment with the ACNZ programmes, assessed on the basis of if the improvements proposed by the programmes made logical sense given the wider PBC programme intent and schematic maps.
- **KiwiRail:** Prior to Workshop 2, the KiwiRail Regional Freight Hub project was assessing a long list of sites either side of the rail line around Longburn, the North East Industrial Zone/Railway Road and between Bunnythorpe and Feilding.
    - Several programmes had limited alignment to two or more of the potential KiwiRail hub locations, due to the lack of direct network upgrades to support the re-located site. E.g. Programme 3 land use, without accompanying interventions, would not directly support any of the siting options.
    - Programme 2 (Targeted Improvements) had a medium alignment to both to the Longburn and North East Industrial sites, due to online network upgrades from Longburn to Bunnythorpe.
    - Programmes 6, 7 and 8 were considered to have a high alignment as they contained a range of network wide infrastructure upgrades to support all siting options. Programme 5 (partial ring road with an upstream bridge) was considered to support the North East and North Bunnythorpe sites but a lower alignment to a site in Longburn.

12.4.2 Workshop 2: Longlist to Short List

The second facilitated workshop with stakeholders was held on the 23rd of October 2019[80].

The purpose of this workshop was for stakeholders to review, comment and challenge the development and assessment of the programme longlist with the aim of reaching a consensus on a shortlist of programmes to develop further.

The Workshop 2 agenda, presentation and post workshop pack is provided in Appendix E.

Workshop 2: Initial Programme Short List

Each programme was presented to the workshop attendees and discussed in terms of its approach, the component options which make up the programme, and outcomes from the assessment.

The attendees then participated in a facilitated discussion, with particular consideration of the questions:

- Which programmes do not contribute enough to the Investment Objectives or Key Principles?
- Which programmes should be short listed?
- Which programmes do not need to be considered further?

It was identified early in the discussion that Programme 6 (Partial Ring Road with Downstream Bridge), Programme 7 (Full Ring Road with two bridges) and Programme 8 (Access and Accessibility) were the only programmes to score well across all investment objectives and key principles. It was noted that Programme 8 was very similar to Programme 6, and both did not need to be brought forward to the short list.

Questions were asked as to why Programme 5 (Partial Ring Road with Upstream Bridge) did not perform as well against the investment objectives. The project team confirmed that this was due to the lower uptake in use of the upstream bridge[81] taking fewer vehicles away from the city centre (compared to the downstream bridge) and therefore not significantly improving amenity or access.

The participants felt that no other programme by itself adequately addressed the investment objectives. However, there were interventions within these programmes which could be beneficial; these are discussed below.

- **Programme 2 (Targeted Infrastructure):** stakeholders noted that both the targeted infrastructure programmes (2A/B), focusing on addressing key existing issues such as bridge restrictions, could form the first stage of a broader package of works (linking with Programme 6 specifically mentioned); however, this programme alone was not considered to be an appropriate future network.
- **Programme 3 (Land Use):** The land use programme was aimed at shifting industrial land uses into areas which can be more easily serviced by existing transport connections. The stakeholder group agreed that land use changes, over the longer term, were required as part of any programme but on its own would not deliver on the investment objectives.
- **Programme 4 (Safer Speeds) and Programme 9 (Safety):** Stakeholders agreed that a range of speed management and safety improvements were required across the network to both address high-risk areas and help de-tune other routes (i.e. Improve safety and encourage freight to identified routes, and away from residential areas). The majority of interventions identified were already included (in some form) in other programmes and the safe system philosophy would be embedded into any shortlisted programme.

[80] The Transport Agency commenced the Accessing Central NZ Programme Business Case and the Palmerston North Integrated Transport Improvements business cases in 2018, with an initial workshop held in August. Since the initial workshop KiwiRail began investigating a rail freight hub and this has a strong relationship to the NZTA business cases. As a result, there has been a longer than usual time between workshops whilst the programmes were brought into closer alignment so that the benefits of an integrated planning approach could be achieved.

[81] Based on previous modelling undertaken by as part of the SH3 Manawatu Gorge project, a scenario with the preferred Gorge Route (Option 3) and an upstream bridge was demonstrated to attract fewer than 3,900 vehicles per day in 2031. In comparison, the preferred Gorge Route with a downstream bridge only was forecast to attract over 6,300 (an increase of over 60%) (Source Manawatu Gorge Options, Beca, 2018)

- **Programme 10 (Amenity):** The Amenity programme was assessed as having limited alignment to the Safety and Access investment objectives, with stakeholders recognising the need to supplement the programme with other targeted wider network upgrades.

Accordingly, it was suggested that a new programme be created that excluded a new Manawatū River Bridge but included a wide range of interventions from the other programmes which together may be able to provide appropriate contribution to the investment objectives.

As a result, the programmes that were taken into the second part of the workshop were:

- Programme 6 (Partial Ring Road with Downstream Bridge);
- Programme 7 (Full Ring Road with two bridges); and
- Programme 11 (New programme upgrading existing infrastructure)

Workshop 2: Further Programme Short List

The remaining programmes were considered in further detail during breakout sessions, where smaller groups had the opportunity to review each programme to include key elements from the land use, amenity, safer speeds and safety programmes.

For the existing programmes:

- Should any projects be added or deleted from the programme?
- Does the assessment undertaken by the project team feel right?
- What are the dependencies for this programme?
- What are the major risks for this programme?
- Is it a programme that should be on the final shortlist?

For the new programme:

- What are the interventions that should be included in the new programme

The discussion resulted in with amendments to the each of the short listed programmes.

Following the breakout session, another facilitated group discussion was undertaken, focusing on key feedback and comments on each of the remaining programmes to incorporate as part of the Short List Programme Development, presented in Section 13 below.

13 SHORT LIST PROGRAMME DEVELOPMENT

The next step in the process was to adjust the shortlisted programmes (Programmes 6, 7, and 11) to include Workshop 2 feedback and then undertake further detailed assessment to present to stakeholders at Workshop 3.

13.1 SHORT LIST OPTIONS

As outlined in Section 12.4.2, Workshop 2 effectively refined down 10 programmes to a shortlist of three based on a review of nine criteria including performance against the investment objectives, impacts and the ability to deliver the programmes.

All three programmes featured several common interventions, such as speed management, land use changes (e.g. the longer term relocation of several industrial areas to the city outskirts) and online route upgrades to help give effect to the identified freight route (e.g. the upgrade of the Kairanga Bunnythorpe Road).

Appendix G contains the MCA Report, which includes the MCA Workshop 2 summary and the short list programme one-pagers outlining further details around options, outcomes, risks and dependencies.

13.1.1 Short List Programme Options

The shortlisted programme schematic maps are presented in Figure 13-1 to Figure 13-3.

- **Programme 6** – a comprehensive programme including a partial ring round around Palmerston North with a new southern bridge.
- **Programme 7** – a comprehensive programme including a full ring road around Palmerston North with both an upstream and downstream bridge.
- **Programme 11** – a programme focused on upgrading the existing infrastructure, including bypasses at Ashhurst and Bunnythorpe but with no additional Manawatu River Bridge.

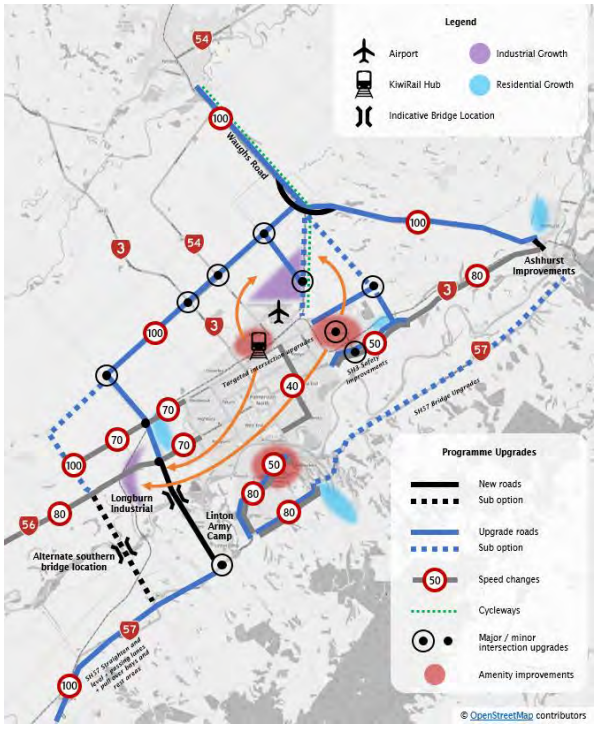


Figure 13-1: Programme 6 proposed interventions

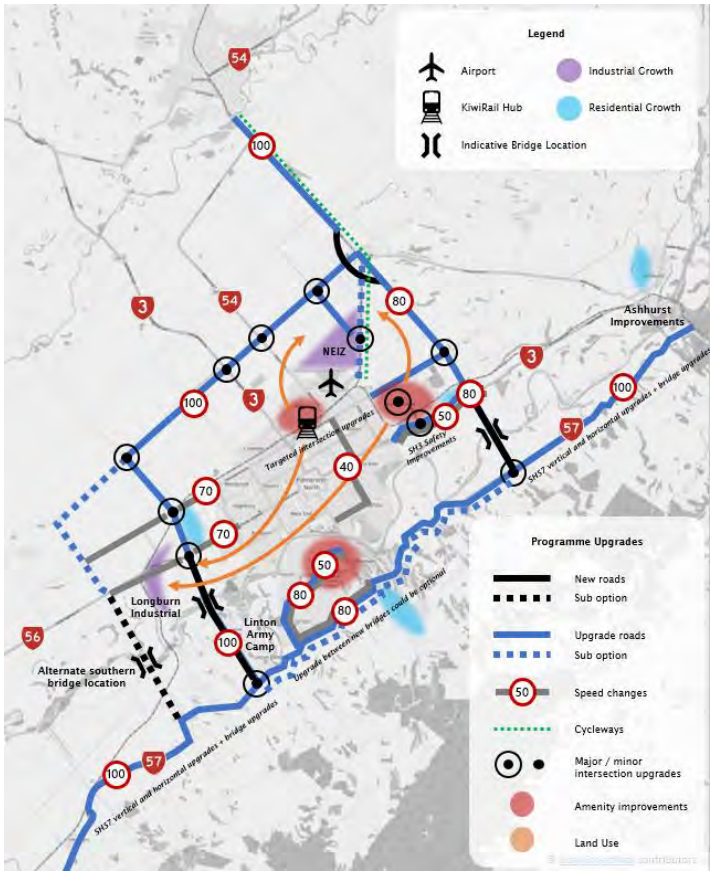


Figure 13-2: Programme 7 proposed interventions

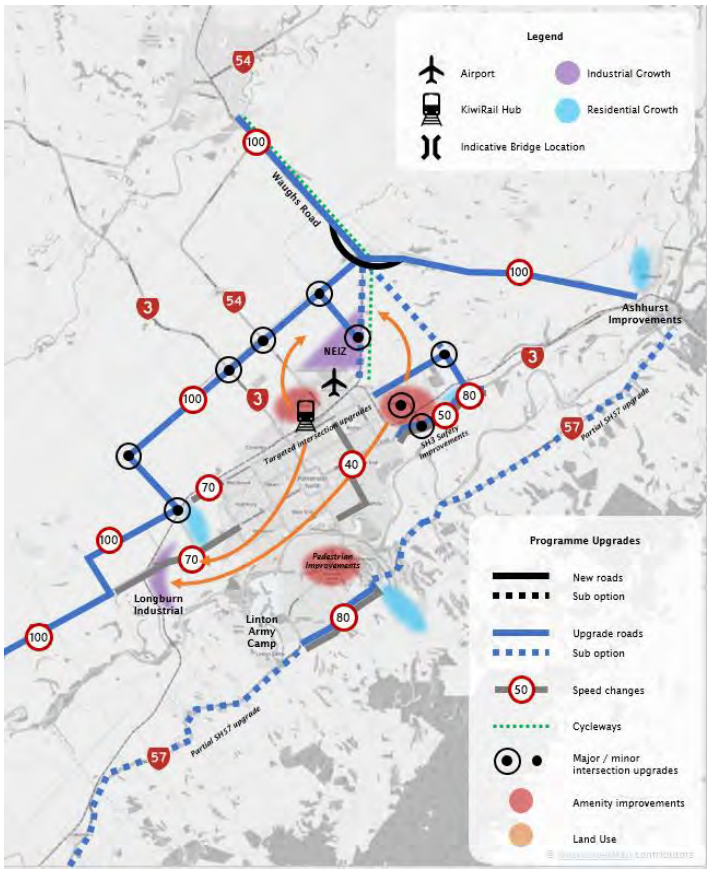


Figure 13-3: Programme 11 proposed interventions

13.2 TRAFFIC MODELLING

The three shortlist programmes were modelled using the PNATM, for a 2031 future year, focusing on interventions within the programme that can be reflected in a strategic model. These improvements related to online corridor and intersection upgrades, new links and speed changes.

The purpose of modelling the short listed programmes was to inform the key performance indicators for the investment objectives and provide inputs into several of the MCA criteria discussed in the Section 13.3 and the shortlist economics.

As outlined in the model review (Section 6.2), recent population growth has outpaced model projections. However, due to delays with Census 2018 information coupled with Council noting that Infometrics updated population and employment forecasts would only be available in mid-2020, model forecasting updates were not able to be incorporated in time for Workshop 3 in December 2019. To counter this uncertainty, a range of sensitivity testing was undertaken as part of the economic analysis, including a scenario with growth occurring 10 years earlier than forecast (i.e. the impact of 2041 modelled demands occurring in 2031).

13.2.1 Modelling Results

A summary of the outputs of the traffic modelling is provided below, focusing on changes in traffic flow between the each of the programme options compared to the do-minimum network in 2031.

Further modelling information relating to Levels of Service, total flows, travel times and network stats is provided for each of the programmes in Appendix F.

Flow Difference

Total daily flows for the 2031 base network and flow difference plots for Programme 6,7 and 11 are presented in Figure 13-4 to Figure 13-8 below.

- For the 2031 base network total daily flows, darker green and red indicate higher flows.
- For the flow difference plots, links in green indicate an increase in volume with red indicating a reduction in flow, whilst the thickness of the band represents the scale of flow change.

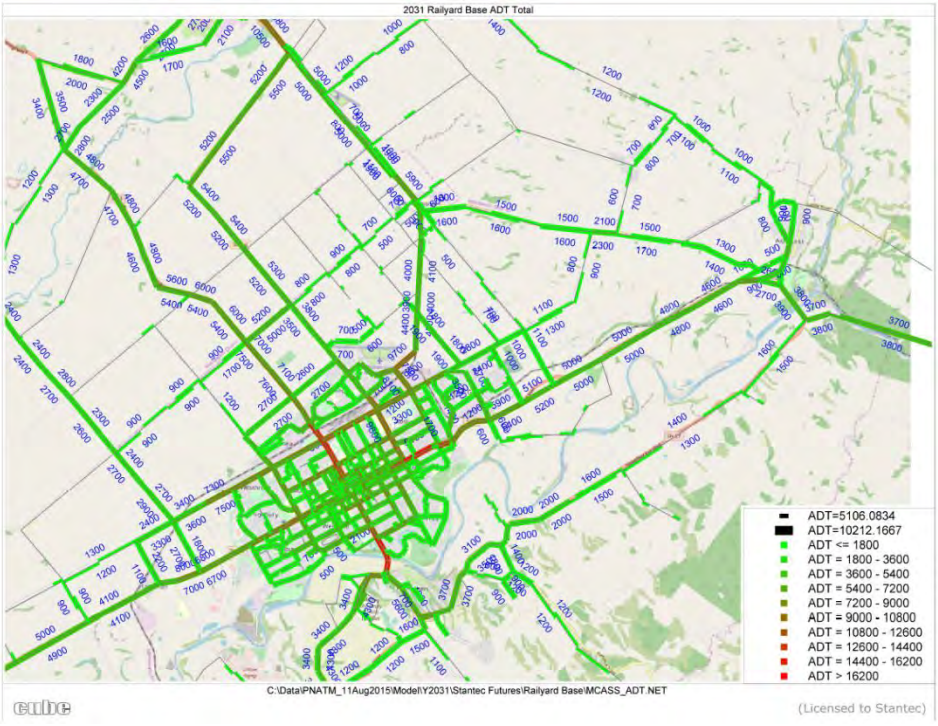


Figure 13-4: Base 2031 Average Daily Traffic

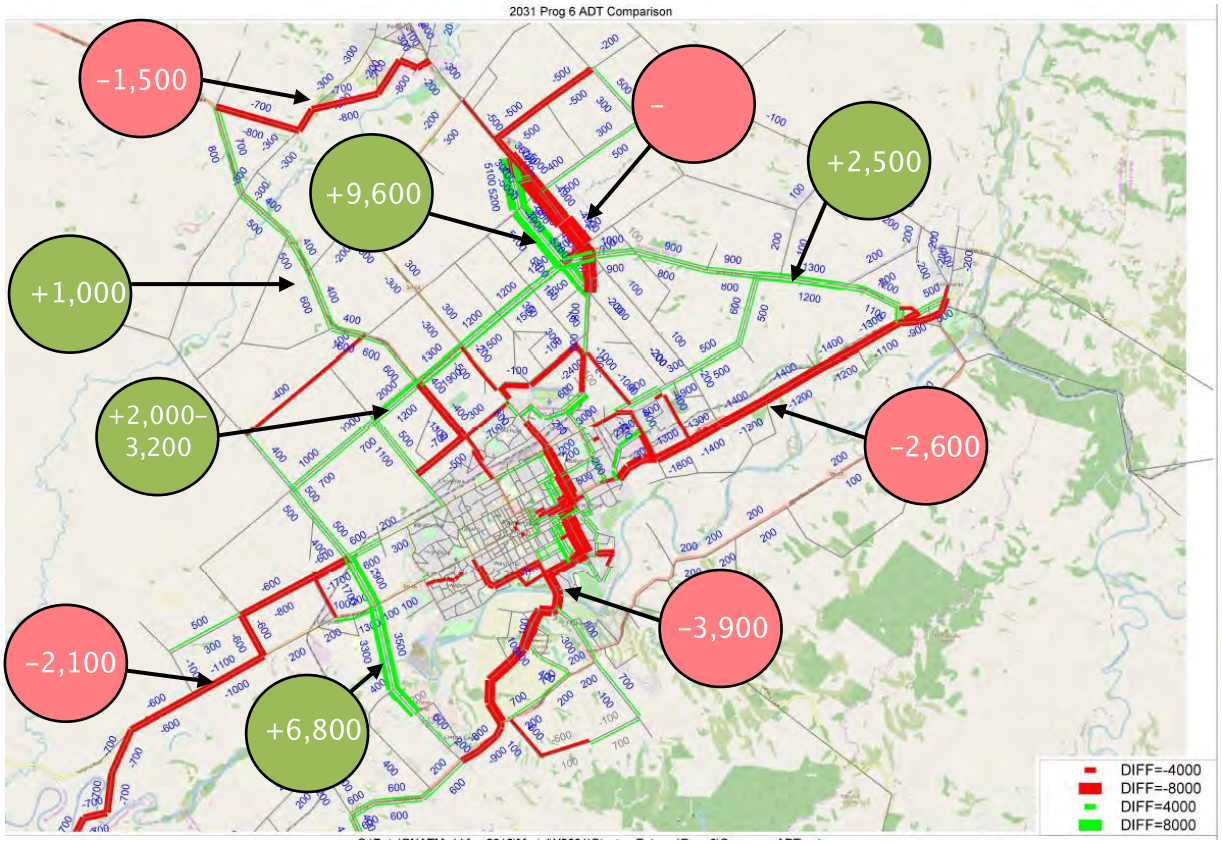


Figure 13-5: Programme 6 Daily Flow Difference Plot (2031 vs Do Min)

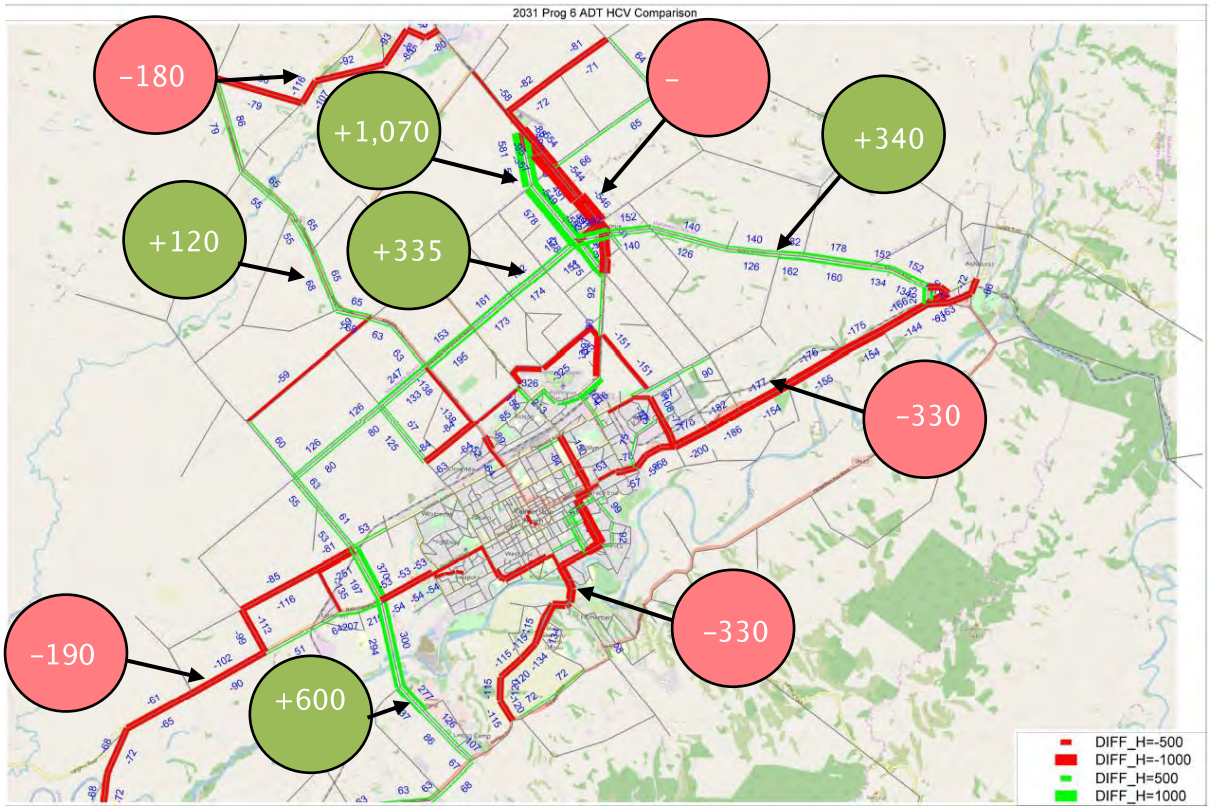


Figure 13-6: Programme 6 Heavy Vehicle Flow Difference Plot (2031 vs Do Min). Similar trends between the Total and HCV flows are also observed for Programme 7 and 11.

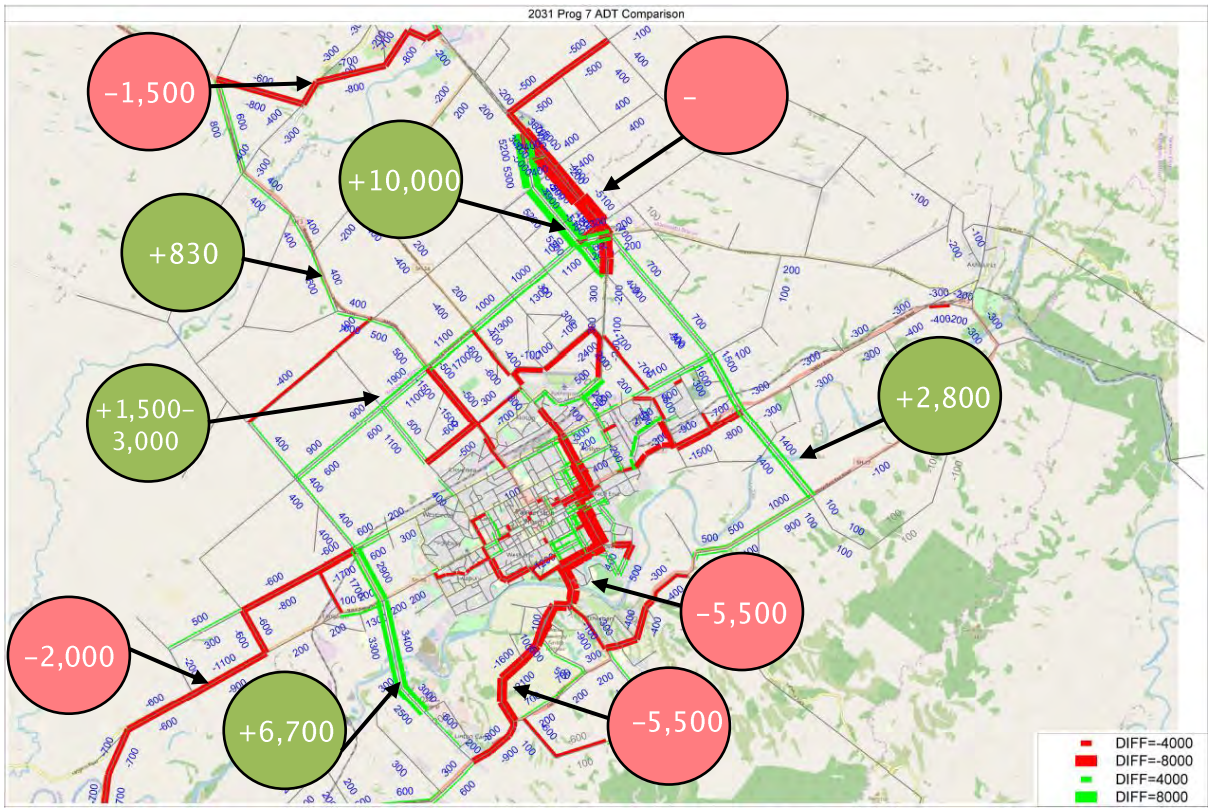


Figure 13-7: Programme 7 Daily Flow Difference Plot (2031 vs Do Min)

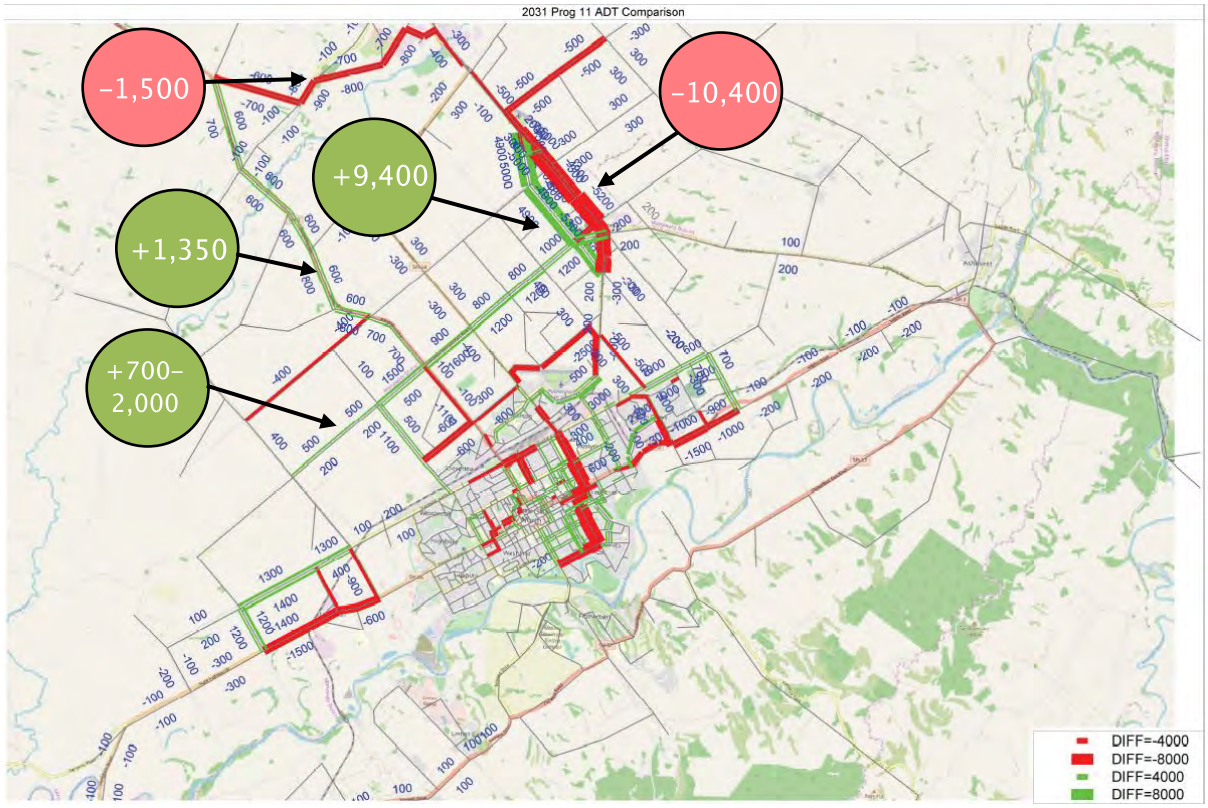


Figure 13-8: Programme 11 Daily Flow Difference Plot (2031 vs Do Min)

The results show that there are similarities for all three programmes for the following:

Kairanga Bunnythorpe Corridor Improvements

- The improvements along the Kairanga Bunnythorpe corridor attract additional traffic with an increase of up to 2,500 vpd (including 300 heavy vehicles per day). In particular, the section of Kairanga Bunnythorpe Road immediately adjacent to SH3 experiences an increase in traffic from vehicles bypassing Fielding and using SH3 as a route into Palmerston North.
- The western section of Kairanga Bunnythorpe Road experiences an increase in traffic accessing the downstream bridge in Programme 6 and 7. In programme 11, in the absence of such bridge, this section of Kairanga Bunnythorpe Road carries approximately 900 less vehicles compared to Programme 6 and 7.
- Improvements along Kairanga Bunnythorpe road also result in the reduction of flows along the parallel route of Richardsons Line and Flygers Line.

Feilding to Ashhurst Corridor

- Improvements to Kairanga Bunnythorpe Road result in a change of trip choice or routing from SH3 /Mt Stewart to Ashhurst/Gorge, with the SH3/Kairanga Bunnythorpe road route to Ashhurst being preferred over the Feilding route.
- Although the Kairanga Bunnythorpe route is slightly longer, it is modelled to be quicker than the route through Feilding /Campbell/Waughs, which has urban speed zones. This could result in over 1,000 fewer 'through' trips in Feilding per day (including 200 heavy vehicles).

Bunnythorpe

- A western Bunnythorpe bypass, modelled using a potential Te Ngaio Road to Waughs Road alignment[82], attracts the majority of traffic off the existing route (over 10,000 vpd, including over 1,000 heavy vehicles). Such a bypass would improve access for Feilding to Palmerston North/Ashhurst/Gorge traffic by avoiding the Bunnythorpe township, the NIMT level crossing on KB road and the 'Kung-fu' corner where Campbell and Waughs cross over the NIMT level in a S-bend arrangement.
- A southern Bunnythorpe bypass, modelled using a potential link between Ashhurst Road and Kairanga Bunnythorpe Road[83], could attract between 4-5,000 vpd (including over 500 heavy vehicles). Such a bypass would improve access for trips from both SH1/3 and Feilding to Ashhurst by avoiding the Bunnythorpe township and the NIMT level crossing on Kairanga Bunnythorpe Road.

Tremaine Avenue

- All programmes show a limited flow difference along Tremaine Avenue along its entire length; highlighting that although the routes to access Tremaine Avenue may change as result of improvements or speed changes, it is still a key origin and destination for trips across the network.
- Preliminary modelling of the KiwiRail freight hub shows that any potential re-location will however result in a significant reduction in freight volumes along Tremaine Avenue, the scale of which will relate to the replacement land use of the existing facility. Therefore, while flow reductions along Tremaine Avenue are largely dependent on KiwiRail, the improvements planned as part of PNITI will enable and help support any future KiwiRail hub location, and support the traffic shift.

[82] Based on options developed as part of the Joint Transport Study (2010) for a western bypass of Bunnythorpe. Alignment to be developed as part of the next phases.
[83] Based on options developed as part of the Joint Transport Study (2010) for a southern bypass of Bunnythorpe. Alignment to be developed as part of the next phases.

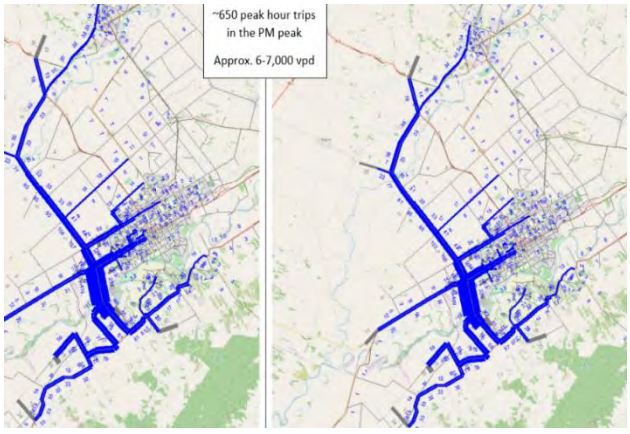
City Centre and Kelvin Grove Impacts

- Kelvin Grove: All options, as a result of the SH3 Napier Road improvements speed limit reduction and signalisation of Roberts Line/SH3 Napier Road, show a reduction in flow along Roberts Line (SH3 Napier Road to Railway Road). This results in a corresponding increase along Mihaere Drive and Keith St South. There is also an associated reduction in flow along SH3 Napier Road between Roberts Line and Stoney Creek with an increased usage of Stoney Creek to Kelvin Grove Road alternate route.
- The flow difference plots show large reductions in volume along the Te Awe Awe St to Ruahine St in the CBD for all programmes. This is a result of an 40km/h speed limit reduction which was modelled under all options. The impacts of speed, including modelling with and without speed reductions, are discussed further in Section 13.2.2 below.
- However, Figure 13-10 below shows that without this urban speed limit reduction, Programme 11 (left), without an additional downstream bridge has minimal reduction in flow through the CBD. In contrast, Programme 6 (right) shows that there are reductions along the north-south spine from Fitzherbert through to SH3 north, Te Awe Awe Street, Albert Street, Park Road, Botanical Road with smaller reductions elsewhere in the city.

Figure 13-9: CBD Flow Differences (without speed reductions): Programme 11 (left) vs Programme 6 (right)

Additional Manawatu River Crossing

The key differences between the programmes in terms of modelling outputs relate to the provision of additional Manawatu River Crossings. The modelling outputs for Programme 6 (including a downstream bridge) and Programme 7 (including both an upstream and downstream bridge) are outlined below.

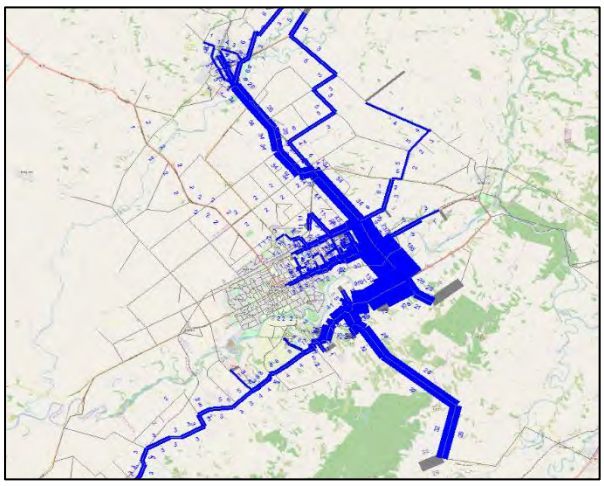


Modelling showed that the downstream bridge of Programme 6 could attract up to 6,800 vpd in 2031 (including over 600 heavy vehicles)

Programme 7, with two additional bridges, was modelled to attract similar volumes on the downstream bridge (~6,700vpd) as highlighted in Figure 13-10 below, but less than 2,800 vpd on the upstream bridge (including over 250 heavy vehicles).

Both options result in a reduction of trips along the existing Fitzherbert Bridge ranging from 4,000 for Programme 6 to 5,500 for Programme 7.

Figure 13-10: Programme 6 (LHS) vs Programme 7 (RHS) Downstream Bridge Usage Comparison (2031 PM Peak, 650 peak hour trips)



270 peak hour trips (40% of downstream)

For Programme 7,

Figure 13-11 shows the trips attracted to the upstream bridge are primarily between CBD and Aokautere (over 50%), followed by trips from Feilding to Aokautere and trips to Pahiatua Track. The modelling shows very few journeys would be made further south on SH57 using the upstream bridge and no journeys using the Manawatu Gorge, SH3 or SH56 would use the upstream bridge.

Figure 13-11: Programme 7 – Upstream Bridge Usage (2031 PM Peak, 270 peak hour trips)

13.2.2 Impact of Speed

The shortlisted programmes include a range of speed management improvements which have been modelled, e.g. improving Kairanga Bunnythorpe Road (and other rural roads identified for upgrades) to a higher standard link, allowing 100km/h travel (modelled with a free flow speed of 95km/h, similar to other state highways and arterials).

The programmes also include a range of de-tuning or speed reduction measures in order to support route choice via the rural ring road and discourage shorter routes through the CBD or residential streets from being used, particularly for freight vehicles. The de-tuning measures will require a combination of engineering, enforcement, signage and education aspects to be successful. The programme de-tuning/speed reductions routes include:

- Engineering changes and a speed limit reduction to ensure a reduction in speed along SH3 Napier Road to between 50-80km/h west of Stoney Creek (All programmes) to provide an Eastern Gateway to Palmerston North
- Engineering changes and a speed limit reduction to ensure a reduction in speed along SH3 Napier Road to 80km/h south of the new Ashhurst bypass on Programme 6 – to encourage use the of Ashhurst Road
- Engineering changes and a speed limit reduction to ensure a reduction in speed along SH56 to 80km/h south of the proposed downstream bridge (Programme 6 and 7),
- Engineering changes and a speed limit reduction to ensure a reduction of speed along Tennent Drive from 100km/h and 70km/h to 80km/h and 50km/h through Massey/Food HQ (Programme 6 and 7)
- An example 40km/h CBD route along Te Awe Awe Street, Albert St and Ruahine St (undertaken for modelling purposes for all programmes, noting that due to the grid nature of Palmerston North CBD, any speed management will need a network approach to prevent rat-running).

To account for the considerable impact of speed changes on the network, both in terms of improvements in safety and increases in travel time, 'B' variants were modelled for each of the shortlist programmes which excluded any speed reduction measures. Speed increases along Kairanga Bunnythorpe Road and Ashhurst Road were maintained as per the original programmes to reflect the proposed infrastructure. This approach was adopted as the likely roll-out, timing and extent of speed management in the do-minimum is uncertain across the wider local and state highway network.

Figure 13-12 and Figure 13-13 highlight the impact of speed changes for Programme 6 and 7:

- Tennent Drive south of Massey results in 1,000+ fewer vehicles with speed reductions. However, the Fitzherbert Bridge was found to attract similar journeys with or without speed reductions, this is due to re-routing to avoid Tennent Drive along Summerhill Drive and SH57/Old West Road.

- Usage of the downstream bridge reduced by 500vpd without speed restrictions whereas the upstream bridge (Programme 7) was found to not be sensitive to modelled speed changes.
- The greatest impact was in the CBD, with the 40km/h route through Te Awe Awe St reducing journeys by over 5,500 vpd. However, while such speed reductions could be an effective tool to reinforce a network hierarchy, the figures below show that some rat-running on other routes is likely to occur and any implementation would require a network wide speed management approach.

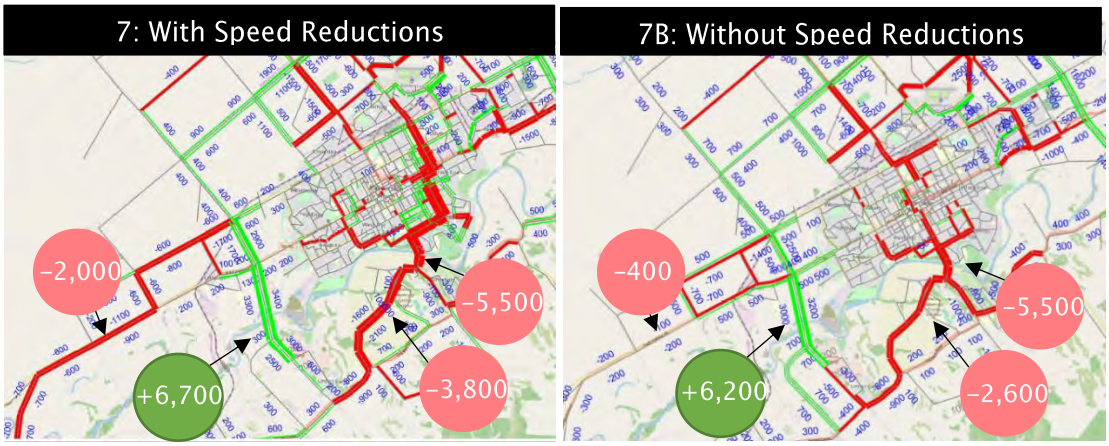


Figure 13-12: Programme 7 – Impact of Speed Reductions (LHS, with speed reductions)

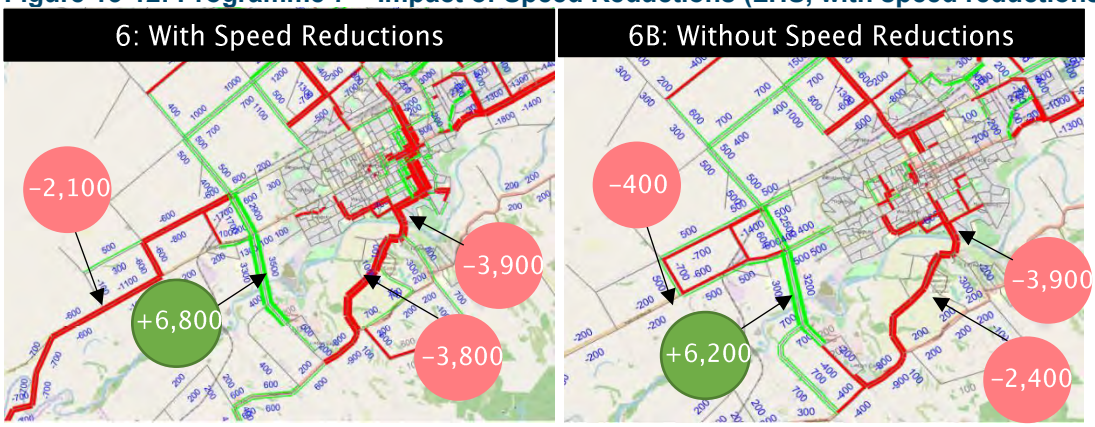


Figure 13-13: Programme 6 – Impact of Speed Reductions (LHS, with speed reductions)

13.2.3 Levels of Service

As presented in Section 6.3 and Figure 13-14, the base network modelling shows significant intersection issues on all routes entering and leaving the City by 2031 in the afternoon peak if no further investment in the roading network is undertaken to respond to the anticipated growth.

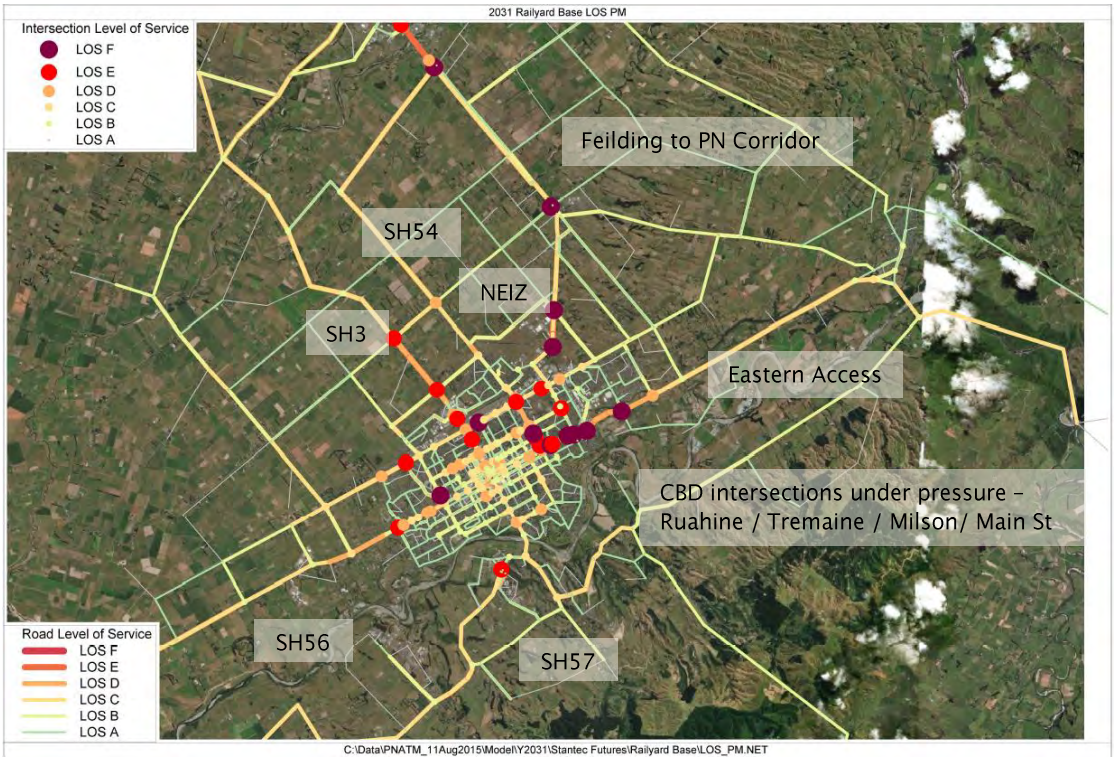


Figure 13-14: 2031 Base level of service (PM)

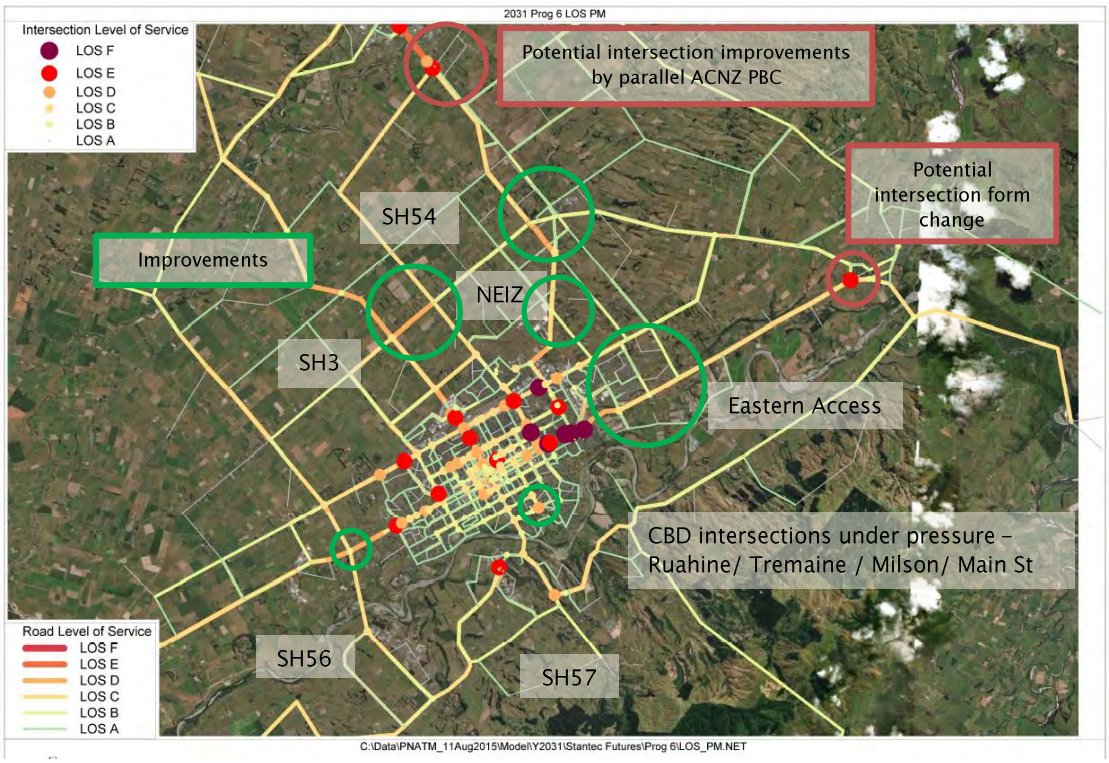


Figure 13-15: 2031 Programme 6 level of service (PM)

Figure 13-15 shows that Programme 6 address several intersections with poor Levels of Service, including SH3/54, SH54/Milsons Line, Kairanga Bunnythorpe/Railway Road, Railway Road/El Prado, Railway Road/Roberts Line, SH3 Napier Road intersections among others. Programmes 7 and 11 also provide similar LoS improvements.

However, the modelling also highlights:

- Potential intersection and corridor improvements can be made between Feilding and SH54/Waughs (investigated as part of the ACNZ PBC).
- Further refinement of the shortlisted programmes can be undertaken e.g. improvements to the intersection form of the SH3/Ashhurst Bypass or improvements at the Massey/Tennent Drive intersection.
- Despite the range of proposed infrastructure measures – including the two new bridges of Programme 7, there is still significant traffic through the city resulting in poor intersection performance, particularly in the PM peak. This is because the arterials and the CBD are still origins and destinations in their own right (e.g. Tremaine, SH3 Eastern City Access, Railway Ave, Square).
- Significant improvements along Tremaine Avenue are largely dependent on the outcomes of the KiwiRail's proposed freight hub relocation. However, improvements identified as part of the programme options will help support and enable the relocation of the traffic demands.

Overall, the short list modelling shows that further consideration of speed management, land use, enforcement and wayfinding measures are required in the CBD to better 'unlock' and give effect to any proposed infrastructure measures.

13.3 SHORT LIST ASSESSMENT

As with earlier analysis, it was necessary to identify relevant criteria for assessment. Thirteen criteria were selected and modified to suit the diversity of the programme options, based on the original four high level criteria of investment objectives, key principles, implementability and value for money. The criteria were discussed in detail with the technical specialists who were to be involved in the Multi-Criteria Assessment Workshop (Workshop 3), to ensure the scope of each criterion was sufficient and appropriate to identify the characteristics of the options and any differences between them.

Prior to MCA Workshop 3, technical specialists were identified to undertake preliminary technical investigations and to prepare a short report on each criterion.

The agenda for MCA Workshop 3 was:

- Story – problems, benefits, investment objectives and KPIs
- Workshop 2 recap – programme long list to short list
- Confirmation of the criteria
- Discussion, definition and scoring of the programme options
- A discussion on the weighting to be applied to each criterion in the analysis.

An early briefing note had been pre-circulated to attendees along with the draft agenda.

Appendix G contains the MCA Report, which includes the MCA Workshop 2 summary, the specialist briefing notes, criteria descriptions and the Workshop 3 Agenda.

Fatal flaws were not evaluated as this was a key criterion in intervention development and the programme development in earlier workshops.

13.3.1 Multi-Criteria Analysis Criterion

Thirteen criteria were decided upon and scoped with the assistance of the technical experts, building on the long list evaluation criteria. The criteria are outlined further below.

- **Safety**: An overall assessment of the programme covering the safety impacts on state highways and local roads. This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area.
- **Amenity**: An overall assessment of the programmes' impact to the local amenity both positive and negative. This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations.
- **Access**: This criterion reflects the investment objective and relates to how well the programme improves access between key destinations and access into major areas.
- **Economic**: A high level assessment of each programmes' ability to facilitate economic growth. This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications.
- **Alignment with Strategies**: This criterion assesses the programmes against the relevant documents associated with the strategic direction of the city.
- **Sustainable Environment**: This criterion reflects a key principle and relates to how well the option reduces CO_2 and limits the impact on water quality.
- **Resilience**: This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.
- **Cost**: This criterion includes an indicative high-level analysis (note that MCA analysis is run with and without costs).
- **Engineering degree of difficulty**: This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns",

any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.

- **Archaeology**: This criterion covers the potential impact of the programmes on known sites and/or risk areas.
- **Current and Future Land Use**: This criterion covers the potential impact of the programmes on current and future land uses located on or around the sites.
- **Value for Money**: This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.
- **Integration with KiwiRail Freight Hub**: This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.

13.3.2 Multi-Criteria Analysis of Options

Scoring System

The proposed scoring system had been pre-circulated as part of the agenda and was designed to be consistent with the previous phase. In assigning scores, it was recognised that the project would not proceed unless there were benefits; however, it is more likely the programmes would be distinguished by their adverse effects and difficulties within the criteria. Therefore, the scoring was focussed with this in mind, whilst also capturing where significant benefits were present. The scoring system used is presented below in Table 13-1.

Table 13-1: Basis for Scoring used in the MCA

DESCRIPTION	DEFINITION	SCORE
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

The scale and definitions are consistent with the Transport Agency's business case methodology.

Scoring Process

The overall MCA process was facilitated by Phil Peet. Most attendees at Workshop 3 had also been present at previous workshops, so were familiar with both the processes and the history of the project.

Criteria technical leads or a representative led the discussion on criteria, conducting a short discussion/presentation on the assessment of the criterion and identifying issues relevant to each programme option. Following this, the workshop attendees raised any questions or matters relating to the implications of a programme, or the score proposed by a specialist for each programme.

The individual specialist assessments and workshop presentations for each criterion are in contained in **Appendix G.**

Scoring of Criteria

Table 13-2 sets out the scoring outcomes of the three programmes. While there was general agreement at the workshop, some of the scores were modified from those initially proposed by the

technical specialist[84]. These were robustly discussed amongst the workshop attendees, who sometimes would offer a point of consideration from their field of expertise or local knowledge that may not have been considered by the technical specialist. All scoring achieved consensus, with the exception of the Fit with Strategy Criteria scoring for Programme 6.

Key points made in the discussion that led to the scores are set out in bullet-point form following on from Table 13-2.

Table 13-2: Scoring of the three programmes

Option	Safety	Access	Amenity	Resilience	Economic Growth	Fit with strategy	Land use	Environment	Archaeology	Engineering degree of difficulty	Cost	Value for Money	Integration with Freight Up
Programme 6	3	2	2	2*	2	2/3**	-1	-1	-2	-2	-2	1	2
Programme 7	3	2	2	2*	3	3	-3	-1	-2	-3	-3	0	2
Programme 11	3	1	1	0	1	1	0	0	-1	-1	-1	0	1

NB: dark green means a positive outcome (best) and dark red means a negative outcome (poor).
* Resilience to be reviewed with respect to Linton Defence Base and weight limits and potential degrading on existing bridges
** Sensitivity testing to be undertaken on Fit with Strategy for Programme 6 scoring a 2 or 3 following discussion at the worksh op

While Programmes 6 and 7 score higher in areas such as access and economic growth, they also score worse in terms of cost, engineering degree of difficulty, environmental and archaeological.

Further detail on each assessment is outlined below with **Appendix G** containing the specialist reports and presentations for each criterion. An overall assessment of the investment outcomes is presented in Section 13.5 below.

- **Safety**: The assessment presented to the stakeholders was that given the scale and scope of the improvements included in all programmes that all could be considered significant (3). It was noted that this does not necessarily mean that all would result in the same safety benefits. The bridge options were assessed as providing more safety benefits than Programme 11 as they would remove more traffic from key pedestrian and cyclist areas.
- **Access**: This assessment concluded that Programme 6 would deliver the highest reduction in overall vehicle distance travelled (peak hours) while Programme 7 would deliver the highest network journey time reduction. Programme 11 would provide the fewest peak period benefits.

  In summary, Programmes 6 and 7 were found to be similar in terms of benefit. Programme 7 is slightly better than Programme 6 in terms of the evaluation of individual aspects of the programme, but slightly lower in terms of reduction in vehicle km travelled. Overall travel time benefits between Programme 6 and Programme 7 are similar.
- **Amenity**: This assessment concluded that there are no significant differences in the amenity improvements that would be delivered by the programmes. As such the assessment was undertaken purely based on the predicted traffic volumes along key streets.

  The main difference between the programmes relates to the extent to which they reduce traffic volumes through the town centre and along Tennent Drive (which currently severs connectivity between Food HQ and Massey). Programmes 6 and 7 would deliver better reductions (giving effect to or enabling potential amenity improvements), and hence were afforded a higher score than Programme 11.
- **Resilience**: The analysis showed that Programme 7 was the most resilient option as it proposes a new road and bridge outside of the flooding area. It also seeks to improve SH57 which is more resilient than the SH56 alternative. It provides the best routes for travel in all directions in both flooding and earthquake events, including areas such as the Linton Military Camp. However, as

[84] Note that in some cases the workshop process resulted in scores which were different from those proposed by the technical spe cialist who provided the base case information. The technical specialists were asked to indicate (as part of the relevant Appendix) where they had any disagreement with the workshop score. This ensures their professional independence, while not affecting the MCA outcome process.

there are no significant resilient problems in the current situation, and as Programme 6 provides an alternative route, Programme 7 was not considered enough of an improvement to warrant a higher score.

- **Economic**: Programme 7 will provide the greatest support to the existing freight generating activities, as well as providing the best opportunity to maintain trends seen in freight generating activities and employment. Looking at specific identified growth areas, it provides additional access routes to North East Industrial Zone and improves SH57 which is the primary access point to FoodHQ.

  Programme 6 also provides many of the opportunities as Programme 7. It frequently scored the same or only one below on many of the assessed criteria. Programme 6 also scores highly and will not prevent the achievement of the economic growth potential of the region.

- **Alignment with Strategy**: Programmes 6 and 7 will both provide significant positive impacts through the ring road and bypasses. However, it was determined that Programme 7 would provide the highest alignment as it contains two new bridges.

- **Current and Future Land Use**: Programme 11 scored the best out of the three programmes as it had the least impacts on both current and future land uses. This is mainly due to works being undertaken on the existing alignments of roads, and due to the fact that no bridges are proposed. It is noted that all three programmes will provide access to future growth areas.

- **Sustainable Environment**: Programme 11 scored the best in relation to both temporary and permanent effects on water quality as no bridges are required to be constructed over the Manawatu River.

  With regards to CO_2 emissions, the programmes that resulted in a reduced total distance travelled compared to the base network scored better (as a result of less fuel use). Overall, while all three programmes show a reduction in total distance travelled, the savings are small and amount to a reduction of less than 1% of total network distance travelled across the network.

- **Archaeology**: All of the potential bridge locations are in areas of high archaeological potential and will either directly affect or be in close proximity to historically occupied clearings, hunting and fishing grounds along the banks of the Manawatu River. The Bunnythorpe bypass has the potential to affect sites predominantly relating to European/colonial occupation but further research is required at to determine the extent of 19th century occupation.

  Connections to SH56 and SH3 will directly affect or be in close proximity to European sites adjacent to the former railway. Additional constraints are likely to be identified in these areas as the programme develops. As Programme 11 had the least greenfield infrastructure in high risk areas, this scored the best.

- **Engineering degree of difficulty**: Programme 7 requires further road construction due to the upstream bridge crossing and has an additional 10 km of existing road upgrading to be completed. As a result, this ranks Programme 7 with highest number of (mitigatable) impacts ahead of Programme 6 and 11 which are assessed to be similar, based on the scoring system adopted.

- **Cost**: Using Programme 11 as the lowest cost base for comparison, Programme 6 was assessed as having a cost differential of +20-30% whereas Programme 7 had a cost differential of +50-60% (over Programme 11). On the basis of the relative cost differentials, Programme 11 was scored -1, Programme 6 -2 and Programme 7 -3.

- **Value for money**: Programme 6 had a higher value for money than the other two programmes, but was assessed as relatively low given the costs of the scheme. Programme 7 had a lower value for money than Programme 6, with the additional costs of the second river crossing not matched by benefits. The value for money of Programme 11 was lower than Programme 6 due to more limited impact of investments. This programme had similar value for money results to Programme 7.

  It was noted that the assessment did not include safety, walking or cycling or resilience benefits – all of which were determined to be potentially notable. Interventions coupled with safe and appropriate speed changes were also identified as aspects that should be considered in the next stage. Value for money at the shortlist MCA phase presented qualitative results based on the

analysis and information available at the time, refer **Appendix G**. The full short list economic analysis, including BCRs, is presented in Section 13.4 below.

- **Integration with Freight Hub**: Programme 7 provides reasonable economic integration impacts although the benefits of the construction of the additional upstream bridge are offset by the more limited improvements to the direct route to the east. The impact on the forecast traffic flows is higher than for Programme 6 reflecting the additional infrastructure provided.

  Programme 6 also provides reasonable economic development impacts, although in the scenario with urban speed adjustments, the impact on the flows to and from the rail hub is more limited, reflecting the focus on movements to and from the main urban core. The provision of the additional river bridge improves accessibility for cross river traffic to and from the hub, both by providing a new route and reducing the traffic flows and delays for traffic continuing to use the existing route.

  This contrasts with Programme 11 and its more limited network improvements and in particular the absence of a new river crossing results in a lower impact on economic development opportunities for the hubs and also lower traffic benefits.

13.3.3 Weighting Systems

Workshop Weighting

It was recognised by the workshop attendees that not all criteria are of equal importance and that different stakeholders may accord them different importance. There was acceptance that the criteria did not represent a “base case” and there was no benefit in an analysis with all criteria accorded equal weight. This approach is consistent with earlier MCA undertaken in relation to the project.

A “workshop” weighting was sought and led to some debate. Participants were not constrained in terms of an overall weighting, so no ‘trade-offs’ were made. The weightings were based on input from the technical experts and subsequent discussion. The final agreed workshop weightings are presented below in Table 13-3.

Table 13-3: Agreed Workshop Weighting

Option	Safety	Access	Amenity	Resilience	Economic Growth	Fit With Strategy	Land Use	Environment	Archaeology	Engineering Degree Of Difficulty	Cost	Value For Money	Integration With Freight Hub
Workshop	**10**	**10**	**10**	5	**10**	**10**	5	8	4	5	5	9	**10**

The workshop participants agreed that there were multiple ’equally most important’ criteria, with the four investment objectives (Safety, Access, Amenity, Economic Growth), Fit with Strategy and Integration with the Proposed KiwiRail Freight Hub highlighted as key criteria.

A close second for most important criteria was ‘Value for Money’.

The workshop attendees were made aware that additional weighting systems would also be developed after the workshop to ensure robustness of outcome and as a form of sensitivity analysis. The next section explains the basis for these additional weighting approaches.

Additional Weighting Systems

A range of additional weighting systems were developed by Stantec and applied to the workshop scorings. These are based on “quadruple bottom line” considerations. An RMA evaluation was also included to reflect the fact that statutory approvals will need to be obtained for the project. These are described further below and are shown alongside the workshop weighting in Table 13-4.

Table 13-4: Weighting systems applied (including workshop weighting)

Weighting	Safety	Access	Amenity	Resilience	Economic	Fit with strategy	Current and Future Land use	Environment	Archaeology	Engineering degree of difficulty	Cost	Value for Money	Integration with Freight Up
Workshop	**10**	**10**	**10**	5	**10**	**10**	5	**8**	4	5	5	**9**	**10**
RMA Part 2	6	0	6	0	0	6	**8**	**10**	**10**	0	0	0	0
QBL: Social	**8**	**8**	**10**	4	2	**8**	**8**	4	4	0	0	0	2
QBL: Natural Environmental	0	0	0	0	0	6	6	**10**	0	6	0	0	0
QBL: Cultural	6	0	6	0	0	6	6	**8**	**8**	0	0	0	0
QBL: Economic	6	**8**	0	0	**10**	4	6	0	0	**8**	5	**10**	0

RMA Part 2 – This reflects the aspects that contribute to the overall evaluation of the project under the RMA. Environment and Archaeology were both identified as critical RMA matters and were weighted a 10 under this system, followed by Current and Future Land Use at 8. Most of the other matters relevant to RMA considerations and have been weighted at 6, as they were difficult to distinguish between in the environment where change can be expected. Engineering Degree of Difficulty, Cost and Value for Money are given less weight as they are effectively transient aspects in RMA terms.

Social – This weighting system emphasised the aspects likely to be most important to the community. This places most emphasis on Amenity, Safety, Access, Fit with Strategy and Current and Future Land Use. Other items which are likely to be important to the community have been allocated either a weighting of 4 or 2.

Environment – This weighting system emphasised the physical environment. In this respect, the Environment Criteria had a weighting of 10. The next three criteria which most closely reflect environmental outcomes were Fit with Strategy, Current and Future Land Use and Engineering Degree of Difficulty, with each given a weighting of 6.

Cultural – This weighting system emphasised the cultural aspects and mixes the considerations from both the social and environmental weighting systems. The two criteria which most closely reflect cultural outcomes were Archaeology and Environment with each given a weighting of 8, followed by Safety, Amenity, Fit with Strategy and Current and Future Land Use with a weighting of 6. Note that no formal iwi involvement has been undertaken to date[85], it is recommended that further engagement occurs prior to selection of a preferred programme.

Economic – This weighting system placed high weight on criteria with a significant economic component e.g. Economic Growth, Value for Money, Engineering Degree of Difficulty and Access. Cost was given a lower rating as it is indirectly included in both the Value for Money and Engineering Degree of difficulty criteria.

13.3.4 Additional Criterion Noted

It was indicated at Workshop 3, that "Cultural Values" should be rated separately and have its own criterion. Further discussions with Ms Siobhan Lynch-Karaitiana, a representative of Rangitāne o Manawatū, has resulted in her stating that a separate assessment around cultural values for Rangitāne o Manawatū should be prepared.

[85] Representatives have been invited to workshops and Ms Lunch-Karaitiana, a representative from Rangitāne o Manawatū, was present at Workshop 3.

13.3.5 Results of Multi-Criteria Analysis Process

A clear order of preference emerged from the overall analysis using alternative weighting systems. Based on the Workshop Weighting, Programme 6 (Network improvements including a Downstream Bridge) was the most-favoured option, having the highest aggregated score.

The additional weighting systems which focussed on effects and impacts (RMA Part 2, Natural Environment and Cultural) showed that Programme 11, with the least new infrastructure proposed, was preferred, followed by Programme 6. However, weighting systems which considered benefits (Social, Economics, Workshop) all showed that Programme 6 was preferred.

Programme 6 performed better than Programme 7 under all weighting systems.

Figure 13-16 graphically represents the outcome of this process, with the tallest bar indicating the most favoured option.

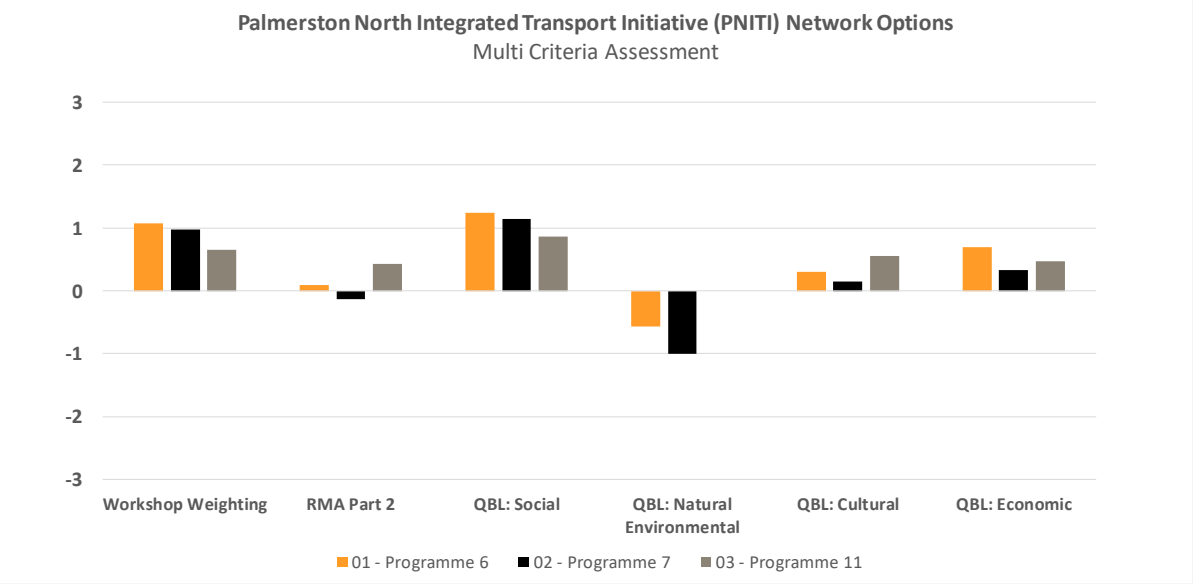


Figure 13-16: Resulting scores from the all weighting systems applied

The analysis was also run with costs excluded and similar results were obtained. In addition, an alternate higher score for Programme 6 for the 'Fit with Strategy' was undertaken to reflect Workshop 3 feedback but again this did not impact the preferred programme option.

13.3.6 Conclusion

It is clear from the analysis that Programme 6 (a comprehensive programme including a ring round around Palmerston North with a new southern bridge) is the preferred programme option from the consideration of a wide range of criteria through a comprehensive MCA process. It scores the best under most weighting systems and appears to appropriately balance achievement of objectives against impacts.

13.4 SHORT LIST ECONOMIC EVALUATION

This section presents a summary of the programme level economic evaluation undertaken for the three short listed programmes, building on the assessments undertaken as part of the MCA phase. The short listed programme has been compared against a Do-Minimum scenario consisting primarily of the SH3 Manawatu Gorge replacement[86].

13.4.1 Benefits

The potential economic benefits of the project are:

- Improved safety
- Reduced travel time and vehicle operating costs
- Wider economic benefits – agglomeration benefits relating broadly to improving travel times which brings firms closer together, making them more productive.

Key inputs and assumptions

The key assumptions which have informed the programme level economic assessment are:

Programme Timing

- As the short list programme modelling reflects the implementation of all improvements, timing for the purposes of economic assessment assumes that the full programme will be in place by 2030 (Time zero of 2019, construction from 2028 and first year of benefits assumed as 2030).
- The programmes will likely be delivered in stages, with a proportion of benefits occurring earlier (or later) compared to the timings above; however, this approach is considered appropriate for programme level comparison purposes. Sensitivity testing on alternate timings of 2025 to 2035 are presented below.

Travel Time and Vehicle Operating Costs

- The economic assessment for travel time and vehicle operating costs has been informed by network-wide traffic modelling results for the 2031 and 2041 future years. Results for intermediate years have been interpolated using these results.
- Benefits post 2041 have been capped. The use of this cap means the analysis has taken a more conservative approach. This reflects the general level of uncertainty around the transport environment post 2041 – particularly regarding traffic growth.
- As presented in Section 6.2.2, recent population growth has outpaced model projections and forecasts. Sensitivity testing was therefore undertaken to account for a scenario if recent growth (2013-2018) continued for the next decade, effectively this would mean the 2041 forecasts are realised up to ten years earlier in 2031.
- As discussed in Section 13.2, each programme has been modelled with and without speed reductions, reflecting the uncertainty of the speed management rollout as part of the Do-Minimum. For the purposes of the short list economics, the programme 'B' variants (without speed reductions) have been compared below, with the impact of including speed reductions presented in the sensitivity testing.

Safety

- The process for the calculation of high level network wide safety benefits involved:
    - Creating a network crash model to estimate the deaths and serious injuries (DSI) saved impact of improvements (direct interventions, speed changes and volume changes) for 19 key intersections and 31 mid-blocks for the period of 2014 to 2018 (using CAS data, based on a DSI equivalents approach).
    - Calculating the future DSI reduction with reference to the following factors:

[86] The Manawatu Gorge route has been modelled using the existing alignment for the Do-Min and all scenarios (as the base model was developed in 2013 and does not consider the Gorge closure in the current or forecast models). This is considered appropriate as the future Gorge route is proposed to tie back into the network from the north at the same intersection point in the model, acknowledging the alignment of the Gorge will change as described in the Te Ahu a Turanga; Manawatu Tararua Highway NOR.

- Direct interventions - using Standard Safety Intervention Toolkit crash reductions, typical measures include roundabouts having an estimated 60% reduction in DSI and wide centreline and associated widening having an estimated reduction of 35% in DSI)
- Speed changes - Figure 2-3 of the High-Risk Rural Roads guide, where a 1% change in mean speed is estimated to have a 4% change in high severity causalities,
- Changes in traffic volumes, based on modelling outputs.

- The crash network model focuses on the sections of the network which are being upgraded as part of the programme, primarily focusing on the rural network. Crashes within the urban 50km/h areas are excluded, this is considered to be conservative as volume reductions are likely to result in reduced crash numbers.

Wider Economic Benefits

- Wider Economic Benefits have been based on the previous work undertaken for the SH3 Manawatu Gorge Alternatives project by EY87. The scope of the assessment was around how different Gorge replacement options affect the future growth of the region's economy.
- WEBS that are only attributable to the Ring Road or proposed bridges have been captured for this assessment – i.e. WEBS such as 'certainty' and 'productivity' have been excluded.
    - Options considered in the SH3 Manawatu Gorge Alternatives Report and the corresponding PNITI programme option are outlined below.
    - Programme 6: Gorge Option 3 (1A) – 'Downstream Bridge + Upgrades'
    - Programme 7: Gorge Option 3 (1C) – 'Double Bridge + Upgrades'
    - Programme 11: Gorge Option 3 (1E) – 'Upgrades + No Bridge'
- Agglomeration benefits range from $60M for PNITI Option 11, with only wider network upgrades, to $97M for PNITI Option 7 which includes the full range of wider network upgrades and two bridges.

  These benefits can be further disaggregated into:
    - $13M for 'no wider networks' upgrade.
    - $47M of for the ring route (excluding either bridge).
    - $33M for a Downstream Bridge.
    - $13M for the Upstream Bridge.
    - $37M for Downstream and Upstream Bridges (less than sum of individual benefits due to diminishing returns).

The additional benefits which could be derived by the project, but which have not been explicitly calculated, or considered in detail at the programme stage, are:

Walking and cycling:

- As the Do-Minimum includes the roll out of PNCC's Urban Cycling Master Plan (UCMP), direct walking and cycling benefits from the PNITI programmes would be limited to wider shoulders on rural corridors. Indirect benefits from the removal of traffic on some routes would however further encourage cycling and help support PNCC's UCMP initiatives. This benefit will be small compared to the other benefits assessed.

Network resilience:

- As outlined in Section 7.4, Fitzherbert Bridge is a key lifeline for the region with high consequences of failure. However, the bridge has been identified as relatively resilient to hazards, with the ability to withstand a one-in-500-year flood and one-in-1700-year earthquake.

[87] Manawatu Gorge Alternatives: Assessment of the Wider Economic Benefits of the Shortlisted Options, EY, 2018. Refer Appendix H.

- As services are now also carried along the He Ara Kotahi Bridge and coupled with the low probability of failure, a high level assessment of route security benefits88 due to natural hazards are in the order of less than $5-10M over a 40 year period. This is expected to be less than 5-10% of total programme benefits.

Impact of KiwiRail Freight Hub:

- A key consideration as part of the next phase(s) of investigation include testing the impact of programme interventions with and without the proposed KiwiRail Freight Hub. Noting that although the KiwiRail Freight Hub was considered as part of the MCA criteria, the modelling undertaken to date does not include the KiwiRail Freight Hub (as details regarding location or impacts were still in development). Therefore, the quantified economic benefits of PNITI and resulting BCRs are likely to higher if the impacts of the KiwiRail Hub are included in a future do-minimum scenario.

Finally it is noted that the economic analysis has been undertaken using simplified procedures, appropriate to this stage of project development, and more detailed economics needs to be undertaken during the subsequent business case phases of each project particularly in relation to timing of implementation.

13.4.2 Costs

Rough order programme cost estimates were prepared for each of the short listed programmes as part of the MCA phase. The range of the cost estimates reflect the significant uncertainty in the exact form of several options within the programmes (e.g. extent of seal widening, type of intersection upgrades, alignment and form of new links/bypasses).

Key inputs and assumptions include:

- Costs have been based on engineering judgement coupled with:
    - Recent design or construction projects near the region (e.g. SH57 Safer Network Programme upgrades, SH3 Normanby Bridge Realignment, SH2 Otamaraho Improvements)
    - Rates from the NZTA Standard Safety Intervention Toolkit (2019)
- Specific considerations have included:
    - Structures and likely earthworks
    - Likelihood of flooding and impacts on the regional drainage network based on Horizons flooding data (Refer Section 10.1).
    - Services relocation, particularly the costs of Transpower power pole relocation along Kairanga Bunnythorpe Road, Rongotea Road and Shirriffs Road, are based on rates from the SH3/54 DBC.
    - Traffic volume forecasts to determine appropriate cross section/safety treatments.
- Exclusions
    - Maintenance and property costs have not been included at this stage.
    - Online improvements do not include allocation for significant vertical or geometric improvements.
- Contingencies
    - A 20% preliminary and general has been applied to the base rates.
    - A 35% contingency has been applied to account for the significant uncertainty at the programme stage to get to the Expected Estimate.
    - A 95th percentile cost has been estimated based on adding a further 35% contingency on top of the Expected Estimate.

[88] Other resilience benefits relating to a reduced impact from low impact high probability events (crashes etc) are limited due to the existing grid network of Palmerston North, resulting in a range of potential detours.

The short list programme rough order cost ranges are outlined in Table 13-5 below. The cost ranges include the base programme costs (including contingency) and the programme costs including sub-options. The sub options are outlined in Section 13.1 as dotted lines on the programme schematics and reflect upgrades or improvements that have significant dependencies. These include Railway Road improvements (dependency with KiwiRail Freight hub), Stoney Creek Road improvements (between Kelvin Grove and Bunnythorpe) and improvements required on Karere Road to support an alternate downstream bridge alignment to Camp Road.

The overall costs reflect the shortlisted programmes are all comprehensive programmes of investment across a large network, with Programme 7 including two additional crossing of the Manawatu River Bridge having the highest cost of up to $475M.

Table 13-5: Short List Programme Expected Estimate Costs

Option	Costs (Base programme) ($M)	Cost (including Sub-Options) ($M)	Rough order expected estimate Cost Range ($M)
6	335	370	335 - 370
7	400	475	400 - 475
11	255	315	255 - 315

13.4.3 Benefit Cost Ratio

The results of the programme economic evaluation are outlined in Table 13-6 and Figure 13-17 below. The programme 'B' variants (without speed reductions) have been compared below, with the impact of including speed reductions presented in the sensitivity testing.

Table 13-6: Economic Evaluation Summary

Option	Benefits				Costs	BCR Range	
	Travel Time & VOC ($m)	WEBS ($m)	Safety ($m)	TOTAL PV BENEFIT ($m)	Discounted Cost Range ($m)	Excluding WEBS	Including WEBS
6B	135	93	94	321	201 - 221	1.0 - 1.1	1.5 - 1.6
7B	143	97	85	325	241 - 284	0.8 - 0.9	1.1 - 1.3
11B	115	60	81	256	153 - 188	1.0 - 1.3	1.4 - 1.7

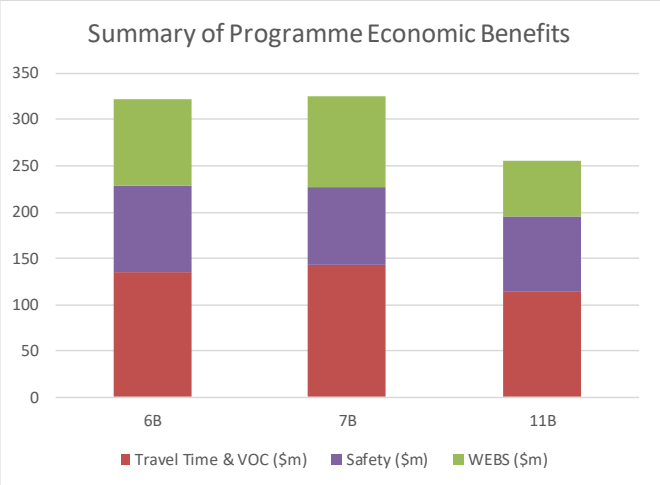


Figure 13-17: Summary of Programme Benefits

The results show that:

- Programme 6B and 7B result in similar total benefits, with 7B having slightly improved travel time and wider economic benefits but reduced safety benefits compared to Programme 6B.
- Programme 11 has similar safety benefits, but lower net benefits compared to the other short listed options, primarily this relates to reduced wider economic benefits, travel time and vehicle

operating costs. Largely this is a result of Programme 11 not having an additional crossing of the Manawatu River.

- Including wider economic benefits, all programmes have a BCR above 1.0. Wider economic benefits account for approximately 20-30% of conventional benefits which is in line with similar projects nationally.
- Excluding wider economic benefits, 6B and 11B both have a BCR above 1.0 while Programme 7B has a BCR of less than 1.0.

Incremental Analysis

Incremental analysis assesses whether the additional benefits of higher cost options are justified.

- Comparing Programme 6B to the lowest cost option Programme 11B, shows that Programme 6B is preferred with an incremental BCR of up to 2.0. The incremental benefits primarily relate to the wider economic benefits and travel time and vehicle operating costs that accrue from the additional Manawatu River bridge crossing.
- Programme 7B was then compared to Programme 6B. In this case, the limited additional benefits of Programme 7B over 6B were not large enough to offset the increased investment, resulting in an incremental BCR of 0.1.
- The economically preferred option is therefore Programme 6B.

Sensitivity Analysis

Several sensitivity tests have been undertaken to provide a likely BCR range for the programmes, focusing around the following influential factors which have not already been presented above (i.e. the impact of including sub-options (cost) and wider economic benefits):

- Changing the timing of the intervention (first year of benefits)
- The impact of higher growth
- Impact of speed reductions included in the programme options (rather than the do-minimum)
- The economic discount rates

Table 13-7 provides the economic sensitivity analysis, based on the costs including sub-options and with wider economic benefits included for each programme option.

Table 13-7: Economics Sensitivity Analysis

	SENSTIVITY			BCR RANGE		
VARIABLE	UPPER BCR	BASE	LOWER BCR	6B	7B	11B
Project Timing / First year of benefits	2035	2030	2025	1.2 (2025) 1.5 (2030) 1.7 (2035)	0.9 (2025) 1.1 (2030) 1.3 (2035)	1.1 (2025) 1.4 (2030) 1.6 (2035)
Impact of Growth	Higher growth (2041 forecasts reached in 2031)	Model forecasts	-	1.5 - 1.6	1.1 – 1.3	1.4 – 1.6
Impact of Speed Reductions	-	Excluded ('B' variant)	With speed reductions	1.3 - 1.5	1.1 - 1.1	1.3 - 1.4
Cost – Impact of sub-options	Expected Estimate, Excluding sub-options	Expected Estimate, Including sub-options	-	1.5 - 1.6	1.1 - 1.3	1.4 - 1.7
Cost – Expected vs 95th Estimate	-	Expected Estimate, Including sub-options	95th %tile, Incl. sub-options	1.1 -1.5	0.8 – 1.1	1.0 -1.4

	SENSTIVITY			BCR RANGE		
VARIABLE	UPPER BCR	BASE	LOWER BCR	6B	7B	11B
Discount Rate / Analysis Period	4% 40 Years	6% 40 Years	-	1.5 - 1.8	1.1 - 1.4	1.4 - 1.7

The sensitivity testing shows that the BCR ranges are reasonably robust between 0.8 and 1.8 across the three programmes under a range of scenarios.

The key variable was found to be the timing of implementation, assuming benefits accruing from 2025 (rather than 2030), the BCR for all programmes reduces, with 7B dropping below 1.0. This shows that programme timing and staging of individual components will be a key consideration for the development of the recommended programme.

13.5 CHOOSING A RECOMMENDED PROGRAMME

An assessment of the overall outcomes of the shortlist programmes, with respect to the investment objectives, key principles, impacts and implementability is provided overleaf. Refer **Appendix I** for a full version of the short list outcomes.

The outcomes table coupled with the MCA results and economic analysis demonstrates that, based on the work undertaken in this Network Options Report, Programme 6 is the recommended option as it:

- outperformed other options through the MCA process under most weighting systems.
- performs best, along with Programme 7, against the investment objectives
- performs best from an economic evaluation perspective

Programme 7 does have improved outcomes against the key principles when compared to Programme 6 (economic growth and fit with strategy) however, it also has higher impacts (e.g. land use) and lower Implementability.

Accordingly, Programme 6 has been taken forward to the next section of this report as the recommended option.

It is recognised that continuing consultation will be required with iwi and investment partners in relation to this programme.

Table 13-8: Short List Outcome Assessment

Outcome Type	Strategic Driver	Key Performance Indicator	Measure	Baseline	Programme Outcomes Programme 6	Programme 7	Programme 11
Investment Objectives	Amenity	Reduce both freight and vehicles on residential and place-based streets	**Reduction in heavy vehicles through the CBD and along local streets / places**	**2031 Modelled Daily HCV** •City Centre Access (Fitzherbert Br): 1,700vpd – proxy for city reduction •Te Awe Awe St 800 vpd •Albert Street 900 vpd •Kaimanawa Street 340 vpd •Keith Street 270 vpd •College St 295 vpd •Kelvin Grove Road 965 vpd •Maxwells Line 420 vpd	-300-500 fewer heavy vehicles per day through the CBD , Bridge and Tennent Dr -Approx. 1000 fewer HCVs heading into Bunnythorpe -100 fewer trucks through Feilding and Ashhurst	- 300-500+ fewer heavy vehicles per day through the CBD, Bridge and Tennent Dr - Approx. 1000+ fewer HCVs heading into Bunnythorpe - <50 fewer trucks through Feilding	-Limited reductions in the CBD relating to speed measures with 200 fewer heavies on Te Awe Awe (but rat-runnning on other routes without speed changes) -Approx. 1000 fewer HCVs heading into Bunnythorpe -50 fewer trucks through Feilding
			Reduction of general traffic through townships or key places	**2031 Modelled ADT** •City Centre Access over 30,000 vpd •SH3 Napier Road over 12,000 vpd •Tennent Drive 8,000 vpd •Bunnythorpe 12,000 vpd •Feilding up to 21,000 vpd •Ashhurst over 7,000 vpd	-4,500 fewer vehicles per day through the CBD , Bridge and Tennent Dr - 3,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 10,000 fewer vehicles heading through Bunnythorpe Village -Approx 1,000-1,500 fewer vehicles through Feilding and Ashhurst	-5,500 fewer vehicles per day through the CBD, Bridge and 4,000 fewer along Tennent Dr - 2,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 10,000 fewer vehicles heading through Bunnythorpe Village -Approx 500-1000 fewer vehicles through Feilding and Ashhurst	-No reduction in the number of vehicles across the Fitzherbert Bridge or Tennent Dr (flow reductions on streets due to speed management) - 2,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 10,000 fewer vehicles heading through Bunnythorpe Village -Approx 500-1000 fewer vehicles through Feilding
			Increase the number of heavy vehicles on selected freight routes	**2031 Modelled Daily HCV** •Kairanga Bunnythorpe Road: 135 -1,000 vpd •Longburn Rongotea Road 600 vpd •Ashhurst Bunnythorpe Road 500vpd •SH54 (Milsons Line to Newbury Line) 840 vpd •SH3 North of KB Road 1000vpd •SH57 South of PN 600vpd •SH56 South of PN 105vpd •Stoney Creek Road 105 vpd	- Increase in freight (approx. 300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight (approx. 200-300 vpd) using Ashhurst Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - Increase in freight along SH57 south of Linton (100-200vpd) - up to 1,000 heavy vehicles attracted to the Bunnythorpe Bypass	- Increase in freight (approx. 200-300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight (approx. 100-200 vpd) using Stoney Creek Road - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - Increase in freight along SH57 south of Linton (100-200vpd) - up to 1,100 heavy vehicles attracted to the Bunnythorpe Bypass	- Increase in freight (approx. 200-300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight along No1 Line (100-200vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (100vpd) - up to 1100 heavy vehicles attracted to the Bunnythorpe Bypass
		Increased uptake and attractiveness of active modes	Pedestrian and cyclist measures to be considered under existing PNCC metrics in parallel project (UCMP). Baseline : •Journey to work (cycle): 5.3% (2013 census) •Journey to work (walk): 9% (2013 census) •Cycling Counts (PNCC): 540 across 3 sites (2017) – a reduction from 840 in 2013		Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes	Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes	Potential to support and enables UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes. However, reductions through the city centre are dependent on speed management changes
		MCA (WS3)	An overall assessment of the programmes' impact to the local amenity both positive and negative. This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations.		Reduction of general and heavy vehicles on key routes and areas. Greater reduction of volume on Tennent Drive and town centre than Prog 11	Reduction of general and heavy vehicles on key routes and areas. Greater reduction of volume on Tennent Drive and town centre than Prog 11	Reduction of general and heavy vehicles on key routes and areas, but to a lesser extent than Prog 6 and 7. Reduction on local roads dependent on speed management.
					2	2	1
	Safety	**Reduction in Deaths and Serious Injuries (DSI)**	DSI Saved / 5 years	Wider network, excl. CBD network 2014-2018: 103 actual DSI (5yr), 100 estimated DSI (5yr)	37	33	29
		Improve safety infrastructure	Number of high risk intersections treated:	Baseline = 13 intersections identified	10	10	10
		Safe and appropriate speeds	Number of high risk speed management corridors treated:	Baseline = 27 corridors identified for treatment	18 direct, and one sub-option	18 direct, and one sub-option	15 direct
		MCA Score (WS3)	An overall assessment of the programme covering the safety impacts on state highways and local roads. This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area.		All programmes includes treatment of identified high-risk intersections and corridors. The bridge options were assessed as providing more safety benefits than P 11 as they would remove more traffic from key pedestrian and cyclist areas	All programmes includes treatment of identified high-risk intersections and corridors. The bridge options were assessed as providing more safety benefits than P 11 as they would remove more traffic from key pedestrian and cyclist areas	All programme includes treatment of identified high-risk intersections and corridors.
					3	3	3
	Access	**Intersection LoS**	Reduction in the number of key rural or freight intersections operating at capacity (LoS E/F) in the PM peak in 2031.	Baseline = 16 intersections (LoS E/F)	8	8	8
		Reduce journey time between key destinations	AM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1687 mins	46	65	7
			IP Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1624 mins	46	60	5
			PM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1804 mins	67	82	20
		MCA Score (WS3)	This criterion reflects the investment objective and relates to how well the programme improves access between key destinations and access into major areas.		Highest reduction in overall vehicle distance travelled (peak hours). Similar overall travel time benefits to Prog 7. Number of intersections with LoS issues addressed on the freight network is similar across programmes.	Highest network journey reduction time. Similar overall travel time benefits to Prog . Number of intersections with LoS issues addressed on the freight network is similar across programmes.	Some network improvements, but fewer peak period benefits than Prog 6 and 7.Number of intersections with LoS issues addressed on the freight network is similar across programmes.
					2	2	1

Outcome Type	Strategic Driver	Key Performance Indicator	Measure	Baseline	Programme Outcomes Programme 6	Programme 7	Programme 11
Key Principles	Economic growth	MCA Score (WS3)	A high level assessment of each programmes' ability to facilitate economic growth. This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications.		New river crossing and minor improvements on SH57 will assist FoodHQ growth. Southern bridge will link Longburn with cross river accessibility.	Provides greatest support to existing freight generating activities. Provides direct routes for NEIZ and FoodHQ.	Marginal benefits identified. Provides well for NEIZ, and Longburn, but not as well for FoodHQ
					2	3	1
	Resilience	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.		P 6 was the second most resilient option, with a new downstream bridge outside of key flooding areas, but overall resulted in the same moderate positive score as P7. The new bridge allows a freight route south of the city to avoid the likely disrupted areas. It was considered not as resilient as P7 in an earthquake due to the unknown nature of the disruption to local road bridges on the western ring route.	P 7 was the most resilient option, scoring a moderate positive. It proposes a new road and bridge outside of the flooding area. It also seeks to improve SH57 which is more resilient than the SH56 alternative. It provides the best routes for travel in all directions in both flooding and earthquake events, including areas such as the Linton Military Camp	P 11 provided no substantial change to the current resilience of the network, with incremental improvements to the existing network and localized improvements to flooding. There were no substantial gains to resilience for both earthquakes or low impact events
					2	2	0
	Fit with strategy	MCA Score (WS3)	The alignment with strategy criterion assessed the three programmes against the relevant documents associated with the strategic direction of the city. The common themes that were identified through the analysis included efficiency, integration and connectivity.		Impact through ring road, bypasses, and new bridge results in good alignment to several strategic documents.	Significant impact through ring road, bypasses and two new bridges results in the highest alignment to strategic documents.	Lack of new bridge key difference between Prog 11 and other Progs, impacting on the blueprint outlined for the city identified in several strategic documents.
					2/3*	3	1
Impacts	Land Use	MCA Score (WS3)	This criterion covers the potential impact of the programmes on current and future land uses located on or around the sites.		Impact on current and future land use. Less than Prog 7 as only one bridge in the south.	Most impacts on current and future land uses. Impacts on existing lifestyle blocks. Highest impact of highly productive land.	Least impact on both current and future land uses. Works being undertaken on existing alignments. No bridges.
					-1	-3	0
	Environment	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces CO2 and limits the impact on water quality.		New bridge over the Manawatu River will have temporary and permanent effects. Slight reduction in total distance travelled.	New bridges over the Manawatu River will have temporary and permanent effects. Slight reduction in total distance travelled.	No new bridges over the Manawatu River. Slight reduction in total distance travelled.
					-1	-1	0
	Archaeology	MCA Score (WS3)	This criterion covers the potential impact of the programmes on known sites and/or risk areas.		New bridge in area of high archaeological potential. Bypasses have potential to affect sites predominantly relating to European/colonial occupation	New bridges in area of high archaeological potential. Bypasses have potential to affect sites predominantly relating to European/colonial occupation	Major works restricted to Bunnythorpe, with potential to affect European/colonial sites
					-2	-2	-1
Implement-ability	Engineering degree of difficulty	MCA Score (WS3)	This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.		The inclusion of river crossing(s) under Programmes 6 and 7 are the principal difference between these and Programme 11. Many other aspects of the works are similar across the 3 programmes – Bunnythorpe bypass, treatments on KB road for transmission lines and flood risk are examples.	Two new bridges, and additional 10km of existing road to be upgraded.	Difficulty relates to aspects of work common across programmes – KB Road transmission lines, Bunnythorpe Bypass etc
					-2	-3	-1
	Cost	MCA Score (WS3)	This criterion includes an indicative high-level analysis (note that MCA analysis is run with and without costs)		Cost differential from Prog 11 +20-30%	Cost differential from Prog 11 +50-60%	Lowest cost for base comparison
					-2	-3	-1
	Value for money	MCA Score (WS3)	This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.		Greater value assessed due to impact of investment, but overall rating low due to costs of scheme	More costs than Prog 6 not matched by benefits	Lower impact of investments than Prog 6
					1	0	0
	Integration with freight hub	MCA Score (WS3)	This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.		Reasonable impacts, however scenario with urban speed adjustments reduces this impact. Additional river bridge improves access.	Reasonable impact although benefits of additional upstream bridge offset by more limited improvements to the direct route to the east	Network improvements limited relative to other programmes, particularly absence of new river crossing.
					2	2	1
	IAF (Indicative)	Results Alignment (Indicative – Safety led)			High	High	High
		High Level Cost Range ($M)			335-370	400-475	255-315
		BCR Range (incl. WEBS)			1.3 - 1.5	1.1 - 1.3	1.3 - 1.6
		BCR Range (Excl. WEBS)			0.9 - 1.0	0.7 - 0.9	1.0 - 1.2

14 PART B (II) RECOMMENDED PROGRAMME

14.1 OVERVIEW

The recommended programme (Programme 6 shown in Figure 14-1 below) was developed with stakeholders, following consideration of the problems and opportunities coupled with a range of different alternatives and interventions.

The recommended programme consists of a comprehensive package of improvements including online corridor and intersection upgrades for safety and access as well as safer speeds, placemaking, and land use changes across the network. The package also includes longer term interventions to support the KiwiRail freight hub, such as improvements between Ashhurst and Bunnythorpe, and a future downstream bridge to reduce trips through the City and enable placemaking and amenity improvements.

The programme presents a blueprint for how the city's transport network can support growth over the long term. It is estimated to cost between $335M and $370M with a BCR of between 1.3 and 1.6 (0.9 – 1.1 excluding WEBS).

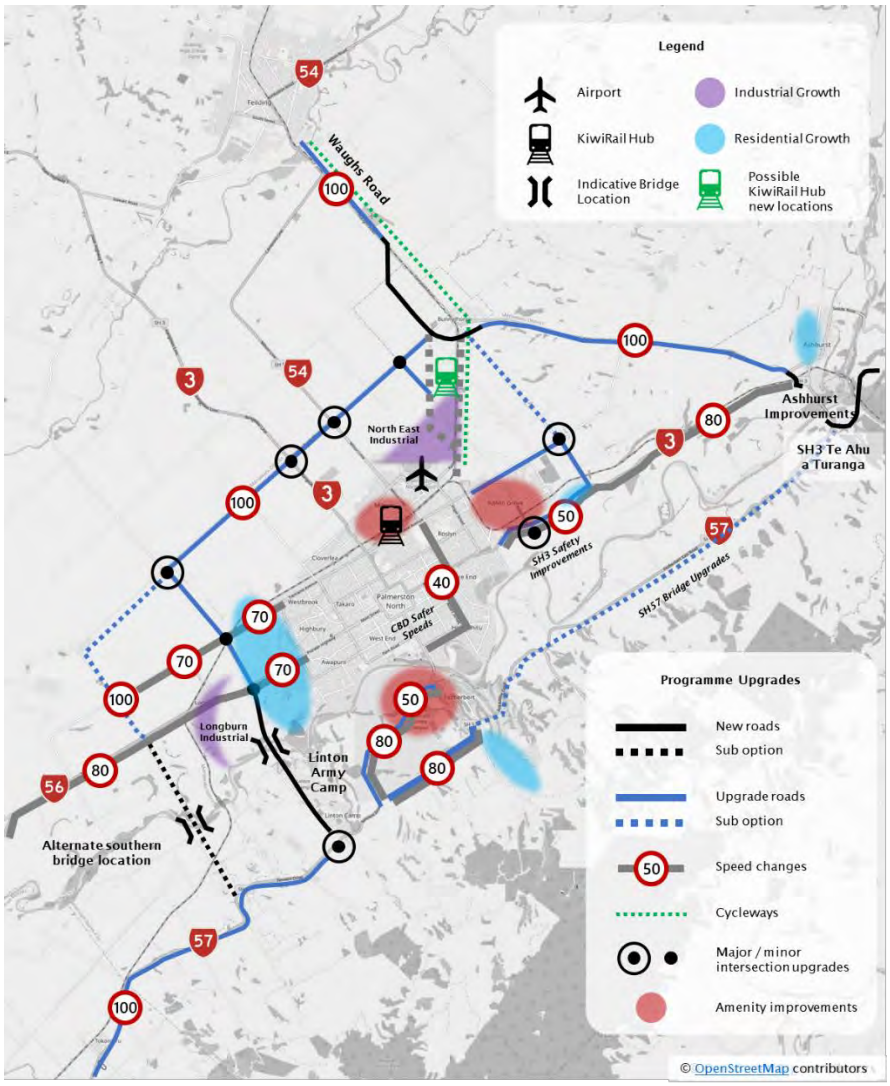


Figure 14-1: Recommended Programme Schematic

14.2 RECOMMENDED PROGRAMME ASSESSMENT

As presented in Section 13.5, Programme 6 was recommended after consideration of the key benefits, dis-benefits, risks, and alignment to the investment objectives when compared to the other shortlisted programmes.

This section provides an outline of the expected programme outcomes, key risks and value for money, as well as the indicative assessment profile.

14.2.1 Programme Outcomes

The outcomes from implementing the recommended programme over the next 10-20 years have been estimated and are presented in Table 14-1 below. Alignment to the wider strategic benefits sought for the City, as identified in Section 8.1, have also been assessed and are presented in Table 14-2.

Further detail on the outcomes is presented in **Appendix I** and Table 13-8 above.

Overall, the Palmerston North Integrated Transport Improvements project aims to unlock regional economic development opportunities, provide safer and more effective connections between some of the region's key industrial areas and remove heavy trucks from Palmerston North's city centre.

Table 14-1: Programme Outcomes

INVESTMENT OBJECTIVES (PNITI)	KEY PERFORMANCE INDICATOR	MEASURES & BASELINE	INDICATIVE PROGRAMME OUTCOME MEASURES (2031) (INCLUDING SPEED MANAGEMENT)
Reduce severance and increase amenity	Reduce both freight and vehicles on residential and place-based streets	**2031 Modelled Daily HCV flows** • City Centre Access (Fitzherbert Br): 1,700vpd • Te Awe Awe St 800 vpd • Albert Street 900 vpd • Kaimanawa Street 340 pd • Keith Street 270 vpd • College St 295 vpd • Kelvin Grove Road 965 vpd • Maxwells Line 420 vpd **2031 Modelled Daily total flows** Reduction of general traffic through townships or key places • City Centre Access over 30,000 vpd • SH3 Napier Road over 12,000 vpd • Tennent Drive 8,000 vpd • Bunnythorpe 12,000 vpd • Feilding up to 21,000 vpd • Ashhurst over 7,000 vpd	A reduction of freight on residential and place-based streets is anticipated as a result of providing better access for freight on freight routes, delivering amenity improvements, and speed management approaches. **2031 Modelled flows** • Up to 4,000 fewer vehicles (including 300-400 heavy vehicles) per day through the CBD, Fitzherbert Bridge and Tennent Dr • Up to 500 fewer heavy vehicles on Te Awe Awe St and Albert St, with 25-100 fewer heavy vehicles on other streets • Up to 3,000 fewer vehicles (including 250-300 heavy vehicles) per day on SH3 Napier Road into Palmerston North • Up to 10,000 fewer vehicles (including 1,000 heavy vehicles) heading through Bunnythorpe Village • Up to 1,000-1,500 fewer vehicles (including 100 heavy vehicles) through Feilding and Ashhurst
	Increased uptake and attractiveness of active modes	Pedestrian and cyclist measures to be considered under existing PNCC metrics in parallel project (UCMP). Baseline • Journey to work (cycle): 5.9% (2013) reducing to 3.4% (2018 Census) • Journey to work (walk): 9% (2013) reducing to 6.8% (2018 Census) • Cycling Counts (PNCC): 540 across 9 sites (2017) - a reduction from 840 in 2013	Supports and enables Urban Cycling Masterplan initiatives and investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractiveness of active modes across the study area.

INVESTMENT OBJECTIVES (PNITI)	KEY PERFORMANCE INDICATOR	MEASURES & BASELINE	INDICATIVE PROGRAMME OUTCOME MEASURES (2031) (INCLUDING SPEED MANAGEMENT)
Improve Access to and from key destinations	• Improve Intersection LoS • Reduce journey time between key destinations	• 16 key rural or freight intersections operating at capacity (LoS E/F) in the PM peak in 2031. • Refer Appendix C for a summary of the existing journey times between key destinations in the 2031 PM peak.	Intersection LoS improvement: • Reduction in key rural or freight intersections operating at capacity (LoS E/F) in the PM peak in 2031 by up to 50% (16 to up to 8). It is anticipated that the recommended programme will help to reduce journey times between key destinations: • Journey time savings of up to 10 mins for trips between Linton/SH57 and northern destinations (e.g. Feilding, Sanson) • Journey time savings of up to 2 minutes for trips to the Gorge from Feilding, SH57 Linton and SH56 Longburn • Access improvements out of the NEIZ of 1-3 minutes to most key destinations
Improve Network Safety	Reduction in Deaths and Serious Injuries (DSI)	• Wider network, excl. CBD network 2014-2018: 103 actual DSI (5yr), 100 estimated DSI (5yr) • 13 High Risk Intersections • 27 Speed management corridors identified	• Estimated 32-37 DSI saved / 5yrs across the rural network (up to 35-40% reduction over 5 yrs.) • 9-12 High-Risk Intersections treated • Up to 18 speed management corridors treated (out of 27 identified)

Table 14-2: Alignment to PNCC Strategic Direction and Vision

WIDER STRATEGIC OBJECTIVES	RECOMMENDED PROGRAMME OUTCOMES
Reduction of heavy traffic in residential areas Divert traffic out of the city centre and reduce traffic delays around the east of the city Free up capacity for, and link, with alternative transport modes including rail, air, walking and cycling	• Refer Table 14-1 above for traffic reductions outcomes (reduce severance and increase amenity)
Improve the safety, efficiency and effectiveness of the transport network	• Refer Table 14-1 above for safety and access outcomes.
Support KiwiRail Freight Hub Development and Rail into the NEIZ	• Programme 6 has been developed in parallel to KiwiRail's freight hub developments. Programme 6 is anticipated to align to the proposed hub sites, particularly a site around the NEIZ. • The NEIZ has been developed as a key location for New Zealand's freight in central New Zealand taking freight from north, south, east and west. The recommended programme provides the supporting roading infrastructure to the area.
Support existing activity and economic development opportunities at the airport, Food HQ and Linton Military Camp Promote regional economic development	• Support existing economic activities in the Palmerston North area by helping freight generating activities due to improvements on the rural freight network, and a new downstream river crossing. • Support potential specific growth areas of NEIZ, FoodHQ, and particularly Longburn and Linton due to the network safety and access upgrades along with full cross-river accessibility (without passing through the CBD).
Improving safety and access to planned developments	• Whakarongo development – safety improvements along SH3 Napier Road and key intersections • Aokautere development – safety assessment and/or improvements of State Highway 57 • City West – Speed Management on No1 Line and SH56, and possible improvements to Longburn Rongotea Road

14.2.2 Value for Money Assessment

Section 13.4 above outlines the inputs, assumptions and results of the economic analysis of the short listed programmes, including the recommended programme.

The recommended programme is estimated to cost between $335 and $370M with a BCR of between 1.3 and 1.6 (0.9 to 1.1 excluding WEBS). Refer Financial Case, Section 15.2 for an estimate of costs by project area.

Sensitivity Analysis

Several sensitivity tests have been undertaken to provide a likely BCR range for the recommended programme, focusing on the following influential factors:

- Impact of speed reductions included in the programme option (rather than the do-minimum)
- The impact of wider economic benefits
- First year of benefits/programme timing
- The impact of higher growth
- The economic discount rates and 60-year analysis period
- Impact of cost, considerations included:
    - Inclusion of sub-options. The sub options are outlined as dotted lines on the programme schematics and reflect upgrades or improvements that have significant dependencies.
    - Expected Estimate and 95th Percentile Estimate (estimated as expected estimate +35% contingency)

Table 14-3 provides the economic sensitivity analysis, the table below is based on the Expected Estimate, including sub-options (higher end cost range) and WEBs.

Table 14-3: Recommended Programme Sensitivity Analysis

VARIABLE	SENSTIVITY			BCR	
	UPPER BCR	BASE	LOWER BCR	P6 (WITH SPEED REDUCTIONS)	P6B (WITHOUT SPEED REDUCTIONS)
Wider Economic Benefits	-	Included	Excluded	0.9 - 1.3	1.0 - 1.5
Project Timing / First year of benefits	2035	2030	2025	1.1 (2025) 1.3 (2030) 1.6 (2035)	1.2 (2025) 1.5 (2030) 1.7 (2035)
Impact of Growth	Higher growth (2041 forecasts reached in 2031)	Model forecasts unadjusted	-	1.3 - 1.5	1.5 - 1.6
Discount Rate / Analysis Period	4% 60 Years	6% 40 Years	-	1.3 - 2.6	1.5 - 2.8
Cost – Scope, impact of sub options	Expected Estimate, excluding sub-options $335M -	Expected Estimate, Including sub-options $370M	-	1.3 – 1.5 (incl. WEBS) 0.9 – 1.0 (excl. WEBS)	1.5- 1.6 (incl. WEBS) 1.0 – 1.1 (excl. WEBS)
Cost – Expected estimate vs 95th percentile	-	Expected Estimate, incl. sub-options $370M	95th %tile, incl. sub-options $500M	1.0 – 1.3 (incl. WEBS) 0.7 – 0.9 (excl. WEBS)	1.1 – 1.5 (incl. WEBS) 0.8 – 1.0 (excl. WEBS)

The sensitivity testing shows that the programme level BCR is relatively robust under a range of scenarios, ranging from 0.7 (95th percentile cost estimate, without WEBs) to 2.8 (60 year evaluation period, with WEBs).

As presented above, the programme economic analysis has been undertaken using simplified procedures, appropriate to this stage of project development.

Based on the sensitivity testing, the key variables for further consideration as subsequent business case stages develop include:

- **Wider economic benefits:** WEBS provide approximately 30% of the total benefits, with sensitivity testing showing that the programme BCR without WEBS ranges from 0.9-1.0, depending on speed reductions. It is understood that PNCC are investigating WEBS for the programme in more detail.
- **Speed Management:** the overall programme includes several speed management measures, BCRs for the programme have been provided with and without speed reductions, reflecting the uncertainty of the speed management rollout as part of the Do-Minimum.
- **Project Timing**
    - As programme modelling reflects the implementation of all improvements, timing for the purposes of economic assessment assumes that the full programme will be in place by 2030. Sensitivity testing shows that the BCR reduces if full implementation is assumed to occur prior to 2030.
    - The programme will likely be delivered in stages, with a proportion of benefits occurring earlier (or later) compared to the timings above.
    - It is recommended that further modelling and benefit analysis of individual projects within the programme is undertaken as part of the subsequent project business case phases.
- **Consideration of other benefits:** further consideration of resilience, walking and cycling and benefits relating to amenity improvements should be considered further as part of the subsequent business case phases.
- **Cost:** At PBC level, cost uncertainty relates to scope uncertainty (e.g. type of intersection upgrades, extent of widening, alignment of proposed new or upgraded links) in addition to uncertainties relating to level of available data (e.g. ground information, utilities, topography, land value/use). However, there are opportunities during the next phase(s) to optimise interventions to maximise value for money (e.g. reduce cross sections on lower volume sections).
- **Impact of KiwiRail Freight Hub:** a key consideration as part of the next phase(s) of investigation include testing the impact of programme interventions with and without the proposed KiwiRail Freight Hub. Noting that although the KiwiRail Freight Hub was considered as part of the MCA criteria, the modelling undertaken to date does not include the KiwiRail Freight Hub (as details regarding location or impacts were still in development). Therefore, the quantified economic benefits of PNITI and resulting BCRs are likely to higher if the impacts of the KiwiRail Hub are included in a future do-minimum scenario.

14.2.3 Programme Investment Assessment Profile

An assessment profile has been undertaken for the entire programme under the category of "Regional, local road and state highway improvements".

The assessment has been undertaken using NZTA's Investment Assessment Framework for the 2018-21 National Land Transport Programme. A provisional assessment has also been undertaken against the 2021 Draft GPS, which introduces improved freight connections as a key strategic priority, as this is a key driver of the recommended programme.

The programme obtains a GPS priority rating of HIGH based on the anticipated safety outcomes. Based on the programme's GPS results alignment rating, and estimated BCR range, the corresponding programme priority order number is 5. It is noted that components within the programme will have higher priorities, for example the Napier Road and SH3/54 safety and access improvements[89].

Table 14-4: Investment Assessment Framework Profile

PROGRAMME GPS 2018/2021 RESULTS ALIGNMENT RATING	HIGH (Safety / Improving Freight Connections)
PROGRAMME BCR BRACKET ESTIMATE	LOW (1-2.9)
CORRESPONDING PROGRAMME PRIORITY ORDER RATING	5

GPS PRIORITY	RATING	COMMENT
Safety (GPS 2018, 2021)	HIGH	The programme will aim to address a range of safety issues in the network. For example: o 9-12 high-risk intersections have been identified for treatment in the programme. o Up to 18 Speed Management Corridors identified for treatment. o Estimated 32-37 DSI saved / 5yrs across the rural network (up to 35-40% reduction over 5 yrs.)
Improving Freight Connections (GPS 2021)	IAF to be developed, provisional 'High'	Improving freight connections for economic development is a key strategic priority of the draft 2021 GPS. As the delivery of recommended programme is likely to span several NLTP cycles, PNITI has been provisional assessed as 'High' based on the following: – The programme aims to improve multi-modal freight access (road, rail, and air) in and out of the key Palmerston North hub. – The Palmerston North area is located on national and regional critical links including; North Island Main Trunk Line (NIMT), Palmerston North to Gisborne (PNGL), State Highways (3, 56, 57, 54 and connections to SH1) and the Palmerston North Airport. – Currently, the sections of the primary rural freight network of Palmerston North are not fit for purpose due to network deficiencies (understrength bridges, narrow carriageways, high risk intersections) and a lack of rail access into key industrial areas which results in heavy vehicles on local streets. – The programme consists of upgrades to give effect to the primary freight route of Palmerston North and provide improved access to the key industrial areas of North East Industrial Zone, Longburn, and Feilding. – The programme would also provide supporting upgrades to ensure safe and reliable links to the proposed KiwiRail freight hub, which would enable rail into the NEIZ, and Palmerston North Airport.

[89] It is also noted that the Napier Road and SH3/54 DBC's, which form part of the recommended programme, have IAF profiles of H/VH (P1) and VH/L (P1) respectively.

14.2.4 Programme Risks

This section of the report is a summary of the risks from across the whole PNITI programme (i.e. all of the recommended project/packages).

Many of the risks are a product of the stage that the current business case is at and will be addressed during the next phase(s) of each project / package. Several of these of these risks can be mitigated or minimised through further information gathering i.e. further traffic modelling, ongoing consultation, and through more detailed investigations at subsequent business case stages.

The key risks are shown in Table 14-5 below.

Table 14-5: Key Risks and Opportunities

TRIGGER	CERTAINTY	IMPACT	COMMENTS
KiwiRail Freight Hub (Site Selection, NoR lodgement)	More than likely	Very high	This risk relates to the next steps, timing and outcomes of the KiwiRail Freight Hub relocation. The key triggers/dependencies include: • KiwiRail site selection and NoR lodgement • KiwiRail implementation funding The preferred site for the KiwiRail hub is still under development, with the NoR lodged in late October 2020. For the purposes of this report we have assumed that the terminal will be relocated at some point in the future. The timing of this relocation will impact on the timing of the projects that are recommended in this report. If KiwiRail ultimately decide not to relocate, a review of the preferred programme will need to be undertaken to address the increasing pressures near the central city. Mitigation is proposed by continuing Waka Kotahi's involvement during the KiwiRail Freight Hub development and ensuring that the next phase(s) of investigation include testing of options and scenarios both with and without the impact of the proposed Hub (e.g. combined transport modelling).
COVID-19 Impacts	More than likely	Medium *(Note: Revised down from High as of December 2020)*	The COVID-19 event, and its impacts, are still evolving globally. The duration and ultimate impact may not be known for some time. In terms of programme triggers Covid 19 has the potential to either accelerate or delay programme delivery. As of December 2020, based on recent recovery trends, the following predictions have been made (Refer Section 10.3): • No significant changes are expected in the nature, scale, and location of transport demand over the medium to long-term. The 10-year outlook remains largely unchanged. • Palmerston North is seeing continued demand as a multi-modal distribution centre. Maintaining safe and reliable connections to the university, Wellington and Napier Port remain critical to supporting recovery across the lower North Island. • There will be an ongoing need for transport services to support COVID-19 recovery by improving access to employment and essential services for vulnerable communities.
Land use development	More than likely	Medium	The timing of development at various locations such as Longburn, NEIZ extension, residential development, defence force rationalisation, FoodHQ growth, and other large developments, may impact traffic volume and the timing of projects within the programme.

In addition, there are a wide number of other risks which are outlined under key areas such as:

Dependencies and Technical Risks:

- Depending on the timing of any future bypasses of Bunnythorpe, 50max bridge strengthening/replacements may not be required (includes two bridges south of Bunnythorpe on Kairanga Bunnythorpe Road and two bridges on Campbells Road west of Bunnythorpe).
- The programme involves improving some corridors, and detuning others with measures such as reduced speeds/calming. There is a risk that if measures are unsuccessful, limited vehicles will be attracted to the rural freight network or other desired routes.

- Other dependencies that would need to be considered further in the subsequent business case phases are outlined in the uncertainty log contained in Table 10-3.

Financial:

- There is a risk that the programme is unable to be progressed as intended as funding needs to come from multiple funding sources (NLTP, Crown and rates) with different constraints. E.g. Interdependencies between KiwiRail, NZTA, PNCC, and MDC.
- Cost estimates may be inaccurate due to level of available data at this feasibility stage, including utility information and assumptions in regards to topography and land value/use.
- Overall cost of programme uncertain due to unknown scope of some options at this preliminary stage i.e. intersection form, extent of widening, bypass alignments.

Stakeholder/Public:

- Stakeholder engagement has been limited to the three programme development workshops. As such, there has been no public engagement on the programme options or the recommended programme. Further consideration as to how and when this engagement should occur is required during the next phase(s).
- Potential to affect sites of cultural, heritage or environmental significance.
- Potential for traffic delays during construction.

Environmental and Social Responsibility:

- Possible environmental effects during construction, particularly on the Manawatū River.
- Risk of difficulties in obtaining resource consents and/or alteration to designation(s). due to environmental impacts.
- There may be historic and cultural sites impacted by the recommended programme. Further assessment and evaluation will be necessary to ensure that such effects can either be avoided or mitigated.

Safety:

- Staggered safety improvements (short and medium term) may not provide a reduction in the number of deaths and serious injuries in the short term when compared with the longer term solution.
- Speed management measures may take longer than expected to implement.

Economy:

- Indicative BCRs may be inaccurate due to the high-level investigation of costs and benefits, for example economic analysis and traffic modelling has been undertaken at the programme, rather than package level.
- Wider economic benefits (WEBs) have been highlighted as a particular area of uncertainty which will require further investigation as part of the next phases.
- Refer to Section 13.4 for further commentary on risks identified in the economic analysis.

A number of these risks can be mitigated or minimised through further information gathering through more detailed investigations at subsequent business case stages.

14.2.5 Programme Staging and Package Development

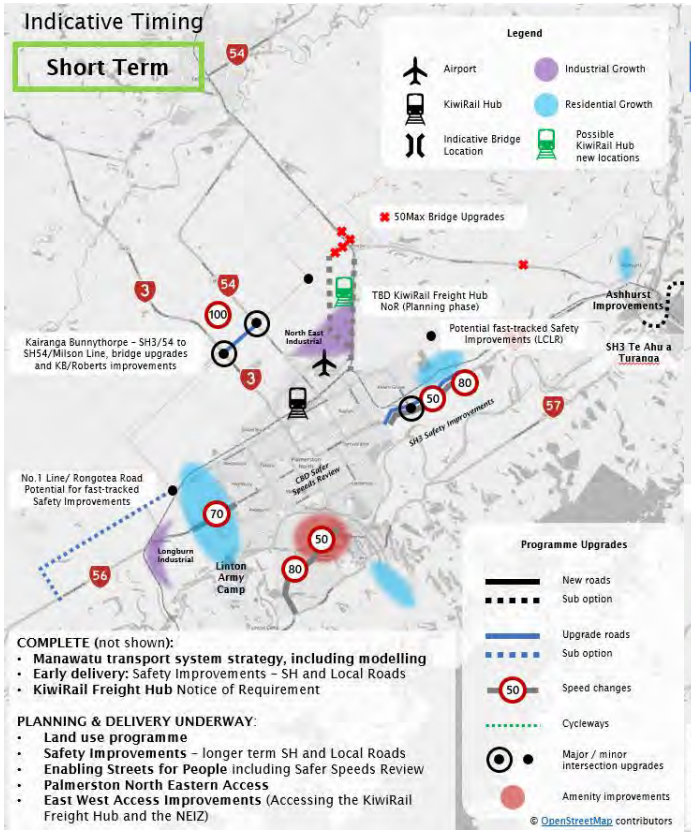
The recommended programme contains a significant tranche of work to respond the problems and opportunities outlined in Part A.

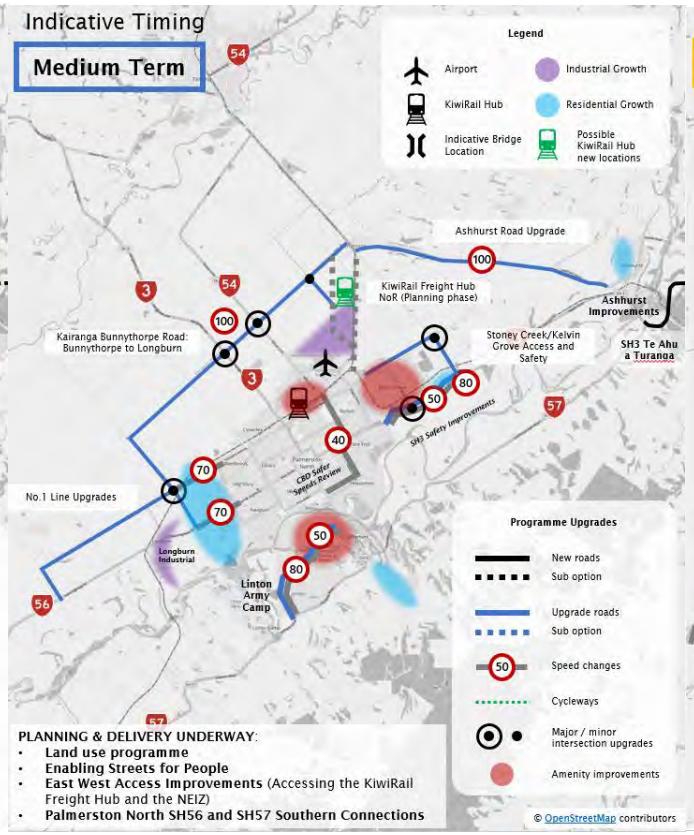
The projects that make up the recommended programme have varying degrees of complexity and implementation readiness and some are dependent, or will be informed by, other investments e.g. the KiwiRail Freight hub.

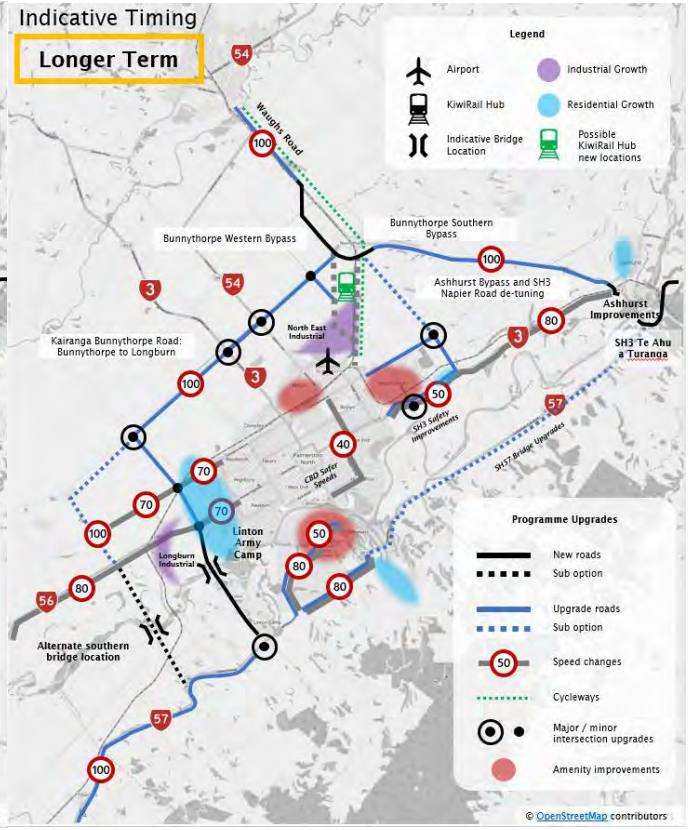
In addition, the problem section highlighted that not all issues identified are significant enough to drive immediate investment, rather investment will be required over the next 10 to 20 years to respond to growth and development.

Although all of the proposed improvements would contribute towards the achievement of the objectives, they cannot all be implemented at once; staged delivery is therefore necessary and also enables flexibility for the programme to adapt to change and deliver better value for money.

The draft staging strategy and maps are presented overleaf. The grouping of activities, and how they should be investigated and implemented, is discussed further in the Management Case presented in the following section.







Phase 1

- Complete the Manawatū Transport System Plan and update the transport model
- Safer Speeds Review and other Safe Network Programme (SNP) intervention roll out, including:
  - SH3 Napier Road Safety and Access Improvements
  - Improvements along Kairanga Bunnythorpe Road, focusing on SH3/54 to SH54/Milson and the replacements/upgrades of 50max bridge restrictions
  - Potential to fast track other safety and access improvements at No1 Line/Rongotea Road to SH56/Tiakitahuna and Stoney Creek/Kelvin Grove
- Planning underway for several business cases

Phase 2 (Timing to be determined by business case phases)

- Enabling Streets for People – Safety, access, amenity and active mode improvements
- Stoney Creek/Kelvin Grove access and safety improvements
- Planning underway for several business cases, which depending on the outcomes of the KiwiRail Freight Hub NoR, could fast-track the need for larger improvements around Bunnythorpe
- Eastern and western linkages of the freight network with corridor safety and access improvements along Kairanga to Bunnythorpe, Longburn Rongotea Road to No1 Line and Ashhurst Road.

Phase 3 (Timing to be determined by business case phases)

- Bunnythorpe bypasses to support east/west movements of people and freight while supporting the KiwiRail freight hub and reducing impacts on Bunnythorpe Village
- Ashhurst bypass along with a detuning of Napier Road
- An additional crossing of the Manawatu River and associated upgrades of SH57 and detuning of SH56 to improve connections to the south while improving access to the Linton Army Camp, Massey and Food HQ campuses.

15 PART C DELIVERING AND MONITORING THE PROGRAMME

15.1 MANAGEMENT CASE

Implementing the PNITI recommended programme over time will require ongoing commitment and effort, and timely investment across central and local government agencies. To achieve the PNITI programme outcomes, multiple agencies each with different mandates and funding priorities, will need to collaborate on an ongoing basis over a 30-year timeframe.

The initial framework for delivering the recommended PNITI programme in this management case is based on principles and outcomes, and collaboration with joined up governance. The structure is designed to be flexible enough to adjust the strategic direction and programme as circumstances change, while holding true to the programme outcomes. The principles used and flexibility built in will enable the PNITI investment and delivery partners to adapt as the operating environment (i.e. certainty and risks, viability, partner priorities, technology, and funding and financing tools) changes and evolves over time.

This section sets out the plan for the initial implementation to deliver the recommended programme, particularly for the first 10 years. To support the core implementation components, the governance arrangements and systems required to manage the implementation across partners are described, along with the benefits realisation plan to support the monitoring of key performance indicators, to a level of detail commensurate with a programme business case.

To maintain relevancy, the management case will need to be reviewed regularly and updated accordingly.

15.1.1 Delivering the programme

The recommended PNITI programme has been organised and sequenced into 9 core components (see Figure 15-1, and Table 15-1) which will achieve the desired community outcomes and transport benefits.

The PNITI programme sequence enables partners to focus on the optimal interventions in response to the identified problems when key investment decisions (such as the KiwiRail Freight Hub) are confirmed, in conjunction with population and economic growth triggers. In this regard, the programme sequence is well aligned to the Waka Kotahi Intervention Hierarchy through the focus on integrated planning interventions and making best use of the existing transport system first.

Some components such as the development of the Palmerston North regional transport system improvement plan (PNRTSIP), undertaking safety and access improvements, completing enabling land use changes, and undertaking the East/West Access Indicative Business Case (IBC) will provide the necessary foundations for the subsequent components of the programme. Completing these components first will support and inform the scope and timing of more complex future investment decisions such as the proposed ring route.[90]

One of the first components of the PNITI programme is the development of the PNRTSIP to identify the core functions of key routes and significant places within Manawatū. By using existing documentation and information to identify the key strategic routes by mode and/or customer and places of note, the existing NOP can be refined with the key routes and interventions to support the routes and balance access, place, and transport amenity.

The PNRTSIP is the first action because several other activities are dependent on its completion in terms of supporting the desired modal throughfares or helping to define the scope of other components. To help get the PNRTSIP underway, an initial scope has been developed and is included as an appendix.

[90] The transport modelling provides a clear rationale about the influence interventions such as speed management could have in managing future travel patterns within Palmerston North and the Manawatū Region.

To reduce road safety risks and DSIs, safety improvements for several State highway and local corridors (including intersections) have been sequenced to be complete within the 2021-24 and 2024-27 Regional Land Transport Plan periods. With most of the safety improvements already included in the Safer Networks/ Road to Zero programme, the process from planning to implementation is expected to be expedient.

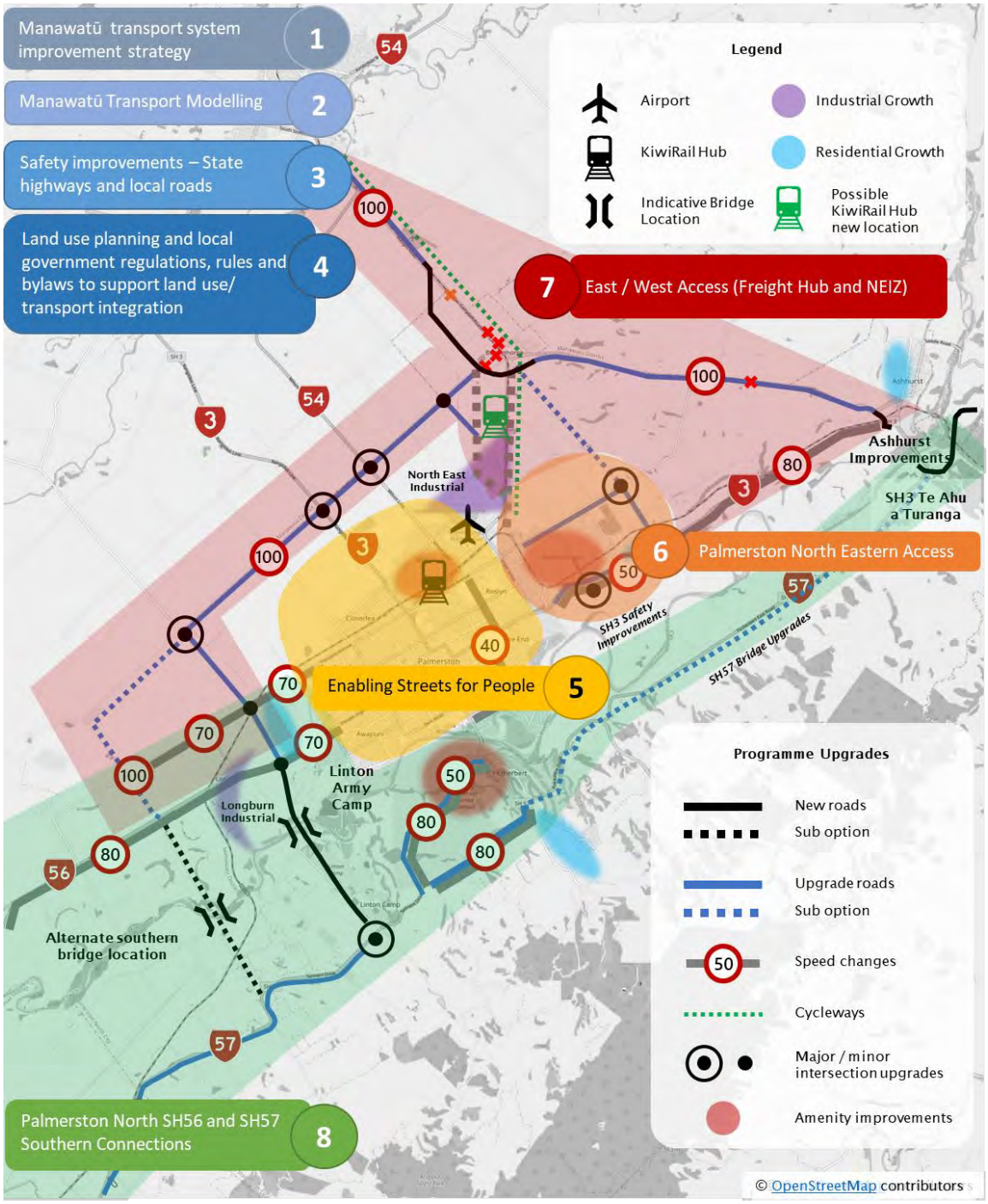


Figure 15-1: Recommended PNITI programme components

Table 15-1: Core projects to implement the PNITI programme

#	PACKAGE	#	ACTIVITIES	TRIGGER(S)/ DEPENDENCIES/ CONDITIONS	EST. TIMING	LEAD
	PNITI monitoring		Update existing monitoring regime to include PNITI benefits realisation measures and identified triggers	Complete first	2021- ongoing	All, PNITI Joint working group
1	Palmerston North regional transport system improvement plan (PNRTSIP)		Develop a Palmerston North regional transport system improvement plan (PNRTSIP) that outlines the main transport routes (by mode) and interventions to balance movement and place.	Complete first	2021/24	PNCC & WK
2	Palmerston North regional transport modelling		Revise/ update the PN model to reflect updated demographics, and other factors. Develop consistent transport modelling assumptions to support government regional economic development and PNITI programme investments	Set up and start before commissioning further business cases	2021/24	PNCC & WK
3	Safety improvements – State highways	A	SH3 Rangitikei Line and SH54 intersection safety improvement (could be combined with 3C)	Safety improvements to consider future HPMV demand and the KiwiRail Freight Hub. Implementation of safety interventions based on safety risk.	2021/30	WK
		B	SH54 Milson Kairanga Bunnythorpe intersection safety improvements aligned to local road safety improvements on corridor (could be combined with 3C)			
		C	SH3/54 to SH54/Milson Line safety and access improvements (note: this activity could include 3A and 3B above as a combined project or remain as individual activities)			
		D	SH57 and Tennent Drive intersection safety improvements			
		E	SH3 Napier Rd and Te Matai Rd intersection safety improvements			
		G	SH3/SH57 to SH2 (Saddle Road/ Piatuhia Track) safety improvements			
		H	SH54/SH3 to Feilding safety improvements			
		I	SH56/SH57 Makerua to Palmerston North			
		J	SH3 PN to Ashhurst			
		K	SH3 Rangitikei St/Featherston intersection improvements			
		L	SH57 improvements – safety and access corridor improvements	Monitor KPIs/ measures, growth, land use, movements affected by Gorge closure		
	Safety improvements - Local Roads	M	PNCC speed limit review – Stage I (Ashhurst, Milson/Bunnythorpe, Massey/Tennant Dr, and the Pahiatua Track)	To be completed first and monitored to understand effectiveness	2021/24, consultation started	PNCC
		N	Stoney Creek/Kelvin Grove safety intersection LCLR	Connect with Land use planning to support transport benefits	2021/24	

#	PACKAGE	#	ACTIVITIES	TRIGGER(S)/ DEPENDENCIES/ CONDITIONS	EST. TIMING	LEAD
		O	Rongotea Rd/No1 Line intersection minor improvements – SNP Local		2021/24	
		P	Roberts Line/ Kairanga Bunnythorpe Road intersection safety improvements aligned with SH intersection improvements on corridor	Co-ordinate with SH3, SH54, Roberts Line intersection	2021/24	
		Q	Tiakitahuna/ No. 1 Line (SH56 to Rongotea) corridor safety improvements (seal widening and barrier improvements) LCLR		2021/24	MDC
4	Land use planning, Council regulations, rules, and bylaws	A	Land use opportunities for the Tremaine Industrial area	KiwiRail developing new rail yard. Are there any transport dependencies?	2021- ongoing	PNCC and MDC where relevant
		B	Kelvin Grove residential zone change	Access onto SHs considered, and interventions designed to avoid safety issues/risk and maintain transport benefits	2021-33	
		C	Kakatangiata plan change to provide approximately 5,000 residential lots and 40ha for industrial land. Plan change to be notified mid 2021		2021/24	
		D	Plan changes to support additional housing in and around Ashhurst. Plan change to be notified early 2021		2021 +	
		E	Rezoning to support the NEIZ expansion	Land use to be considered to avoid poor community and transport outcomes	2021-30	
		F	Flygers Line Proposed Private Plan Change to rezone Rural to residential	Safety risk and multimodal access to be considered to maintain or improve transport benefits	Med- long term	
		G	Napier Road (SH3) Plan Change C – rural to residential	Access onto SHs needs to be carefully considered to avoid safety issues/risk	Underway	
		H	Actions to comply with the NPS-UD		Ongoing	
5	Enabling streets for people – improving safety and access	A	PNCC speed limit review (school areas) – Stage II	Speed management is a critical tool to operationalising the PNRTSIP and influence freight and general traffic movements to better balance access, and place and movement	2021/24	PNCC
		B	PNCC speed limit review (CBD, arterials) – Stage III		2021/24	PNCC
		C	Calming city centre streets to better manage/ balance general traffic, freight, and active mode movements	Scope to be determined and agreed; PNRTSIP will assist with scope	2021/24 +	PNCC, WK
		D	City parking management review	Parking critical tool to operationalising PNRTSIP	2021/24	PNCC
		E	Tremaine Ave optimisation activities – minor (LCLR)		2024/27	PNCC
		F	Tennent Dr safety and access improvements (speed, crossings, reducing mode conflict) LCLR	Speed management implementation first; condition of activities being LCLR	2021/24	PNCC lead, WK support

#	PACKAGE	#	ACTIVITIES	TRIGGER(S)/ DEPENDENCIES/ CONDITIONS	EST. TIMING	LEAD
		G	Develop public transport service and infrastructure business case(s) to support current bus service review		2021-27	Horizons/ PNCC
	Enabling streets for people – amenity and active modes	H	Continue implementation of the Urban Cycling masterplan		2021-30	PNCC/ WK
		I	Feilding to Palmerston North cycling shared path		2021/24	PNCC
		J	Palmerston North Urban Bus terminal redevelopment	PNRTSIP complete	2021/24	PNCC
6	PN Eastern Access	A	Napier Road (SH3 Stoney Creek to Keith St) safety, and active mode accessibility improvements: Speed management Traffic signals at SH3 Napier Rd/Roberts Line Intersection improvements at Napier Rd/James Line Shared path from Sutton Pl to Roberts Line		Underway	WK
		B	Business case for longer term safety and corridor improvements including level crossing(s)	KPIs measures for growth and freight movements	2024-27	TBD
7	East/ West Access via ring route (KiwiRail Freight Hub & NEIZ)	A	Primary business case (IBC) to investigate transport connections (ring route all sections, including river crossing location) and future sequencing based on Freight Hub development and implementation phasing	Complete to identify what connections are required to match the proposed Freight Hub phasing and clear investment commitment	Based on Freight hub, could be as early as 2021/ 24	WK, PNCC, MDC
		B	Business case/pre-imp to investigate the immediate transport inventions to support Freight Hub. Immediate interventions include the HPMV weight restricted bridges (west and south of Bunnythorpe)	IBC (8A) complete. Timing dependent on KiwiRail investment decisions and commitment to progress with the Freight Hub	Likely to be 2021-27 for planning 2027/30 + for delivery to match Freight Hub phasing	
		C	Business case (DBC) to find and design best Ashhurst to Bunnythorpe connection/ access option(s)			
		D	SH56 Longburn to Kairanga via Longburn/ Rongotea Rd corridor business case to identify potential ring route options	These subsequent business cases dependent on approval of lead business cases (8A & B) and PNRTSIP complete. Enabling Streets for People planning complete and implementation underway. Timing dependent on KiwiRail investment decisions and staging for Freight Hub and monitoring of KPIs/ measures. Traffic volumes by mode, post Gorge opening, and pace and scale of development.		
		E	Business case (DBC) to find and design best Feilding to Bunnythorpe connection/ access option(s)			
		F	Business case (DBC) to find and design best Stoney Creek Rd corridor upgrade option(s)			
		G	Business case (DBC) to find and design best Feilding to Palmerston North corridor improvements options			

#	PACKAGE	#	ACTIVITIES	TRIGGER(S)/ DEPENDENCIES/ CONDITIONS	EST. TIMING	LEAD
8	PN SH56 & 57 Southern Connections	A	Connections to Kairanga Bunnythorpe Rd corridor	Conditions: Freight Hub and PNRTSIP implementation	2027/30 +	
		B	Tennant Dr Food HQ urban/ transport amenity improvements	Enabling Streets for people planning complete. Transport investment will be proportionate to transport benefits, analysis for need and the benefits, along with consideration of broader South connections via Tennant Dr is required	2030/33 +	PNCC, WK
		C	DBC/ SSBC/pre-imp for long term optimal interventions for SH56, SH57, Fitzherbert and Tennant Dr, and Longburn and Karere Rd corridors and connections, including design for potential river crossing	Dependent on approval of lead business cases (8A & B) and PNRTSIP complete. Enabling Streets for People planning complete and implementation underway. Timing dependent on KiwiRail investment decisions and staging for Freight Hub and monitoring of KPIs/ measures.	Based on Freight hub, and dependent activities	WK, PNCC

The KiwiRail Freight Hub is a significant driver for much of the PNITI programme, with many of the activities supporting safe access to the Freight Hub. Due to the extent of the Freight Hub and its influence on future freight and traffic movements within the Manawatū, certainty about the size, location, and extent, along with the optimal transport connections to support the Hub are necessary to enable the ongoing implementation and delivery of the PNITI programme.

Once decisions regarding the size, location, and extent of the new Freight are complete there is a need to undertake further investigations to finalise the pre-cursor transport system activities essential to support the safe operation of the Hub. These investigations will be timed to complement KiwiRail's decision pathways to confirm its investment and construction commitments which will provide sufficient certainty to warrant transport investment.

To help provide flexibility and support the appropriate levels of accessibility to the Freight Hub and other key destinations within the Region, the programme includes several subsequent business case phases (8A-G) to investigate the sections that make up the ring route. These business cases phases will enable the planning stages to be complete ready for when implementation is needed to deliver the right transport outcomes and benefits.

Following commitment to developing the Freight Hub, there are several dependent PNITI components which can start based on a clearer evidence base and understanding of how the transport system is operating based on the monitoring of key performance indicators. To ensure monitoring is recognised in the programme both for informing the assessment of benefits realisation and for when activities might be required. Monitoring has deliberately been included in the recommended programme to ensure appropriate funding is provided for this important activity.

15.1.2 Programme governance and management

With several agencies across the public and private sectors involved in PNITI, there are different accountabilities, responsibilities, and processes that will need to be considered. To support the project and/or asset owners and lead investor, a collaborative governance and management structure overseeing the PNITI programme has been proposed. This structure (see Figure 15-2) provides shared direction and advice while preserving the ability for asset owners and/or investors to maintain their approval and decision-making processes.

The collaborative structure will help achieve Manawatū's shared vision and strategic direction through the implementation of the PNITI programme over time. The structure recognises that agencies involved have different and varying accountabilities and responsibilities — often dependent on which agency is the project and/or asset owner or lead investor.

At the core of the structure is the PNITI Steering and Joint Working group who will have overall responsibility to jointly implement, monitor and review the PNITI programme.

The Steering and Governance Groups have been designed to provide overall programme direction and support the project owner's approval and investment decision-making processes.

Supporting the PNITI Steering and Governance Groups, is the joint working group, made up of relevant technical staff from the involved agencies. The role of the Joint working group is to:

1. Advise and support the governance group, particularly where adjustments to the PNITI programme are recommended
2. Ensure collaboration and connections between individual projects are maintained to deliver the whole PNITI programme as endorsed by partners
3. Undertake the monitoring and reporting of the outcome and key performance indicators outlined in the benefits realisation framework
4. Work with and support lead agencies accountable and responsible for the components that collectively making up the PNITI programme by providing advice and support
5. Proactively support and work with the delivery agencies implementing the different components of the PNITI programme

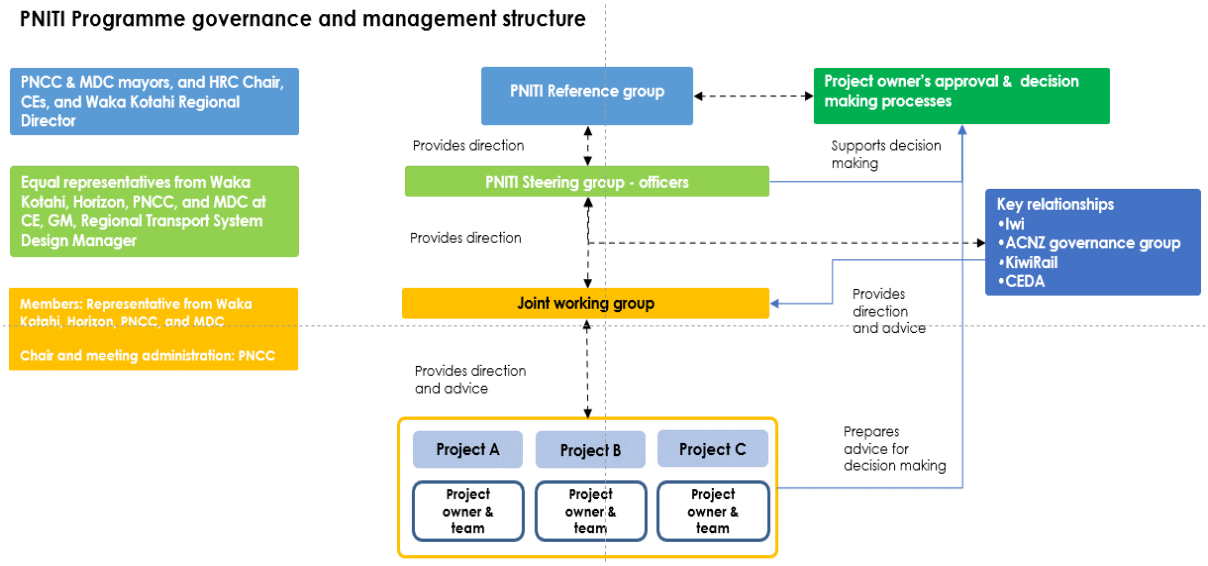


Figure 15-2: PNITI Programme governance and management structure

Individual agencies leading the implementation of components and/or activities within the PNITI programme will have their own governance, management, and project processes to complete the required implementation. The PNITI governance and management structure is designed to complement and support the agencies leading and completing the activities related to the PNITI programme.

15.1.3 Immediate actions to progress PNITI

Once the recommended PNITI programme has been approved and endorsed, the actions outlined in Table 15-2 need to be completed to set up implementation.

Table 15-2: Setting up the implementation of the PNITI programme

ACTIONS	COMPLETE BY	LEAD
Investment partners approved PNITI programme	Feb 2021	All
Include relevant PNITI transport interventions into the RLTP	Q4 2020/21	PNCC, MDC
Prepare/update terms of reference to establish the governance and management structures	Q3 2020/21	PNCC
Prepare/update the PNITI communications and engagement plan	Q4 2020/21	PNCC and WK
Set up the PNITI Benefits realisation plan and monitoring system(s)	Q4 2020/21	All
Complete the PNRTSIP	Q4 2020/21 or Q1 2021/22	All
Update and revise the Palmerston North regional transport model	Q2 2021/22	PNCC
Prepare scope and procurement documents for Enabling Streets for Everyone project	Q4 2020/21 or Q1 2021/22?	PNCC and WK
Prepare business case/ pre-imp scope and procurement documents for Freight Hub connections	Q1/Q2 2021/22?	All
Start implementing safety and LCLR initiatives		All

15.1.4 Adapting to change

Over the 30-year timeframe estimated for the PNITI it is highly likely some of the assumptions the programme is based upon will change —such as faster or slower population and economic growth.

Where material change occurs, the PNITI programme will need to be appropriately adjusted to reflect the materiality of the change(s) that have occurred.

Through ongoing monitoring and reporting of the key performance indicators (KPIs) and other measures included in the benefits realisation, the Joint Working Group will be able to provide advice to the Steering group to consider what adjustments are necessary to achieve the programme outcomes, and their significance. It is recommended that the programme undergo a formal review be undertaken every 3-years as a precursor to subsequent RLTPs.

15.1.5 Stakeholder engagement

The stakeholder communication and engagement (C&E) plan developed for the PNITI options report will be updated to provide an overarching framework for the subsequent business case phases. The updated C&E plan for the PNITI programme will provide an overall approach to stakeholder engagement, common and minimum expectations for engagement, and the programme key messages to be incorporated into the individual project based C&E plans.

To provide consistent messaging, avoid engagement fatigue, and drive value for money in engagement activities, activity level communications and engagement will be co-ordinated through the Joint working group.

The PNITI Steering group will have overall accountability for the overarching PNITI stakeholder C&E plan, and the Joint working group will be responsible for preparing the plan. Project teams working on initiatives to implement the PNITI programme will provide input to and support the programme C&E plan.

For some PNITI components such as the PNRTSIP and Enabling Streets for People, the involvement of the right stakeholders and user groups is likely to enhance the thinking and work. As such, co-design opportunities should be explored.

15.1.6 Cost management

Fiscal management shall be undertaken on an individual project basis in accordance with the relevant project and/or asset owners' relevant procedures.

Where there are common programme costs, these will be managed and shared appropriately according existing funding policies and arrangements.

15.1.7 Change control and issues management

A programme level change control and issues register shall operate as an extension to the risk register, and track programme issues as they arise. This would be in addition to project specific change control registers. The Joint working group shall be responsible for reviewing the programme register, and where necessary and appropriate escalate significant programme issues to the Steering group. Where issues are escalated to the Steering group, advice to manage, mitigate, or reduce the issues raised will be provided along with a recommended course of action for the Steering group to consider.

15.1.8 Benefits realisation plan

A relevant monitoring regime to enable the assessment of the benefits realised is set out Appendix C. The Joint working group is responsible for establishing the overarching programme framework, under which it is expected individual activities can be measured consistently. In addition, the Joint working group will be responsible for the ongoing monitoring of key performance measures for the purposes of understanding the programme benefits realised and monitoring the individual activity triggers outlined in the programme.

A regular monitoring report based on the benefits realisation plan will be prepared for the PNITI Governance and Steering groups to consider and made available to the Regional transport committee.

15.1.9 Lessons learnt

Lessons to be learned reviews will be undertaken at agreed times throughout the respective contracts and as part of project close-out reports. It will be the responsibility of individual project owners to complete these reviews with respective suppliers and share these reviews with the Joint working group, and the Steering Group.

15.2 FINANCIAL CASE

This section discusses the affordability of the programme, and what elements could be funded by the partner organisations. This section has not yet been presented to funding partners and therefore should be considered a draft for discussion.

15.2.1 Indicative Costs

An outline of the estimated capital costs for the packages is presented below; noting that several next steps for the programme involve the development of the further business cases, rather than delivery of full implementation.

As presented in 14.2.2, the recommended programme expected estimate ranges from $335 to $370M. However, since the development of the recommended programme in 2019, several wider initiatives have developed further which will have an impact on both the scope and funding mechanism of several interventions, these include:

- **KiwiRail Freight Hub**: NoR lodged in October 2020, including selection of a preferred site with indicative transport connectivity now outlined
- **Safer Network Programme (SNP):**
    - Development of the SNP local roads programme for Palmerston North City
    - SH Road to Zero Programme activities for the Manawatu-Whanganui Region developed (Refer Table 15-3 and Table 15-4 below)

The impact of the above developments can be managed during the next tranche of business cases. Indicative costs by package along with timing is provided in Table 15-3 below.

Staging of the packages was discussed in Section 0 and further phasing opportunities within each package have also been identified. This approach will help improve affordability, while still working towards the final desired network.

Table 15-3: Package Estimated Cost

#	PACKAGE	#	ACTIVITIES	LEAD	21-24	24-27	27-31	31+	NEXT PHASE	NEXT PHASE COSTS	IMPL. COST RANGE ($m)
-	PNITI monitoring		Update existing monitoring regime to include PNITI benefits realisation measures and identified triggers	All, PNITI Joint working group					Investigation	<$100k	
1	Palmerston North regional transport system improvement plan (PNRTSIP)		Develop a Palmerston North regional transport system improvement plan (PNRTSIP) that outlines the main transport routes (by mode) and interventions to balance movement and place.	PNCC & WK					Investigation	$100k - 300k	N/A
2	Palmerston North regional transport modelling		Revise/ update the Palmerston North regional transport model to reflect updated demographics, and other factors. Develop consistent transport modelling assumptions to support government regional economic development and PNITI programme investments	PNCC & WK					Investigation	$200k - 300k	
3	Safety improvements – State highways	A	SH3 Rangitikei Line and SH54 intersection safety improvement (could be combined with 3C)	WK (SNP)					Pre-Imp	SNP / $1-2M	$5-10M
		B	SH54 Milson Kairanga Bunnythorpe intersection safety improvements aligned to local road safety improvements on corridor (could be combined with 3C)								$5-10M
		C	SH3/54 to SH54/Milson Line safety and access improvements (note: this activity could include 3A and 3B above as a combined project or remain as individual activities)								$20-25M
		D	SH57 and Tennent Drive intersection safety improvements							SNP	$15-35M
		E	SH3 Napier Rd and Te Matai Rd intersection safety improvements								
		G	SH3/SH57 to SH2 (Saddle Road/ Piatuhia Track) safety improvements								
		H	SH54/SH3 to Feilding safety improvements								
		I	SH56/SH57 Makerua to Palmerston North								

#	PACKAGE	#	ACTIVITIES	LEAD	21-24	24-27	27-31	31 +	NEXT PHASE	NEXT PHASE COSTS	IMPL. COST RANGE ($m)
		J	SH3 PN to Ashhurst								
		K	SH3 Rangitikei St/Featherston intersection improvements								
		L	SH57 improvements – safety and access corridor improvements						SSBC		$30-40M
	Safety improvements - Local Roads	M	PNCC speed limit review – Stage I (Ashhurst, Milson/Bunnythorpe, Massey/Tennant Dr, and the Pahiatua Track)	PNCC (Local Road SNP)					Pre-Imp	TBD	TBD
		N	Stoney Creek/Kelvin Grove safety intersection LCLR								$3.3-5M
		O	Rongotea Rd/No1 Line intersection minor improvements – SNP Local								$0.25 - 3.75M
		P	Roberts Line/ Kairanga Bunnythorpe Road intersection safety improvements aligned with SH intersection improvements on corridor								$3.75-5M
		Q	Tiakitahuna/ No. 1 Line (SH56 to Rongotea) corridor safety improvements (seal widening and barrier improvements) LCLR	MDC							$4.5-6.5M
4	Land use planning, Council regulations, rules, and bylaws	A	Land use opportunities for the Tremaine Industrial area	PNCC and MDC where relevant					Investigation / Implement	TBD	TBD
		B	Kelvin Grove residential zone change								
		C	Kakatangiata plan change to provide approximately 5,000 residential lots and 40ha for industrial land. Plan change to be notified mid 2021								
		D	Plan changes to support additional housing in and around Ashhurst. Plan change to be notified early 2021								
		E	Rezoning to support the NEIZ expansion								
		F	Flygers Line Proposed Private Plan Change to rezone Rural to residential								
		G	Napier Road (SH3) Plan Change C – rural to residential								
		H	Actions to comply with the NPS-UD								
5	Enabling streets for people –	A	PNCC speed limit review (school areas) – Stage II	PNCC					Investigation / Implement	TBD	TBD
		B	PNCC speed limit review (CBD, arterials) – Stage III	PNCC							

#	PACKAGE	#	ACTIVITIES	LEAD	21-24	24-27	27-31	31+	NEXT PHASE	NEXT PHASE COSTS	IMPL. COST RANGE ($m)
	improving safety and access	C	Calming city centre streets to better manage/ balance general traffic, freight, and active mode movements	PNCC, WK							
		D	City parking management review	PNCC							
		E	Tremaine Ave optimisation activities – minor (LCLR)	PNCC							
		F	Tennent Dr safety and access improvements (speed, crossings, reducing mode conflict) LCLR	PNCC lead, WK support							
		G	Develop public transport service and infrastructure business case(s) to support current bus service review	Horizons/ PNCC							
	Enabling streets for people – amenity and active modes	H	Continue implementation of the Urban Cycling masterplan	PNCC/ WK						TBD	TBD
		I	Feilding to Palmerston North cycling shared path	PNCC							
		J	Palmerston North Urban Bus terminal redevelopment	PNCC							
6	PN Eastern Access	A	Napier Road (SH3 Stoney Creek to Keith St) safety, and active mode accessibility improvements	WK					Pre-Imp	$0.6m	$5-6M
		B	Business case for longer term safety and corridor improvements including level crossing(s)	TBD					SSBC	$0.5m	$15-20M
7	East/ West Access via ring route (KiwiRail Freight Hub & NEIZ)	A	Primary business case (IBC) to investigate transport connections (ring route all sections, including river crossing location) and future sequencing based on Freight Hub development and implementation phasing	WK, PNCC, MDC					IBC	$0.7 – 1.0m	N/A
		B	Business case/pre-imp to investigate the immediate transport inventions to support Freight Hub. Immediate interventions include the HPMV weight restricted bridges (west and south of Bunnythorpe)						DBC	$1.0 - 2.0m	$6-10M
		C	Business case (DBC) to find and design best Ashhurst to Bunnythorpe connection/ access option(s)						DBC	$1.0 - 2.0m	$50-65M
		D	SH56 Longburn to SH3/54 intersection via Longburn/ Rongotea Rd corridor business case to identify potential ring route options						DBC	$1.0 - 2.0m	$50-70M
		E	Business case (DBC) to find and design best Feilding to Bunnythorpe connection/ access option(s)						DBC	$1.0 - 2.0m	$20-30M

#	PACKAGE	#	ACTIVITIES	LEAD	21-24	24-27	27-31	31+	NEXT PHASE	NEXT PHASE COSTS	IMPL. COST RANGE ($m)
		F	Business case (DBC) to find and design best Stoney Creek Rd corridor upgrade option(s)						DBC	$1.0 - 2.0m	TBD (Overlap with 7C)
		G	Business case (DBC) to find and design best Feilding to Palmerston North corridor improvements options						DBC	$1.0 - 2.0m	TBD (Overlap with 7E)
8	PN SH56 & 57 Southern Connections	A	Connections to Kairanga Bunnythorpe Rd corridor						DBC	-	TBD (Overlap with 8C)
		B	Tennent Dr Food HQ urban/ transport amenity improvements	PNCC, WK					DBC/SSBC	$0.5 - 1.0m	$5-20M
		C	DBC/ SSBC/pre-imp for long term optimal interventions for SH56, SH57, Fitzherbert and Tennant Dr, and Longburn and Karere Rd corridors and connections, including design for potential river crossing	WK, PNCC					DBC	$2.0 – 5.0m	$70-95M ($200-300M incl. SH57 south of Akers Rd to SH56/57 - ACNZ scope)

15.2.2 Potential Funding Arrangements

The delivery of the recommended programme will require funding from Waka Kotahi, KiwiRail, Palmerston North City Council, and Manawatū District Council. It is anticipated that each project owner will have primary responsibility for funding their respective projects/packages. Further and ongoing discussion will be needed to decide upon the funding streams for each package through the channels outlined in the Management Case.

The recommended programme will require funding from a variety of sources:

- The state highway aspects of the programme will primarily be funded through the NLTF by including activities in future NLTPs. The Waka Kotahi Investment Proposal 21-31 is underdevelopment; however, indicative outputs relevant to PNITI are outlined in Table 15-4 below.

Table 15-4: Manawatu-Whanganui Waka Kotahi Investment Proposal[91] 21-31

REF	ACTIVITY NAME	ACTIVITY CLASS	FUNDING SOURCE	GPS	PHASE			COST [92]
					21-24	24-27	27-31	
Committed SH Improvements	Programme Business Case Development	SHI	NLTF	ALL	-	DBC	DBC	$
Proposed SH Improvements	Palmerston North Integrated Transport Improvements	SHI	NLTF	ALL	-	PTY IMP	IMP	$$
Proposed Road to Zero SH ($2M+)	Regional Speed Management and Safety Infrastructure activities	R2Z	NLTF	Safety	IMP	IMP	IMP	$$
	Road to Zero Low Cost Low Risk programme	R2Z	NLTF	Safety	IMP	IMP	IMP	$$
	SH3 Napier Road and Te Matai Road intersection	R2Z	NLTF	Safety	IMP			$
	SH3/SH57 to SH2	R2Z	NLTF	Safety	IMP			$
	SH3 Rangitikei Line and SH54 intersection	R2Z	NLTF	Safety	IMP			$
	SH54 Milson Kairanga Bunnythorpe intersection	R2Z	NLTF	Safety	IMP			$
	SH57 and Tennent Drive intersection	R2Z	NLTF	Safety	IMP			$

- Local authority (PNCC and MDC) activities will be part funded through Council rates contribution with some activities part funded through the NLTF FAR.
- KiwiRail package elements are likely to be funded via Crown/Provincial Growth Fund

The current allocations in the NLTF are not sufficient to fund the entire programme, particularly as more infrastructure is proposed and the costs of the PNCC elements are uncertain. However, the NLTF is constrained. Potential alternate future funding streams include:

- Economic stimulus: The Government is currently in the process of responding to the COVID 19 pandemic, aspects of the PNITI programme could be fast-tracked through economic stimulus funding.
- Provincial Growth Fund

A provincial growth fund application has not yet been submitted for this programme of works. If a project can generate additional benefits for regional development, the Provincial Growth Fund can be involved[93]. An indicative assessment against the PGF objectives shows that the programme has the potential to meet most, if not all, PGF criteria.

[91] https://www.nzta.govt.nz/assets/planning-and-investment/docs/waka-kotahi-investment-proposal-2021-31-regional-summary-manawatu-whanganui.pdf
[92] Key to financial magnitude: $ < $10m, $$ = $10-100M, $$$ = $100M+
[93] Source: https://www.growregions.govt.nz/get-funding/how-to-apply/eligible/

15.2.3 Affordability

The overall programme is considered affordable as it is programmed over a 10+ year period, but each individual element will need to be considered in more detail at subsequent business case stages. As discussed above in Section 0, these individual elements may be in phased in delivery, and staging will need to be re-evaluated during the next phases.

Elements within the implementation programme also be staged or adapted to align with any emerging investment priorities. All large projects within the recommended programme have been previously considered by the funding partners and are contained in other planning documents, principally the Joint Transport Study (2011).

APPENDIX A WORKSHOP 1

APPENDIX B FREIGHT DEMAND STUDY

APPENDIX C BASELINE KPIS

APPENDIX D CONSTRAINT MAPS

APPENDIX E LONG LIST DEVELOPMENT

Appendix E1: Long List Interventions

Appendix E2: Programme Long List Development

APPENDIX F SHORT LIST MODELLING

APPENDIX G SHORT LIST MCA REPORT

APPENDIX H WIDER ECONOMIC BENEFITS

APPENDIX I OUTCOMES

Appendix I1: Short List Outcomes

Appendix I2: Recommended Programme Outcomes

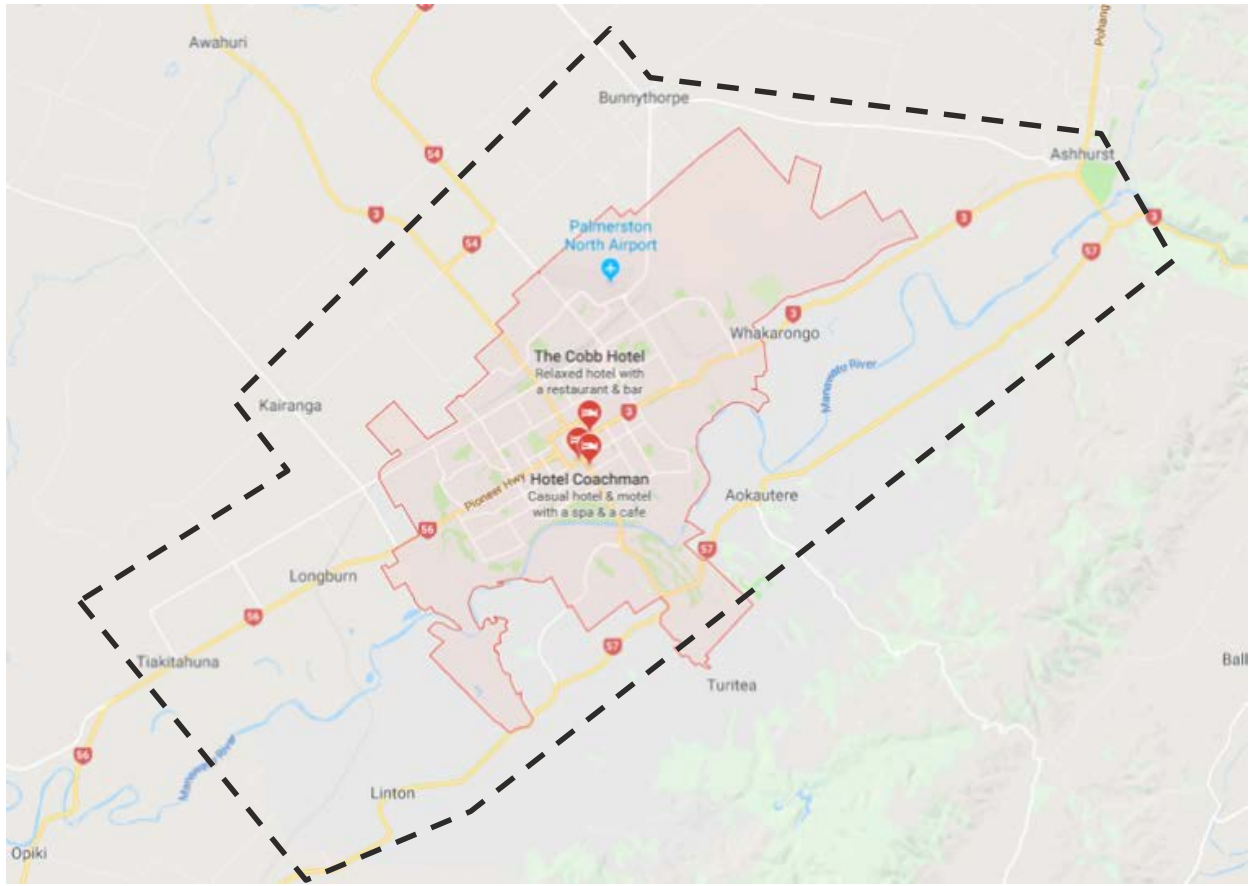
Palmerston North Integrated Transport Initiative

Workshop 1 – Problems, Benefits and Opportunities

Stantec

Palmerston North DBC

Study Area



- Area of influence is much larger

National Freight Demand Study

National & Regional Freight Movements

New Zealand freight volumes

This visualisation shows estimated freight volumes transported within New Zealand in 2012 using data from the Ministry of Transport's National Freight Demand Study.

Note that freight volumes are only shown between origin and final destination regions but actual transport routes may involve intermediate points, and trans-shipments of containers are excluded.

Show freight volumes for:

- All modes
- **Road**
- Rail
- Coastal shipping

4,000,000 tonnes

2,000,000 tonnes

1,000,000 tonnes

500,000 tonnes

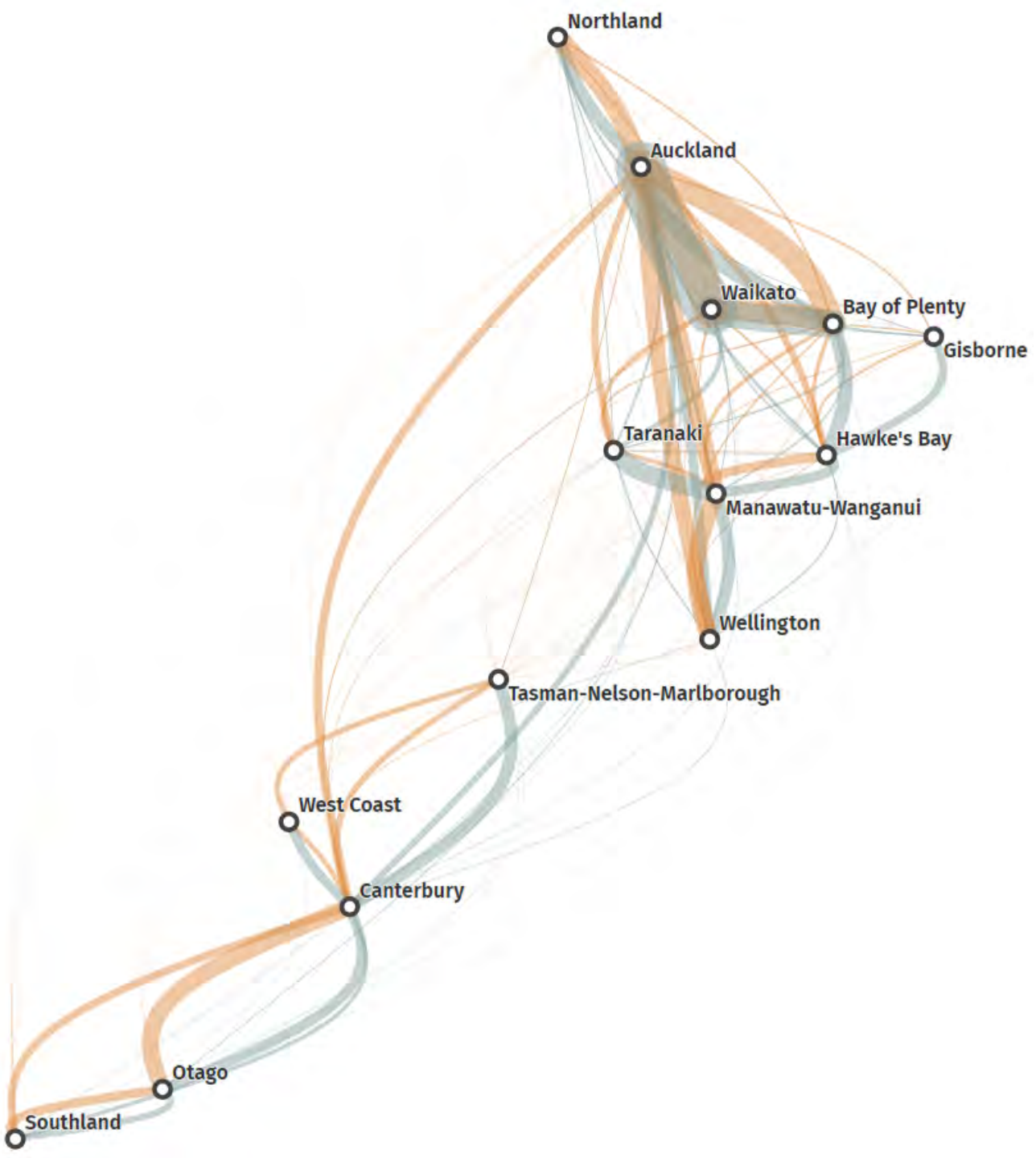
250,000 tonnes

100,000 tonnes

Northbound freight

Southbound freight

Click a region to see only freight to and from that region



New Zealand freight volumes

This visualisation shows estimated freight volumes transported within New Zealand in 2012 using data from the Ministry of Transport's National Freight Demand Study.

Note that freight volumes are only shown between origin and final destination regions but actual transport routes may involve intermediate points, and trans-shipments of containers are excluded.

Show freight volumes for:

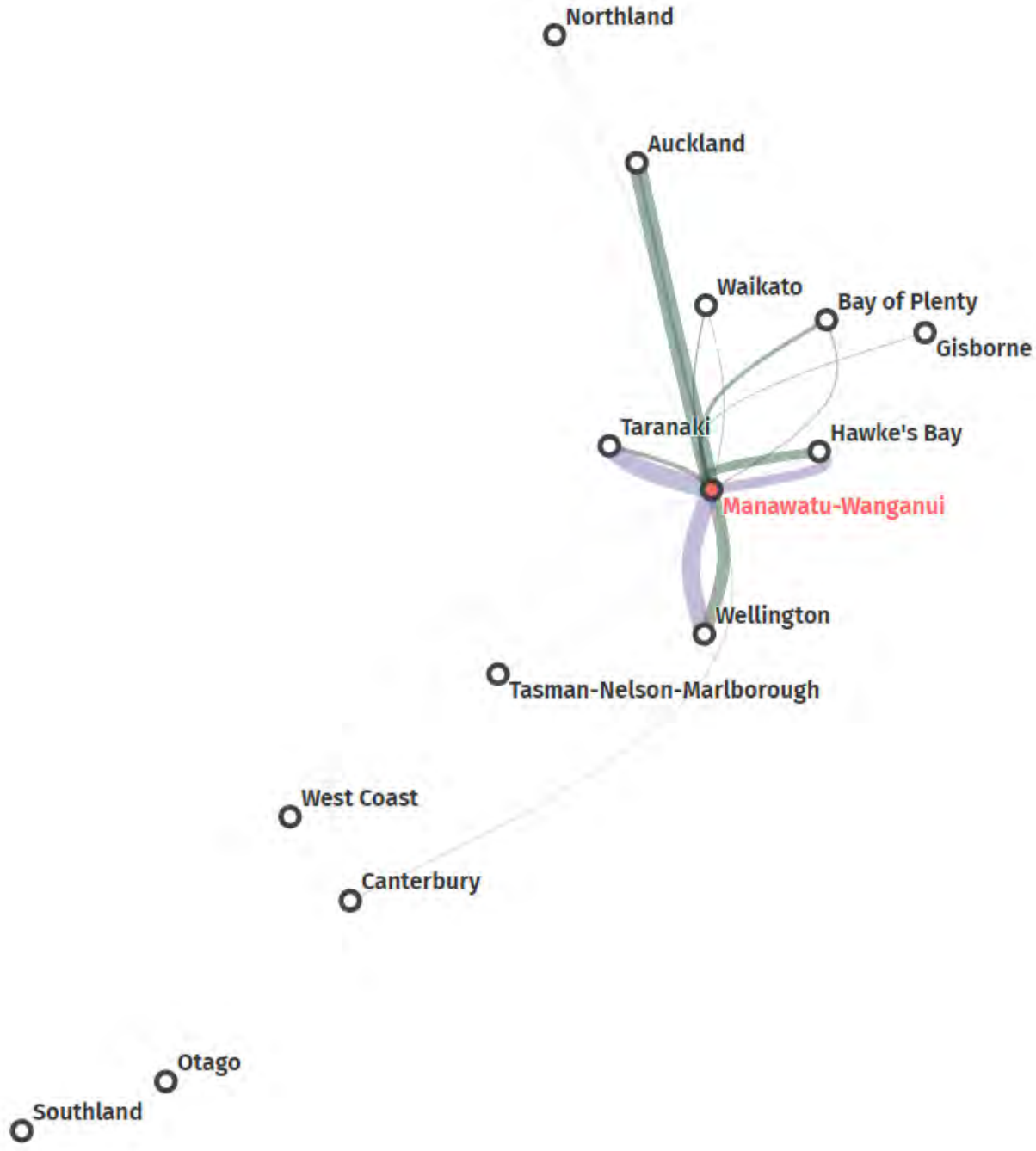
- All modes
- **Road**
- Rail
- Coastal shipping

4,000,000 tonnes
2,000,000 tonnes
1,000,000 tonnes
500,000 tonnes
250,000 tonnes
100,000 tonnes

Inbound freight
Outbound freight

Road freight to and from Manawatu-Wanganui (000 tonnes)

To Taranaki	1,250
To Wellington	1,180
From Auckland	1,140
From Wellington	840
To Hawke's Bay	680
From Hawke's Bay	630
From Taranaki	300
From Bay of Plenty	280
To Auckland	220
To Bay of Plenty	140
From Waikato	110
To Waikato	90
From Gisborne	70
From Canterbury	50
To Canterbury	30
To Gisborne	20
From Tasman-Nelson-Marlborough	20
From Northland	10
To Northland	10
To Tasman-Nelson-Marlborough	10



http://schiff.co.nz/interactive/nzfreight/

New Zealand freight volumes

This visualisation shows estimated freight volumes transported within New Zealand in 2012 using data from the Ministry of Transport's National Freight Demand Study.

Note that freight volumes are only shown between origin and final destination regions but actual transport routes may involve intermediate points, and trans-shipments of containers are excluded.

Show freight volumes for:

- All modes
- Road
- **Rail**
- Coastal shipping

4,000,000 tonnes

2,000,000 tonnes

1,000,000 tonnes

500,000 tonnes

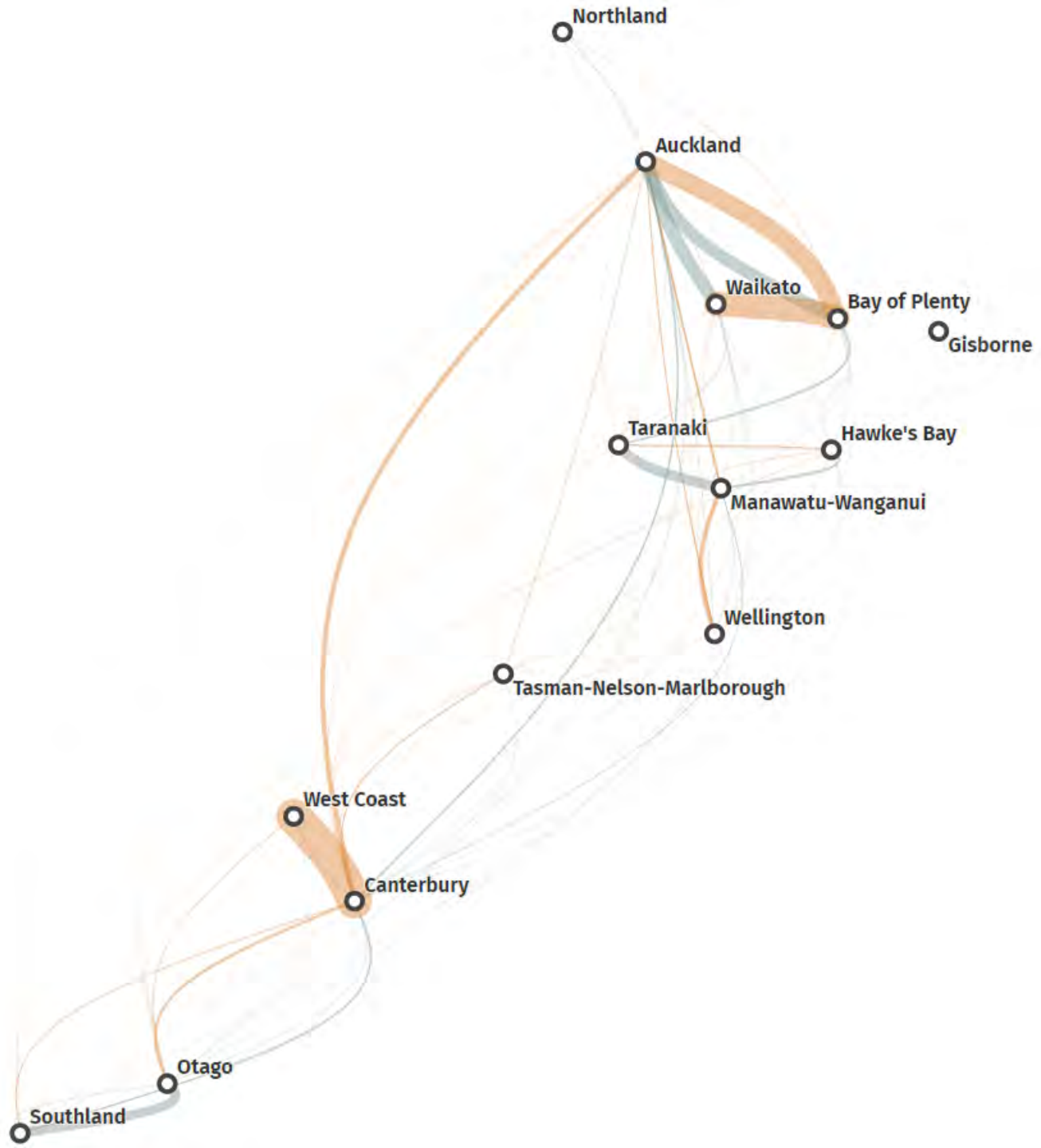
250,000 tonnes

100,000 tonnes

Northbound freight

Southbound freight

Click a region to see only freight to and from that region



New Zealand freight volumes

This visualisation shows estimated freight volumes transported within New Zealand in 2012 using data from the Ministry of Transport's National Freight Demand Study.

Note that freight volumes are only shown between origin and final destination regions but actual transport routes may involve intermediate points, and trans-shipments of containers are excluded.

Show freight volumes for:

- All modes
- Road
- **Rail**
- Coastal shipping

4,000,000 tonnes

2,000,000 tonnes

1,000,000 tonnes

500,000 tonnes

250,000 tonnes

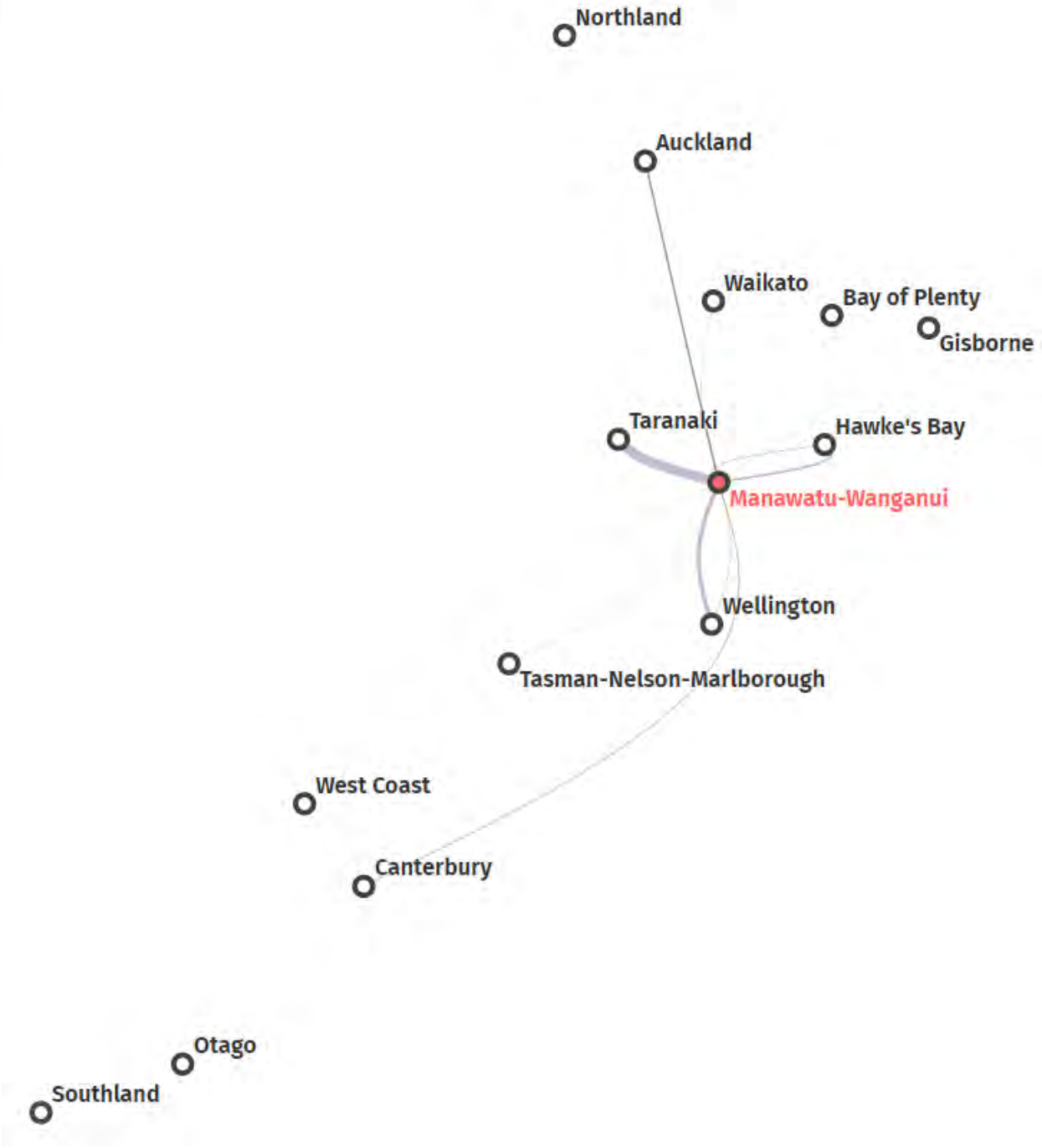
100,000 tonnes

Inbound freight

Outbound freight

Rail freight to and from Manawatu-Wanganui (000 tonnes)

To Taranaki	680
To Wellington	300
To Hawke's Bay	170
From Auckland	150
From Canterbury	70
From Hawke's Bay	50
From Wellington	40
To Auckland	30
To Canterbury	20
To Bay of Plenty	20
To Waikato	20
From Tasman-Nelson-Marlborough	10
From Waikato	10



http://schiff.co.nz/interactive/nzfreight/

Road and Rail – Existing Demands

Patterns of existing freight movements

Road and Rail – Existing Demands

- Main freight flows linked to main industrial areas
- Strong EW axis along Tremaine Ave to north of city centre
- Low flows on SH57 bypassing city to south
- High flows from north

Land use and Growth

One Integrated Plan

PNCC
One Integrated Plan

Our Integrated Plan

Enabling sustainable growth

A more vibrant city centre

Developing recreation activities

An innovative and growing city


Encouraging more events through purpose built facilities

Mapping the Future

Sustainable Growth (Industrial)

1. Wastewater Treatment Plant Upgrade
2. Regional Ring Road, Rail, Airport & multi-modal infrastructure to enable industrial growth: Longburn & North East Industrial Zone (NEIZ)
3. Water Storage & Drainage*

** City-wide*

Sustainable Growth (Residential)

1. Infrastructure for residential growth: Whakarongo (our own city development), Aokautere, City West, Urban Intensification, Ashhurst

City Centre Transformation

1. City Centre Streetscape Plan & Redesign
2. Te Manawa 2025 Redevelopment
3. Library of the Future
4. Central Energy Trust Arena Masterplan & Projects
5. Heritage Protection Package*
6. Initiatives with City Business Partners*

** Across City Centre*

Manawatū River Network

1. Central Energy Trust Wildbase Recovery Centre
2. Victoria Esplanade Masterplan & Projects
3. He Ara Kotahi Bridge & Shared Pathway
4. Manawatū River Shared Pathway (Ashhurst to City)
5. Te Apiti Biodiversity & Recreation
6. Ahimate Park (Waitoetoe Park)
7. Te Motu o Poutoa (Anzac Park)

City-wide Partners:

Rangitāne, Central Economic Development Agency (CEDA), Central & Local Government, Massey University, Research & Food HQ, NZ Defence, MidCentral DHB, Airport*

** City-wide*

Manawatū River & Tributaries

Biodiversity Corridors

Urban Areas

Rail

Regional Freight Ring Road

Regional Freight Ring Road Options

City Boundary

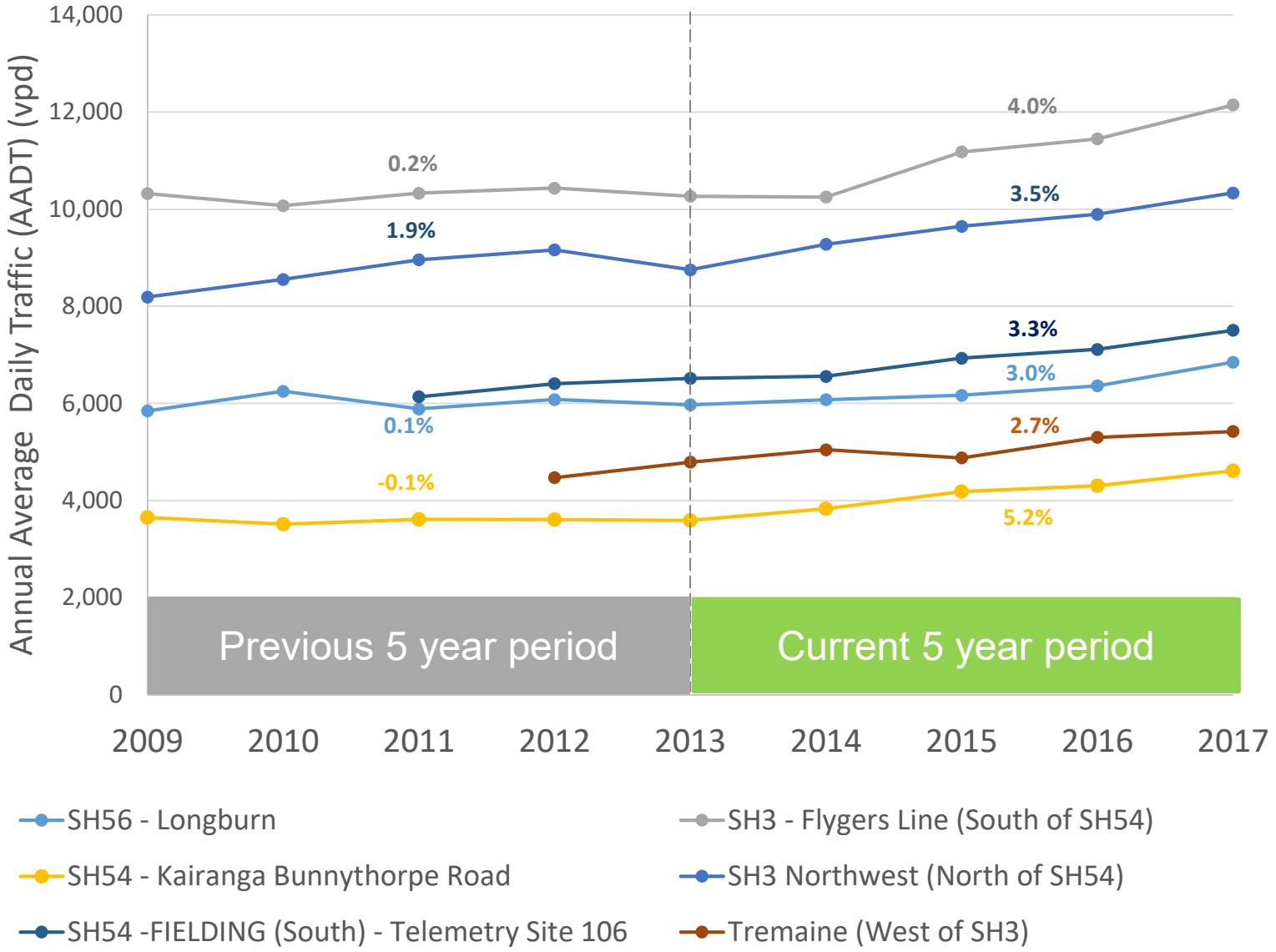
Road and Rail

Future Demands and Growth

Road and Rail –
Future Demands

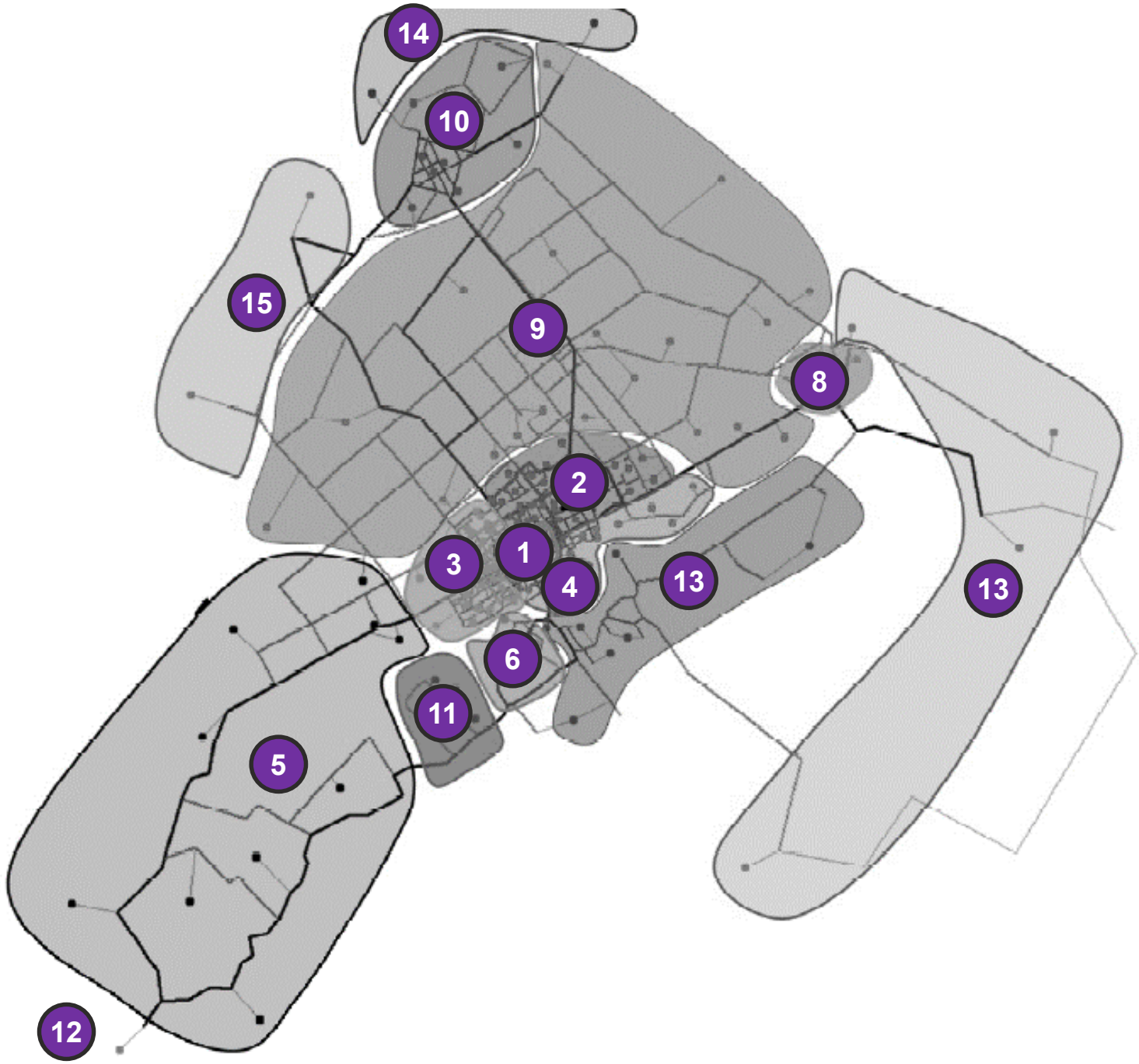
Network Traffic Volumes and Growth

2009-2013 vs 2013-2017



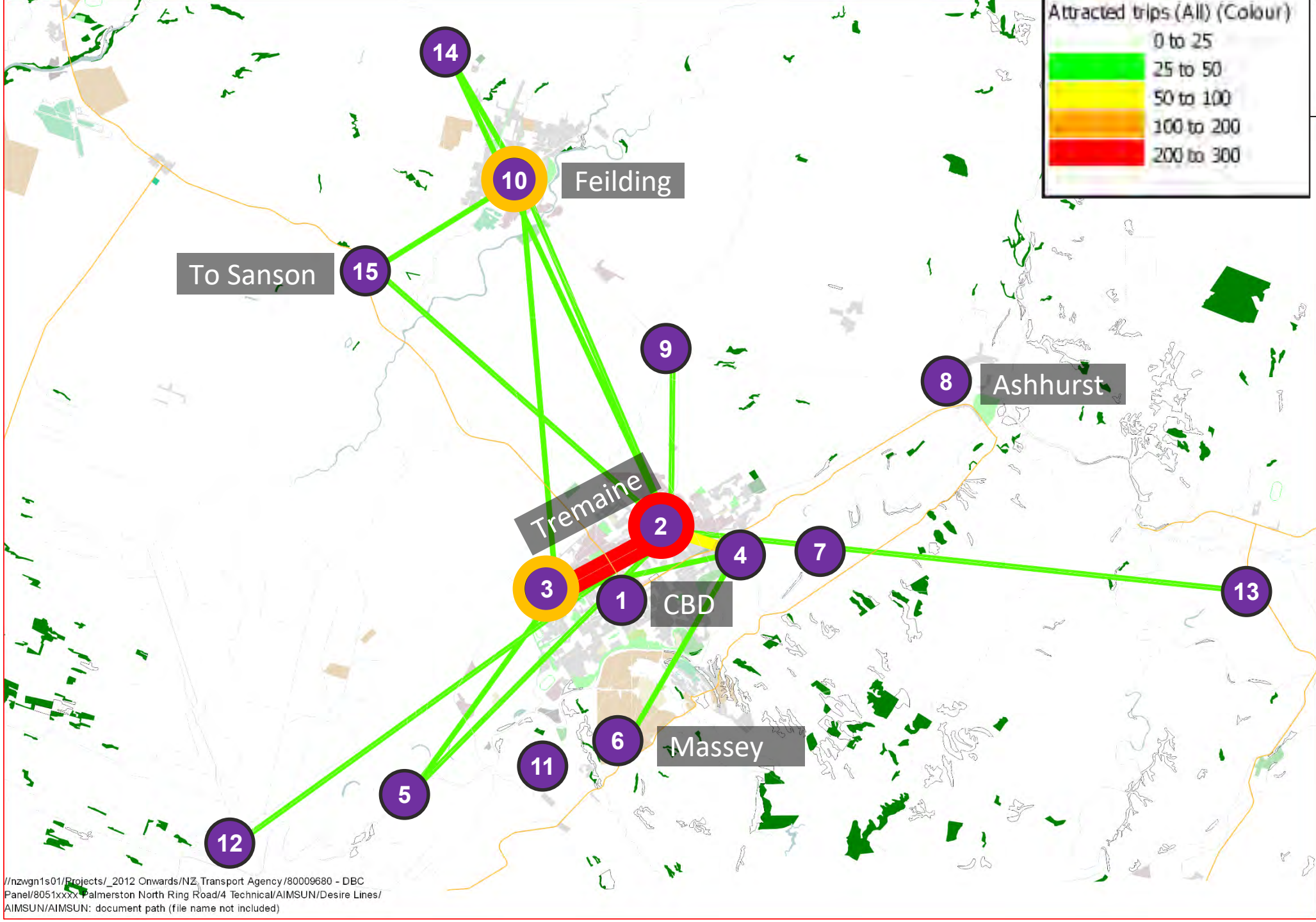
Road and Rail –
Future Demands

Modelled Zones



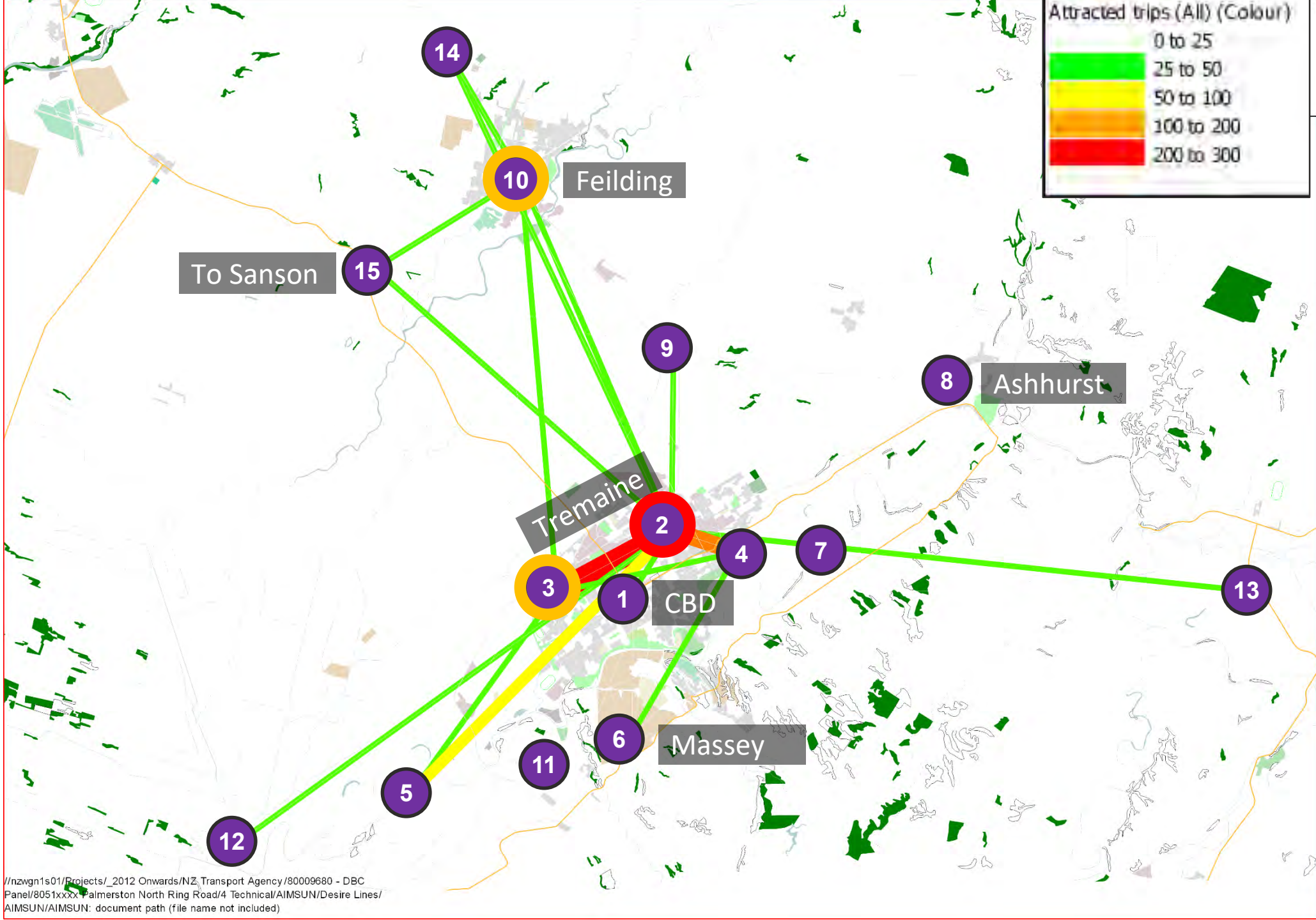
Road and Rail –
Future Demands

HCV OD Desire Lines 2013 AM



Road and Rail –
Future Demands

HCV OD Desire Lines 2031 AM

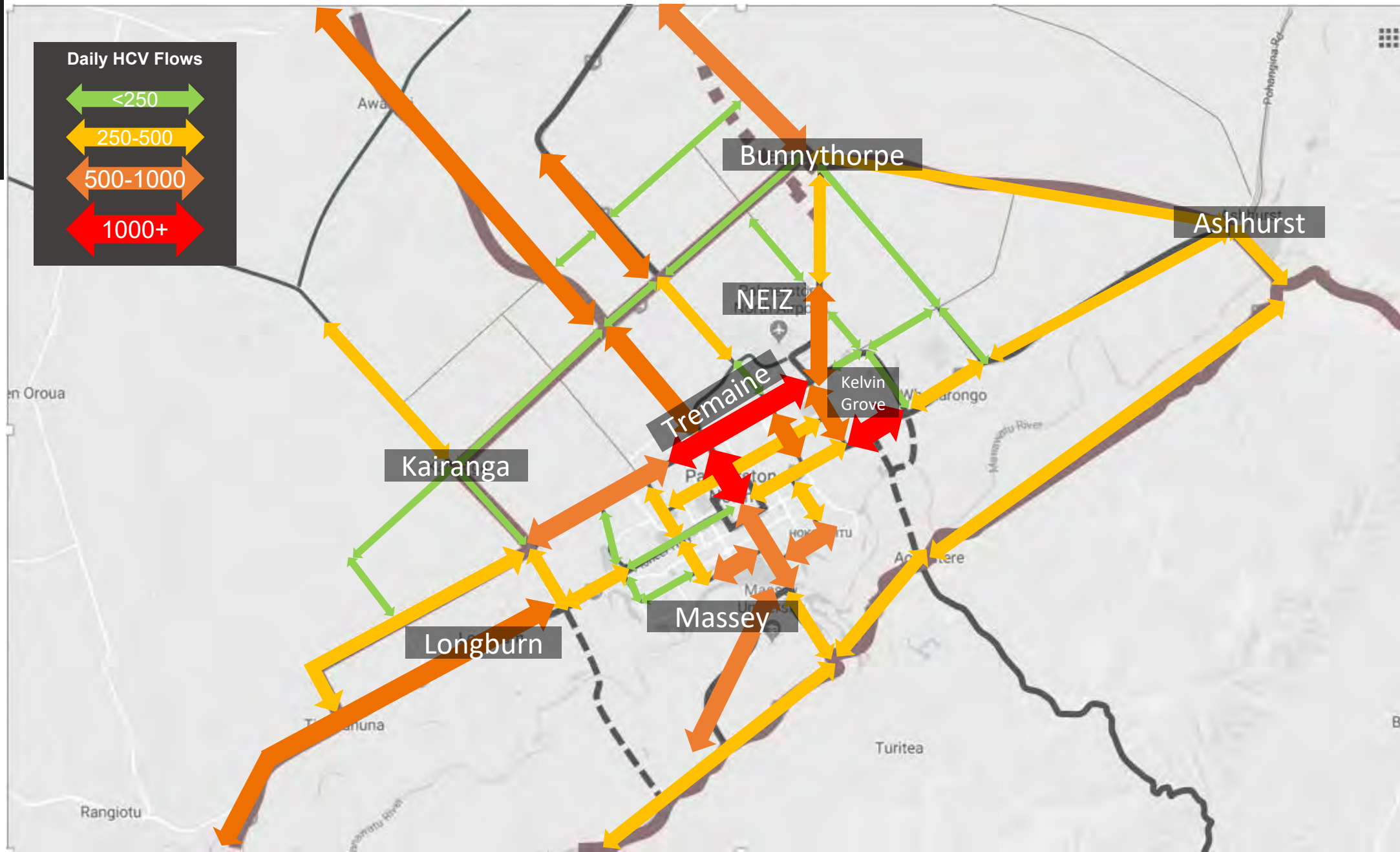


Network Context

Flows vs Network

Network Context

Patterns of existing freight movements



Network Context

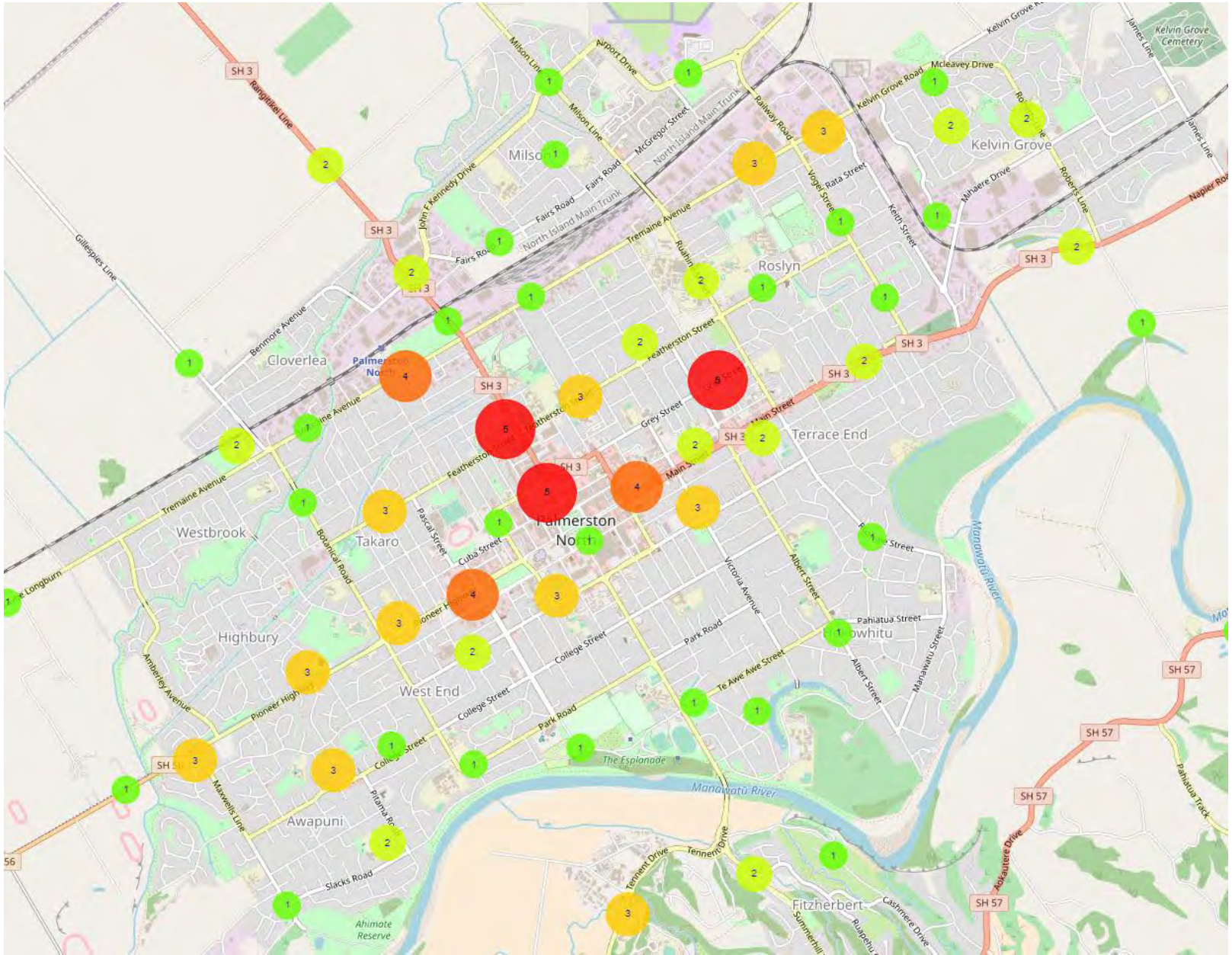
HCV Flows vs Land Use

Network Safety

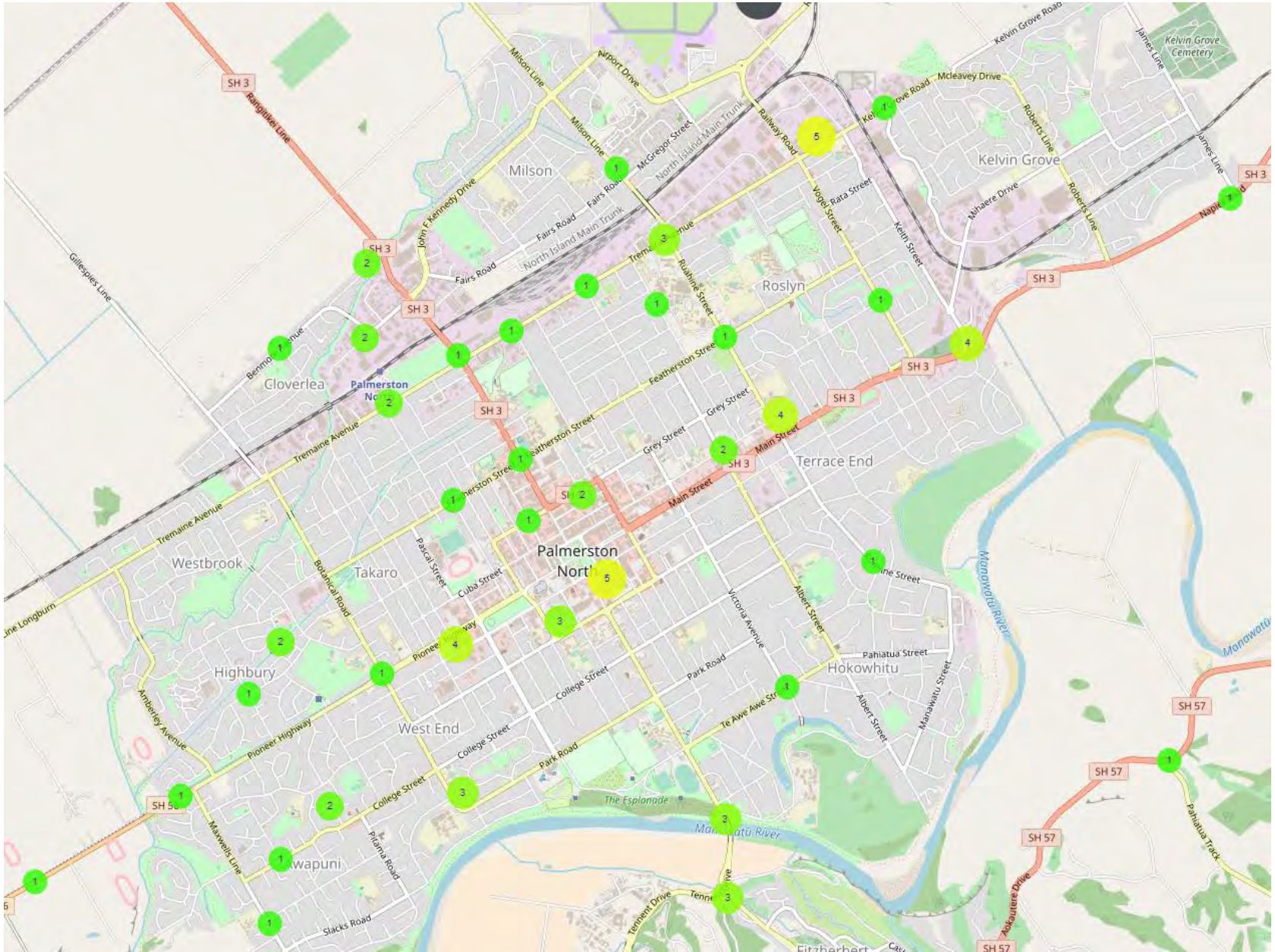
Crash Maps

Central Palmerston – Fatal & Serious

(2013-2017)

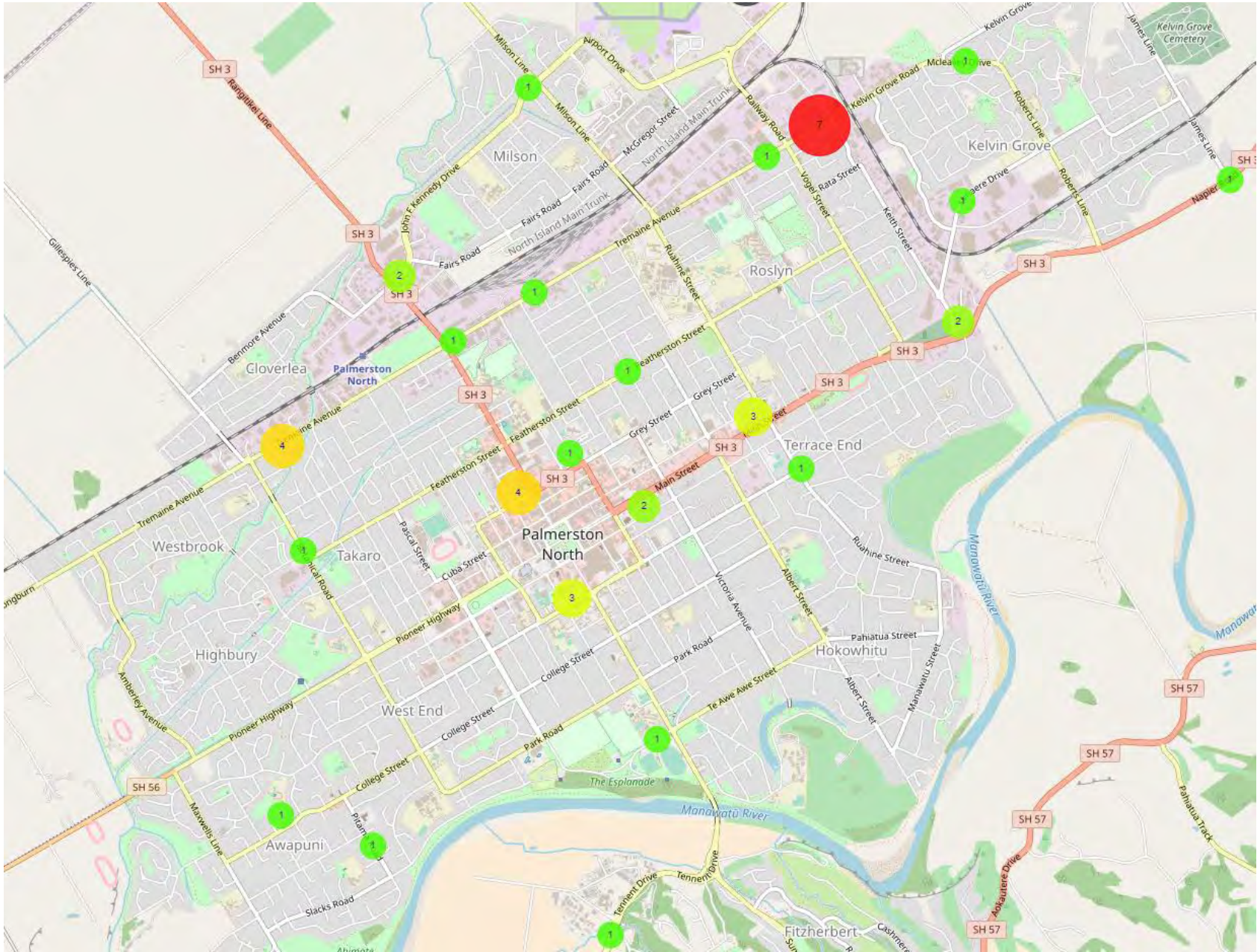


Central Palmerston –Trucks (Primary), All Crashes (2013-2017)



Central Palmerston –Trucks (Secondary), All Crashes

(2013-2017)



Central Palmerston – Trucks (Primary), Fatal and Serious

(2013-2017)

Central Palmerston - Trucks (Secondary), Fatal and Serious

(2013-2017)

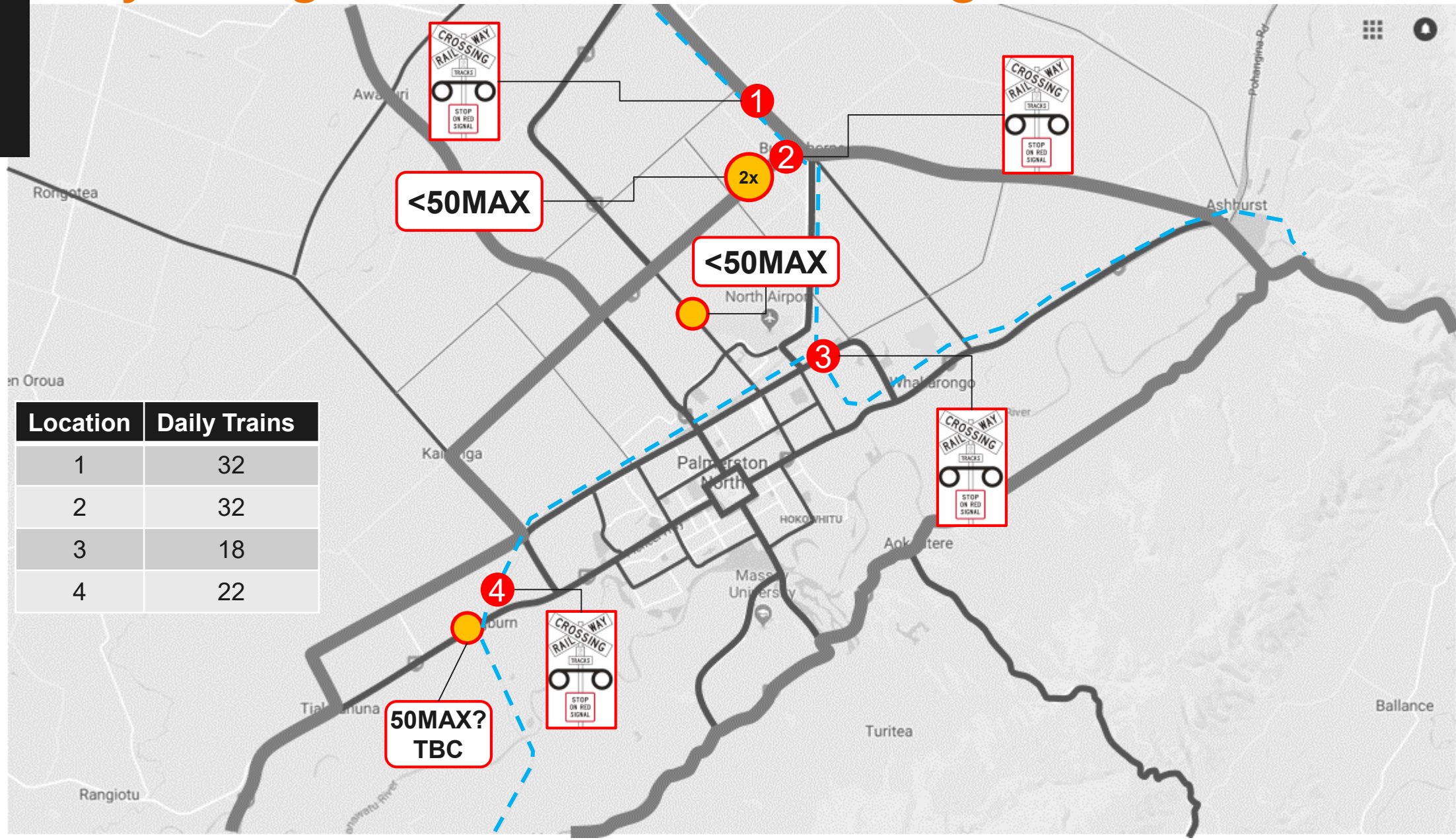
Network Restrictions

Resilience, Restrictions and Alternate Routes

Key Bridges and Level Crossings

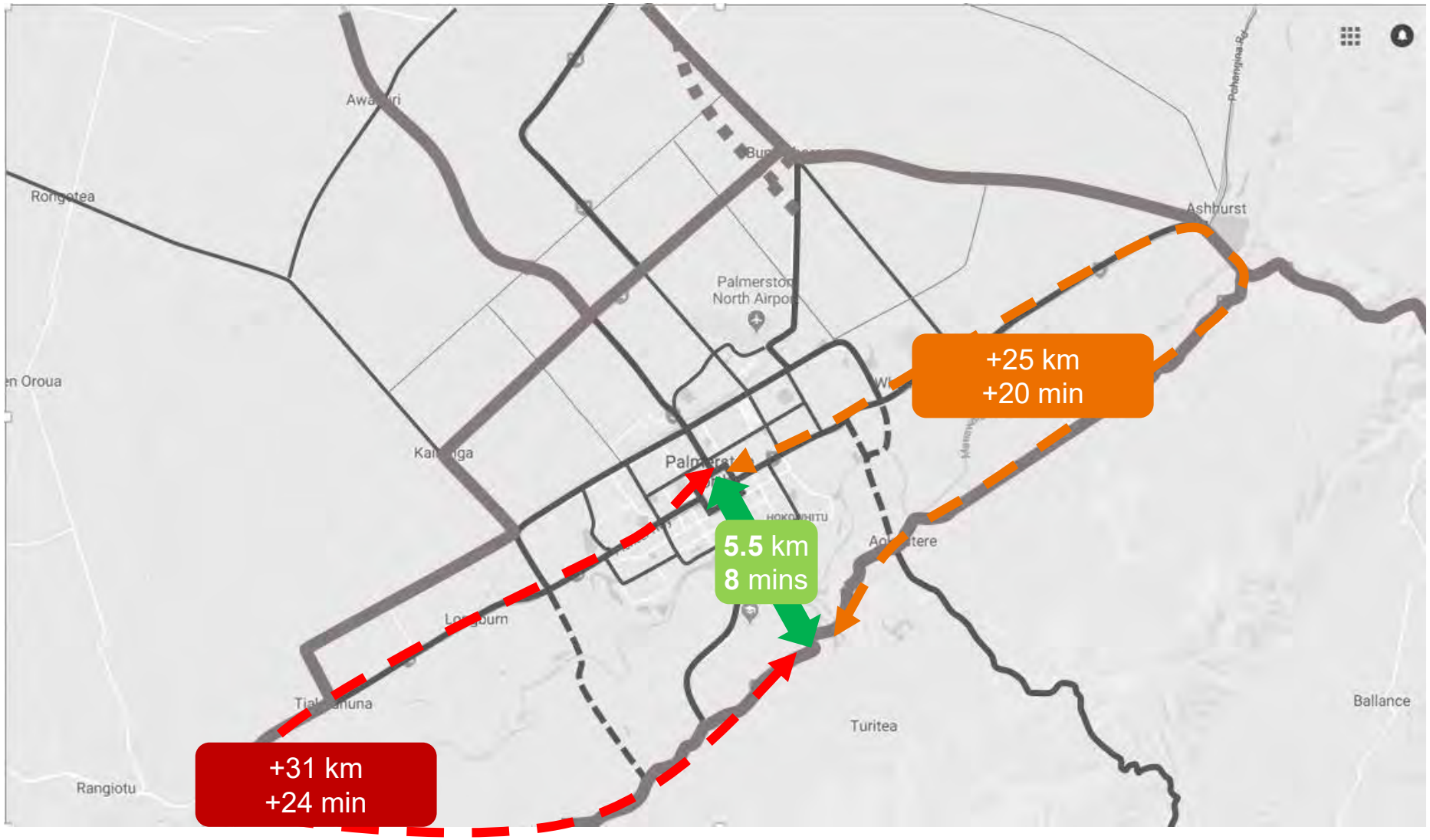
Network Restrictions

Location	Daily Trains
1	32
2	32
3	18
4	22



Resilience

Alternate Routes

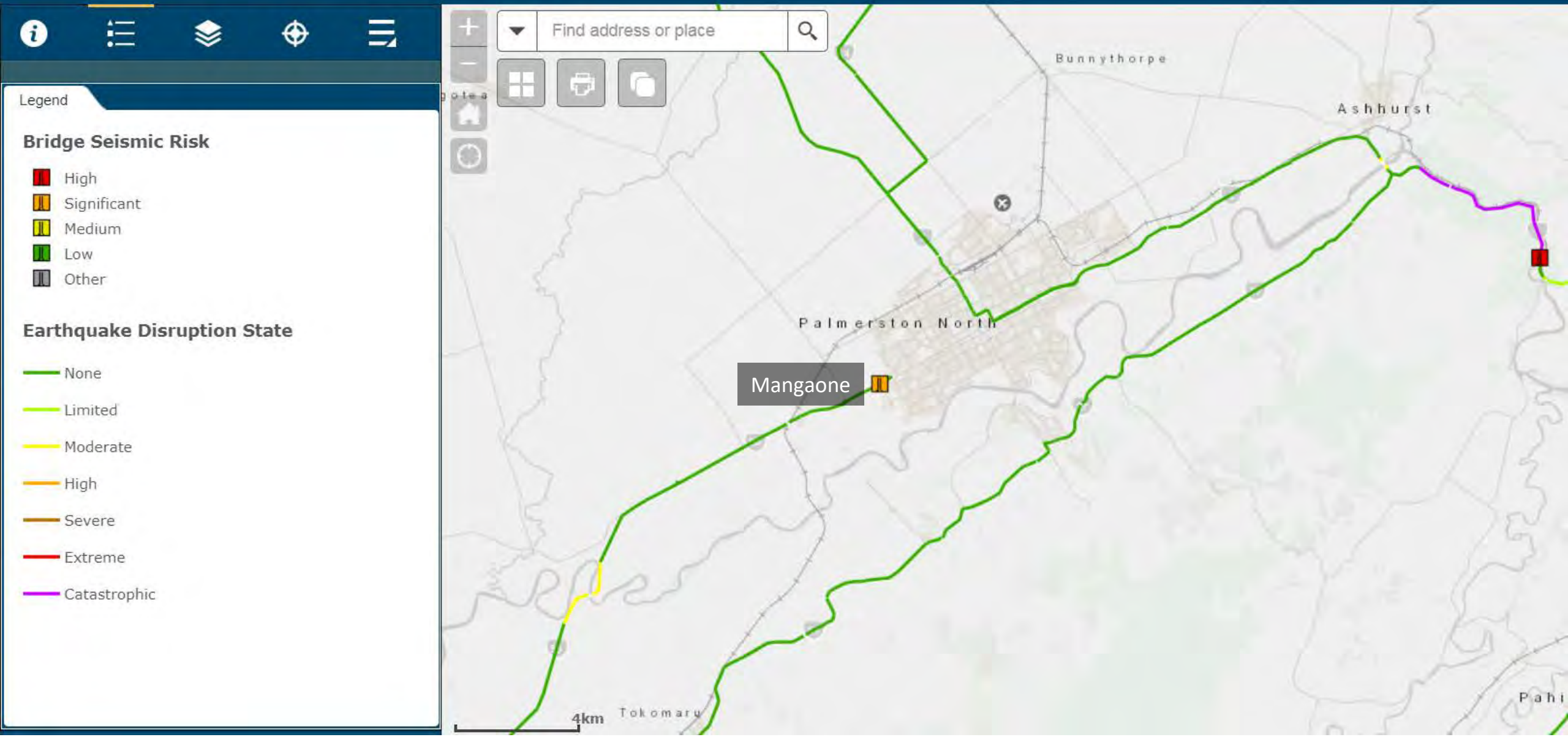


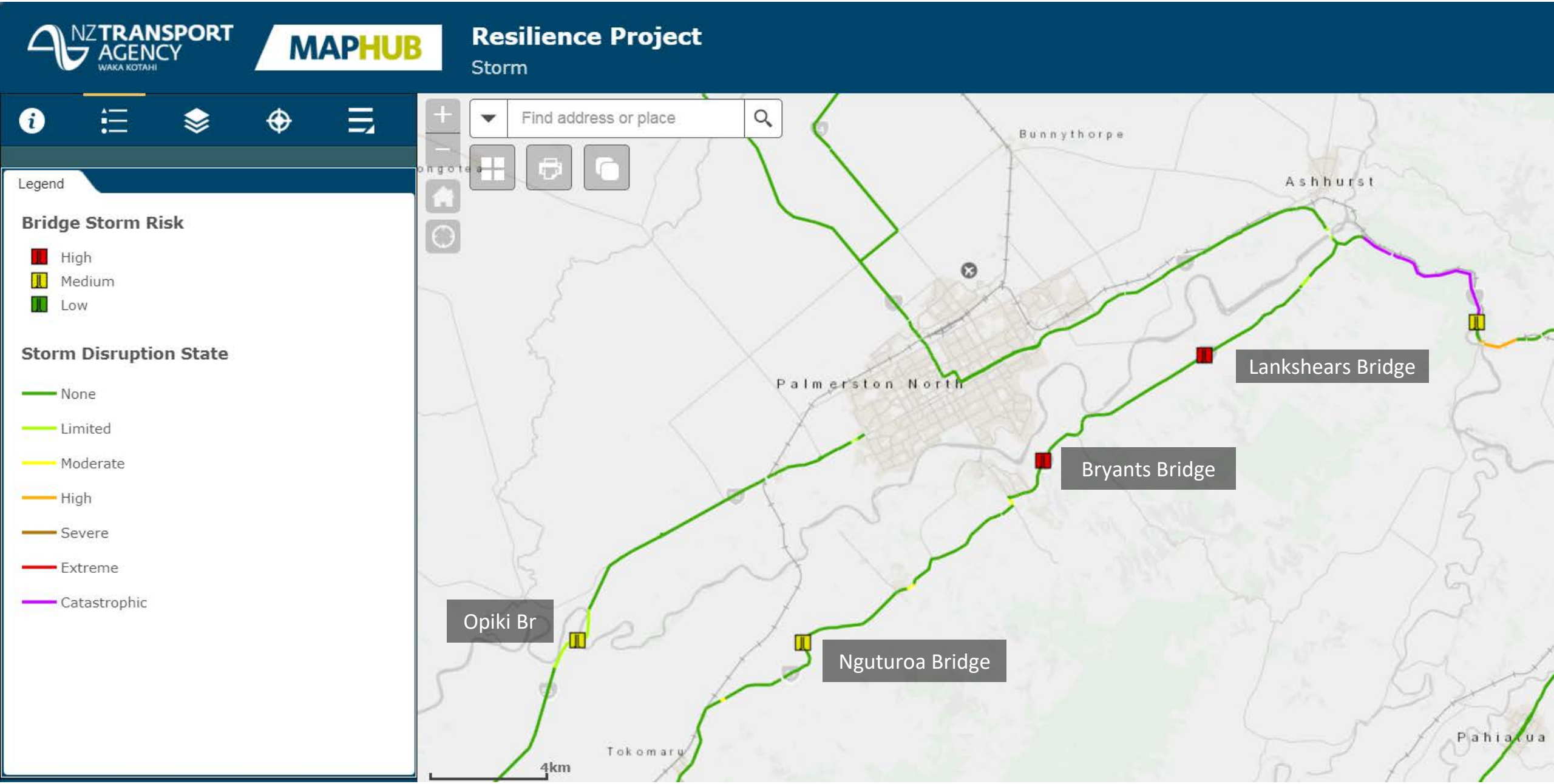
NZ TRANSPORT AGENCY WAKA KOTAHI

MAPHUB

Resilience Project

Earthquake



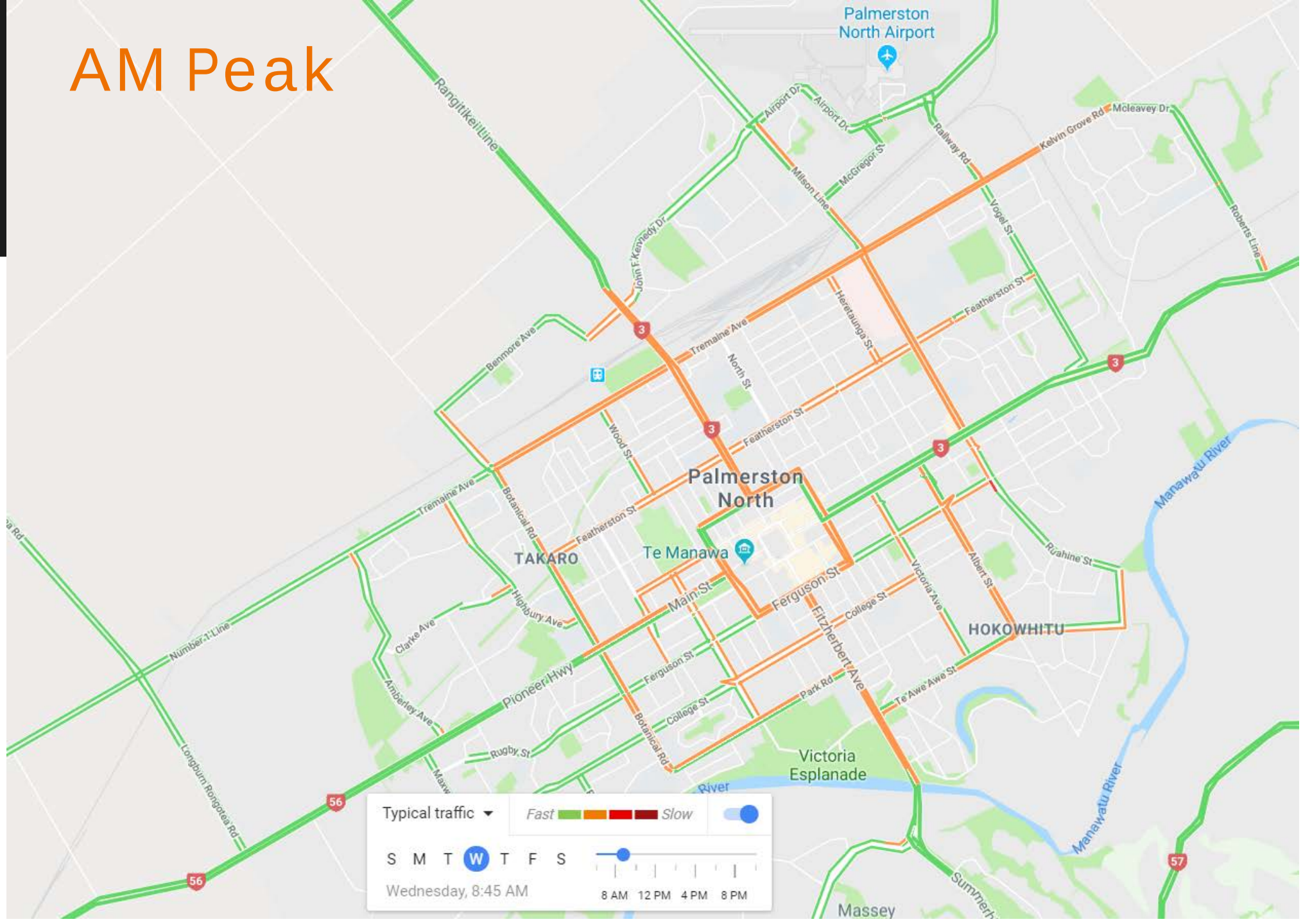

NZ TRANSPORT AGENCY
WAKA KOTAHI
MAPHUB
Resilience Project
Storm
Find address or place
Legend
Bridge Storm Risk
High
Medium
Low
Storm Disruption State
None
Limited
Moderate
High
Severe
Extreme
Catastrophic
Bunnythorpe
Ashhurst
Palmerston North
Tokomaru
Pahiatua
4km
Lankshears Bridge
Bryants Bridge
Opiki Br
Nguturoa Bridge

Network Impacts

Delays and Travel Time

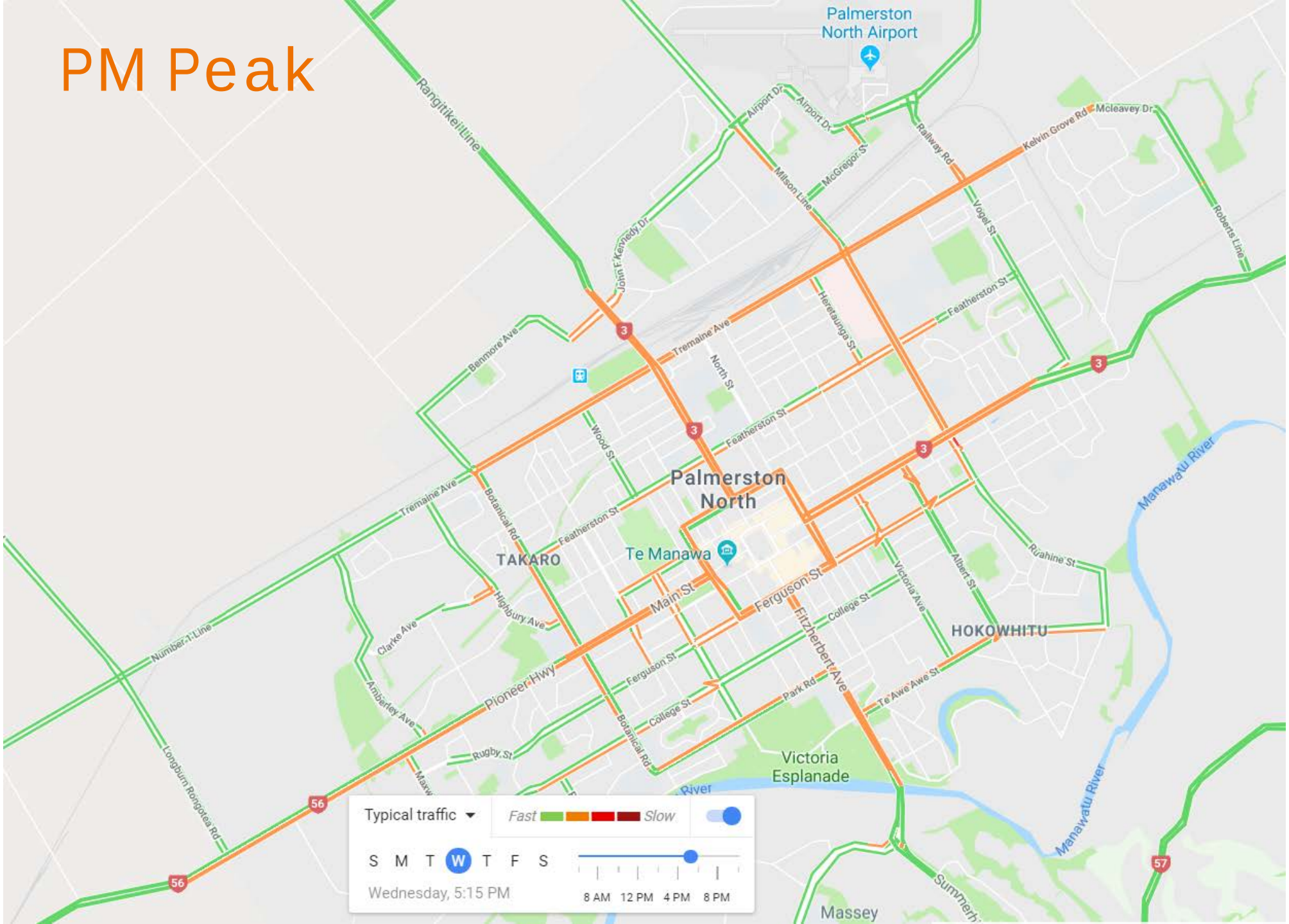
AM Peak

Impacts – Delays and Travel Time



PM Peak

Impacts –
Delays and
Travel Time



Impacts –
Delays and
Travel Time

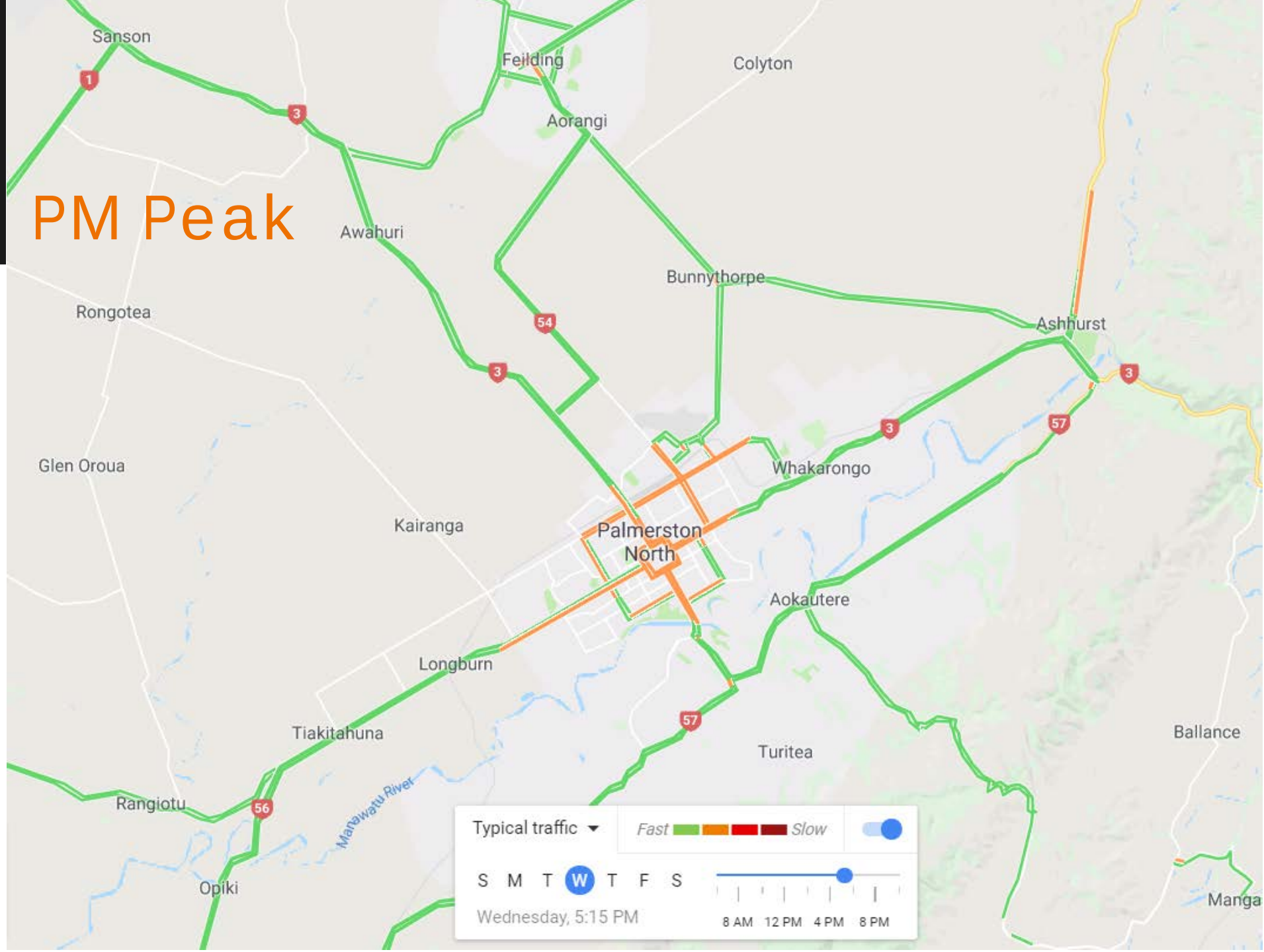
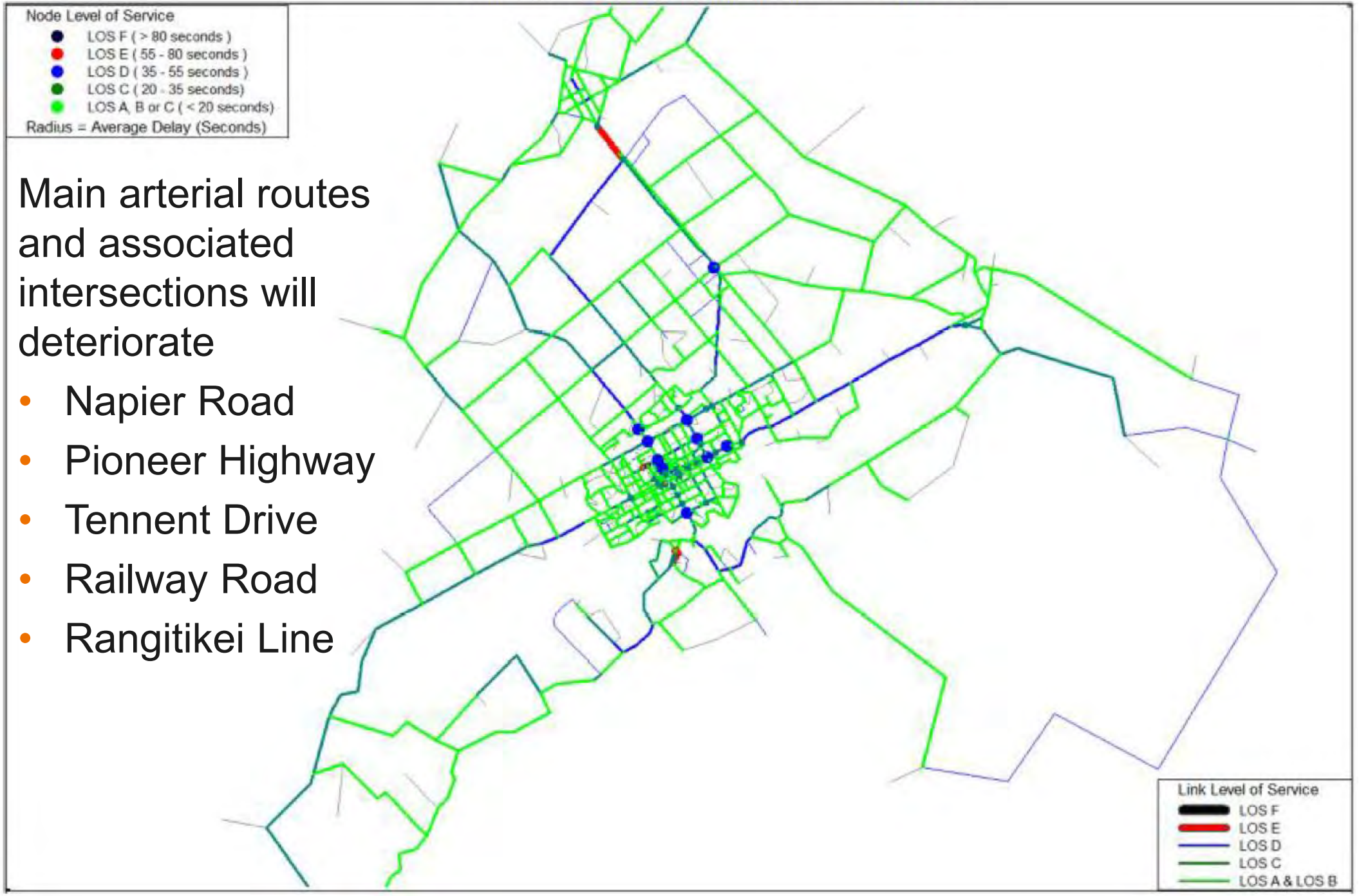


Figure A-1 LOS Plot for Link and Intersection in 2013



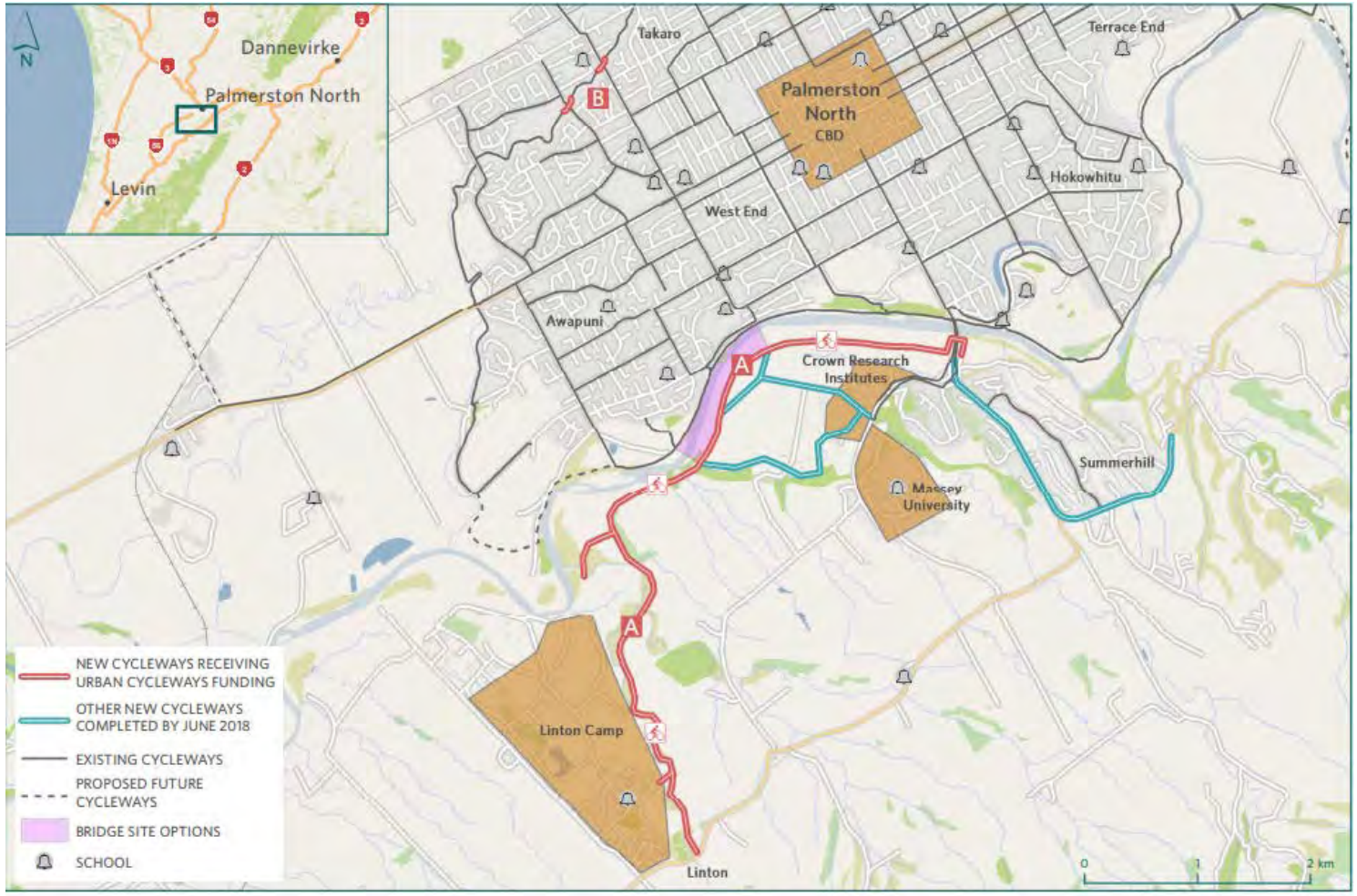
Main arterial routes and associated intersections will deteriorate

- Napier Road
- Pioneer Highway
- Tennent Drive
- Railway Road
- Rangitikei Line

Active modes and PT

Active Modes

Active transport network



Urban Cycleways Funded Projects in Palmerston North

Public Transport & Commuter Rail

Weekdays:

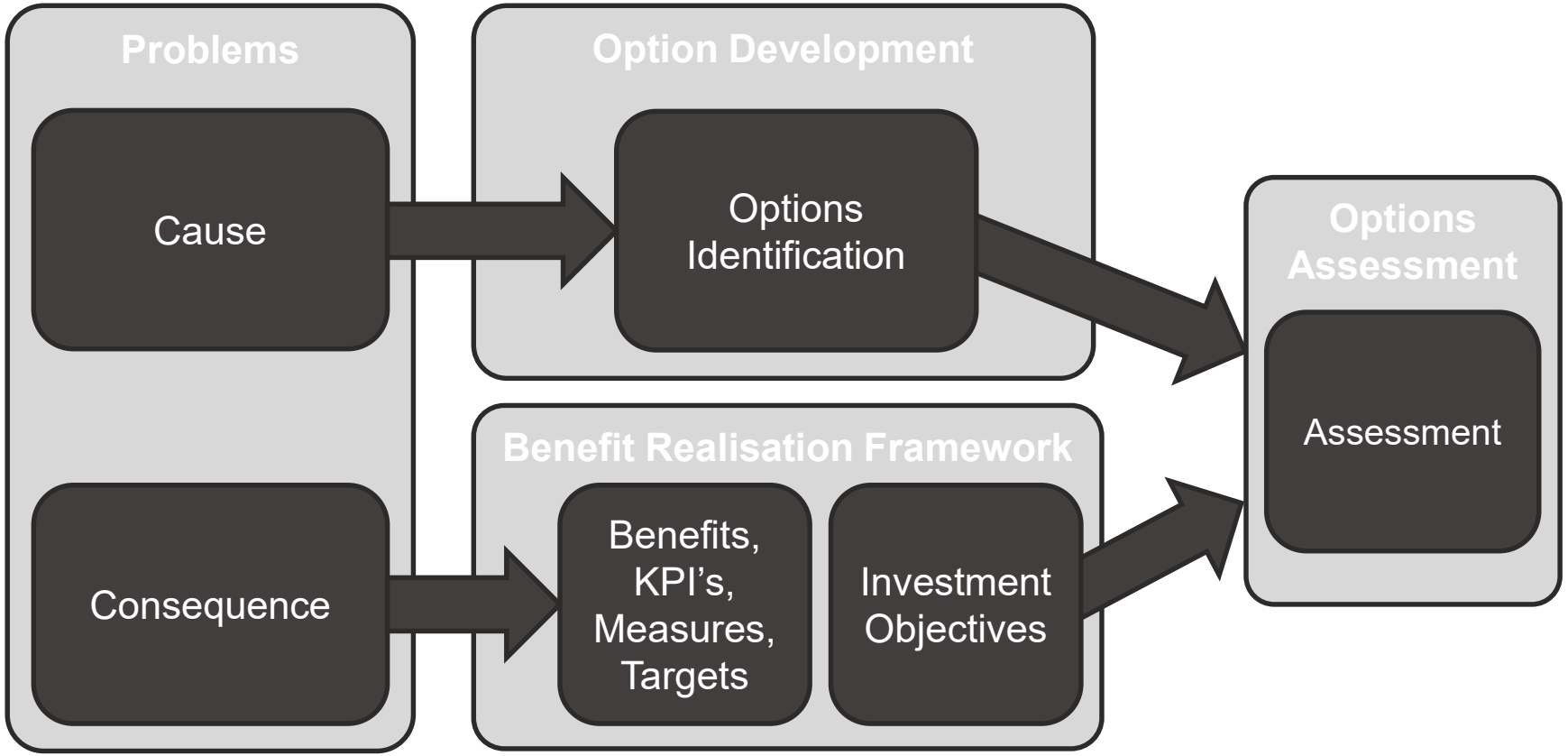
6.15am – 8.20am WGTN

5.15pm – 7.20pm Palmy

Problems and Benefits

- What are the key problems we need to address?
- What are the key benefits or opportunities that transport investment could realise?
- What are the key outcomes that transport investment could achieve?

Mechanics - Simplified



Problems and Benefits

- What are the key problems we need to address?
- What are the key benefits or opportunities that transport investment could realise?
- What are the key outcomes that transport investment could achieve?

Key Principles

- What are the key principles that the project team should take into consideration when developing options?
  - Baseline Assumptions
  - Minimum Requirements
  - Key Outcomes

Constraints

- What constraints are present within the study area that would influence the options that could be investigated?
  - Physical
  - Social
  - Environmental
  - Economic
  - Cultural
  - Other

Identifying Options

- Split into groups
- Each group will have 20 minutes per station to think up as many options as possible to address the Problems
- Reconvene and summarise

Next Steps

- Completing evidence collection
- Confirm problems and investment objectives
- Developing long list options
- Preparing for Workshop 2,3
- Draft DBC

Palmerston North Integrated Transport Initiative

Freight Demand Study

1 Introduction

Palmerston North is an important freight and distribution hub serving the central and lower North Island. As part of the ongoing development of the road transport network in the city and to act in conjunction with the proposed relocation of the rail freight terminal, schemes have been proposed to provide a ring road with a strong freight focus around much of the city.

This report draws together information from a number of sources to look at the freight position in the city to provide a background for the assessment of the ring road and to help identify its impact on the functioning of the freight network serving the city and the wider region.

2 Current traffic patterns and the current role of Palmerston North as a regional transport hub

2.1 Introduction

In order to provide a comprehensive assessment of the current freight movements impacting on the area, information has been drawn from a number of sources. These include:

- The Palmerston North Area Traffic Model (PNATM), using demands based on the 2021 situation. The use of estimated 2021 data was considered to provide a better representation of current conditions than the 2013 data used for the base year of the model. In the analysis that follows the results from the 2021 model are treated as current.
- KiwiRail data
- Preliminary data from the update of the National Freight Demands Study (NFDS) currently in progress.
- Results of surveys of a selection of key freight stakeholders and freight generators in the city (Refer Appendix A for the sample questionnaire)

2.2 Analysis of road traffic

2.2.1 Key results from the 2021 PN traffic model

2.2.1.1 Introduction

To assist in the analysis of the traffic patterns derived from the PN traffic model, the study area has been divided into 8 main sectors, four covering the main urban area and four covering external movements. These are set out in Table 2.1 and Figure 2.1.

Table 2.1 PN Traffic Model Sectors	
Sector no	**Description**
101	Tremaine Avenue/Kelvin Grove
102	Other urban core
103	Other urban South and West
104	Other urban North East
105	External South West
106	External South East
107	External North East
108	External Northwest

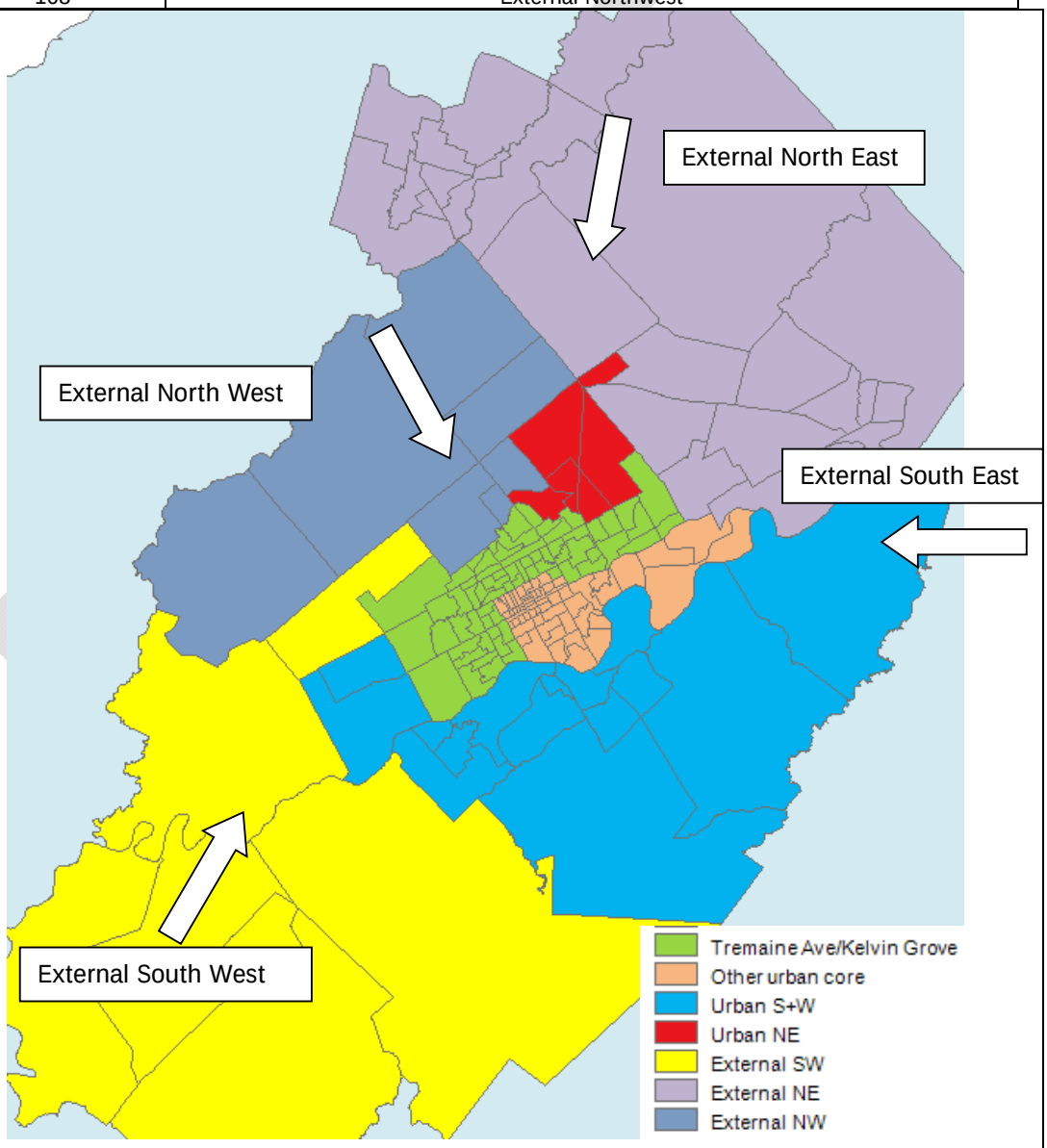


Figure 2.1
PN traffic model sectors for analysis

The external sectors provide entries to the Palmerston North area for the following major road connections: -

External South West	SH56, SH57
External South East	Saddle Road, Pahiatua Track (replacing SH3)
External North East	SH54
External North-west	SH3

2.2.1.2 Analysis by sector

To gain an overall understanding of the freight movements in the area, the distribution of HCV trips by sector has been examined and the results by origin and destination are set out in Figure 2.2.

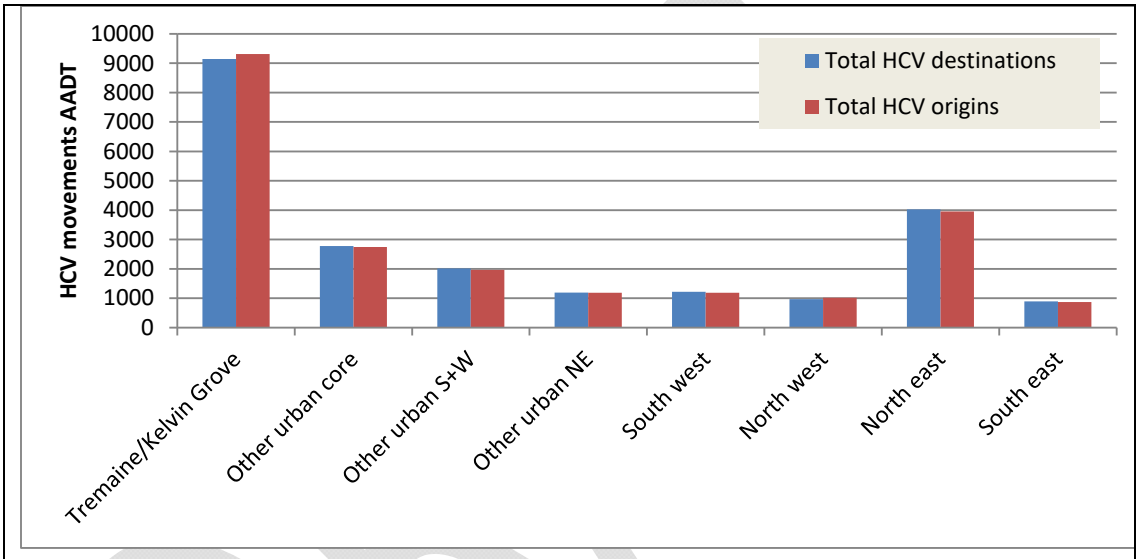


Figure 2.2
Distribution of HCVs by origin and destination 2021 traffic demands

Source: PNATM Traffic model

From this it can be seen that the key freight areas are those immediately to the north east and north west of the CBD mainly along the Tremaine Avenue /Kelvin Grove axis. Between them they account for about 60 percent of the freight trips impacting on the city. This reflects the concentration of economic activity, particularly that associated with the distribution centres and other large freight attractors or generators and also the presence of the rail intermodal terminal.

There are also substantial freight flows to and from the north east but a high proportion of these reflect trips within Feilding and the impact on the Palmerston North urban area is more limited.

Examination of the heavy vehicle movements associated with the Tremaine Avenue/Kelvin Grove area shows that much of this is typically short distance within the area. This is set out in Figure 2.3.

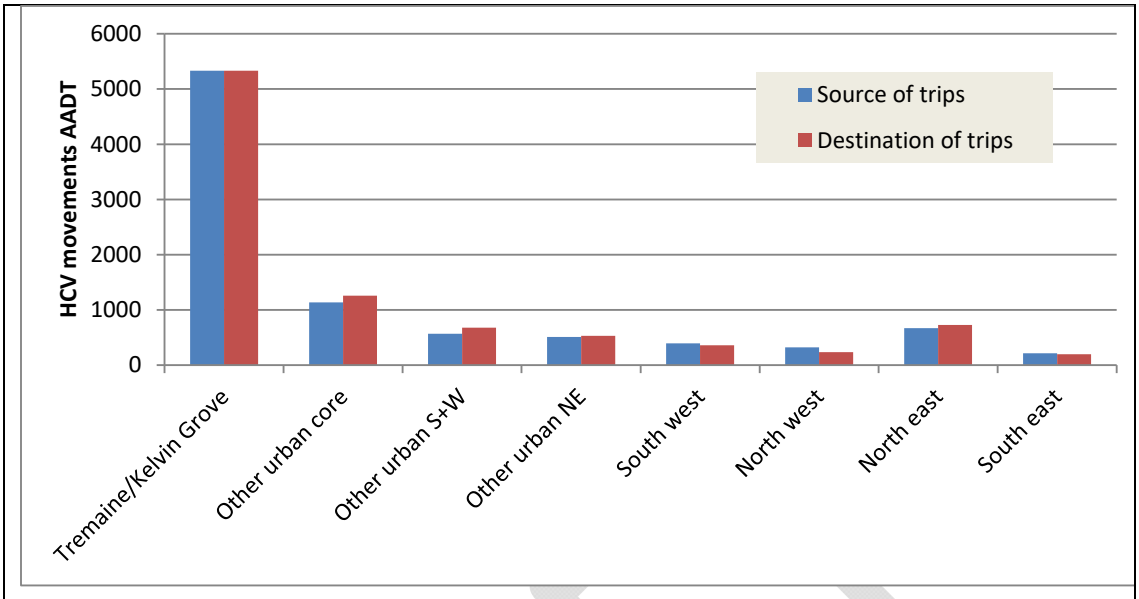


Figure 2.3
Distribution of HCV flows within and into and out of the Tremaine Avenue/Kelvin Grove corridor

Source: PNATM Traffic model

About 70 percent of the traffic to or from the Tremaine Avenue/Kelvin Grove area is relatively short distance, either within the area itself or linking to the remainder of the urban core. Movements to the rest of the main urban area would account for about 13 per cent of the total, with the balance about 15 percent being to or from areas external to the main city. The high proportion of short distance trips would be unlikely to divert to a future ring road in the absence of land-use changes or restrictions placed on freight movements in the city.

Trip making between the Tremaine Avenue/Kelvin Grove axis and the Other urban North East, which includes the airport, the NEIZ and Bunnythorpe, which might have more potential to use the ring road, is estimated to be relatively limited at about 1,000 HCVs per day.

2.2.1.3 Movements from external areas

As well as considering movements into and within the central area where the flows are high but the potential for diversion is limited, movements of trips impacting on the urban area which are to and from areas away from the urban core have also been investigated. The pattern of movement for each of the external sectors identified is set out in Table 2.2.

Table 2.2
Destinations of external HCV trips

		Destination								
Origin	External sector	Tremaine Avenue/ Kelvin Grove	Urban core	Other urban S+W	Other urban NE	South west	North west	North east	South east	Total
	South west	394	109	117	61	296	37	92	80	1185
	North west	324	20	72	66	34	149	272	76	1014
	North east	670	117	106	158	86	251	2363	203	3954
	South east	213	12	39	68	108	79	176	169	865
	Total all external areas	1600	258	334	353	524	517	2903	528	7018
	Total all external areas excluding internal trips	1600	258	334	353	228	368	540	358	4041

Source: PNATM Traffic model

Of the 7,000 total external HCV trips a substantial number (3,000) are internal to each of the individual areas and so would not impact on the main urban area. These are excluded in the last row of the table which gives total external trips excluding those within each of the sectors of just over 4,000, or about 20 percent of the total for the city as a whole. Of these a substantial focus of 1,600 or about 40 percent is to the Tremaine Avenue/Kelvin Grove area and a further 900, 20 per cent, are to other parts of the urban area.

In total therefore 60 percent of the external HCV trips go direct to locations in the urban area, leaving about 1,400 making through trips of one type or another. Of these about 500 are between the North East and North West and only a limited number of these would pass through the urban area. The pattern of the balance of about 1,000 through trips by HCVs is set out in Table 2.3 and summarised in Figure 2.4.

Table 2.3
External through HCV trips (AADT)

	South west	North west	North east	South east	**Total**
South west		37	92	80	209
North west	34		NA	76	110
North east	86	NA		203	289
South east	108	79	176		363
Total	**228**	**117**	**268**	**358**	**971**

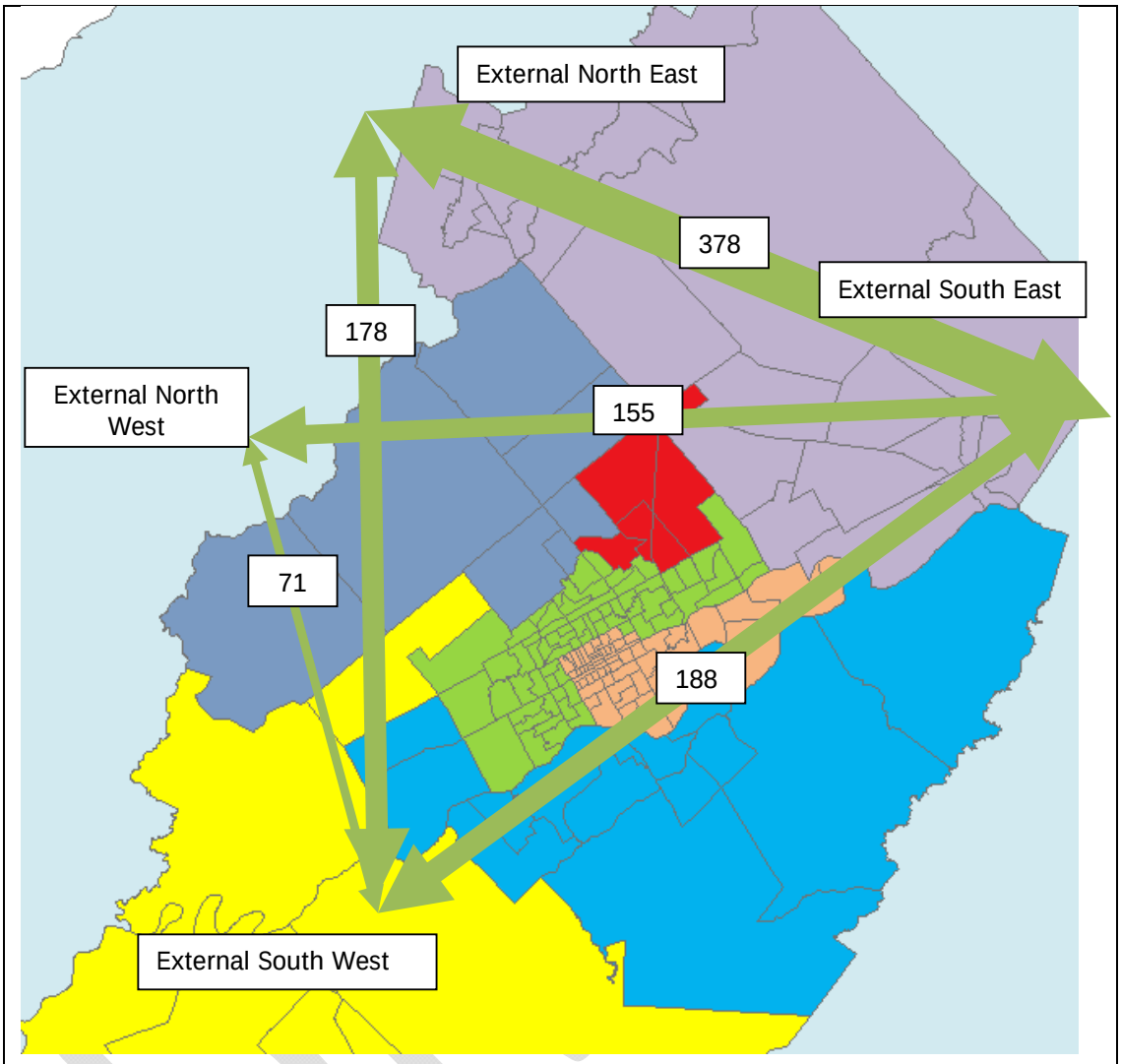


Figure 2.4
External HCV through movements (AADT)

Of the 1,000 through trips that are likely to impact on the urban area and potentially more likely to make use of the ring road sections, the key flows are between the south east and north east at almost 400 trips per day (although some of these may avoid the urban area altogether).

Other major movements include those between the south east and south west at about 200 trips per day and between the south west and north east at about 180 trips per day. The key entry points are therefore the south east and north east with the south east having 700 trips external movements per day and the north east about 550 HCV movements per day.

2.2.1.4 Overall patterns of heavy vehicle traffic

The general pattern of freight traffic that emerges can therefore be summarised as follows: -

- On the basis of the model estimates for 2021 there are about 22,000 HCV journeys within the model study area.

- Within this area there is a heavy concentration of traffic to and from locations in the Tremaine Avenue/Kelvin Grove area amounting to about 13,000 trips (almost 60 percent of the total) with a substantial proportion of these almost 40 percent being within the corridor itself. The potential for these trips choosing to use the proposed ring road sections is limited unless there are land-use changes or moves to restrict the movement of freight vehicles on particular routes within the central area.
- Traffic from external areas and potentially impacting on the Palmerston North urban area amounts to about 4,000 trips per day, with about half of these to the Tremaine Avenue access and the remainder of the urban core.
- Of this about 1,000 trips or about 5 per cent of the total are through trips that potentially may be attracted to one or more ring road sections.

2.2.1.5 Traffic flows on network roads

As well as looking at the broad origin-destination pattern of trips, model estimates are available of the flows of HCVs on the individual links in the network. The position for the AM peak is set out in Figure 2.5 for the CBD and in Figure 2.6 for the modelled area as a whole.

Figure 2.5
Estimated HCV flows on the central area traffic network

Figure 2.6
Estimated HCV flows on the wider area traffic network

Figure 2.5 covering the central area highlights the high flows along the Tremaine Avenue/Kelvin Grove axis, particularly to the north east of the city centre with HCV movements reaching 1500-1700 per day. There are also high flows on the routes north to the NEIZ and across the river.

Looking more broadly at the network as a whole in Figure 2.6, the main routes to the central areas are provided mainly by the State Highways although the links from Bunnythorpe also carry substantial amounts of traffic. There are limited flows on the routes currently bypassing the urban area.

The impacts of freight traffic using local streets is explored as part of the Amenity problem section in the Network Options Report (NoR).

2.2.2 National Freight Demand Study

2.2.2.1 Introduction

In addition to identifying the movements of heavy vehicles, preliminary results from the update of the NFDS have also been explored to look at the patterns of commodity movements in the area. The NFDS provides data at a regional level but some assessment has been made as the extent to which the findings can be applied to the Palmerston North urban area.

The preliminary results of the updated NFDS give the following patterns of movement impacting on the Manawatu-Wanganui region are set out in Table 2.4.

Table 2.4
NFDS3 freight flows to from or within the Manawatu-Wanganui region - Preliminary Estimates (m tonnes 2017/18).

Commodity	Movements within region	To region from outside	From region to outside
Liquid Milk	0.27	0.56	1.23
Dairy Products	0.01	0.09	0.26
Logs	0.88	0.08	1.73
Timber products	0.11	0.12	0.49
Meat	0.01	0.01	0.18
Livestock	0.43	0.19	0.26
Horticulture	0.22	0.19	0.02
Wool	0.00	0.00	0.03
Other agriculture	0.05	0.28	0.01
Petroleum	0.00	0.38	0.00
Aggregate	1.88	0.02	0.02
Limestone/Cement/Fertiliser	0.08	0.30	0.03
Concrete	0.33	0.00	0.00
Steel/Aluminium	0.00	0.02	0.00
Man + Retail	3.05	2.06	1.76
Waste	0.43	0.00	0.03
Other minerals	0.03	0.01	0.01
Total	**7.78**	**4.28**	**6.24**

In total the freight flows with an origin or destination in the Manawatu-Wanganui region are estimated to amount to about 18 m tonnes in 2017/18. Flows through the region are estimated to amount to about a further 9 m tonnes (although this would include some coastal shipping movements which would not really impact on the region).

The main freight flows identified in the table above which are likely to have a major impact on Palmerston North City include: -

- Logs
- Aggregate
- Manufactured and retail goods
- Milk and dairy products
- Waste

2.2.2.2 Logs

While most of the logs harvested in the region travel directly by road to the export ports of Napier, Wellington and New Plymouth, some come into the city for transfer to rail at the terminal located off Tremaine Avenue. The rail yard in the city is currently handles about 250,000 tonnes per year with flows transferring to rail for onward movement to the ports of Napier and Wellington. In addition, some of the flows from the forests to the north including Pohangina would travel by road through the town or its surrounds en route to Napier or Wellington.

2.2.2.3 Milk and dairy products

While much of the milk produced in the region travels to processing plants outside the region and so has no impact on the Palmerston North area, there are three milk processing plants in the city, two at Longburn and one in Kelvin Grove and a further one at Pahiatua to the east of the Manawatu Gorge. These account for a substantial proportion of the liquid milk either brought into the region or circulating within it.

The flows through the processing plant at Kelvin Grove are relatively small at about 0.1 m tonnes pa and the main flows into the urban area would be to Longburn. For movements to and from Longburn some of the traffic passes through the city and typically uses Tremaine Avenue. This route would also be used for a range of through movements since the alternative routes around the city are unsuitable for loaded milk tankers.

2.2.2.4 Manufactured and retail products

Flows of manufactured and retail products are substantial forming about 50 percent of the estimated freight flows into the region and 30 per cent of the outbound flows. Because of the importance of Palmerston North as a distribution hub, a high proportion of these inbound and outbound flows are to or from locations within the city itself, either in the Tremaine Avenue/Kelvin Grove corridor or in the NEIZ.

2.2.2.5 Aggregates

Aggregates are produced at several locations in the Palmerston North area, particularly from sites along the Manawatu River including Aokautere, Te Matai and Longburn. The pattern of movements on particular roads will vary depending on the requirements for specific projects, but the locations of a number of the quarries to the south of the Manawatu River will tend to put pressure on the Fitzherbert Bridge to the extent that supplies from these are used to supply the main urban area.

2.2.2.6 Waste

There are substantial volumes of waste generated in Palmerston North and the main waste transfer station in Palmerston North is adjacent to the rail line and close to Tremaine Avenue. As a result, there are substantial volumes of heavy vehicle traffic focussed on this location and using Tremaine Avenue for access.

2.3 Commodity flows on key links into Palmerston North

Because of the complexity of the road links in the urban area it is difficult to determine reliably the commodity flows on individual links although given its location near many of the major freight generators and attractors it is likely that a wide range of commodities including all those moved by rail will be carried along the Tremaine Avenue/Kelvin Grove axis. This would include general freight cargoes to the distribution centres in the area as well as logs into the freight facility.

Looking further afield an assessment has been made of the main commodity flows on corridors into the Palmerston North area.

The flows from the north west would include those from Auckland and the north using SH1 and SH3 as well as movements from the west using SH3. These routes would carry the main longer distance inbound movements of manufactured and retail goods from the central and upper North Island as well as a share of the logs and milk brought into Palmerston North.

The flows from the north east would include movements using SH54 and local roads through Feilding from the north. This would include some of the logging traffic as well as general freight movements to and from the Feilding area.

The flows from the south east using Saddle Road and the Pahiatua Track would include those to and from Hawke's Bay and Gisborne and also to and from Tararua District and the Wairarapa. These would include movements to and from Napier port particularly for manufactured and retail products and export of logs, and dairy and meat products. The flows would also include the distribution of goods from the distribution centres and manufacturing industries in Palmerston North.

Flows to and from the southwest would be focussed on SH56 and SH57. The flows along this route would include milk to the two dairy factories at Longburn and logs for transfer to rail at Palmerston North. The flows would also include the movements of manufactured and retail goods from the distribution centres and manufacturing plants in Palmerston North to areas in the south of the Manawatu-Wanganui region and further south to Wellington. The route would also include through traffic between Wellington and Hawke's Bay.

2.4 Rail flows

2.4.1 Introduction

KiwiRail traffic in Palmerston North includes both traffic transferred to and from rail at the terminal and also traffic passing through the city without an intermodal transfer.

The volumes of goods handled at the Palmerston North rail terminal (including the siding at Longburn) in 2017/18 are set out in Table 2.5

Table 2.5
Main freight flows through the Palmerston North rail terminals 2017/18 (m net tonnes)

	Outbound	Inbound	Total
Dairy	0.13	0.00	0.13
Logs	0.27	0.00	0.27
Manufactured and retail items	0.03	0.28	0.31
Meat	0.04	0.00	0.05
Milk	0.10	0.00	0.10
Other Agriculture	0.00	0.02	0.02
Steel and aluminium	0.00	0.01	0.01
Wood products	0.00	0.01	0.21
Total	**0.56**	**0.32**	**0.88**

The distribution of commodities by type for inbound and outbound flows is set out in Figure 2.7 and Figure 2.8.

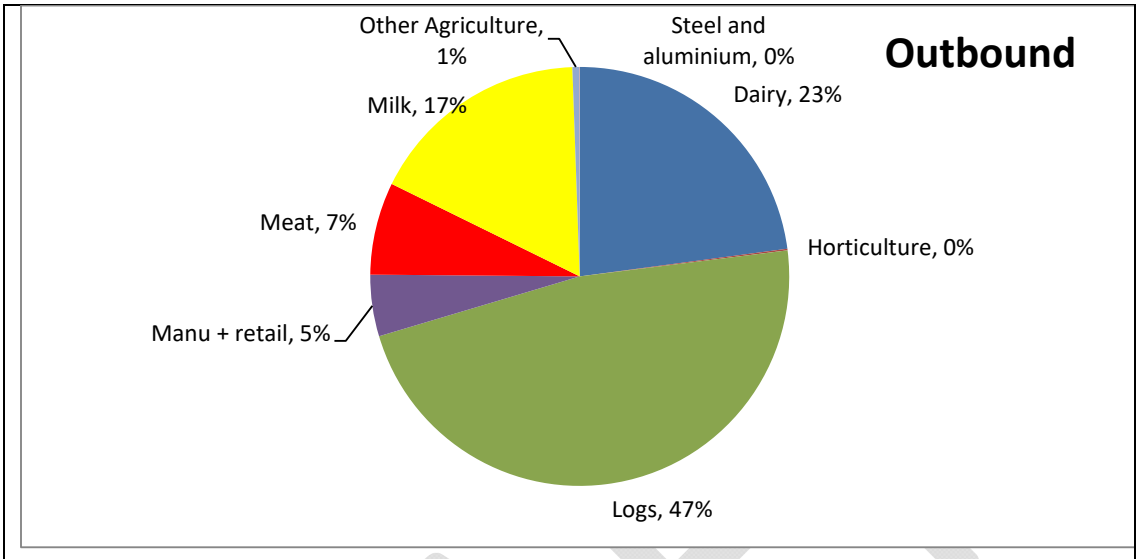


Figure 2.7
Outbound flows from the PN rail terminal facilities

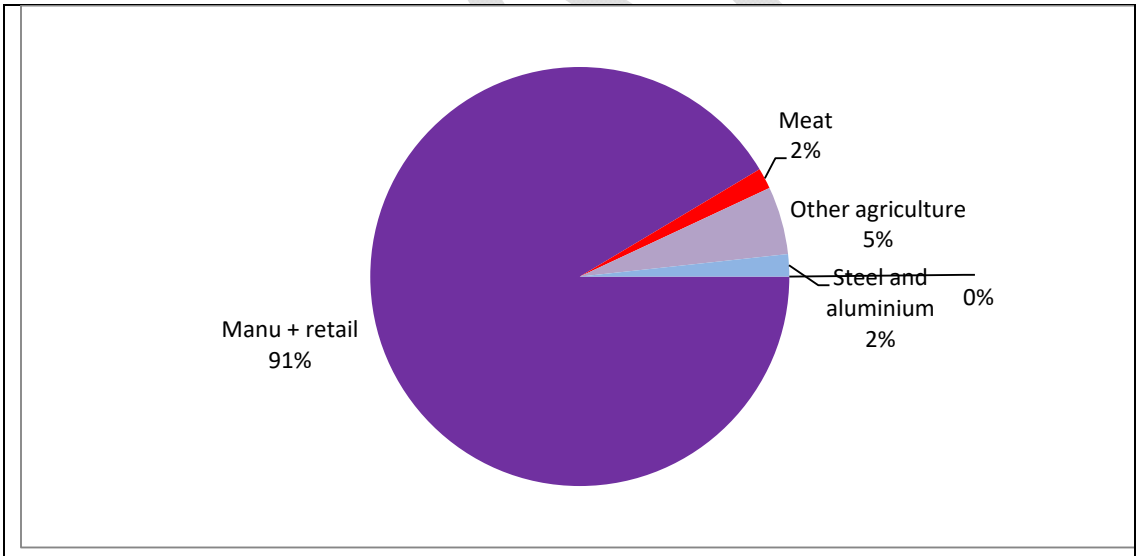


Figure 2.8
Inbound flows to the Palmerston North rail terminal facilities

In total the rail terminals in Palmerston North handle about 0.9 m tonnes of cargo in a year, about 6 percent of the total volumes transported by rail in the country as a whole. Outbound flows are dominated by primary products, particularly logs which account for about 50 percent of the total, and which are mainly for export through Wellington or Napier. Other important commodities are milk and dairy products which account for a further 40 percent of the total, with the milk going to dairy factories in Taranaki and the dairy products travelling to Auckland or Tauranga for export.

By contrast inbound flows are dominated by manufactured and retail products which account for almost 90 percent of the total reflecting Palmerston North's role as a manufacturing and major distribution centre for the lower North Island.

As well as traffic loaded or unloaded at Palmerston North rail terminals, there are substantial volumes of traffic through the city, reflecting its position at the crossroads of a number of major rail tracks. This through traffic which may pass through directly or be marshalled into different trains is summarised in Table 2.6

Table 2.6
Rail traffic through Palmerston North 2017/18

Two - way movement	Volume (m tonnes)
N-S	0.53
E-W	0.22
S-W	0.04
S-E	0.07
N-W	0.33
E-N	0.04
Total	1.24

In total, the traffic passing through Palmerston North amounts to about 1.25 million tonnes, about 40 percent higher than the volumes loaded or unloaded. Much of this would be marshalled in the city and the ability to accommodate this activity would need to be taken into account in any relocation of the facility.

3 Stakeholder surveys

3.1 Introduction

Surveys of selected key freight stakeholders were undertaken to ascertain their views on the issues faced with the movement of freight in Palmerston North and the extent to which they might use some or all of any proposed new ring road. The opportunity was also taken to discuss the possible effects of the relocation of the rail terminal away from its central location adjacent to Tremaine Avenue.

The questionnaires used for this are attached in Appendix A.

The key issues identified from the survey of freight stakeholders are set out in the following sections.

3.2 Traffic issues

The main traffic issues identified were congestion on Tremaine Avenue and the difficulty of accessing/or departing the rail yard to or from Tremaine Avenue particularly if this involved turning across the main traffic flows. Congestion on the accesses to Kelvin Grove was also mentioned as an issue for some of the stakeholders in the area but others did not identify this as a problem. This may be a reflection of the size and timing of movements.

Congestion on Ruahine Street was also mentioned by some stakeholders, but this appears to be a less serious issue than Tremaine Avenue.

Other transport issues included the capacity of the ports to handle high volumes of log traffic and issues with the reliability of the rail service.

3.3 Importance of proximity to the rail terminal

For those whose goods were delivered directly by rail including the main freight forwarders, proximity to the rail yard was clearly important. Proximity was also important for the management of the loading of logs.

For other firms however close proximity to rail facilities was less important as long as they were within a reasonable distance. For many of these a shift of the rail terminal to Bunnythorpe or a similar location would not require a relocation of their own premises.

3.4 Other potential for site relocation

The majority of firms were not seeking to change location and considered that their current premises or location nearby provided sufficient capacity for their foreseeable requirements. However, there was general agreement that if they were looking, a site in the NEIZ or in Bunnythorpe might be attractive. This was also the case for firms possibly more actively looking to relocated from the Kelvin Grove area.

The provision of sections of the ring road would be one of the factors that would be considered positively

3.5 Impact on amenity

There were concerns from one of the operators in Kelvin Grove about the impact of the traffic serving the site on local roads, especially since one of the main access routes passed by a local school.

The individual findings from the survey are summarised in Appendix B.

4 Forecast changes over time

4.1 PN traffic model predictions

4.1.1 Movements by sector

A possible assessment of the changes in HCV flows in the period to 2031 has been determined by comparing the current (2021) and 2031 forecasts from the PN traffic model. In total in the modelled area these are predicted to increase by about 2,000 per day an increase of just under 10 per cent or about 1 per cent per year.

Within the total growth, the main changes in the numbers of trips to and from different parts of the study area are set out in Figure 4.1.

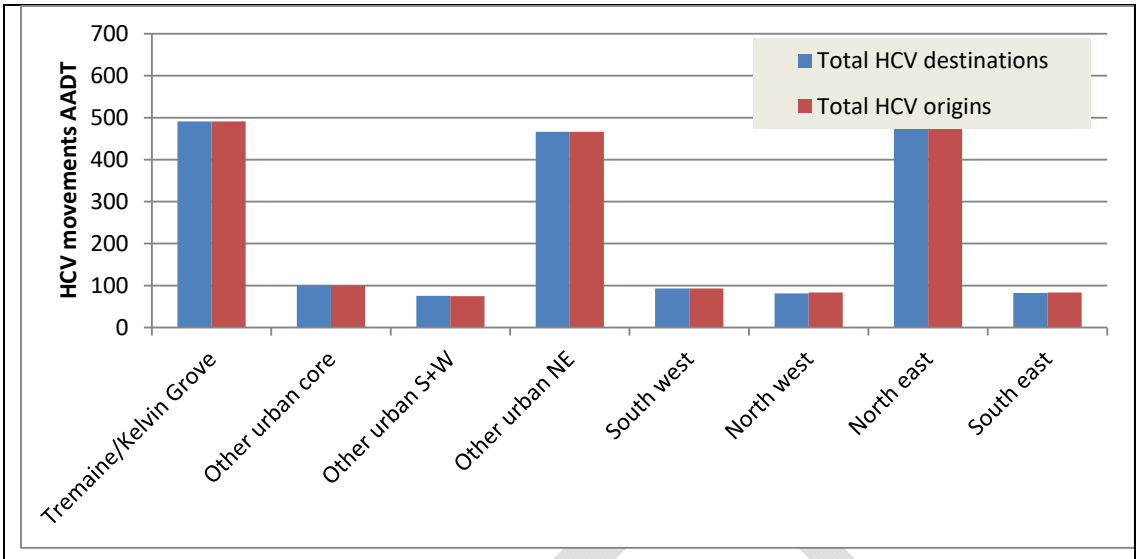


Figure 4.1
Predicted changes in HCV flows to 2031 (AADT)

Forecast growth is mainly focussed in three areas, the Tremaine Avenue/Kelvin Grove corridor, Other urban NE, which includes the NEIZ, and the external north east sector where the majority of the growth is in the Feilding area. Growth to and from other areas is very limited.

There is a strong interaction between the growth in the Tremaine Avenue/Kelvin Grove area and that in the NE urban area. This is illustrated in Figure 4.2.

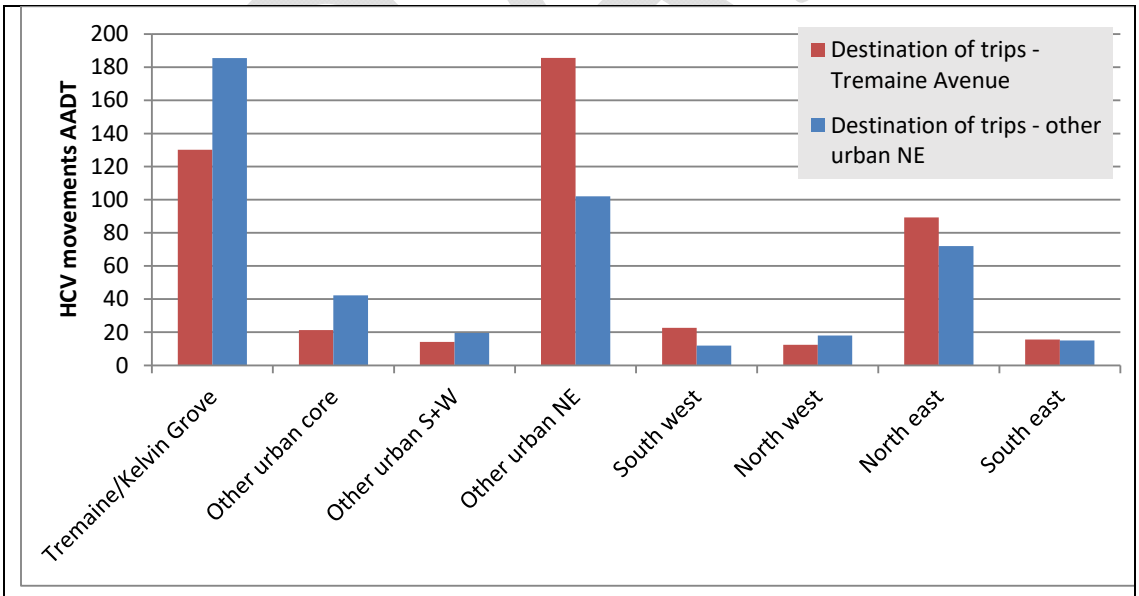


Figure 4.2
Forecasts patterns of growth for HCV trips from the Tremaine Avenue/Kelvin Grove and Other urban north east areas to 2031

In both cases, Tremaine Avenue/Kelvin Grove and Other Urban NE, the majority of the growth in HCV traffic forecast for 2031 is to the other zone albeit accompanied by substantial growth in internal movements within each of these sectors. This growth has implications for the links between them. There is also forecast to be growth in the interactions with the NE external area, mainly focussed on Feilding.

The changes in the predicted pattern for through trips has also been examined and these are set out in Table 4.1

Table 4.1
External through HCV trips

	South west	North west	North east	South east	Total external through movements
South west		3	14	7	24
North west	2		NA	9	11
North east	14	NA		25	39
South east	7	8	27		42
Total external through movements	23	11	41	41	116

The number of trips through the urban area is predicted to increase by about 120 or by about 12 per cent, slightly faster than the growth for the area as a whole. Of these movements those to or from the South East and North East are predicted to increase the fastest, the latter reflecting the substantial growth forecast for Feilding.

4.1.2 Movements along key links

In addition to considering the broad sectoral movements the position for selected key links in the area has also been considered and the results are set out in Table 4.2 and Figure 4.3.

Table 4.2
Changes in HCV flows on selected key links 2021-2031 (All day weekday flows)

Link	HCV flows in		Growth 2021-2031	
	2021	2031	Per cent	Number
Tremaine west of SH3	1479	1834	24%	355
Tremaine east of SH3	1554	2082	34%	528
Kelvin Grove	1448	1605	11%	158
Railway Road	1374	2086	52%	712
Fitzherbert Bridge	1924	2012	5%	88
Napier Road	714	797	12%	84
Ashhurst Road	341	369	8%	29
SH3 North	679	885	30%	206
SH54	842	826	-2%	-16
Waughs Road	835	1164	39%	329
SH56	1036	1155	12%	120
SH57	668	678	1%	10

Table 4.2 Changes in HCV flows on selected key links 2021-2031 (All day weekday flows)				
Northern access - SH3+ Waughs Road+SH54	2356	2875	22%	519
Waughs Road+SH54	1677	1990	19%	313
S of Fielding	1708	2043	20%	335
Corridor to SW SH56+SH57	1703	1833	8%	130

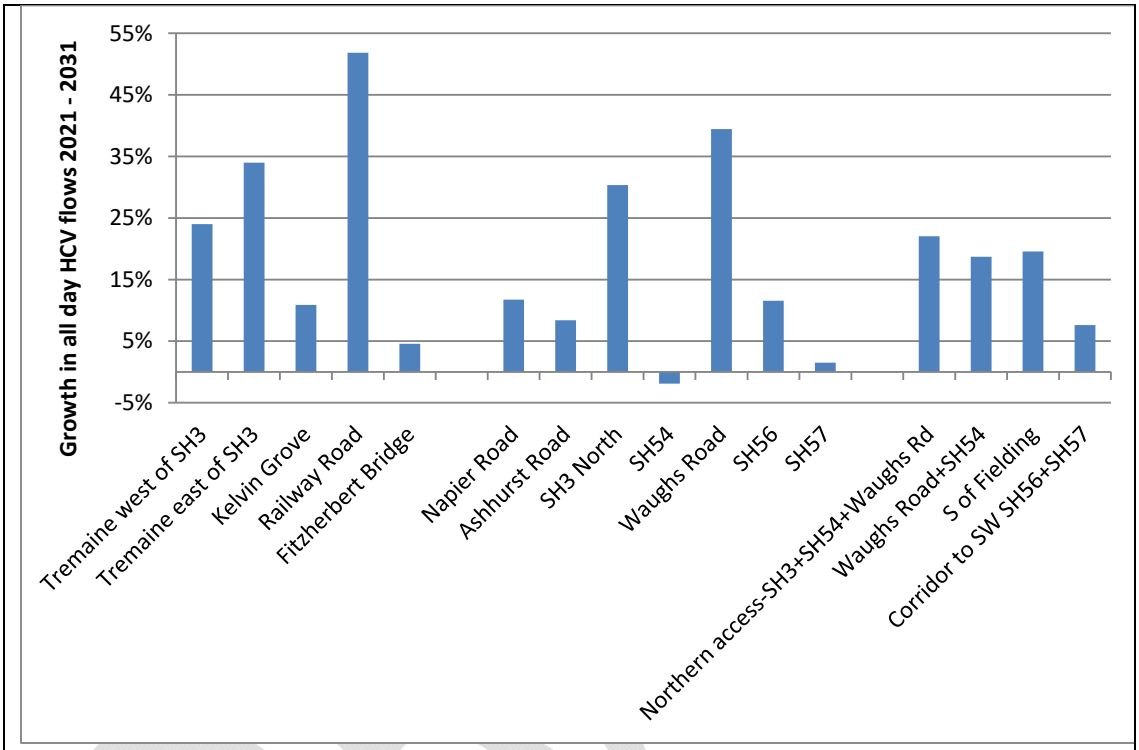


Figure 4.3
Changes in HCV flows on selected key links 2021-2031 (All day weekday flows)

High growth is anticipated in the routes from the north, especially along Waughs Road and Railway Road reflecting both the improvement of the route with the construction of the Bunnythorpe bypass improving access into the city and the increase in activity forecast for the NEIZ and its strong links with the Tremaine Avenue area. This will feed through into the increased flows along Tremaine Avenue reflecting both the growth of traffic feeding directly into the activities in the corridor and as well as that associated with the increased distribution activity in the NEIZ.

Away from this axis, growth in HCV traffic along the routes selected is forecast to be more moderate. Traffic across the Fitzherbert Bridge is forecast to grow by about 5 percent, that to the east of the main urban area in Napier Road and Ashhurst Road by 8-12 percent and that to the south west by about 8 percent (12 percent on SH56 and 1 percent on SH57). This indicates the stronger links between Palmerston North and the areas to the north probably particularly Auckland and is represented in simplified form in Figure 4.4.

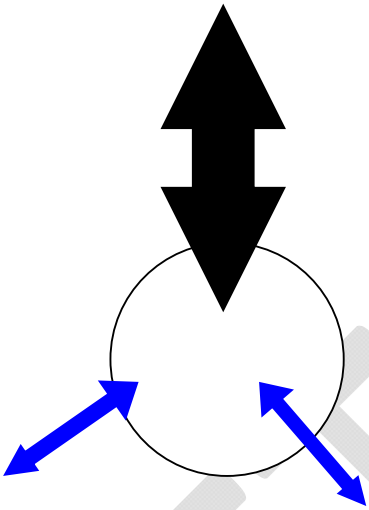


Figure 4.4
Forecast increases in heavy vehicle flows between Palmerstone North and external area 2021-2031 (HCVs per day)

4.2 Freight flows by commodity

Although forecasts from the updated NFDS are not yet available, the initial analysis suggests that the flows of many agricultural products including logs and milk and dairy products are likely to remain broadly constant in the period to 2032/3, although for logs in particular the volumes may fluctuate significantly from year to year in response to market conditions. Much of the longer term growth in overall freight flows will come from the movements of manufactured and retail goods supporting the growth of Palmerston North as a regional distribution hub and from movements of building materials reflecting the increase in construction activity in the area.

In the absence of any changes in the location of the freight terminal, the effects of which are discussed below, the growth in demand for the manufactured and retail goods would increase the flows on the key links serving this traffic. This would be particularly the case for movements into Palmerston North from the north supplying the distribution hubs typically located in the Tremaine Avenue/Kelvin Grove access and also probably increasingly into the NEIZ with the relocation and development of new activities into this area. The onward distribution of these goods would again tend to increase the flows on the main distribution routes within the city, again particularly along the Tremaine Avenue/Kelvin Grove axis.

4.3 Land use development proposed by PNCC

The changes in traffic flows expected for the period up to 2031 reflect to some extent changes in land-use patterns. In particular the rapid increase in the number of heavy vehicle trips to or from the north east, increasing the number of trips to or from the area by about 800, 40 percent of the total growth in the model study area therefore reflects one assessment of the level of growth expected for the area. Looking at this in a different way, trips to the NEIZ and surrounding areas are predicted to grow from about 1,000 per day to about to 1,350 per day by 2031, so a substantial amount of land-use growth is therefore expected for the area. However the forecasts which also include growth in the Tremaine Avenue/Kelvin Grove area, suggest that the increase in heavy vehicle movements to or from the north east represents the focus of new growth in the city rather than the relocation of activity from elsewhere in the urban area.

5 Impacts of possible further relocation of activities to the NEIZ/Bunnythorpe area on broad traffic flows

5.1 Introduction

The previous section has discussed the possible changes in traffic flows which might arise in response to the planned growth for the city including an expanded role for the NEIZ but in the absence of any relocation of the rail terminal facilities from their current site.

However given the proposals to relocate the rail terminal to a site near Bunnythorpe, this section considers the broad changes in traffic flows which might arise with the repositioning of the rail terminal and the possible relocation of other activities for which good access to the rail terminal would be desirable. The availability of one or more sections of the proposed ring road may have some impact on the changed traffic patterns with the new terminal but this has not been investigated in detail.

5.2 Impact of move of KiwiRail Hub

The relocation of the KiwiRail hub away from its current location on Tremaine Avenue would directly have a significant impact on traffic flows in the area. Currently the terminal handles about 1 m tonnes of freight per year almost all of which accesses the terminal via Tremaine Avenue. The removal of this traffic would reduce the heavy vehicle flows on Tremaine Avenue by about 3-500 trips per day although some of this may be replaced by trips from the relocated freight terminal. This compares with a current flow of about 1,600 per day so could represent a major reduction.

The extent to which this reduction might be achieved in practice would depend on: -

- **What activities moved into the areas vacated by the rail terminal**? If these were all large freight generators, the impact would be limited, but if the new land uses had a high proportion of commercial or office activities or even residential the freight demands would be much less. The smaller impact on freight could however possibly be balanced by higher levels of private car and small vehicle traffic serving these different sorts of activities and the overall impact on traffic conditions along Tremaine Avenue may therefore be much more limited.

- **What routing through the city would be followed for traffic using the relocated freight terminal**? This would depend on what other routes would be available, particularly sections of the proposed ring road and whether steps are taken to restrict heavy vehicle traffic on the existing routes through the urban area.

  Taking the increased flow to and from the NEIZ forecast for the period up to 2031 as a base, examination of the distribution by area of this increased traffic is set out in Figure 5.1

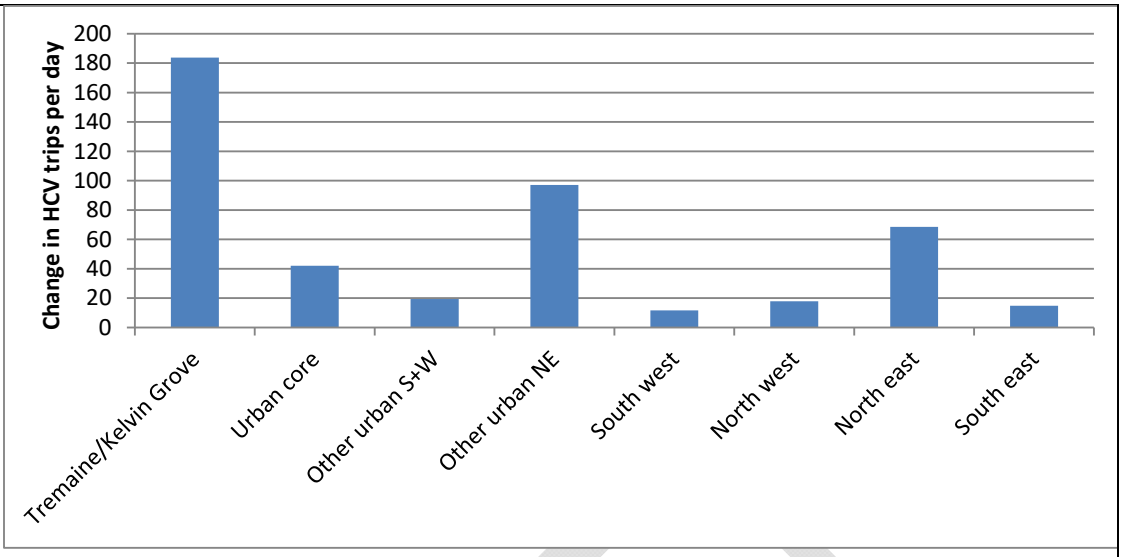


Figure 5.1
Distribution of increased HCV trips from the North East 2021-2031

Even without the possible relocation of the rail terminal, a large part of the increased traffic from the North East area is forecast to connect with the Tremaine Avenue/Kelvin Grove corridor. This is also likely to be the case if the terminal is relocated, particularly for the inbound movement of retail and manufactured goods servicing the distribution centres and other firms along Tremaine Avenue, if these chose not to relocate. Even if they did, they would still need to serve the retail and industrial customers in the central urban core again using routes like Tremaine Avenue. There would however be some reduction along the routes in the urban area for the bulk traffics including logs transferring to rail at the terminal.

- **The extent to which other activities would relocate to the new terminal.** If other activities such as the major distribution centres moved to sites close to a relocated rail terminal this could have a more significant impact on the traffic flows in the urban area, although the extent of this would depend on the extent to which a new ring road was provided. Indeed this may be a necessary factor before relocation to the NEIZ could take place.

  The freight surveys undertaken have indicated that there is some pressure for firms to relocate away from the congested parts of the Tremaine Avenue/Kelvin Grove corridor especially for areas in the east but the possible choice of a site near a relocated rail terminal would be influenced by the availability of high quality road connections in the area.

In summary therefore, while the relocation of the rail terminal would lead to some reductions in the flows along the Tremaine Avenue axis, the extent of this may be limited unless there are moves by the major customers of the facility and also of other large freight generators to relocate to be close to the new terminal. While there is some interest in this, the surveys suggested that the scope for this, at least over the short term may be limited. Any reduction in heavy freight traffic would be likely to be balanced by increased flows of light vehicle traffic if the land currently used for the rail terminal and distribution centres along the route was replaced by commercial and residential uses.

6 Possible use of ring road sections

As part of the surveys, stakeholders were asked about their possible use of sections of the proposed ring road. To a significant extent the use of the ring road would depend on whether the rail freight terminal was relocated and whether the firms themselves might relocate, either with the main objective of being close to new terminal location or because of issues with their current site.

In the case of firms relocating to be close to the terminal, they in general anticipated that they would make considerable use of the ring road, indicating the strong inter-relationship between the development of the new terminal and the road transport network supporting this.

For other firms which were not proposing to relocate, their potential use of the ring road would be more limited since they could continue to use their existing transport routes. For firms which might relocate but not necessarily to be close to the terminal, much would depend on the site chosen, but the presence of the ring road was judged to be a factor to be taken into account in the relocation decision.

7 Summary and conclusions

The key findings from the examination and analysis of current and future freight patterns in Palmerston North include: -

- Palmerston North is an important freight hub serving the central and lower North Island and is also an important manufacturing location.
- Much of the traffic in the city is associated with movements to and from the Tremaine Avenue/Kelvin Grove axis. This contains many of the major distribution centres serving the area and also contains the intermodal rail terminal. Tremaine Avenue is also an important route for general traffic and the combination of this traffic and the freight flows means that there is considerable congestion along this route. This is perceived to impact on the life of the city.
- There are also significant volumes of freight traffic to or from locations in the surrounding area. Some of this traffic passes through the city but the greater part travels to or from sites within the urban area
- Freight traffic is forecast to grow steadily with a continued focus on shorter distance movements in the Tremaine Avenue area and also beyond this in the NEIZ. This will therefore compound the existing transport issues in the corridor.
- The rail terminal generates considerable volumes of traffic serving outbound flows of logs and inbound flow of manufactured and retail goods mainly supplying the major distribution centres in the area.
- There are proposals to relocate the rail terminal and also to provide parts or all of a ring road round the city to help alleviate the current and emerging traffic issues within the urban area. However the high proportions of shorter distance trips and external trips to or from urban locations would potentially not benefit directly from the construction of the ring road
- In order to understand the potential impacts of these proposals, key stakeholders were surveyed. The main findings of this survey identified:-
    - Traffic issues mainly along Tremaine Avenue
    - The importance attached to being located near the rail terminal

    - Other options for firm relocation
    - Amenity issues
- As well as identifying increased traffic levels in the city, the traffic forecasts have also highlighted the potential growth in movements to and from the north to Feilding and locations further north.
- The impacts of the growth into the city from the north would be compounded by the development of the NEIZ being promoted by PNCC.
- The NEIZ would also be boosted by the proposed relocation of the rail terminal towards Bunnythorpe. However the exact impacts of this on traffic flows and issues in the urban area would depend on the extent to which other firms and activities chose to relocate with the rail terminal and also on the nature of development that took place on the vacated rail land.
- The stakeholder survey also asked about potential use of the ring road. This indicated that the firms which might move to be close to a relocated rail terminal would potentially make use of some or all of the ring road sections. For firms which might relocate but not necessarily to be close to the rail terminal, the presence of the ring road would probably be a factor which would be taken into account into their decision making.

The above findings will be incorporated into the Network Options Report (NoR) Part A (Strategic Case) and Part B (Programme development).

Appendix A

Discussion notes for stakeholder surveys

Palmerston North Freight Ring Road Study

Notes for discussions with road transport companies

Details of your operations

How large is your operation in Palmerston North (numbers employed, number of vehicles etc)?

Where are your major premises located in the Palmerston North area?

What is the main function of these e.g. consolidation/transfer points, warehousing, intermodal terminals?

What are the main flows and commodities you handle into, out of, through, or around Palmerston North?

Which geographical markets are served from your premises and what are the flows to these (including international)?

What are the main sources of the goods that you bring into Palmerston North?

- To what extent do these come from your branches elsewhere or direct from other sources?

Where are your suppliers including your own organisation located?

Do you use rail for bringing goods into or out of Palmerston North? If so, what are the commodities handled inbound and outbound and their volumes?

For movements to and from your premises or your main customers in Palmerston North which particular road routes do heavy vehicles typically use?

If a ring road was built to avoid the built-up area, would this be useful to you?

If so, which section or sections do you think you might use

A. a route north of the airport between Bunnythorpe and SH 3 north-west of the city
B. a route between Bunnythorpe and Ashhurst
C. a route running south of Bunnythorpe to join SH57 south of the river (upstream of the existing bridge)
D. a route between Longburn and SH3 in the north west of the city
E. a route in the southwest between Longburn and SH57 south of the river near Linton (downstream of the existing bridge)

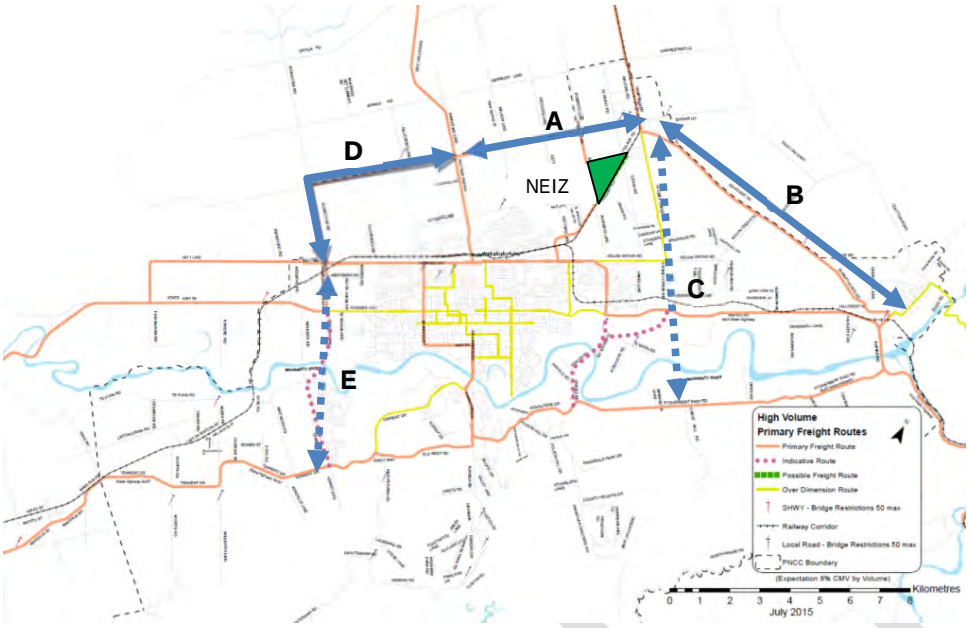


Figure 2: Palmerston North Primary Freight Routes (Source: PNCC Strategic Transport Plan)

Do you use any of these route sections currently and are there any issues with these?

Do you anticipate any major changes in the patterns of movement to or from your premises or your customers? If so, what are these?

Transport issues

Are there transport issues associated with your operations? If so, what are these?

Do these significantly impact on the efficiency of your operations?

Might these be relieved by you or your customers moving to another location?

Have you considered moving to another location? If so, what barriers appeared to exist for this move?

Other issues

Apart from transport issues are there any other constraints associated with the site you currently occupy. If so, what are these?

Is there sufficient space available at your current site to meet your needs over the foreseeable future? If not when are likely to consider moving and what would be the key elements in your decision?

How important is it for you to be located close to a rail transfer facility?

Above what distance or time would this become a significant issue for you?

Would moving the main rail freight centre to another location near Palmerston North be an issue for you?

In particular, if the main rail freight centre moved to a site near the, NEIZ (to the north-west of the airport) would this encourage you to relocate to this area?

Would another location e.g. at Longburn suit you better?

What might influence your decision whether or not to relocate? Would the provision of an enhanced ring route around the city play an important part in any relocation decision?

Palmerston North Freight Ring Road Study

Notes for discussions with owners of goods (Producers and retailers)

Details of your supply chain

Where are your main premises located in the Palmerston North area?

What is the main function of these e.g. regional or national distribution centres, manufacturing plant or other?

What are the main commodities handled or manufactured and their volumes?

Which geographical markets are served and what are the flows to these (including international)?

What are the main sources of the goods brought into your manufacturing or distribution centres?

- To what extent do these come from other parts of your organisation or from other suppliers?

Where are your suppliers including your own organisation located?

What volumes inbound and outbound are transported by rail?

To what extent do you deliver direct to retail outlets or final customers or to what extent do you use warehousing or other intermediate storage, processing or repackaging facilities on the way.

- Where are these typically located?

For movements to and from your premises which particular routes do heavy vehicles typically use?

If a ring road was built to avoid the built-up area, would this be useful to you?

If so, which section or sections do you think you might use

F. a route north of the airport between Bunnythorpe and SH 3 north-west of the city
G. a route between Bunnythorpe and Ashhurst
H. a route running south of Bunnythorpe to join SH57 south of the river (upstream of the existing bridge)
I. a route between Longburn and SH3 in the north west of the city
J. a route in the southwest between Longburn and SH57 south of the river near Linton (downstream of the existing bridge)

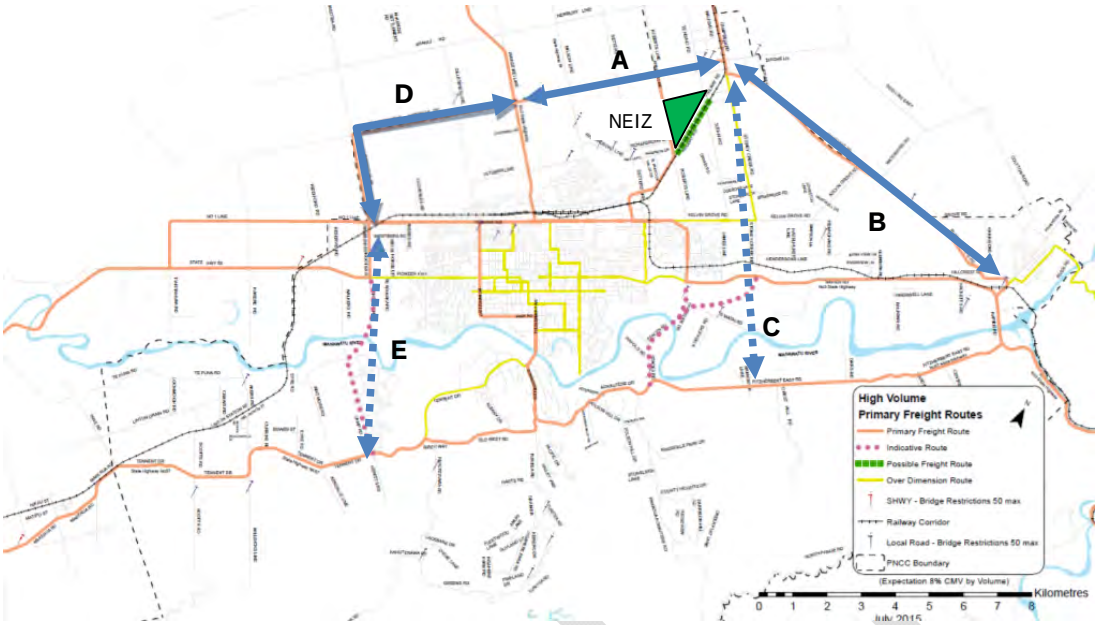


Figure 3: Palmerston North Primary Freight Routes (Source: PNCC Strategic Transport Plan)

Do you use any of these route sections currently and are there any issues with these?

Do you anticipate any major changes in the patterns of movement to or from your premises? If so, what are these

Transport issues

Are there transport issues associated with your operations? If so, what are these?

Do these significantly impact on the efficiency of your operations?

Might these be relieved by moving to another location?

Have you considered moving to another location? If so, what barriers appeared to exist for this move?

Other issues

Apart from transport issues are there any other constraints associated with the site you currently occupy? If so, what are these?

Is there sufficient space available at your current site to meet your needs over the foreseeable future? If not when are likely to consider moving and what would be the key elements in your decision?

How important is it for you to be located close to a rail transfer facility?

Above what distance or time would this become a significant issue for you?

Would moving the main rail freight centre to another location near Palmerston North be an issue for you?

In particular, if the main rail freight centre moved to a site near the NEIZ (to the north-west of the airport) would this encourage you to relocate to this area?

Would another location e.g. at Longburn suit you better?

What might influence your decision whether or not to relocate? Would the provision of an enhanced ring route around the city play an important part in any relocation decision?

Appendix B

Summary of survey results

Table 7.1
Summary of stakeholder survey findings

	Current use of rail terminal	Traffic issues	Importance of proximity to rail terminal	Relocation potential	Amenity concerns	Potential use of ring road sections (Refer Figure 1 in Appendix A)
A	Yes	Tremaine Avenue and Ruahine Street	**Yes**	**Yes**	No	A, B, D and E
B	Not directly	Access through suburban street	Some	**Yes**	**Yes**	A, B, C and D
C	Yes	Tremaine Avenue	**Yes**	**Yes**	No	If relocated possibly all sections
D	Yes	Tremaine Avenue	**Yes**	**Yes**	No	Possibly all sections
E	Not directly	Tremaine Avenue	No	No	No	No
G	No	Saddle Road	No	**Yes**	No	A, B and D
H	No	Tremaine Avenue	No	No	No	Possibly all sections
I	No	No	No	No	No	Possibly
J	No	No	No	No	No	None identified
K	Not directly	None identified	No	No	No	No
L	Yes	None identified	Moderate	No	No	No

BASELINE SAFE AND APPROPRIATE SPEED CORRIDORS

ID	Site (Refer MegaMaps)	SAAS (base)	Project area
1	Milson Line (Kairanga Bunnythorpe Road to Richardson Line)	Existing limit 80kph, SAAS 60kph	PNITI
2	State Highway 54 (Pine Road to SH3)	Existing limit 100kph, SAAS 80kph	PNITI
3	Waughs Road (~1km south of SH54 to Rail Level Crossing (Kung Fu Corner))	Existing limit 100kph, SAAS 80kph	PNITI
4	Campbells Road (Kung Fu Corner to ~100m north of Dixons Lane)	Existing limit 100kph, SAAS 60kph	PNITI
5	Kairanga Bunnythorpe Road (Roberts Line to Campbell Road)	Existing limit 100kph, SAAS 80kph	PNITI
6	Kairanga Bunnythorpe Road (from Rongotea Road eastwards, ~1km)	Existing limit 70kph, SAAS 60kph	PNITI
7	Ashhurst Road (Campbell Road to ~300m west of Spelman Ct)	Existing limit 100kph, SAAS 80kph	PNITI
8	Railway Road (~300m south of Maple Street to Roberts Line)	Existing limit 100kph, SAAS 80kph	PNITI
9	Railway Road (Roberts Line to Airport Drive RAB)	Existing limit 70kph, SAAS 60kph	PNITI
10	Kelvin Grove (McLeavey Drive to James Line)	Existing limit 70kph, SAAS 60kph	PNITI
11	Kelvin Grove (James Line to Henaghans Road)	Existing limit 80kph, SAAS 60kph	PNITI
12	State Highway 3 (~100m west of Sutton Place to ~100m east of Hacketts Road)	Existing limit 100kph, SAAS 80kph	PNITI
13	Rongotea Road (~0.5km section midway between Kairanga Bunnythorpe Road and No1 Line)	Existing limit 100kph, SAAS 80kph	PNITI
14	State Highway 57 (SH3 Int to ~300m east of School)	Existing limit 100kph, SAAS 80kph	PNITI
15	State Highway 57 (~300m east of School to Pahiatua Aokautere Road)	Existing limit 80kph, SAAS 60kph	PNITI
16	State Highway 57 (Pahiatua Aokautere Road to Summerhill/SH3 Int)	Existing limit 70kph, SAAS 60kph	PNITI
17	Summerhill Drive (SH57 to overbridge)	Existing limit 70kph, SAAS 60kph	PNCC Lead
18	Tennent Drive (Bridge to Moginier Road)	Existing limit 70kph, SAAS 40kph	PNITI
19	Tennent Drive (western lanes)	Existing limit 70kph, SAAS 60kph	PNITI
20	Tennent Drive (Moginier Road to SH57)	Existing limit 100kph, SAAS 60kph	PNITI
21	State Highway 57 (Summerhill Drive to Tennent Drive)	Existing limit 100kph, SAAS 60kph	PNITI
22	SH57 (Whitmore Road to ~500m east of Tokomaru Road)	Existing limit 100kph, SAAS 80kph	PNITI
23	State Highway 56 (Mangaone Stream to Walkers Road)	Existing limit 100kph, SAAS 80kph	PNITI
24	State Highway 56 (Walkers Road to ~200m west of Ngaire St South)	Existing limit 70kph, SAAS 60kph	PNITI
25	State Highway 56 (~200m west of Ngaire St South to Manawatu Bridge)	Existing limit 100kph, SAAS 80kph	ACNZ
26	Tiakitahuna Road (SH56 to No1 Line)	Existing limit 100kph, SAAS 80kph	PNITI
27	No 1 Line (Tiakitahuna Road to Rongotea Road)	Existing limit 100kph, SAAS 80kph	PNITI
28	No1 Line (~500m section from Rongotea West)	Existing limit 100kph, SAAS 60kph	PNITI
29	No1 Line (Rail Bridge to Cloverlea)	Existing limit 70kph, SAAS 60kph	PNITI
30	College Street (Cook to Victoria)	Existing limit 50kph, SAAS 40kph	PNCC Lead
31	Grey Street (Ngata to Ruahune)	Existing limit 50kph, SAAS 40kph	PNCC Lead
32	Ferguson Street (Cook to Victoria – reported in 4 segments: Cook to Pitt, Pitt to Oxford, Oxford to Princess, Princess to Victoria)	Existing limit 50kph, SAAS 40kph	PNCC Lead
33	Cook Street East (Cuba to Church and Church to Ferguson)	Existing limit 50kph, SAAS 40kph	PNCC Lead
34	SH3 / Princess (Queen to Princess)	Existing limit 50kph, SAAS 40kph	PNCC Lead

ID	Site (Refer MegaMaps)	SAAS (base)	Project area
35	Princess Street / SH3 (SH3 to Ferguson)	Existing limit 50kph, SAAS 40kph	PNCC Lead

BASELINE INTERSECTIONS

ID	High Risk Intersections (MegaMaps)	Collective Risk (base)	Personal Risk (base)
1	Longburn Rongotea Road / No1 Line	High	High
2	SH3 / Kairanga Bunnythorpe Road	Medium	Medium High
3	Milsons Line / Kairanga Bunnythorpe Road	High	High
4	Roberts Line / Kairanga Bunnythorpe	Medium High	High
5	Featherston Avenue / SH3	Medium High	Medium
6	Pioneer Highway / Botanical Road	High	High
7	Ferguson Street / Fitzgerald Avenue	Medium	Medium
8	Kelvin Grove Road / Stoney Creek Avenue	High	High
9	Napier Road (SH3) / Roberts Line	High	High
ID	**High Risk Intersections (SafetyNet)**	**2013-2017 Collective Risk (base)**	
10	Flygers Line / SH3	Medium High	
11	SH57 / Old West Road	Medium High	
12	Stoney Creek Road / SH3	Medium High	
13	James Line / SH3	High	

Note: SH3/Tremaine was also identified (Medium High) but has undergone recent treatment

DSI CAUSALTIES

Area	Actual DSI (2014-2018)	Actual F, S Crashes	Actual Injury (2014-2018)	Estimated DSI Equivalents
Study Area, excluding urban crashes/ CBD network, Primarily rural network	83	66 (14, 52)	229	82.1
Wider Study Area, excluding urban crashes (SH3, Feilding) (i.e. to include the impacts of modelled volume reductions outside of the immediate area)	103	83 (20, 63)	283	100.1

REDUCTION IN HEAVY VEHICLES THROUGH THE CBD AND ALONG LOCAL STREETS

Reduction in heavy vehicles through the CBD and along local streets	
2031 Modelled HCV:	- City Centre Access (Fitzherbet Br): 1,700 vpd
	- Te Awe Awe St 800vpd
	- Park Road 580vpd
	- Tennent Drive (Massey) 540vpd
	- Bunnythorpe (Western Appr.) 1,300vpd

Reduction in heavy vehicles through the CBD and along local streets	
	- Feilding (to SH54) 2,000 vpd
	- Ashhurst 480vpd

INCREASE THE NUMBER OF HEAVY VEHICLES ON SELECTED FREIGHT ROUTES

Increase the number of heavy vehicles on selected freight routes	
2031 Modelled:	- Kairanga Bunnythorpe Road (SH3 to SH54) 1,000 vpd
	- Kairanga Bunnythorpe Road (SH54 to Roberts) 135 vpd
	- Longburn Rongotea Road 600 vpd
	- Ashhurst Bunnythorpe Road 500 vpd
	- SH54 (Milsons Line to Newbury Line) 840
	- SH3 North of KB Road 1000vpd
	- SH57 South of PN 600 vpd
	- SH56 South of PN 105 vpd
	- Stoney Creek Road (Kelvin Grove to Ashhurst Road) 105 vpd

REDUCTION OF GENERAL TRAFFIC THROUGH TOWNSHIPS OR KEY PLACES (BUNNYTHORPE, TENNENT DRIVE, FEILDING, CITY CENTRE)

Reduction of general traffic through townships or key places (Bunnythorpe, Tennent Drive, Feilding, City Centre)	
2031 Modelled:	- City Centre Access (over 30,000 vpd)
	- SH3 Napier Road (over 12,000)
	- Tennent Drive (8,000vpd)
	- Bunnythorpe (12,000vpd)
	- Feilding (up to 21,000 vpd)
	- Ashhurst (over 7,000vpd)

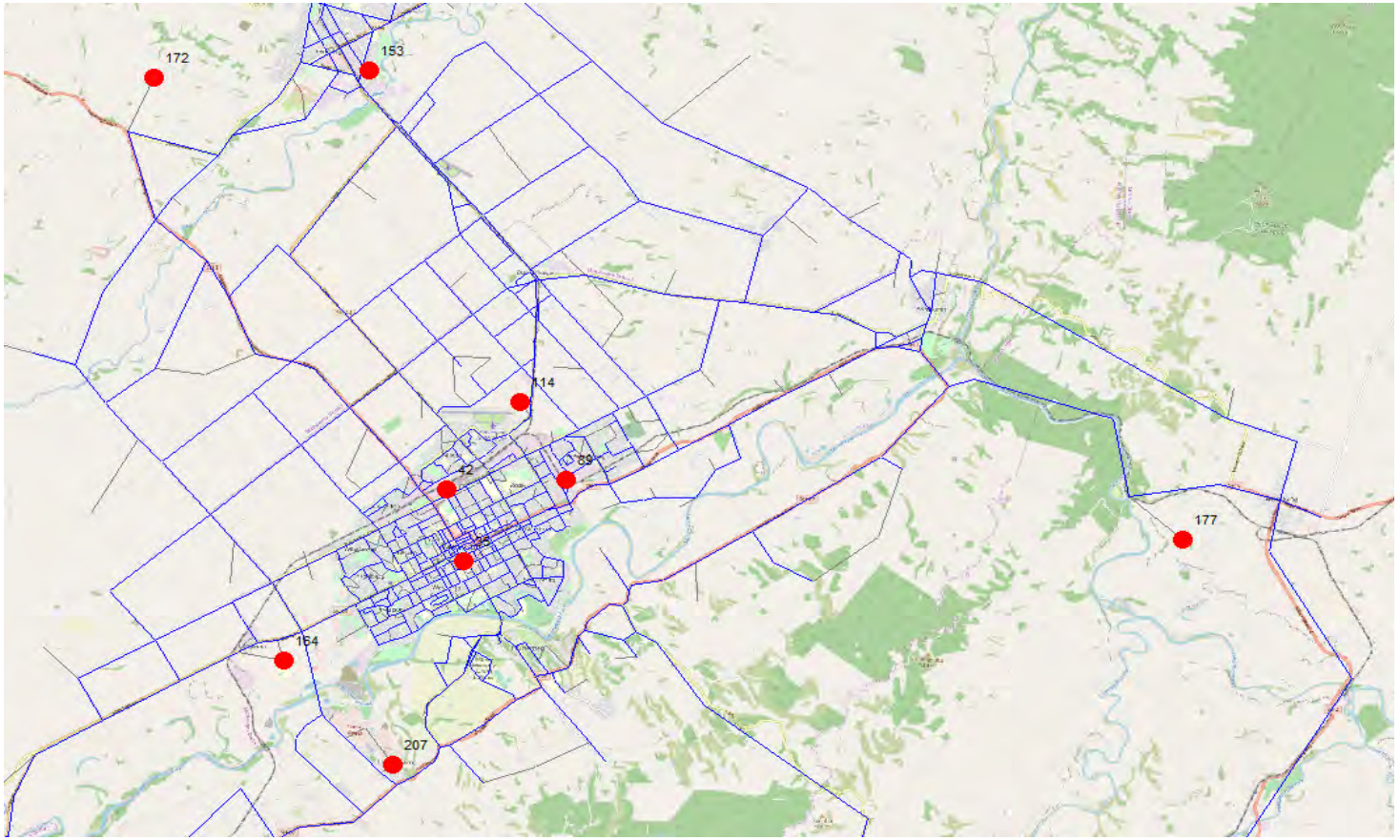
NUMBERS OF PEDESTRIANS AND CYCLISTS AND QUALITY OF EXISTING INFRASTRUCTURE

Numbers of pedestrians and cyclists and quality of existing infrastructure
Pedestrian and cyclist measures to be considered under existing PNCC metrics in parallel project (UCMP).
· Journey to work (cycle): 5.9% (2013 census)
· Journey to work (walk): 9% (2013 census) · Cycling Counts (PNCC): 941 across 9 sites

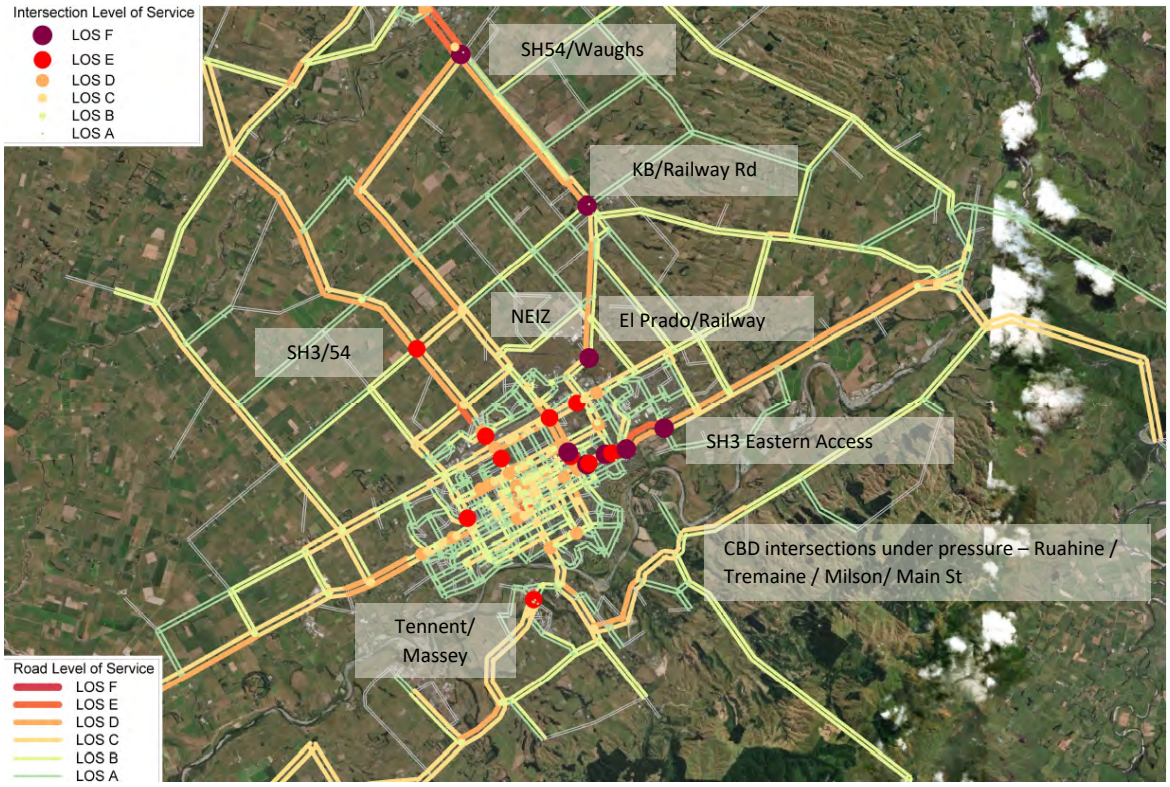
JOURNEY TIMES BETWEEN KEY LOCATIONS

Travel Time (minutes)
Scenario: 31_RailyardBase
Period: PM

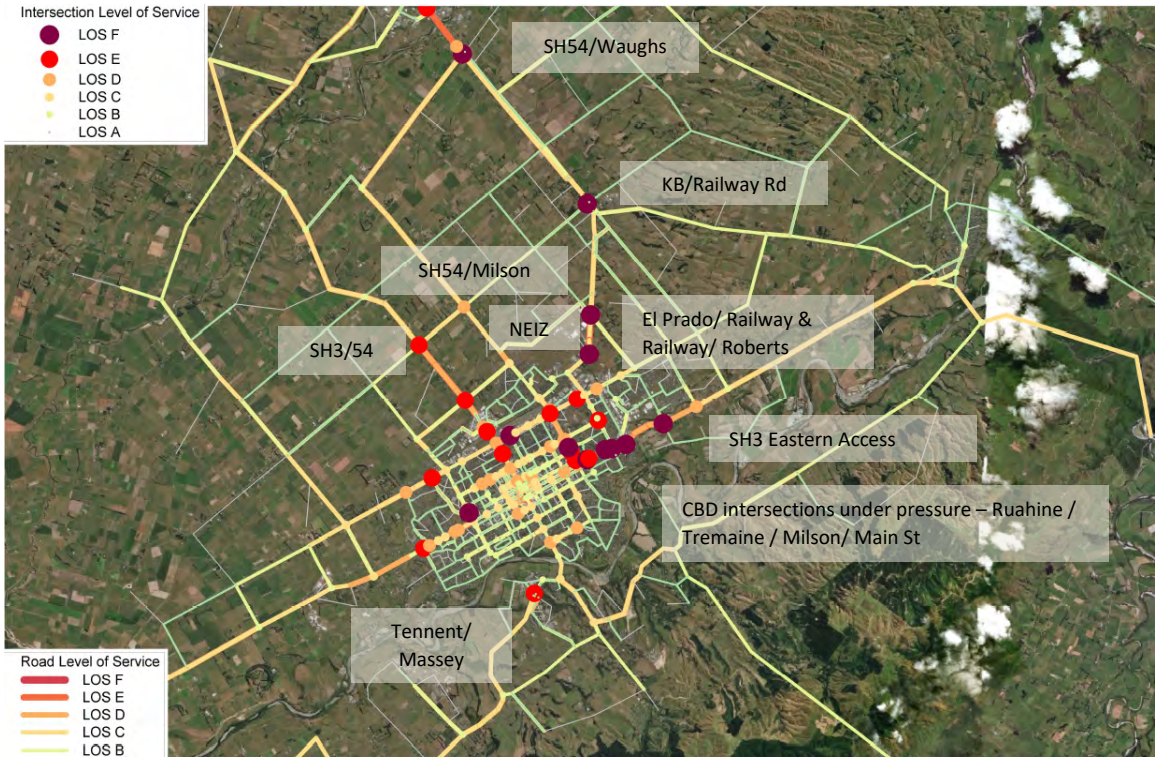
		Destination Zone									
Origin Zone	**Location Description**	**35**	**177**	**42**	**164**	**153**	**114**	**175**	**89**	**172**	**207**
35	PN Square (The Square/Fitzherbet)		21.9	7.6	8.4	23.0	13.4	23.3	10.2	18.1	10.5
177	East of Ashhurst (SH3/George St)	20.0		21.3	28.1	23.6	17.9	34.3	15.1	29.0	21.1
42	Tremaine (Tremaine/North St)	7.4	22.6		11.7	19.6	8.9	26.7	10.3	14.7	16.3
164	Longburn (SH56/Reserve Road)	8.4	29.3	10.0		20.6	15.4	15.4	17.7	15.2	16.8
153	Fielding (SH54/East St)	20.2	22.4	16.0	19.5		11.2	34.2	15.7	9.2	30.1
114	NEIZ (Railway/El Prado Drive)	25.1	28.7	21.0	26.7	24.2		41.6	18.0	25.7	33.6
175	Southwest (SH56/SH57 Intersection)	22.8	34.9	24.4	15.0	35.0	29.8		30.5	29.6	15.3
89	Kelvin Grove (Roberts/MIharere Dr)	12.1	15.4	10.0	18.3	17.6	7.6	33.1		19.3	20.2
172	Northwest (SH3/Stewart Road)	17.0	28.4	12.9	15.4	9.2	15.1	30.1	19.0		27.3
207	Linton Army Base (SH57/Camp Road)	10.6	22.0	16.6	16.9	32.9	20.8	15.7	17.7	28.2	



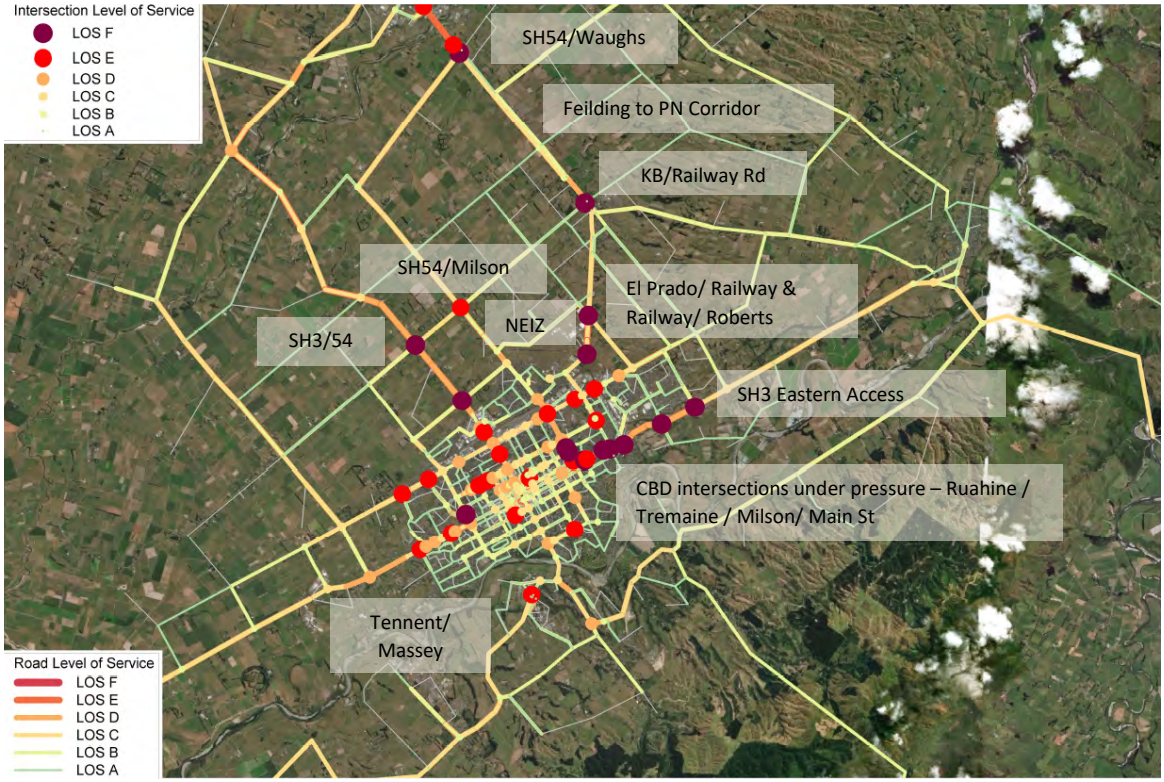
INTERSECTION LEVELS OF SERVICE



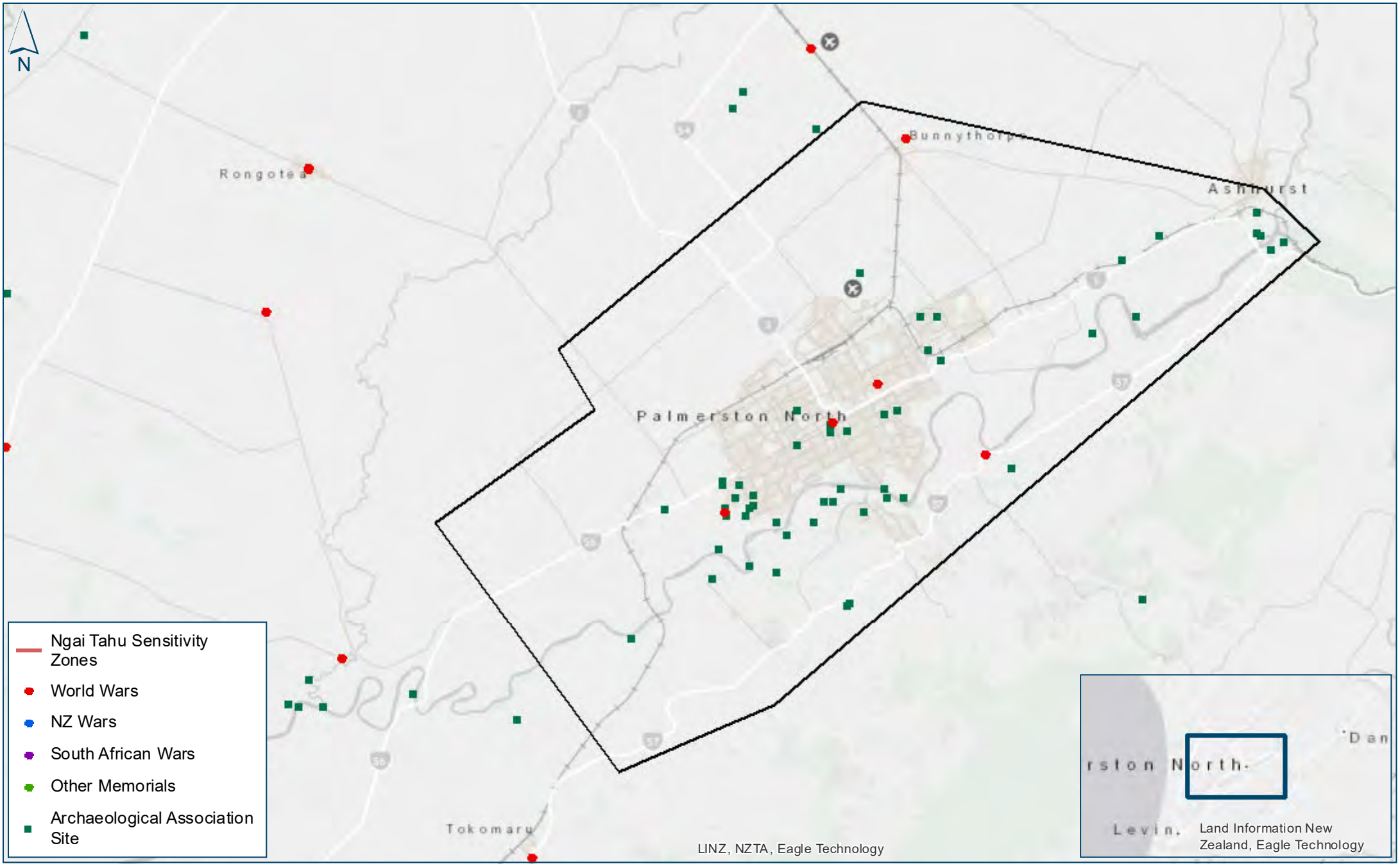
2021 Base level of service (PM)



2031 Base level of service (PM)



2041 Base level of service (PM)



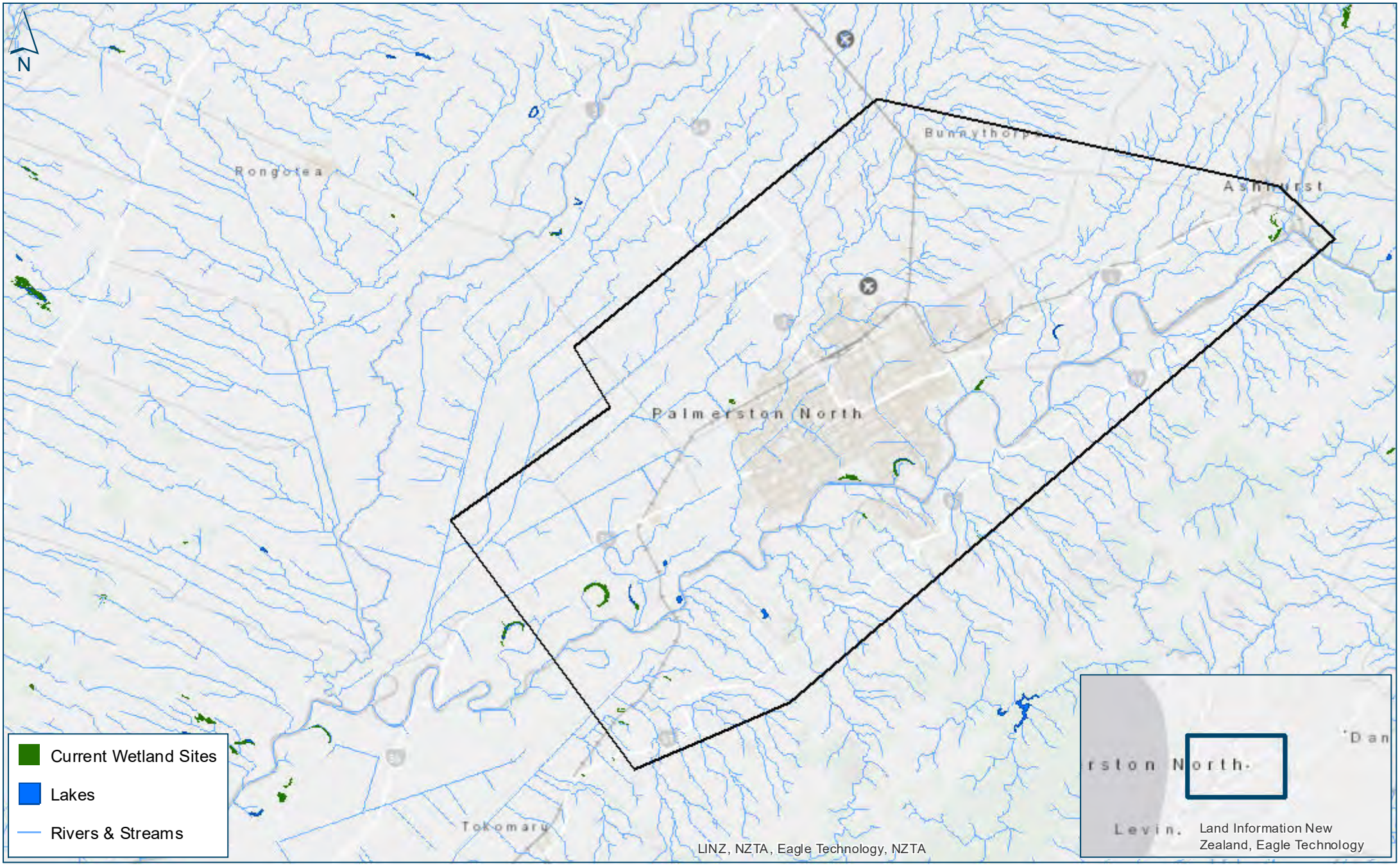
NZ TRANSPORT AGENCY WAKA KOTAHI

Culture

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18



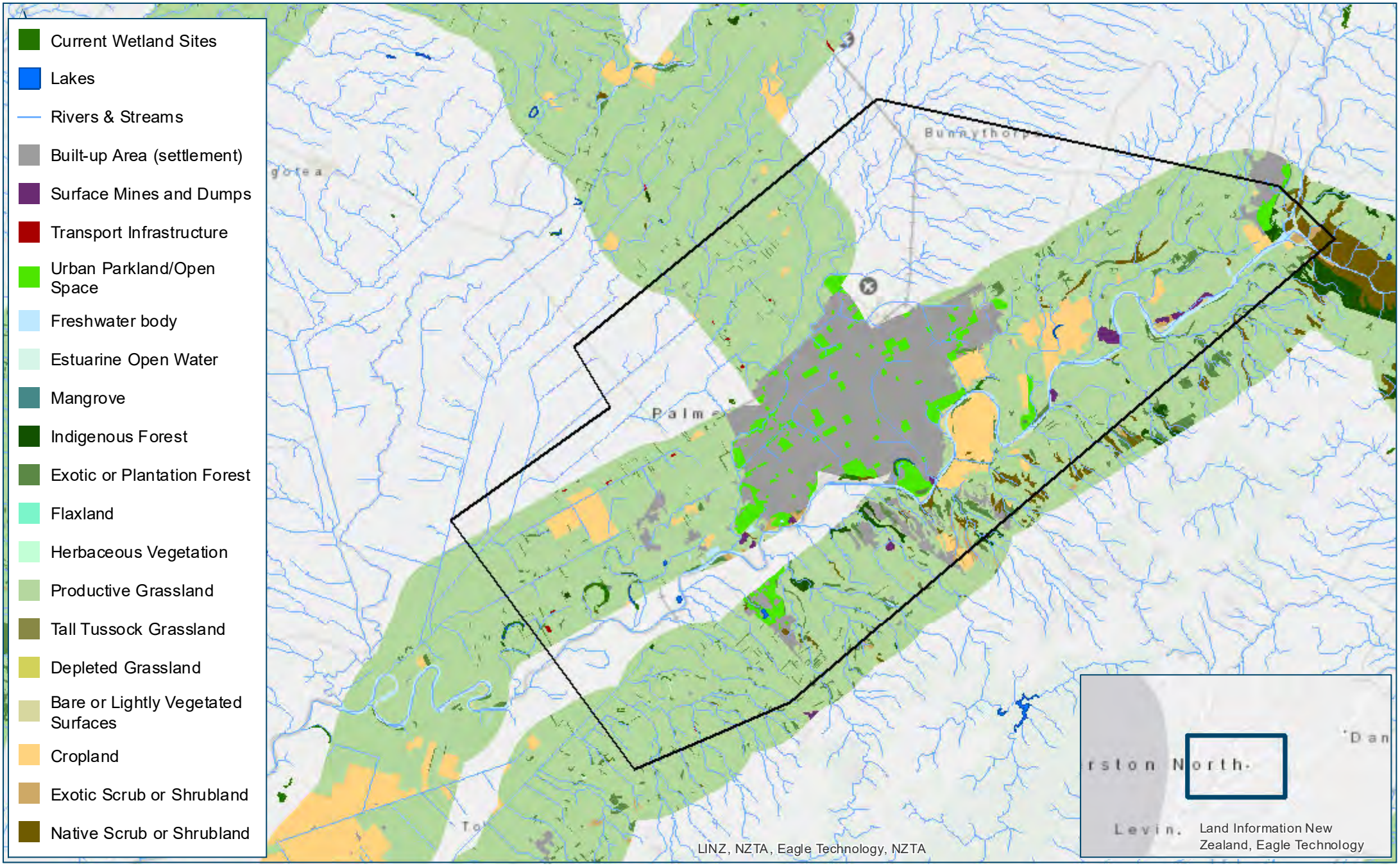
NZ TRANSPORT AGENCY WAKA KOTAHI

Freshwater only

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18



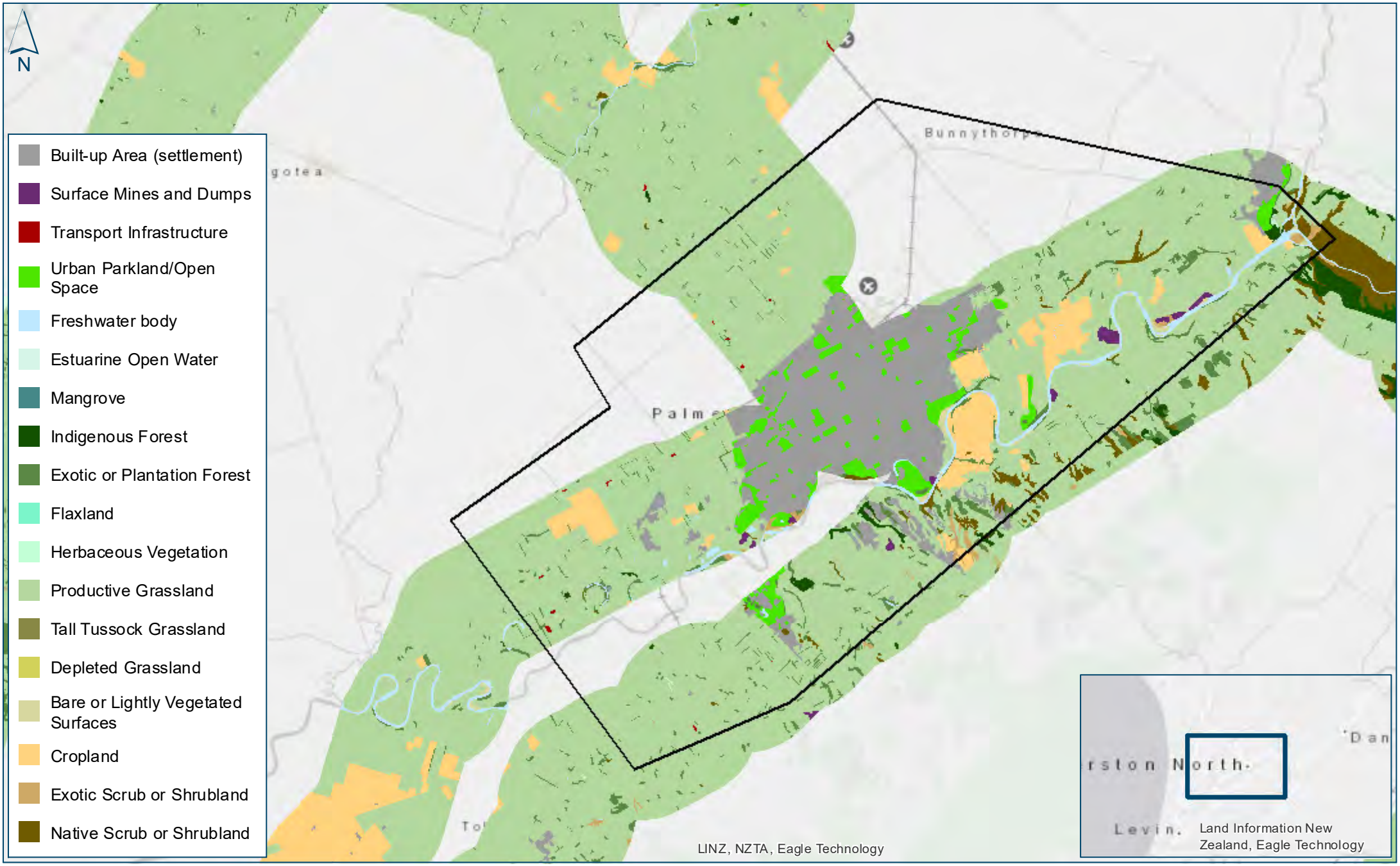
NZ TRANSPORT AGENCY WAKA KOTAHI

Landcover and Freshwater

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18



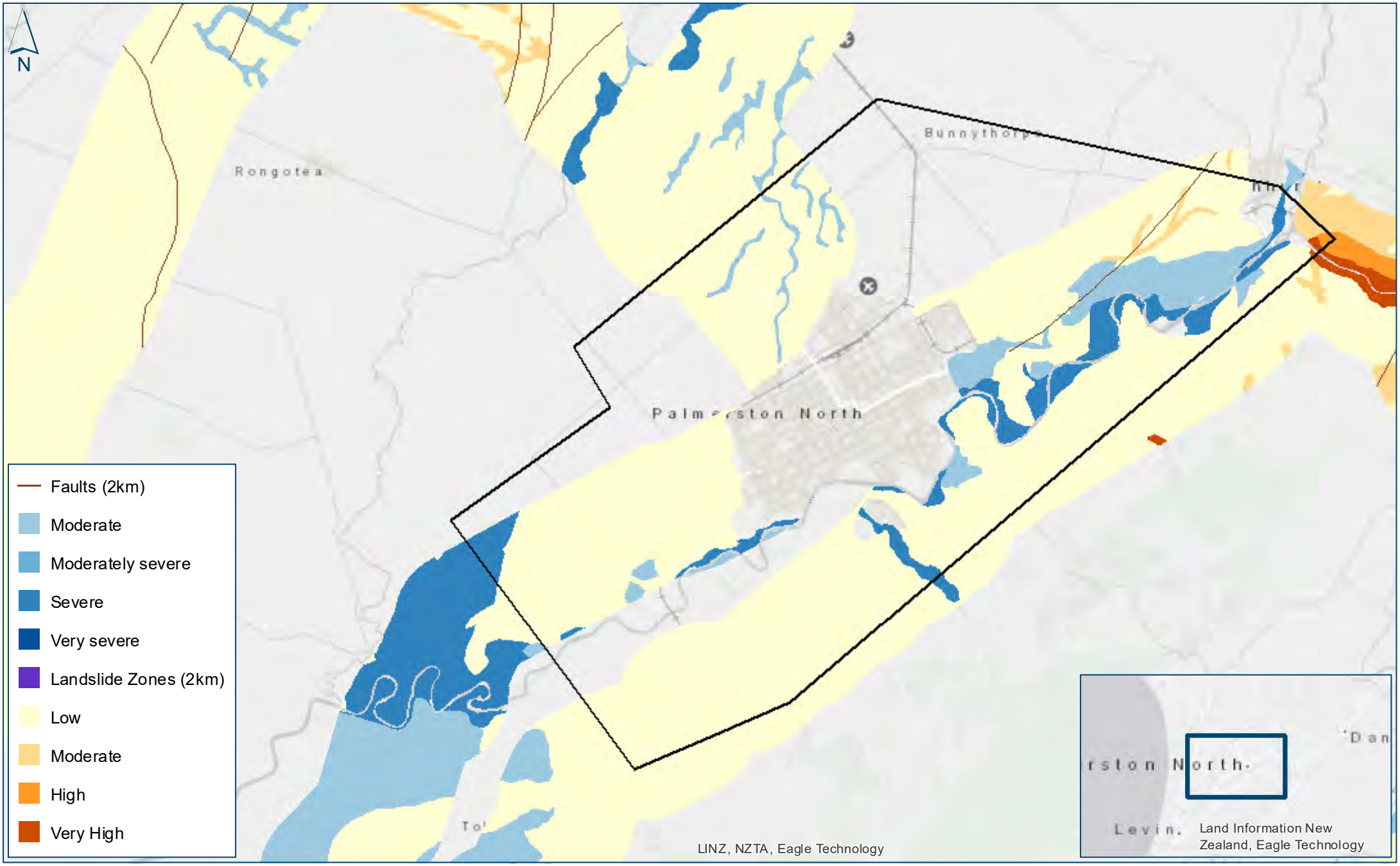
NZ TRANSPORT AGENCY WAKA KOTAHI

Landcover only

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18



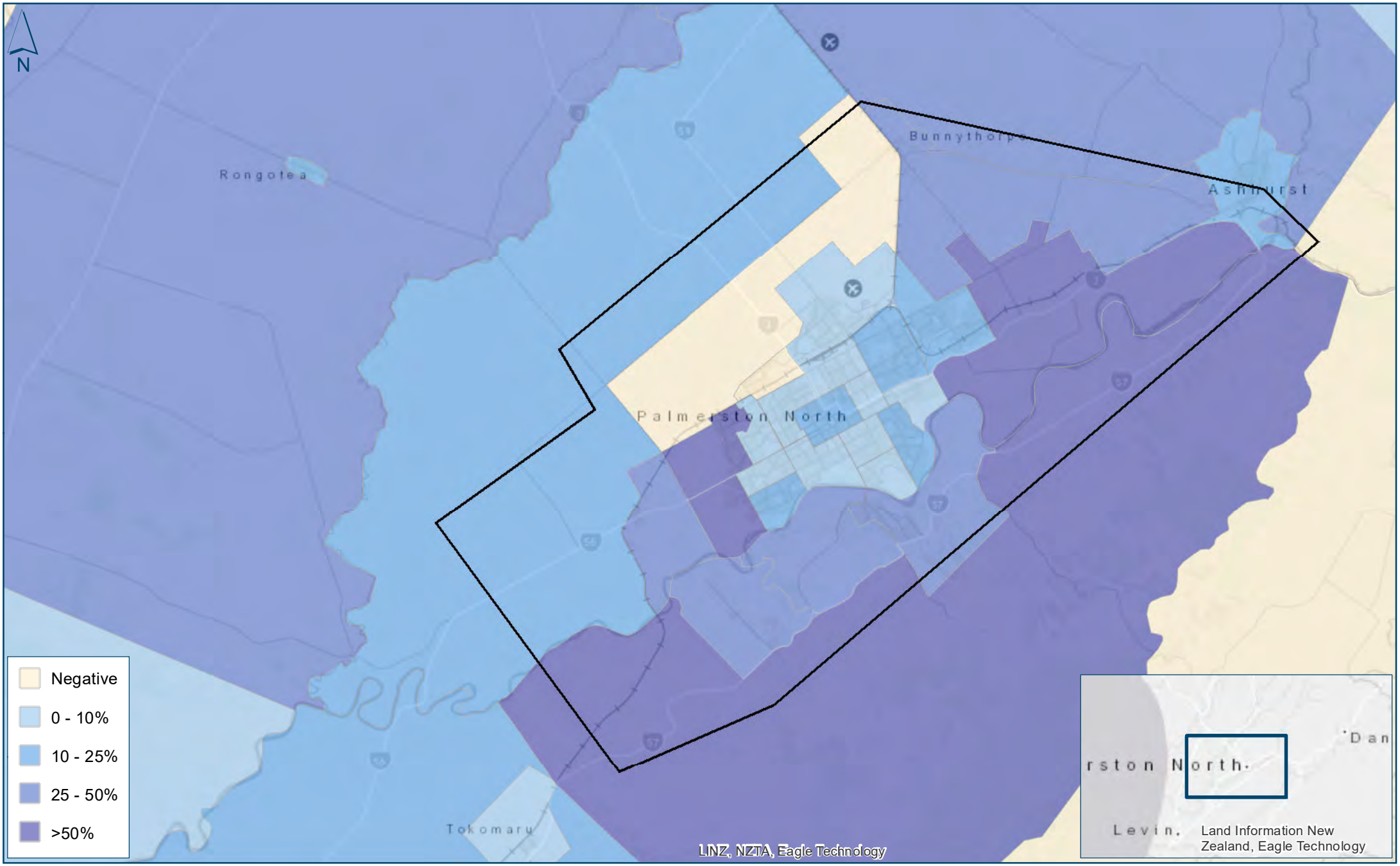
NZ TRANSPORT AGENCY WAKA KOTAHI

Natural Hazards

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18



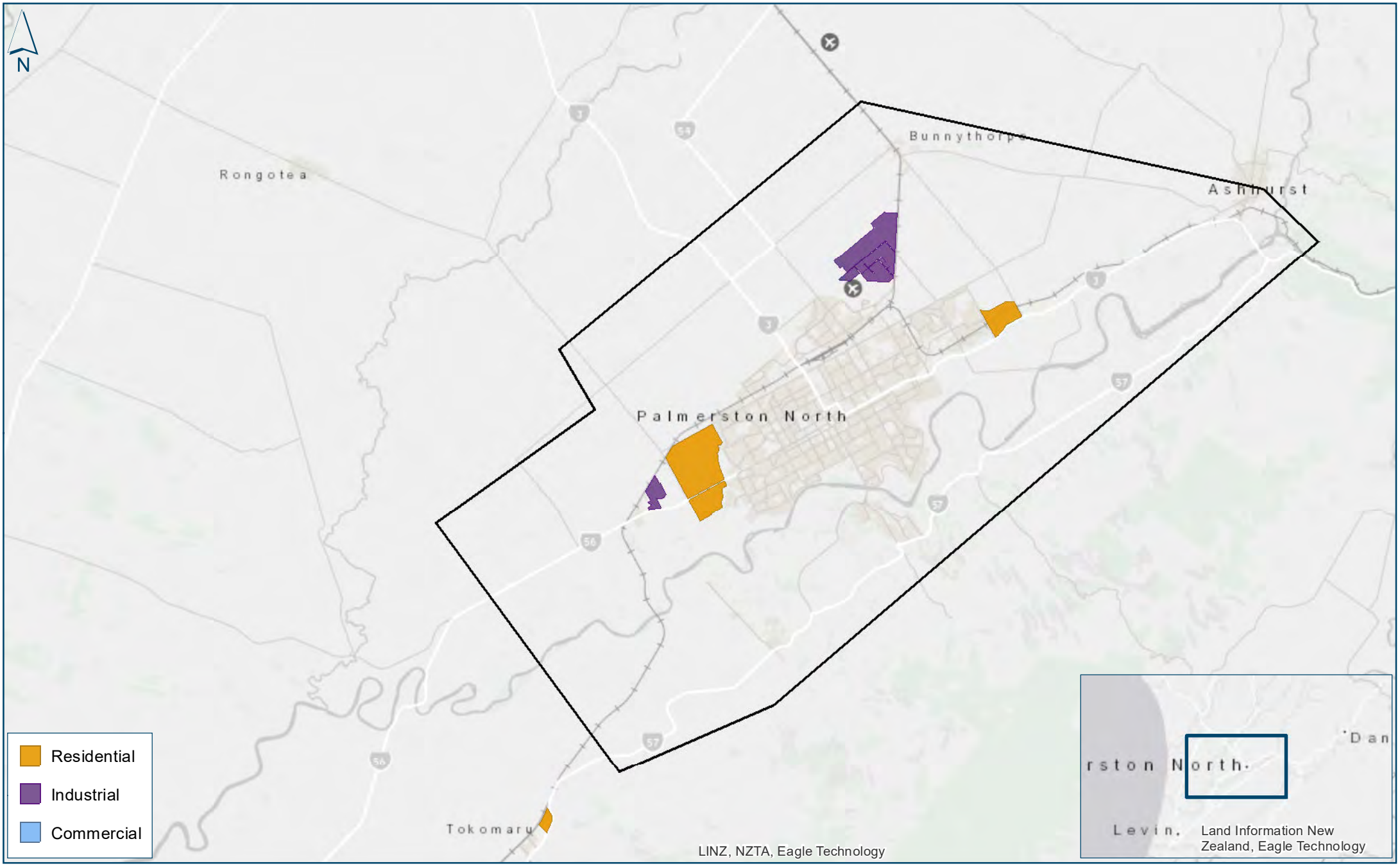
NZ TRANSPORT AGENCY
WAKA KOTAHI

Population Growth (2013 to 2043)

Palmerston North Integrated Transport Investigation

0 1 2 km

17/08/18

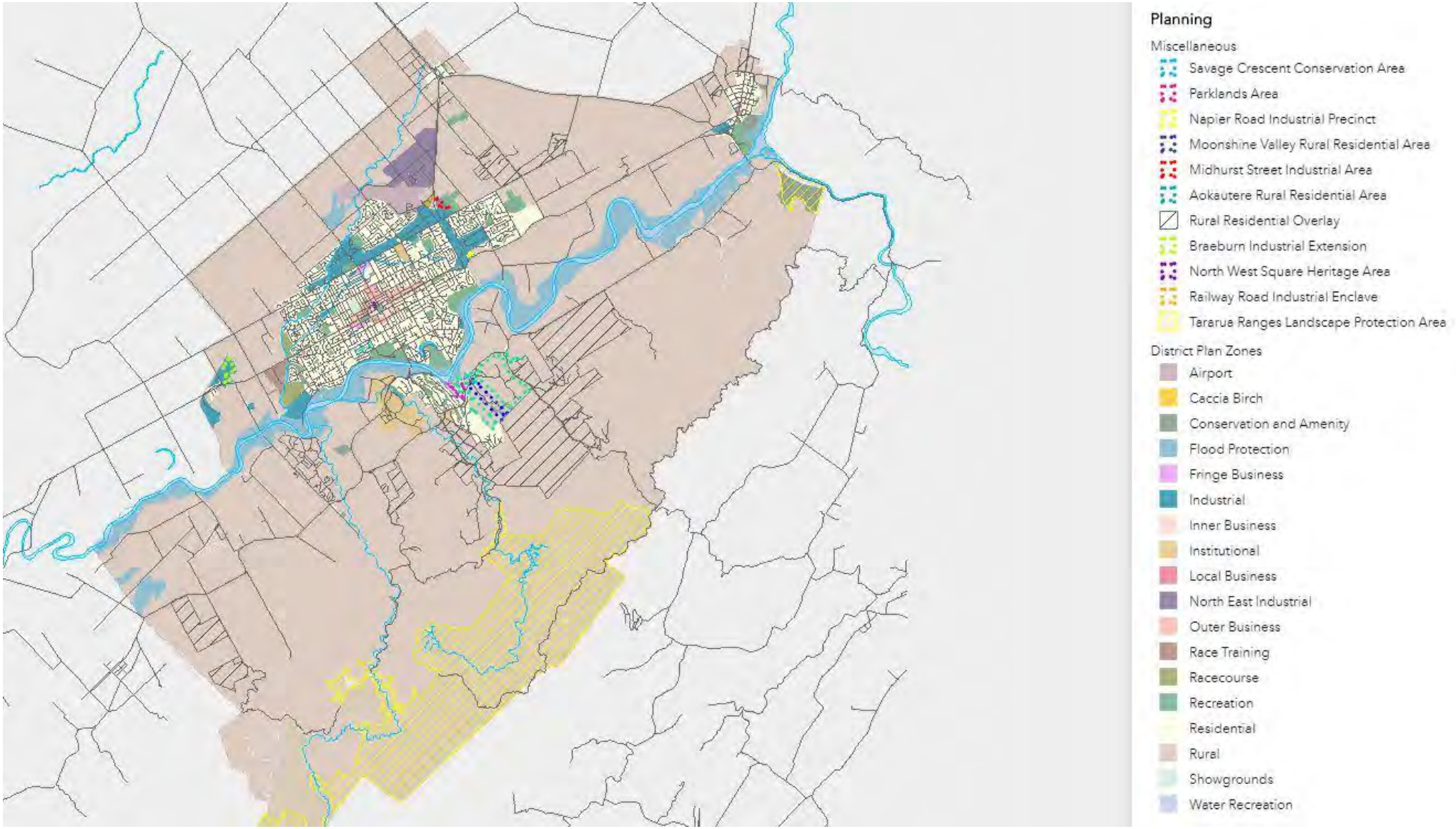


Urban Growth

Palmerston North Integrated Transport Investigation

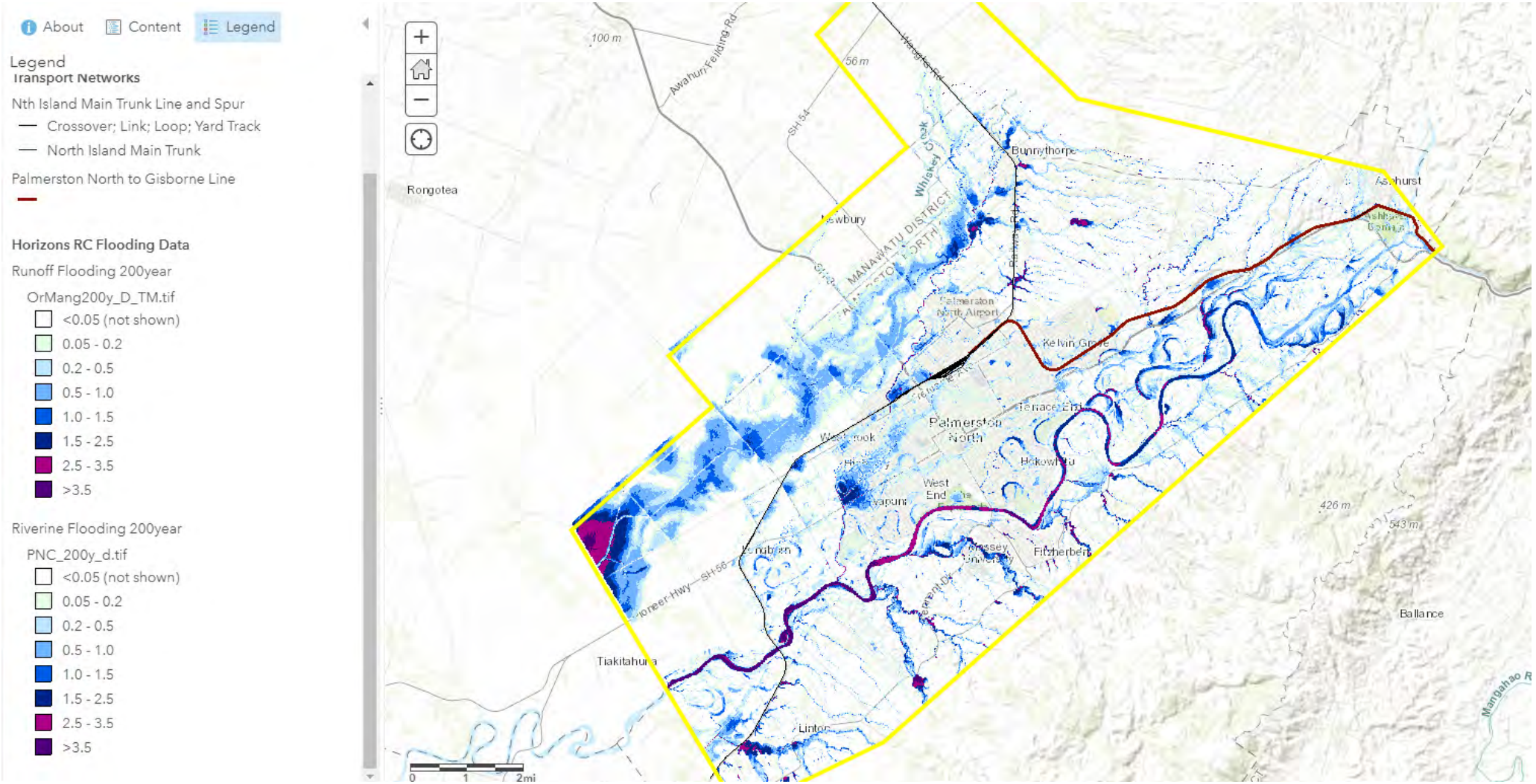
0 1 2 km

17/08/18



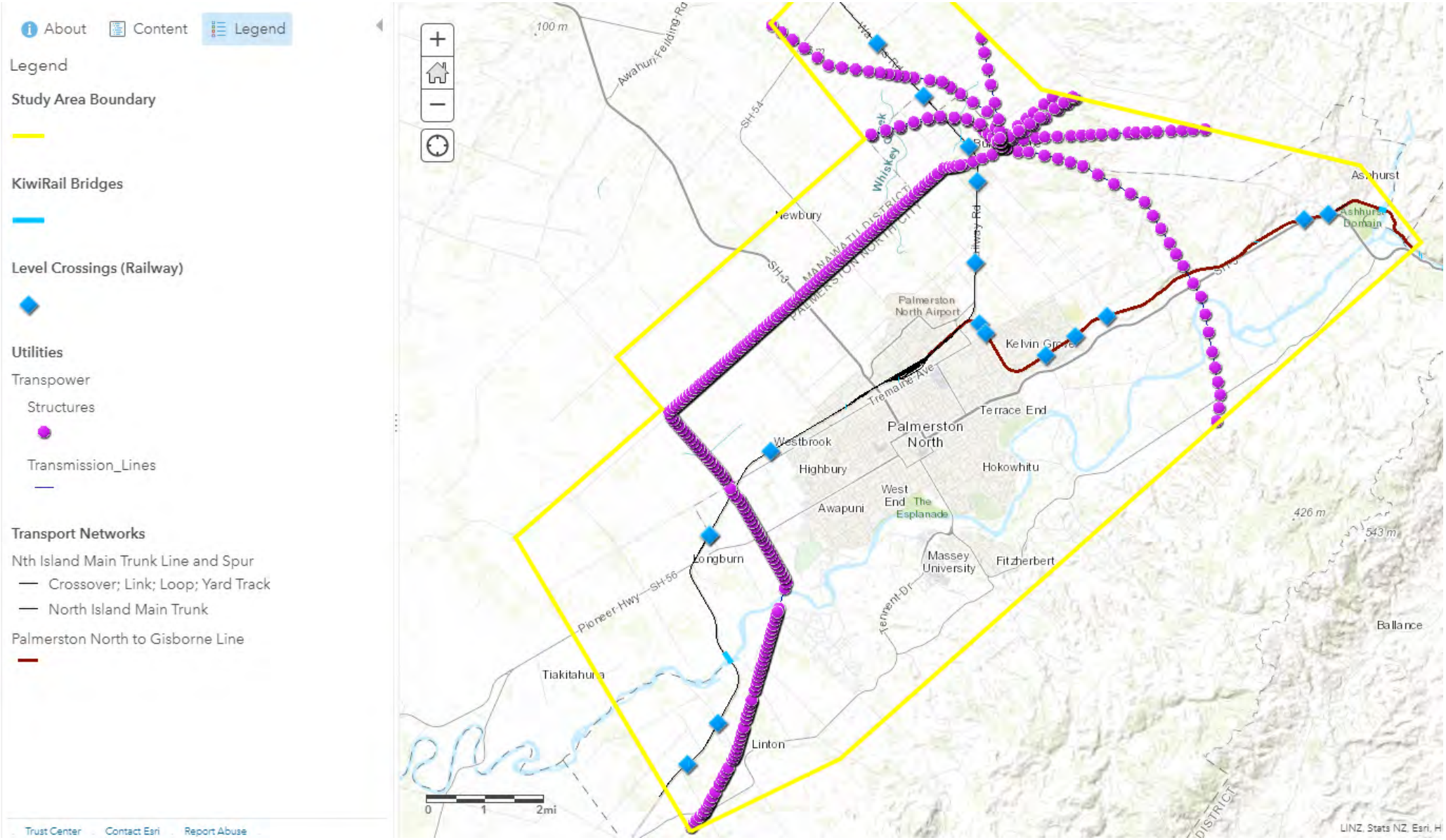
District Zoning Map

Palmerston North Integrated Transport Investigation



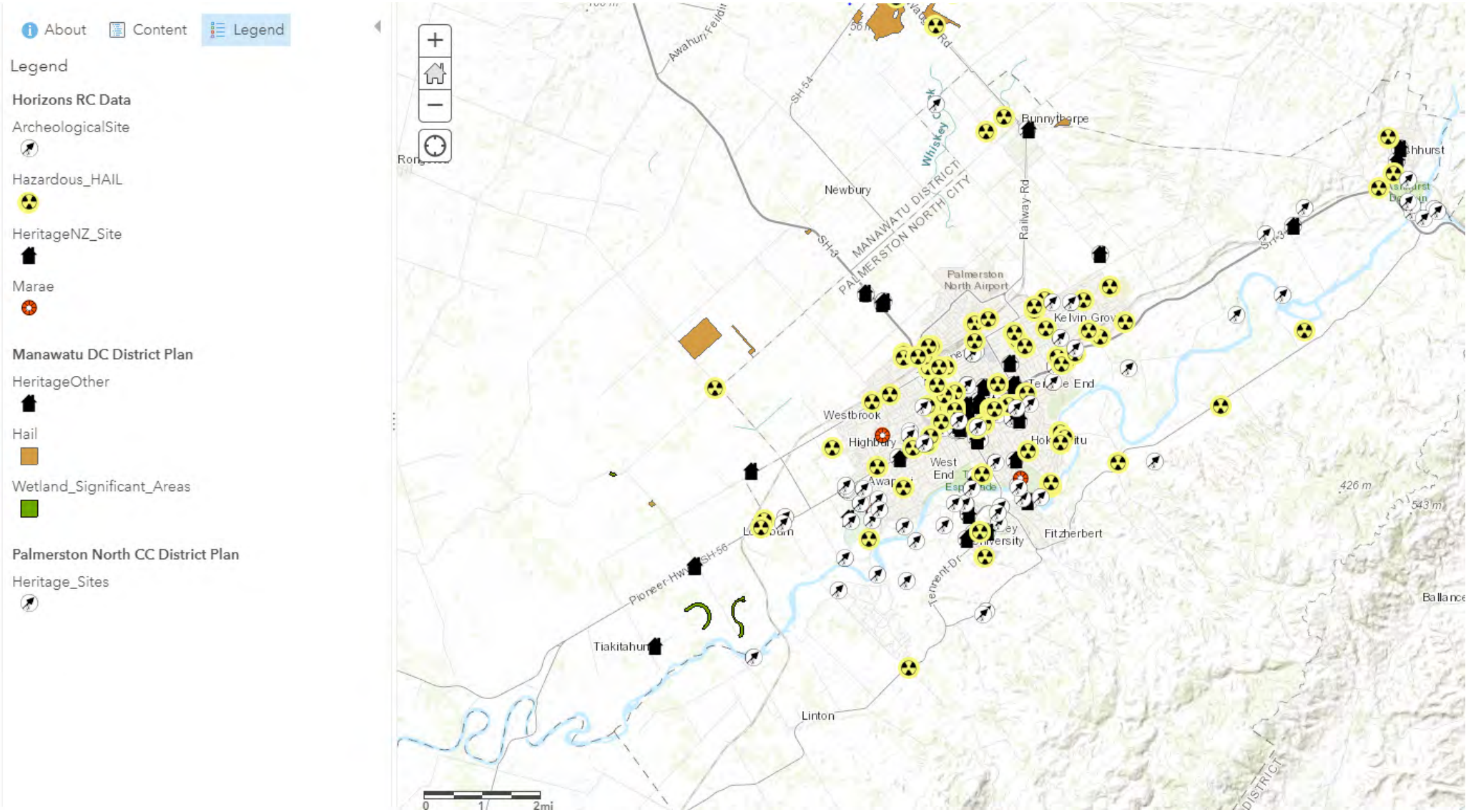
Flooding

Palmerston North Integrated Transport Investigation



Utilities and Structures

Palmerston North Integrated Transport Investigation



Hazards and Heritage

Palmerston North Integrated Transport Investigation

LONGLIST BACKGROUND REVIEW

Problems Key			
	Inappropriate roading hierarchy		Lack of sustainable transport options and usage
	Large traffic volumes, further impeded by predicted growth		Lack of resilience
	One bridge crossing - Manawatu River - concentration of traffic flows		Manawatu Gorge - lack of resilience
	Concentration of traffic through Bunnythorpe		Network Inefficiencies
	Poor commuter rail options		Safety concerns

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
Palmerston North-Manawatu Strategic Transport Study - Phase 1 Report	Traffic Design Group (TDG)	Mar-10	Palmerston North (general)	Road	Insufficient roading hierarchy	Palmerston North (general)	Road	Assessment of road hierarchy. Proposal at the time: SH between Mt Stewart and Manawatu Gorge, upstream bridge, eastern corridor connecting upstream bridge and bypass of Bunnythorpe
			Palmerston North (north of centre)	Road	Insufficient roading hierarchy and routes of strategic significance running through centre of Palmerston North	Mt Stewart to Bunnythorpe	Road	SH between Mt Stewart to Bunnythorpe via Feilding or via KB Road
			Palmerston North (northeast and east of centre)	Road	Insufficient roading hierarchy and routes of strategic significance running through centre of Palmerston North	Bunnythorpe to Ashhurst	Road	SH between Bunnythorpe and Ashhurst via Ashhurst Road or Stoney Creek Road or Tutaki Road
			Feilding to Palmerston North	Road	Heaviest traffic volumes outside of the Palmerston North urban area are along the Feilding to Palmerston North corridor. Traffic along this route is expected to grow	Feilding to Palmerston North	Road	Reduce traffic volumes to allow for possible closure of Milson Line
								Railway Road to predominantly serve to north-east industrial area
								Stoney Creek Road and / or Tutaki Road Road-James Line to provide alternative routes into Palmerston North
								Update of roading hierarchy
			Manawatu River	Road	Concentration of traffic along one bridge crossing into Palmerston North	Between Matai Road and Staces Road	Road	PNCC made provision for proposed upstream bridge in LTCCP. NZTA not made any financial commitment
			Eastern Corridor	Road	Ensuring that the upstream bridge is suitably connected so	Stoney Creek Road or Tutaki Road	Road	Provide a SH route between Bunnythorpe and Manawatu Gorge, a route to the new upstream bridge

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
					that it is seen as a viable alternative to the existing bridge			and an additional commuter route between Feilding and Palmerston North. Stoney Creek Road is the preferable route
			Bunnythorpe	Road	Commuter and freight traffic currently having to travel through Bunnythorpe to access Palmerston North	Waughs Road, Te Ngaio Road or Roberts Line	Road	A bypass will allow commuter and freight traffic to bypass Bunnythorpe and the two existing railway level crossings
			Palmerston North (general)	Road	Strategic route currently runs through the congested centre of Palmerston North	Rongotea Road, KB Road and Stoney Creek connecting to SH57 via new upstream and downstream bridges	Road	Removes the reliance of vehicles having to travel through the centre of Palmerston North
			Palmerston North (general)	Railway and Road	Good access to the NEIZ is required intra-regionally and inter-regionally, this also serves as a dual role of a commuter route between Feilding and Palmerston North and as a collector road for the NEIZ to Tremaine Avenue	Feilding and Palmerston NORTH (NEIZ)	Railway and Road	No solution stated
			Palmerston North (general)	Road	The rural network cannot be upgraded without consideration being paid to the urban network	Palmerston North (general)	Road	Rural road network development will be complemented by the urban network without introducing new conflicts. Particular consideration is being given to; distribution of Feilding commuter traffic, minimising conflicts along Milson Line and Railway Road and the role of the eastern corridor as an alternative commuter route and closure of Milson Line
Palmerston North-Manawatu Strategic Transport Study - Phase 2 Report	Traffic Design Group (TDG)	Jun-10	SH3 between Sanson and Manawatu Gorge through Palmerston North	Road	This route through Palmerston North is inefficient as an inter-regional route	Mt Stewart to Manawatu Gorge	Road	Provide a rural SH route between Mt Stewart and the Manawatu Gorge via Bunnythorpe
			Feilding to Palmerston North via Bunnythorpe	Road	Traffic is required to use two level crossings of the North Island Main Trunk (NIMT) railway line along this route	Bunnythorpe	Road	Provide a bypass of Bunnythorpe to remove these conflicts and requirement for traffic to bottleneck through Bunnythorpe. An Eastern corridor between Bunnythorpe and the New Upstream Bridge
			Manawatu River	Road	Heavy reliance on a single bridge crossing - all traffic focused through this one point	Between Te Matai Road and Staces Road	Road	Provide a new bridge between Te Matai Road and Staces Road. An Eastern corridor between

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
								Bunnythorpe and the New Upstream Bridge
			Palmerston North (general)	Road	Lack of a clearly defined road hierarchy. Particularly north and east of Palmerston North to provide access to the NEIZ, proposed eastern residential growth area and the new upstream bridge	Palmerston North (general)	Road	Provide a rural ring road around Palmerston North to allow for appropriate redefining of rural and urban road network
			Tremaine Avenue	Road	Lacking in capacity	Tremaine Avenue	Road	Upgrade Tremaine Avenue to be suitable for the demand that it experiences
Initial Investigation Study - Joint Strategic Roading Package, SH54 Kairanga Bunnythorpe Road	MWH	Oct-13	North Eastern Business Estate	Road	Heavy commercial vehicle restrictions - limited carriageway widths and weight restrictions	Palmerston North (general)	Road	Proposed changes to the roading hierarchy to increase the use by general commercial traffic thereby removing these vehicles from Palmerston North
			Multiple Locations - Palmerston North	Road	A number of areas have been highlighted as providing a concern from a safety perspective	Multiple Locations - Palmerston North	Road	SH3/54 - Roundabout (two orbiting lanes)
								SH54 / Milson Line - single lane orbiting roundabout
								SH54 carriageway widening along KB road
								Upgrading of KB road intersection with Roberts Line (seven crashes in past 5 years - one fatality and 10 minor injury casualties. Further serious injury crash in 2004)
			Multiple Locations - Palmerston North	Road	A number of roads are currently experiencing deficiencies across Palmerston North	Multiple Locations - Palmerston North	Road	Replacement of Jacks Creek Bridge - poor condition and weight restriction
								Replace Mangaone Bridge in 10 years time
								Upgrade Roberts Line between KB Road and the north eastern industrial estate to collector road status
								Widening and strengthening of SH54 / KB Road as part of programmed maintenance plan
								Ad hoc minor road improvements
Integrated Transport Strategy for Palmerston North	Palmerston North City Council	Nov-15	Palmerston North (general)	All Modes	Inefficient use of road capacity for all users	Palmerston North (general)	Sustainable Travel	An improvement in ancillary facilities for walking and cycling
							All Modes	Reduction in crashes and serious injuries

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
							Road	Clearly defined primary routes that are easy to use and evident on the ground
			Palmerston North (general)	Road / Freight / Rail	Inefficient provision and use of freight routes	Palmerston North (general)	Road / Freight	Clearly defined freight routes that are easy to use and evident on the ground
								Over dimension and overweight routes clearly defined, easy to use and evident on the ground
							Road	Emergency vehicle routes clearly defined, easy to use and evident on the ground
								Improved SH links to the rest of NZ
							Rail	Land designation for access for potential rail links to industrial areas
							Road	Increase proportion of heavy traffic on the rural ring road
			Palmerston North (general)	Sustainable Travel	Low patronage concerning the use of passenger transport	Palmerston North (general)	Sustainable Travel	Increase proportion of journeys by passenger transport - better services, higher frequency, extended routes etc
								Increase inter-regional passenger transport with specified inter-regional bus terminals being built
			Palmerston North (general)	Sustainable Travel	Low levels of commuter cycling due to a strong reliance on the private vehicle	Palmerston North (general)	Sustainable Travel	Increase the number of people cycling to work through identifying safe, connected and convenient routes, treating cyclists as a planning priority, provide more cycle facilities that provide continuity and a feeling of overall safety
								Clearly defined primary cycle routes that are easy to use and evident on the ground
								Reduction in crashes and serious injuries
			Palmerston North (general)	Sustainable Travel	Low levels of pedestrian activity due to a reliance on the private vehicle	Palmerston North (general)	Sustainable Travel	Increase proportion of walking for commuter purposes by improving the pedestrian vehicle interaction - removing large vehicles, making pedestrians a planning priority, improve pedestrian safety and

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
								general pedestrian environments to encourage walking
								Prioritise pedestrian movements within the CBD
								Reduction in crashes and serious injuries
			Palmerston North (general)	Road / Air / Rail	A lack of inherent resilience and connectivity within previous planning decisions	Palmerston North (general)	Road	Investing in an alternative river crossing taking in to account the current infrastructure capacities
								Improve access and links to Linton, Ashhurst, Bunnythorpe and Longburn
								Implement a strategic road network
								Enhance access to SHs
								Advocate changes to SH to align speed limits and intersections with changing land use environments
							Air	Facilitate plans to extend the airport runway
							Rail	Facilitate rail connectivity to industrial areas
Accelerate 25: Draft Manawatu-Whanganui Economic Growth Action Plan Enabler - Transport, KEY INVESTMENT OPPORTUNITY: Palmerston North - Manawatu Regional Ring Road	Horizons	2016	Palmerston North (general)	Road	Impacts upon economic growth and productivity due to infrastructure shortfalls and incapacities	Palmerston North (general)	Road	Targeted transport investment into the Manawatu-Palmerston North Regional Ring Road, with specific emphasis on doubling agribusiness exports by 2025
			Kairanga to Bunnythorpe	Road	Existing land uses are currently dependant on moving through urban corridors - Tremaine Avenue - which are now under pressure, rather than using the ring road as it is not up to standard with poor road carriageway and an inappropriate road hierarchy. Driver take Alternative routes through residential areas	Kairanga to Bunnythorpe	Road	To upgrade this strategic corridor in order to provide better access to NEIZ to allow fluid heavy vehicle travel to the north, northwest, south and east. Ideal would be to construct the necessary bypasses at Bunnythorpe with additional high-speed roundabouts
			Bunnythorpe Bypass	Road	All traffic travelling between Feilding and Palmerston North has to currently travel through Bunnythorpe which impacts upon efficiency	Bunnythorpe Bypass	Road	The provision of a the Bunnythorpe bypass will provide better connection between Feilding and Palmerston North, whilst also allowing for residential growth and better social connectedness. Additional provision for freight movements north and east will also be achieved

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
			Ashhurst to Bunnythorpe	Road	Poor freight connections across Palmerston North due to the quality, designation and restrictions along many of the roads within the area	Ashhurst to Bunnythorpe	Road	These improvements will complete the eastern and western linkages of the regional ring road around Palmerston North, therefore enabling better freight movements east, west and south to key port destinations
			No 1 Line / Rongotea Road to Longburn			No 1 Line / Rongotea Road to Longburn		
			Manawatu River Bridge	Road	Over reliance on a single river crossing into / out of Palmerston North	Manawatu River Bridge	Road	The provision of a second river bridge will complete the regional ring road connections to the south and will provide good connections to the Defence Force, Massey University and FoodHQ campuses
Accessing Central NZ Strategic Case	NZTA	Nov-16	Palmerston North (general)	Road	Access into and from key destinations in the area is deteriorating and becoming less predictable creating inefficiencies, particularly in the freight distribution logistics chain - a key route is Tremaine Avenue which is a local road and has become increasingly congested contributed by the increased freight movements	Palmerston North (general)	Road	Provide a more optimised transport network to improve the effectiveness and efficiency of freight movements
					Recent and future development in land use is outpacing the direction of the planned strategic network leading to a transport network that is not function as intended. Despite development occurring, this is not supported by a clear road hierarchy or advancement of improvements on the ground			Implement a more realistic roading hierarchy
					Changes in the type and size of vehicles using the network has created pinch points at locations across the transport network - SH1/3 intersection in Bulls			A reduction in modal conflict as an outcome of the above two points will reduce the number of conflict points, improving journey reliability, reduce delays and increase throughput
					Conflicts between residential areas and freight was linked to safety issues			Above three points should improve overall safety in general. Other problem locations to be treated on a case by case basis, led by crash data and improved on a case by case basis
Manawatu Gorge Alternatives - Assessment of the Wider	EY	2018	Manawatu Gorge	Road	SH3 through Manawatu Gorge has been closed due to major slips since April 2017 - increasing	North of Saddle Road	Road	Provides a new road corridor across the Ruahine Range north of Saddle Road

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
Economic Benefits of the Shortlisted Options					transport costs, travel time and reduced accessibility of traffic moving between the Manawatu-Whanganui and Hawkes Bay regions	Saddle Road Upgrade		A major upgrade of the existing Saddle Road corridor
						South of Saddle Road		A new road corridor across the Ruahine Range south of Saddle Road - chosen option
						South of the Gorge		A new route south of the Manawatu Gorge providing a new road corridor
Reginal Land Transport Plan - 2015-2025 (2018 Review)	Horizons Regional Council	2018	Horizons (general)	Road	Recent development through the region has outpaced planned strategic land transport network - network is no longer fit for purpose	Horizons (general)	Road	Update of roading hierarchy
					Access to and from other regions linking north-south and east-west are under pressure, becoming less predictable, resulting in inefficiencies. Roading network pressures further compounded by an under-utilised rail network that lacks integration			Improvements to SH1 - Desert Road, SH4 - Paraparas, SH1 - north of Levin to Wellington Airport, SH3 Manawatu Gorge, SH3 to Taranaki as well as a heavier reliance on the regional rail corridors for freight and passenger movements to improve safety and reduce congestion
					Predicted population and economic growth will impact upon the functioning of the transport network			Update of roading hierarchy
					Parts of the current transport system, including poor user behaviour are failing to achieve a safe road system resulting in high risk and death and serious injuries on our roads			13 areas identified where current performance needs to be strengthened. Investment will be guided into these areas
					Different industry and land use pressures predicted for the districts has resulted in increases and changes in the type and size of vehicles using the network - increasing the deterioration of the local road network and creation of pinch points due to conflicting vehicle types			Investment in to identified heavy freight routes and the introduction of the ONRC based on the function of the road
					Access into and from key destinations are vulnerable to a range of potential events which can result in severe disruption to certain parts of the land transport network			Ensuring that future options e.g. the Manawatu Gorge replacement is resilient to potential environmental hazards that may impact upon the roading network
Strategic Transport Plan - Palmerston North - Small	Palmerston North City Council	2018	Palmerston North (general)	Road	The high number of intersections associated with the grid pattern increases the risk of accidents	Palmerston North (general)	Road and Rail	· Undertake remedial work in areas with high crash or safety concerns taking into consideration context

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
City Benefits, Big City Ambition					The capacity of the rail over-bridges, Fitzherbert Bridge, and lack of alternative bottle necks at peak times. Manawatū River crossings, force traffic to converge and create bottle necks at peak times.			sensitive design. · Identify and implement a package of safety measures across the network. · Review speed limits under proposed new national rules for setting speed limits. · Maintain street lighting and energy efficiency across the network. · Deliver roading and parking maintenance and renewal in a cost-effective way according to the Roading Efficiency. Group's One Network Road Classification and Customer Levels of Service. · Enforce parking rules and time limits. · Explore ways to minimise the volume of traffic travelling unnecessarily through the city. · Provide transport infrastructure for growth. · Maintain car parking occupancy levels in the city centre. · Promote local initiatives and improvements to city and regional bus services in collaboration with Horizons Regional Council and NZTA. · Advocate for improvements to regional and urban public transport services including rail) services. · Develop plans, in partnership with the Regional Transport Committee, to enhance regional intermodal transport links · Work with electricity providers to enable the provision of fast-charging stations. · Review parking management in the central city. · Maintain road corridor environment, aesthetics and amenities e.g. trees and street furniture.
					The increasing population of commuters, changes in the type and size of vehicles using the network has created pinch points at locations across the transport network, such as Ruahine Street outside the Hospital and near the Tremaine Avenue Rail terminal, and intersections linking to Main Street East (State Highway).			
					The road link to the Tremaine Ave rail terminal is under increasing pressure from congestion.			
				Rail	Rail access at Longburn is limited to sidings only and rail is unavailable at the north east industrial area.			
				Road	The Manawatū Gorge permanent closure is disrupting access to eastern New Zealand, increasing transport costs and travel times to the city and making connections to other regions and markets less efficient.			
					Heavy State highway traffic is diverting onto city roads and creating future road maintenance issues for the City.			
					The frequency and operating hours of public transport and low cost for parking are a disincentive to use public transport and heavy dependence on motor vehicles is contributing to congestion pinch points.			

Report Reference			Problem			Solution		
Name	Organisation	Date	Location	Infrastructure	Detail	Location	Mode	Detail
					Recent and future development in land use is outpacing the direction of planned strategic network leading to a transport network that is not functioning as intended.			
SH3 / 54 Kairanga Bunnythorpe Road - Detailed Business Case - Problems, Opportunities and Constraints Report	Stantec	Jul-18	KB Road	Road	KB Road is not performing its role in the strategic network and is part of a wider strategic network that is also experiencing deficiencies	KB Road	Road	Roundabouts at both SH3/54 and SH54/Milson Line with midblock carriageway widening and hazard protection
					Safety - poor intersection form and increasingly high volumes of conflicting movements, coupled with roadside hazards on SH54 between the intersections - results in high crash risk and deaths and serious injuries			
					Access - efficiency and reliability - poor intersection form and increasingly high volumes of conflicting movements results in escalating intersection delays and subsequent re-routing of traffic, particularly freight, to urban corridors.			
Palmerston North to Napier to Gisborne - Corridor Management Plan	NZTA	2018	Palmerston North (general)	Road	Large sections of narrow width and slow alignment roads	Palmerston North (general)	Road	Viable alternative routes: Consultation with local authorities to determine appropriate investment opportunities so viable local road alternative routes are available, particularly between Napier and Wairoa to support an expected increase in logging activity.
					Projected growth along SH3 projected by Palmerston North City Council as city limits expand			ONRC Classification: There are sections of the corridor with National or High-Volume road classifications, with high levels of availability and accessibility expected by customers.
					Half bridges in the Manawatu Gorge requiring increasing levels of maintenance and have a limited life span. General issues involving road closures from land slips and traffic accidents.			Cost effectiveness of bridge maintenance versus replacement in the Manawatu Gorge, (particularly for HPMV strengthening) will be a key consideration for future investment. Upgrading the Saddle Road to provide an alternative route.

LONGLIST PREPARATION – KEY ORIGIN AND DESTINATIONS

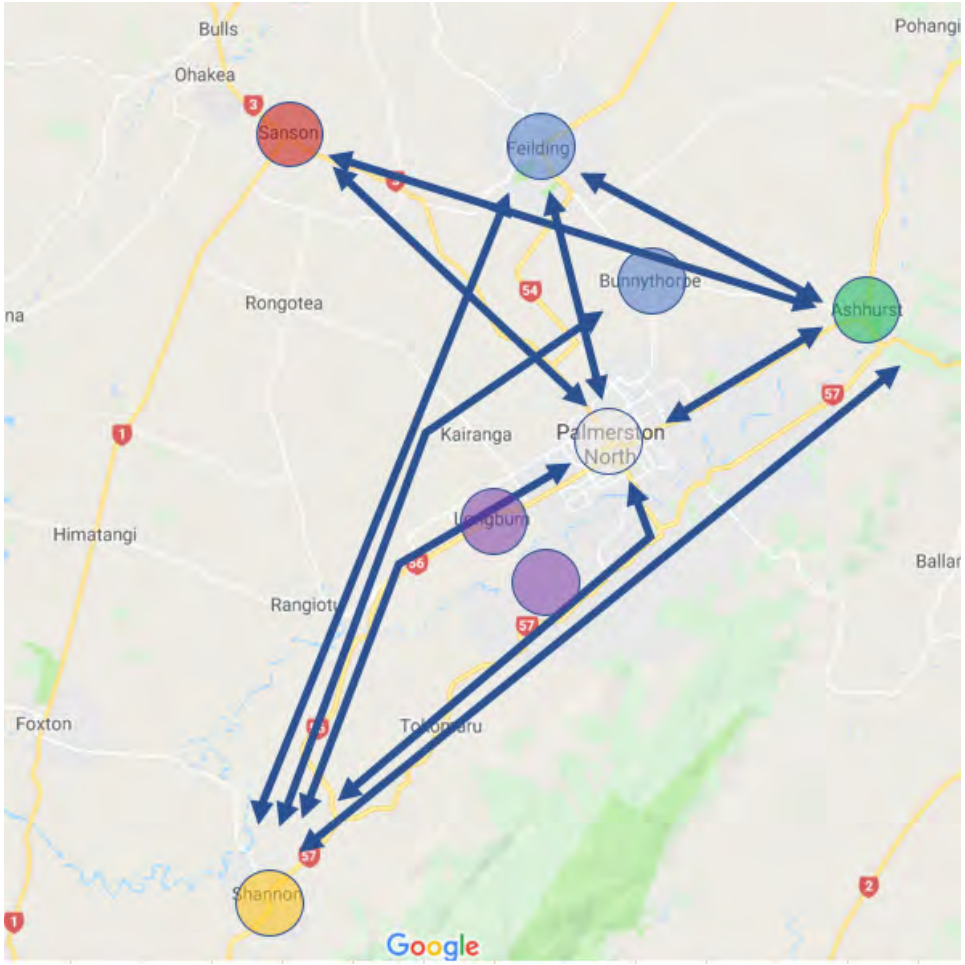


Figure: Key origins and destinations identified in initial longlisting process. Base map source: Google Maps.

LONGLIST PREPARATION – CONSOLIDATION

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
100		Physical works to Roads (Midblock)				
	101	State Highway Development	101a	State Highway from Mt Stewart to Bunnythorpe	Mt Stewart and Bunnythorpe	Provide SH between Mt Stewart to Bunnythorpe via Feilding
						Provide SH between Mt Stewart to Bunnythorpe via KB Road
			101b	State Highway from Bunnythorpe to Ashhurst	Bunnythorpe and Ashurst	Provide SH between Bunnythorpe and Ashhurst via Ashhurst Road
						Provide SH between Bunnythorpe and Ashhurst via Stoney Creek Road
						Provide SH between Bunnythorpe and Ashhurst via Tutaki Road
			101c	State highway between Bunnythorpe and Manawatu Gorge	Bunnythorpe and Manawatu Gorge	Provide a SH route between Bunnythorpe and Manawatu Gorge incorporating a route to the new upstream bridge and an additional commuter route between Feilding and Palmerston North. Stoney Creek Road is the preferable route
			101d	Rural state highway between Mt Stewart and Manawatu Gorge	Mt Stewart and Manawatu Gorge	Provide a rural ring road around Palmerston North to allow for appropriate redefining of rural and urban road network
	102	Road Development (not State Highway)	102a	New road across north of Saddle Road	Saddle Road / Manawatu Gorge	Provides a new road corridor across the Ruahine Range north of Saddle Road
			102b	New road across south of Saddle Road	Saddle Road / Manawatu Gorge	A new road corridor across the Ruahine Range south of Saddle Road - chosen option
			102c	Whakarongo vehicle underpass (north western Palmerston North)	Whakarongo (north-western Palmerston North)	Construction of a vehicle underpass to allow for a road with collector status to be achieved
	103	Online Upgrades	103a		Stoney Creek Road	Stoney Creek Road to be upgraded to provide alternative routes into Palmerston North

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
				Upgrade to provide more attractive routes and achieve appropriate roading hierarchy	Tutaki Road	Tutaki Road to be upgraded to provide alternative routes into Palmerston North
					James Line	James Line to be upgraded to provide alternative routes into Palmerston North
						Safety improvements to be included
			103b	Upgrade Tremaine Avenue	Tremaine Avenue	Upgrade Tremaine Avenue to be suitable level for the demand that it currently experiences
			103c	SH54 widening	SH54	SH54 carriageway widening along KB road. Strengthening of road is also required
			103d	Upgrade Roberts Line	Roberts Line	Upgrade Roberts Line between KB Road and the north eastern industrial estate to collector road status
			103e	Upgrade Kairanga to Bunnythorpe	Kairanga and Bunnythorpe	To provide better access to NEIZ to allow fluid heavy vehicle travel to the north, northwest, south and east; carriageway widening should also be considered to help achieve this. The ideal would be to construct the necessary bypasses at Bunnythorpe with additional high-speed roundabouts
			103f	Ashhurst to Bunnythorpe	Ashurst and Bunnythorpe	These improvements will complete the eastern and western linkages of the regional ring road around Palmerston North, therefore enabling better freight movements east, west and south to key port destinations
			103g	Upgrade Saddle Road	Saddle Road / Manawatu Gorge	A major upgrade of the existing Saddle Road corridor is required
				Kairanga to SH56/Longburn	Kairanga and SH56/Longburn	Kairanga to SH56/Longburn route general improvements
				Fielding to Bunnythorpe	Fielding and Bunnythorpe	Fielding to Bunnythorpe general mprovements
				Ferguson Street - Linton Street to Pitt Street	Ferguson Street	Ferguson Street general improvements
			103h	KB Road: Rangitikei Line to Milson Line	KB Road	KB Road: Rangitikei Line to Milson Line seal widening
			103i	KB Road: Milson Line to Bunnythorpe	KB Road	KB Road: Milson Line to Bunnythorpe seal widening
			103j	Upgrades to Ashhurst Road	Ashurst Road	General upgrades

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
			103k	Upgrades to Rongotea Road	Rongotea Road	General upgrades
			103l	Upgrades to The Square - ANZ to Plaza	Central Palmerston North	General upgrades
			103m	The Square - Main Street west to Rangitikei Street, Plaza to Square Edge and Broadway to Rangitikei/Cuba intersection	Central Palmerston North	General upgrades
	104	Bypass	104a	Bunnythorpe bypass - Option for a western or southern bypass	Bunnythorpe	A bypass to allow commuter and freight traffic to bypass Bunnythorpe and two existing railway level crossings
						Provide a bypass of Bunnythorpe to remove conflicts and traffic creating bottlenecks through Bunnythorpe. An Eastern corridor between Bunnythorpe and the New Upstream Bridge would also be beneficial
						The provision of a Bunnythorpe bypass will provide better connection between Feilding and Palmerston North, whilst also allowing for residential growth and better social connectedness. Additional provision for freight movements north and east will also be achieved
200		Intersection improvements				
	201	Stop Controlled Four Leg Intersection	201a	Rangitikei Line / Kairanga Bunnythorpe (KB) Intersection Upgrade	Rangitikei Line / Kairanga Bunnythorpe (KB) Intersection	Change the intersection layout to a two-orbiting lane roundabout
			201b	SH54 Milson Line / KB road intersection Upgrade	SH54 Milson Line / KB road intersection	Change the intersection layout to a roundabout

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
			201c	KB road / Roberts Line intersection		Upgrading of KB road intersection with Roberts Line (seven crashes in past 5 years - one fatality and 10 minor injury casualties. Further serious injury crash in 2004) - roundabout
	201	Traffic Light Controlled Four Leg Intersection	202a	Rangitikei Street / Featherston Street intersection upgrade	Rangitikei Street / Featherston Street intersection	Intersection widening
300		Physical works to Bridges				
	301	Replacement / Upgrades	301a	Jacks Creek Bridge replacement	Jacks Creek Bridge	Replacement of Jacks Creek Bridge - poor condition and weight restriction
			301b	Upgrade existing bridge infrastructure	KB Road	Wider Kairanga Bunnythorpe Road - new/upgraded bridges
			301c	Mangaone bridge replacement	Mangaone Bridge	Future requirement to replace Mangaone Bridge - 10 years time
			301d	Replace and strengthen bridges through Palmerston North	Scope wide	Replace and strengthen bridges throughout Palmerston North to allow larger vehicles to avoid less suitable routes
	302	Development	302a	Provision of a Manawatu River Bridge	Manawatu River	The provision of a second river bridge will complete the regional ring road connections to the south and will provide good connections to the Defence Force, Massey University and FoodHQ campuses
			302b	Upstream bridge in LTCCP		Removes the reliance of vehicles having to travel through the centre of Palmerston North
			302c	Provide an eastern corridor between Bunnythorpe and the New Upstream Bridge	Te Matai and Staces Road	Provide a new bridge between Te Matai and Staces road

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
			302d	Provision of southern bridge	Southern Bridge	Provision of a southern bridge would provide connection to either Karere Road or Longburn Rongotea Road with good connection to the NEIZ via KB Road
400		Traffic/Trip management				
	401	Signage	401a	Improved Signage	Scope wide	Signage (Safety, Wayfinding, ADS, VMS)
	402	Traffic Management	402a	Traffic management	Scope wide	Review hierarchy for intersecting roads (ban certain movements to ensure hierarchy is adhered to)
	403	Speed Management	403a	Active speed management	Scope wide	Reduce speed on approach to intersections - specifically with rear end shunt type collisions
500		Public Transport				
	501	Public Transport	501a	Improved services	Scope wide	PT services (e.g. bus network/service improvements)
600		Walking and Cycling				
	601	Walking and Cycling Facilities	601a	Improved and more frequent walking and cycling facilities	Scope wide	Better, more readily available and more accessible cycle lanes/integrate with wider cycle network/separated cycle facility and equestrian (limit/discourage). Better, more readily available and more accessible footpath / shared footpath facilities
			601b	Walking and cycle facilities across Tennent Drive	Tennent Drive	Improved urbanisation of Tennent Drive, in the vicinity of the University and proposed FoodHQ super campus, linking the two together, as well as further to Palmerston North via a pedestrian and cycle bridge currently being developed across the Manawatu River
700		Physical work to Rail				
	701	Realignment	701a	Improve railway facilities	Scope wide - Commuter and freight	Realign the railway from existing location to further North. Converting the current corridor to highway / cycleway or a combination of both
						Realign the railway from existing location to further North, between KB Road and Flyger Line, reconnecting to the east of Longburn Rongotea Road
		New Connections	701b			Propose connections (from new station?) to Kelvin Grove and NEIZ - confirmation from KiwiRail required
800		Air				

Overall option No	Option No	Option Category	Option No (subcategory)	Detail / Location	Location	Option Description
	801	Airport Runway Extension	801a	Expand PAX and Freight Potential	Palmerston North Airport (PNA)	The expansion of PNA will allow for more PAX to utilise the airport, as well as increasing the amount of freight traffic the airport can accommodate. The expansion of the runway would result in the full or partial closure of Milson Line
900		General improvement				
	901	General	901a	Connecting the rural and urban network more seamlessly	Palmerston North rural network	Rural road network development to be complemented by the urban network without introducing new conflicts. Particular consideration is being given to; distribution of Feilding commuter traffic, minimising conflicts along Milson Line and Railway Road and the role of the eastern corridor as an alternative commuter route and closure of Milson Line
			901b	Improving investment opportunities by improving the strategic road network	Palmerston North general	Targeted transport investment into the Manawatu-Palmerston North Regional Ring Road, with specific emphasis on doubling agribusiness exports by 2025
			901c	Improve safety and reduce congestion	Palmerston North general and further afield	Improvements to SH1 - Desert Road, SH4 - Paraparas, SH1 - north of Levin to Wellington Airport, SH3 Manawatu Gorge, SH3 to Taranaki as well as a heavier reliance on the regional rail corridors for freight and passenger movements to improve safety and reduce congestion

LONGLIST - INTERVENTIONS

Alternative	Strategic Response	Long List Options (source: Palmerston North-Manawatu Strategic Transport Study, Austroads Research Report AP-R534-16)	PROBLEM ALIGNMENT (Yes, No, Maybe)		
			Severance / Amenity	Safety	Access and accessibility
Physical works to road / road sides (100)	Intersection Works (100.1)	Rangitikei Line / KB intersection conversion to RAB	M	Y	Y
		SH54 Milsons Line / KB road conversion to RAB	M	Y	Y
		KB road / Roberts Line intersection	M	Y	Y
		Rongotea Road / Pioneer Highway	M	Y	Y
		Old West Road / Summerhill Drive / Aokautere Drive	M	Y	Y
		Tennent Drive / Old West Road	M	Y	Y
		SH57/3 Intersection (North)	M	Y	Y
		Ashhurst Road / Mulgrave Street / SH3	M	Y	Y
		KB Road / Railway / Campbell Road	M	Y	Y
		Campbell / Waugh - Railway Intersection	M	Y	Y
		Tennent Drive / Camp/Hewitts Road	M	Y	Y
		Longburn Rongotea Rd / Kairanga Bunnythorpe Road	M	Y	Y
		Stoney Creek Road / Railway Road / Ashhurst Road	M	Y	Y
		Kelvin Grove Road / Stoney Creek Road (rural roundabout?)	M	Y	Y
		Stoney Creek / Napier Road	M	Y	Y
		Stoney Creek / Railway Line Intersection	M	Y	Y
		Newbury Line / Waughs Road	M	Y	Y
		Vogel Street / Tremaine Ave - minor improvements: Continuity lines, channelisation.	M	Y	Y
		Vogel Street / Tremaine Ave - adjust signal phasing to discourage heavy vehicle through movements	M	Y	Y
		Armstrong Street / Tremaine Ave - close Armstrong Street + signalise Francis Way + connect Armstrong and Settlers Line	M	Y	Y
		Armstrong Street / Tremaine Ave - signalise	M	Y	Y
		Featherston Street / Rangitikei Street - pedestrian upgrades (refuges, drop crossings and tactiles)	M	Y	Y
		Featherston Street / Rangitikei Street - signal and signage improvments (gantry directional signage, mastarm signals on all approaches)	M	Y	Y
		Featherston Street / Rangitikei Street - left turn slip lanes (using Countdown or McDonalds, or both, car parks)	M	Y	Y
		Featherston / Rangitikei Street upgrade	M	Y	Y
		Tremaine Ave / Rangitikei Street - recent upgrade, minor improvements	M	Y	Y
		Bunnythorpe Western Bypass / KB Roundabout	M	Y	Y
		Napier Road / Stoney Creek Roundabout	M	Y	Y
		Napier Road (SH3) / Roberts Line	M	Y	Y
		Ferguson Street / Fitzherbert Street upgrade	M	Y	Y
		Pioneer Highway (SH56) / Botantical Road	M	Y	Y
		Longburn Rongotea Rd / No 1 Line	M	Y	Y
	Online upgrades (carriageway, geometry, alignment, additional lanes, road diet etc) (100.2)	Stoney Creek Road upgrade (arterial)	M	Y	M
		Tutaki Road upgrade	M	Y	M
		James Line upgrade	M	Y	M
		Upgrade Tremaine Avenue	M	Y	M
		SH54 carriageway widening along KB road	M	Y	M
		Upgrade Roberts Line between KB Road and the north eastern industrial estate to collector road status (100kph?)	M	Y	M
		Upgrade Kairanga to Bunnythorpe	M	Y	M
		Ashhurst to Bunnythorpe	M	Y	M
		Upgrade Saddle Road (Focus of Manawatu Gorge Project - out of scope)???	M	Y	M
		Kairanga to SH56/Longburn	M	Y	M
		Feilding to Bunnythorpe	M	Y	M
		Ferguson Street - Linton Street to Pitt Street	M	Y	M
		KB Road: Rangitikei Line to Milson Line	M	Y	M
		KB Road: Milson Line to Bunnythorpe	M	Y	M
		Upgrades to Ashhurst Road (upgrade to 100kph standard) (8.5m - or wider?)	M	Y	M
		Upgrades to Rongotea Road	M	Y	M
		Upgrades to The Square - ANZ to Plaza	M	Y	M
		The Square - Main Street west to Rangitikei Street, Plaza to Square Edge and Broadway to Rangitikei/Cuba intersection	M	Y	M
		Karere Road (upgrade to 100kph standard)	M	Y	M
		State Highway 57 (upgrade to 100kph standard) (whole project area)	M	Y	M
		State Highway 57 (upgrade to 100kph standard) (from new bridge north to Ashhurst)	M	Y	M
		State Highway 57 (upgrade to 100kph standard (from south to new southern bridge	M	Y	M
		Kelvin Grove Road (upgrade to 100kph) (Railway crossing to Stoney Creek)	M	Y	M
		Camp Road Upgrade	M	Y	M
		Upgrade to Longburn Rongotea Road	M	Y	M
		Upgrade Railway Road (Roberts Line to Airport)	M	Y	M
	Priority lane treatment (100.3)	TBC programme stage			
	Traffic calming (100.4)	Install soft traffic calming measures (platforms, chicanes, narrowing) at residential area x	Y	Y	N
		Install soft traffic calming measures (platforms, chicanes, narrowing) at residential area y	Y	Y	N
		Install soft traffic calming measures (platforms, chicanes, narrowing) at residential area z	Y	Y	N
		Jacks Creek Bridge Replacement	M	M	Y
		Palmerston North Bridge 50max upgrades/replacement	M	Y	Y
		Mangaone Bridge Replacement	M	M	Y

Alternative	Strategic Response	Long List Options (source: Palmerston North-Manawatu Strategic Transport Study, Austroads Research Report AP-R534-16)	PROBLEM ALIGNMENT (Yes, No, Maybe)		
			Severance / Amenity	Safety	Access and accessibility
	New / Additional Bridges (100.5)	Palmerston North Bridge 50max strengthening	M	N	Y
		New Manawatu River Bridge (south west 1)	M	M	M
		New Manawatu River Bridge (south west 2)	M	M	M
		New Manawatu River Bridge (central)	M	M	M
		New Manawatu River Bridge (north east)	M	M	M
	New / Additional Roads (100.6)	Bunnythorpe bypass southern	M	M	Y
		Bunnythorpe bypass western	M	M	Y
		Mt Stewart to Bunnythorpe State Highway via Feilding	M	M	Y
		Mt Stewart to Bunnythorpe State Highway via KB Road	M	M	Y
		Mt Stewart to Manawatu Gorge State Highway	M	M	Y
		Bunnythorpe to Ashhurst State Highway via Ashhurst Road	M	M	Y
		Bunnythorpe to Ashhurst State Highway via Stoney Creek Road	M	M	Y
		Bunnythorpe to Ashhurst State Highway via Tutaki Road	M	M	Y
		Bunnythorpe to Manawatu Gorge State Highway via Tutaki Road via Stoney Creek (dependency new upstream bridge)	M	M	Y
		Feilding-Ashhurst Road (is this difference to above??)	M	M	Y
		Feilding -Stoney Creek Road (is this difference to above??)	M	M	Y
		Bunnythorpe Bypass	M	M	Y
		Ashhurst Bypass	M	M	Y
		SH57 to SH3 (including connecting a new northern bridge)	M	M	Y
	One way streets (100.7)	TBC programme stage			
Physical works to Rail (200)	Realignment (200.1)	Realign the railway from existing location to further North. Converting the current corridor to highway / cycleway or a combination of both	Y	Y	M
		Realign the railway from existing location to further North, between KB Road and Flyger Line, reconnecting to the east of Longburn Rongotea Road (PN Rail Bypass)	Y	Y	M
	New / Additional Tracks (200.2)	Propose connections (sidings) to Kelvin Grove and NEIZ - confirmation from Kiwirail required	N	M	M
	Double tracking (200.3)	From Kawakawa/Feilding to Waikanae (and possibly more further south...)	N	N	M
	Targeted cost subsidy (200.4)	Capital Connection (Palmy - Wellington commuters)	Y	Y	Y
	Level Crossing Improvements (200.5)	Waughs Road / Campbell Road grade separation	M	Y	M
		Bunnythorpe (major) grade separate	M	Y	M
		Bunnythorpe (minor) fence off rail corridor, improve pedestrian facilities (currently passive), formalise western escape route.	M	Y	N
		Kelvin Grove (minor) improve cyclist facilities, fence off rail corridor, improve pedestrian crossing (currently passive) if volume warrants	M	Y	N
		Reserve Road - install HABs on northing crossing (both approaches) and FLBs on the southern crossing. Ensure FLBs are visible on approaches	M	Y	N
		Roberts Line - widen road near approach to intersection, remove vegetation on north side to improve sight lines. If high HCV turning left Railway Road into Roberts Line consider widening left turn lane to fit trucks to ensure space to wait for trains	M	Y	N
		James Line - Improvement should include installation of a pedestrian crossing with FLBs facing pedestrians. Could also consider installing HABs if current/future traffic volumes warrant it.	M	Y	N
		Stoney Creek - HABs should be considered for this road crossing.	M	Y	N
		Bunnythorpe Southern Bypass to Stoney Creek Road incl NIMT Railway Overpass	M	Y	N
Active modes (300)	On road cycling (300.1)	TBC	Y	M	M
	Off road cycling (300.2)	Projects in PN (loop at southern end of PN along river)	Y	M	M
		Provide off road cycle facilities on heavy vehicle route: y	Y	Y	Y
	Cycling demand (300.3)	Create cycle hire schemes	M	N	N
	Cycle crossings (300.4)	Provide cycle crossings (signalised?) at location x	Y	Y	Y
	Pedestrian crossings facilities (300.5)	Provide crossing facility (signalised?) at location x	Y	Y	M
		Provide crossing facility (refuge?) at location x	Y	Y	Y
	Pedestrian footpath (300.6)	proposed FoodHQ super campus, linking the two together, as well as further to	Y	M	N
	Pedestrian roads (300.7)	TBC	Y	M	M
Public transport (400)	Dedicated bus lanes (400.1)	Sqaure to Massey University (Fitzherbert Ave)	N	N	M
	Bus ways (400.2)	Using current rail corridor (from Cloverlea/Gillespies Line to Airport and Roberts Line)	N	N	M
	Improved bus stop infrastructure (400.3)	More shelters provided (concentrating on popular stops first), also live update screen at popular superstops/hubs	N	N	M
	Incentivise Public Transport Use (400.4)	TBC programme stage			
		Improve attractiveness of public transport through cost and convenience	N	M	M
Freight (500)	Freight specific signage (500.1)	Special vehicle route signage - named urban and rural routes	M	M	M
	Dedicated freight management (500.2)	Freight delivered by cycle?	M	M	M
	50max (500.3)	Intermodal freight hub connections	M	M	M
ITS (600)	Adaptive signage control (600.1)	TBC programme stage			
	Automatic incident detection (600.2)		N	N	M
	Variable speed limits (600.3)		N	N	N
Traffic Management (700)	Signage (700.1)	Route choice for HCVs	Y	Y	Y
	Speed management (physical) (700.2)	Reduce approach speed to intersections (intersection x, y, z)	N	Y	N
		displacement	M	Y	M
		Reduce speed limit	M	M	M
		Reduce speed limit	M	M	M
		Reduce speed limit	M	M	M
		Reduce speed limit	M	M	M
		Reduce speed limit (along with engineering)	M	M	M
	Speed management (enforcement) (700.3)	Enforce a reduced speed limit on Tremaine Avenue	M	Y	M
Trip Management (800)	Communicating multi-modal status (800.1)	TBC programme stage			
	Driver education and training, media campaigns	Individualised marketing	M	N	M

Alternative	Strategic Response	Long List Options (source: Palmerston North-Manawatu Strategic Transport Study, Austroads Research Report AP-R534-16)	PROBLEM ALIGNMENT (Yes, No, Maybe)		
			Severance / Amenity	Safety	Access and accessibility
[illegible]	Driver education and training, media campaigns (800.2)	Social marketing	M	N	M
		Travel blending	M	N	M
Optimise Capacity (900)	Demand-side: Aid Travel Planning (900.1)	Disseminate real-time transport information	N	N	M
		Capture personal history / carbon footprint	N	N	N
		Implement travel work plans for businesses	N	N	N
		Establish and manage school travel plans	M	M	M
	Demand-side: Enforce vehicle restrictions (900.2)	Mandate vehicle ownership controls	N	N	N
	Supply-side: Manage road space dynamically (900.3)	Implement a tidal flow system	N	N	M
		Manage choke and pinch point program (e.g. clearways)	N	N	M
	Supply-side: Actively manage capacity (900.4)	Plan for road closures and accidents	N	N	M
		Install intelligent incident management systems	N	N	N
	Supply-side: Enhance capacity (900.5)	Lower permanent speed limits	M	Y	N
		Install variable speed control systems	N	N	N
		Optimise traffic signals	N	N	M
		Install smart ramp metering	N	N	N
Operate Effectively (1000)	Demand side: Manage events (1000.1)	Create routine in incident / works / event warnings	N	N	M
		Introduce event travel planners	N	N	M
		Increase and promote public transport for events	M	N	Y
	Supply side: Manage events (1000.2)	Create a roadworks management plan	N	N	M
	Actively manage traffic (1000.3)	Deliver smart motorways	N	N	N
		Leverage predictive analytics to understand relief routes	N	N	M
Change Behavior (1100)	Tolling (1100.1)	Point to point toll on Tremaine Ave for through freight movements	N	N	N
	Modify travel demand (1100.2)	Stagger work/school hours	N	N	M
		Create flexibility in work hours	N	N	M
		Regulate car sharing schemes / technology	N	N	N
		Offer car pooling	N	N	M
	Substitute travel (1100.3)	Establish telework centres	N	N	M
		Deliver e-work programs	N	N	M
	Manage freight (1100.4)	Mandate pre-booking of trip plans	N	N	M
		Create emission zones and selective access	N	N	N
	Implement policy measures (1100.5)	Mandate city licenses / permits	N	N	N
		Change business expense allowances	N	N	N
	Manage freight (supply side) (1100.6)	Establish dedicated freight lanes	M	M	M
	Control destination choice (supply side) (1100.7)	Manage roadside parking controls / costs	N	N	M
		Implement resident parking zones	N	N	N
Air Transport (1200)	Expand Airport (1200.1)	Expand PAX and Freight Potential The exapnsion of PNA will allow for more PAX to utilise the airport, as well as increasing the amount of freight traffic the airport can accommodate. The expansion of the runway would result in the full or partial closure of Milson Line	N	N	N
	Relocate Airport (1200.2)	Develop Feilding Aerodrome			
	Drone Delivery (1200.3)	Market lead initiative	N	N	N
Water Transport (1300)	Coastal Shipping (1300.1)	Develop artificial harbour at Foxton	N	N	N
	River Transport (1300.2)	Any navigability of Manawatu river?	N	N	N
Pipeline transport (1400)	Additional gas lines? (1400.1)		N	N	N
Landuse Planning / Resource Management (1500)	Develop structure plans (1500.1)		M	M	M
	Limited access plans (1500.2)		M	M	M
	Re zoning (1500.3)	Kelvin Grove change to residential	M	M	M
		Tremaine commercial but not industrial	M	M	M
		NEIZ and Longburn expanded	M	M	M

Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 1: DO MIN

DESCRIPTION

1. Continued maintenance and operations
2. Committed projects such as a staged roll out of the Palmerston North City cycle improvements
3. Ashhurst improvements
4. Manawatu Gorge tie-in (2024/25 opening)
5. Ongoing low-cost low-risk (LCLR) improvements
6. Improved connections to the new walking and cycling bridge near Massey
7. Longburn Rongotea Road/ No 1 Line intersection improvements

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
0	-1	-1	0	1	1	-1	0	2

Key outcomes of the programme assessment:

- Does not address the identified investment objectives or key principles and current issues would get worse over time
- Unlikely that the public would be happy with this programme given current expectations

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

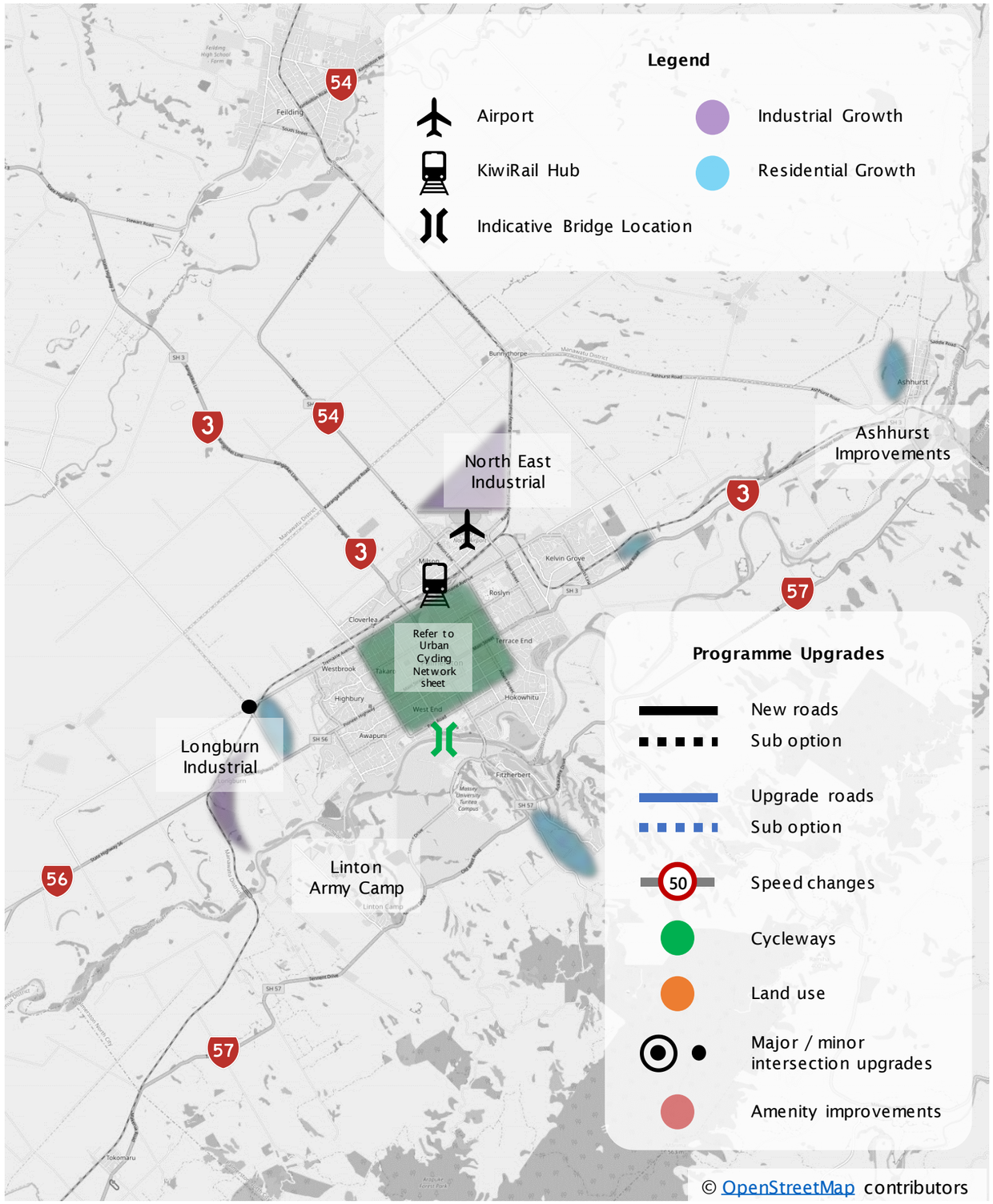
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Low	Low	Low	Low	Low	Low	Low	Low	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan, and Palmerston North City speed limit changes

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Identified problems remain or worsen	• Stakeholder and public expectations		



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 2A: TARGETED INFRASTRUCTURE

DESCRIPTION

- This programme improves selected infrastructure in a targeted manner that addresses existing online issues such as narrow bridges and carriageways on key sections of the Palmerston North network that can be readily fixed.
- For example: An online upgrade (seal widening and bridge replacements) of Kairanga Bunnythorpe Road, No 1 Line, Longburn Rongotea Road (from SH56 to Bunnythorpe), and an online upgrade of Kelvin Grove and connecting roads (via Stoney Creek Road).
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	1	1	1	1	0	1	-1	2

Key outcomes of the programme assessment:

- Limited treatment of the identified investment objectives

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

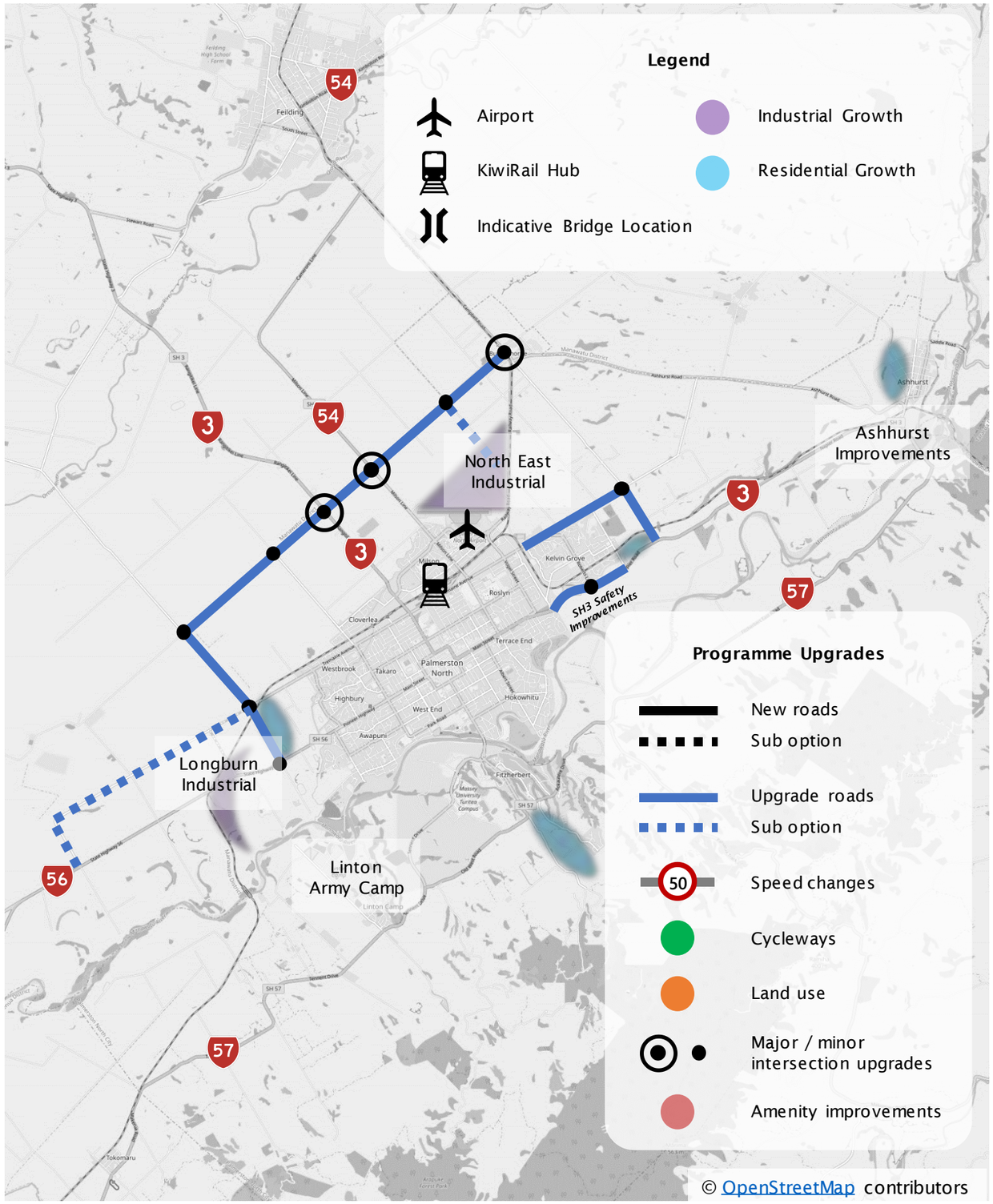
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Medium	Medium	Low	M	Medium	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), Palmerston North City speed limit changes, SH3 Napier Road DBC, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Identified problems remain or worsen	• Stakeholder and public expectations		



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 2B: TARGETED INFRASTRUCTURE

DESCRIPTION

- This programme improves selected infrastructure in a targeted manner that addresses existing online issues such as narrow bridges and carriageways on key sections of the Palmerston North network that can be readily fixed
- For example: An online upgrade (seal widening and bridge replacements) of Kairanga Bunnythorpe Road, No 1 Line, Longburn Rongotea Road (from SH56 to Bunnythorpe), and an online upgrade of Kelvin Grove and connecting roads (via Ashhurst Road)
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	1	1	1	1	0	1	-1	2

Key outcomes of the programme assessment:

- Limited treatment of the identified investment objectives

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

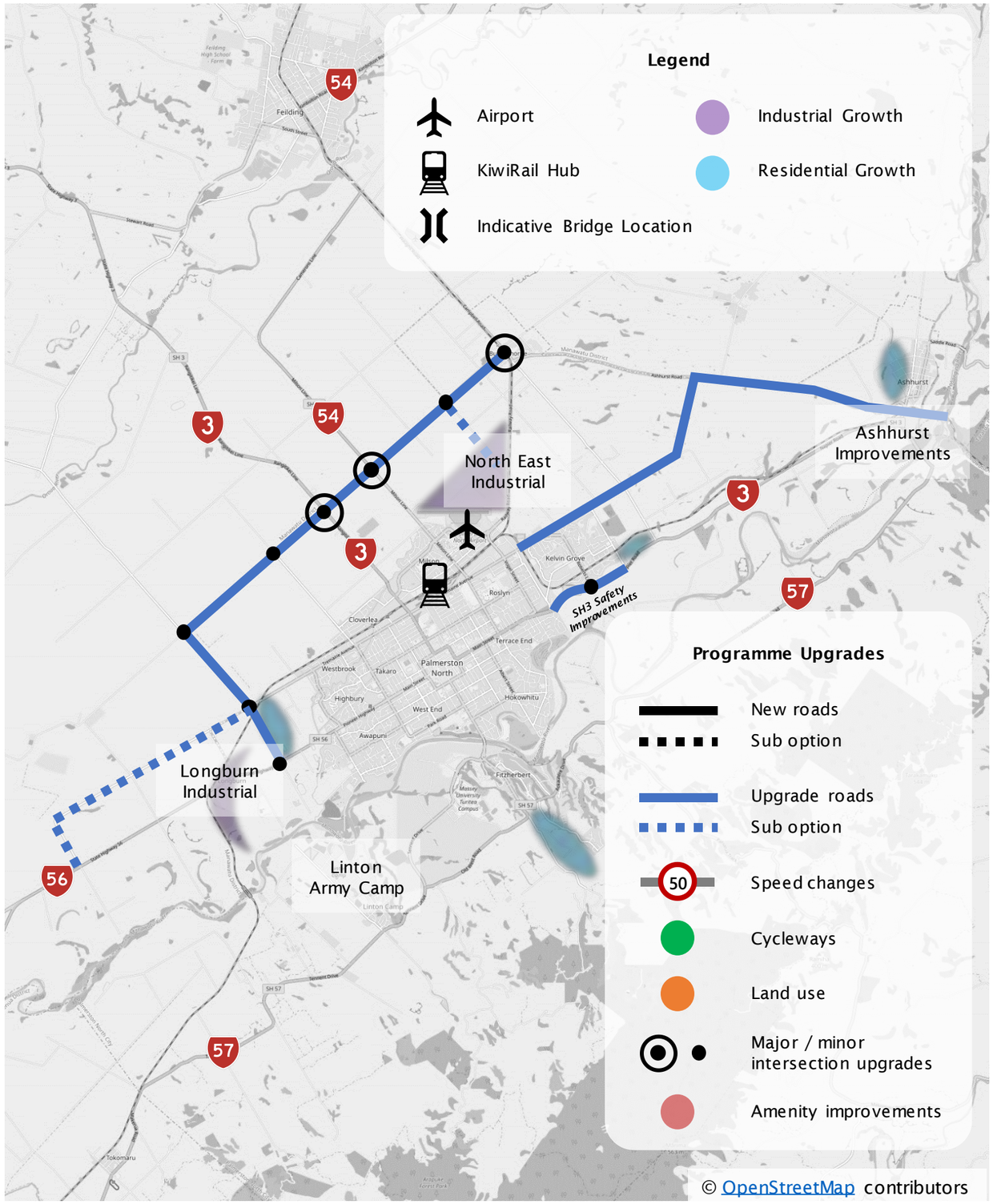
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Medium	Medium	Low	M	Medium	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), Palmerston North City speed limit changes, SH3 Napier Road DBC, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Identified problems remain or worsen	• Stakeholder and public expectations		



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 3: LAND USE

DESCRIPTION

- This programme focuses on making changes to the existing land use. It is aimed at shifting industrial land uses into areas which can be more easily serviced by existing transport connections
- Kelvin Grove change to residential
- Tremaine commercial but not industrial
- NEIZ and Longburn expanded
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
0	1	1	1	1	0	-1	-1	0

Key outcomes of the programme assessment:

- Important underlying issues are addressed allowing for future development
- Relocation of some freight movements from Kelvin Grove - away from residential zone(s)
- Does little to address the identified investment objectives

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

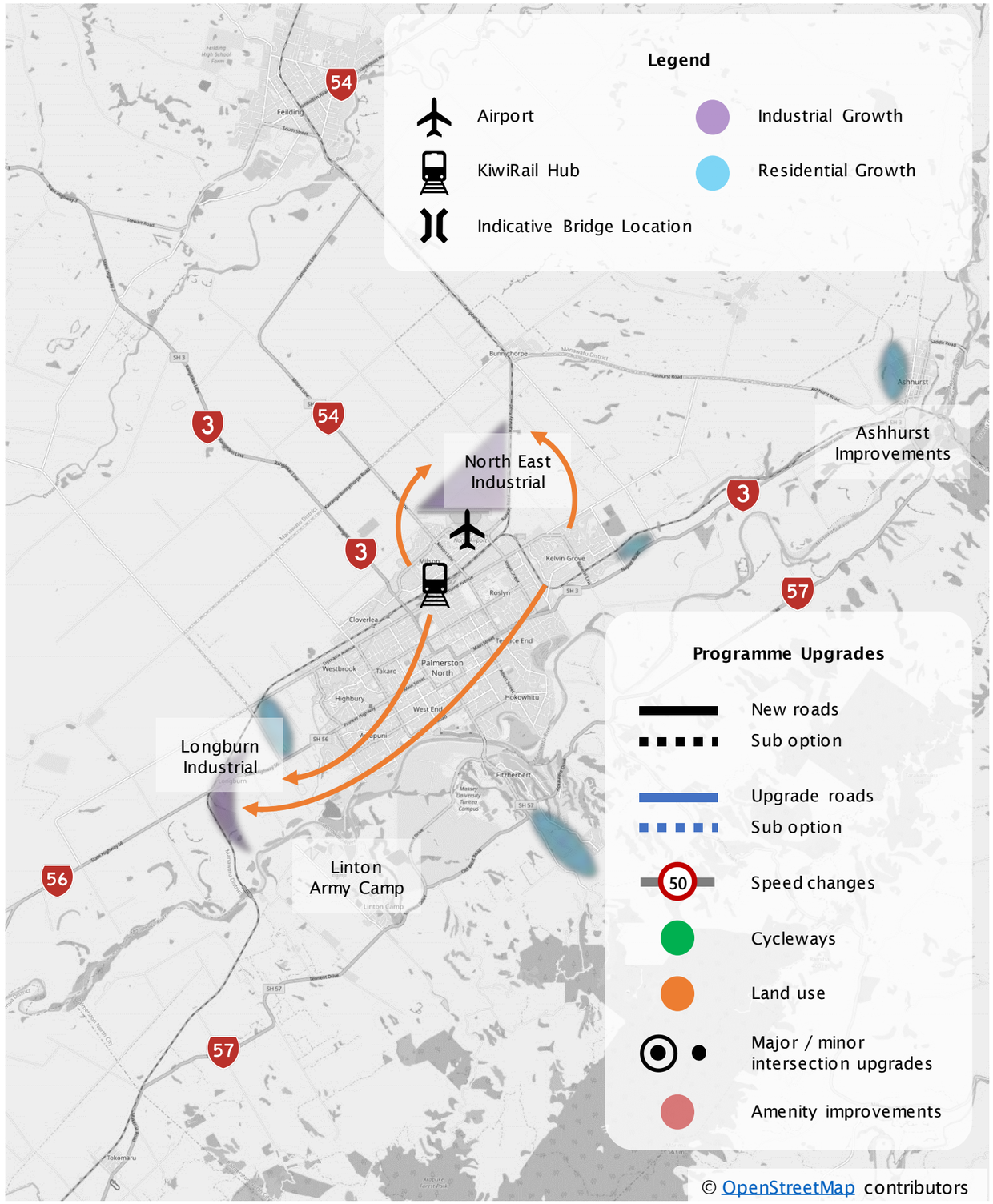
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Low	Low	Low	Low	Low	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), and, Palmerston North City speed limit changes

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Land use changes would probably need new infrastructure. • Identified problems remain and/or worsen (such as safety hotspots around Palmerston North unrelated to Kelvin Grove shift)	• This is a long-term treatment, and there will be limited immediate outcomes.		



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 4: SAFER SPEED

DESCRIPTION

- This programme adopts an approach of using safer speed tools to improve safety and encourage freight to use identified routes, and away from residential areas. Includes two approaches – improving selected roads so that the current speed limit is safe, and reducing the speed limit on other roads to match the safety of the current road
- For example: Engineering up (improving the safety of a road so drivers can travel at higher speeds) on Kairanga Bunnythorpe Road, and Ashhurst Road, reducing speed limits on Number 1 Line, Pioneer Highway and residential streets such as Te Awe Awe Street.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	1	1	1	1	1	1	-1	2

Key outcomes of the programme assessment:

- Freight encouraged away from sensitive and unsafe corridors
- Crash severity reduced on identified corridors for treatment
- Possible travel time increase on some routes
- More traffic may be encouraged to use the ring-road, but the proposals may generate resistance from general public.

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

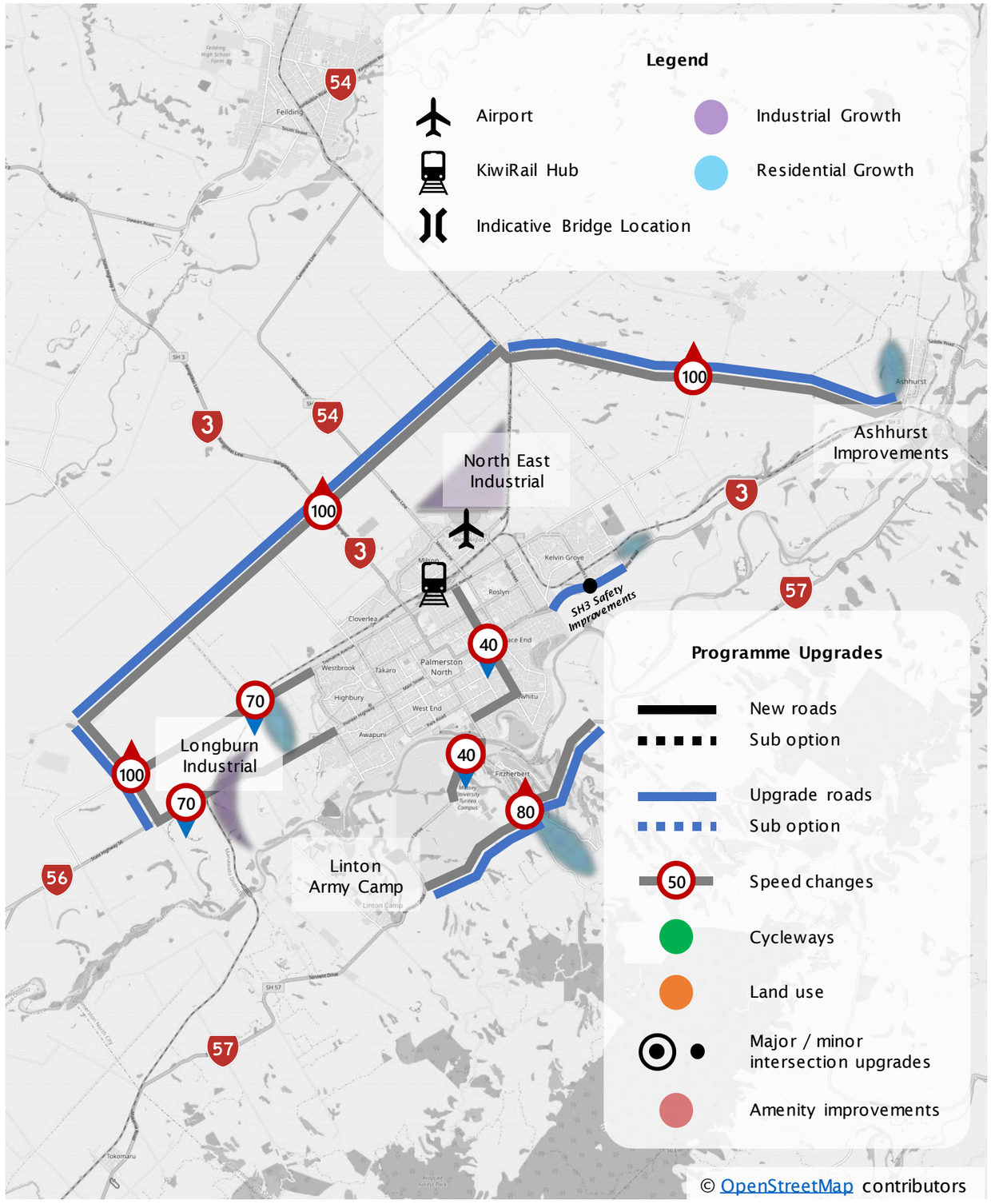
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Low	Low	Low	M	Medium	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Identified problems remain or worsen - e.g. land use issues	• Limited treatment of the identified investment objectives - e.g. access • Risk of underlying safety issues unresolved		• Reducing speeds may result in adverse economic outcomes, although this may be judged acceptable if it produces significant other benefits.



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 5: PARTIAL RING ROAD WITH SH57 UPSTREAM BRIDGE

DESCRIPTION

- This programme is based on providing a partial ring road that connects SH3, Bunnythorpe with State Highway 57 via an upstream bridge.
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	1	1	2	1	0	3	-2	1

Key outcomes of the programme assessment:

- Limited treatment of the identified investment objectives - e.g. access as it does not provide efficient connections to the south and has been estimated to attract fewer vehicles per day compared to a downstream bridge.
- Attempts to shift movements to the north of Palmerston North
- The ring-road would probably not divert many trips from the urban area to the south west
- Significant impacts on residential areas around Stoney Creek and Whakarongo School

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

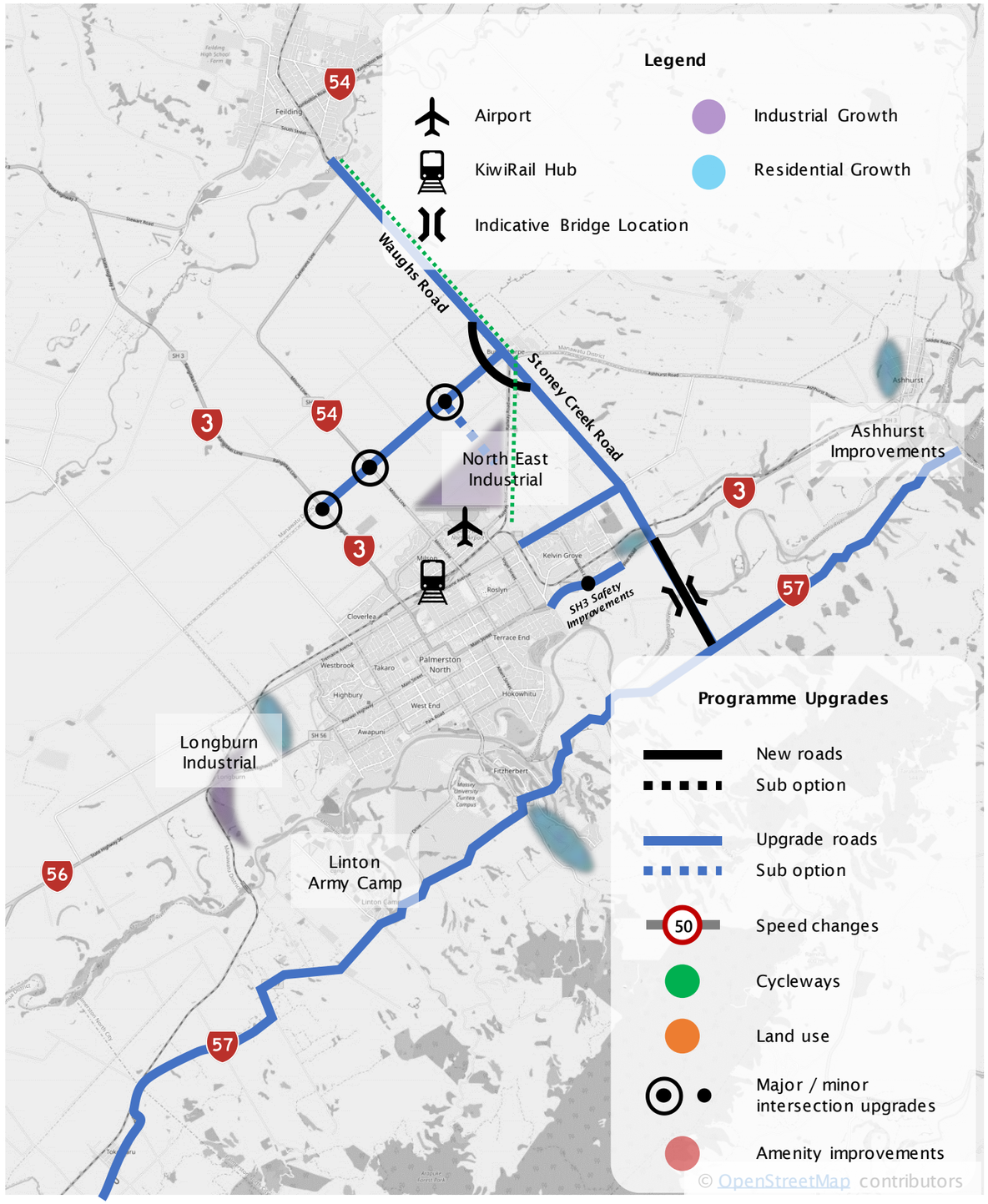
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Low	High	High	M	M	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• The road upgrade between SH57 and SH3 creates a barrier, impacts two communities on either side • Limited improvement in movements from urban area to the south west	• Identified problems remain or worsen - e.g. land use issues • Freight flows may not significantly change routes	• Feasibility and affordability	



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 6: PARTIAL RING ROAD DOWNSTREAM BRIDGE

DESCRIPTION

- This programme is based on providing a full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	2	3	2	1	3	-2	2

Key outcomes of the programme assessment:

- Allows for development on Tennent Drive
- Reduction of heavy traffic in residential areas.
- Support for possible relocation of rail hub to NE
- New road and bridge will impact adjacent land uses

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

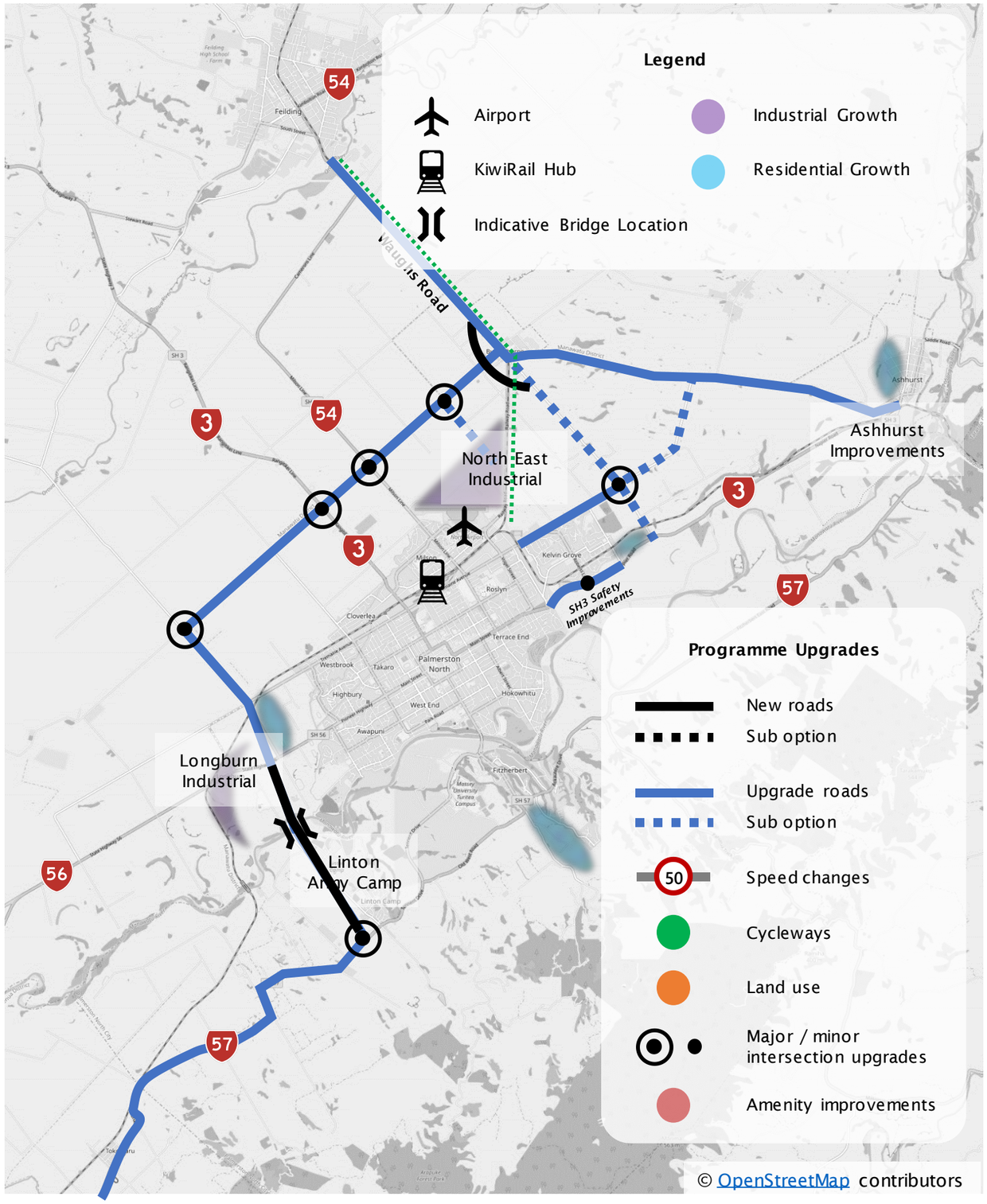
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
High	High	High	M	High	High	High	High	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated	• Consentability	• Feasibility and affordability	• Benefits depend on whether SH56 or SH57 is the preferred route to the west



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 7: FULL RING ROAD WITH TWO BRIDGES

DESCRIPTION

- This programme includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	2	3	2	1	3	-3	1

Key outcomes of the programme assessment:

- Full ring road allowing for greater certainty future land use planning.
- Significant infrastructure improvements on rural network.
- Reduction of heavy traffic in residential areas.
- Limited benefit for through movements between the Manawatu Gorge and the south west.
- New roads and bridges will impact adjacent land uses (north and south)

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

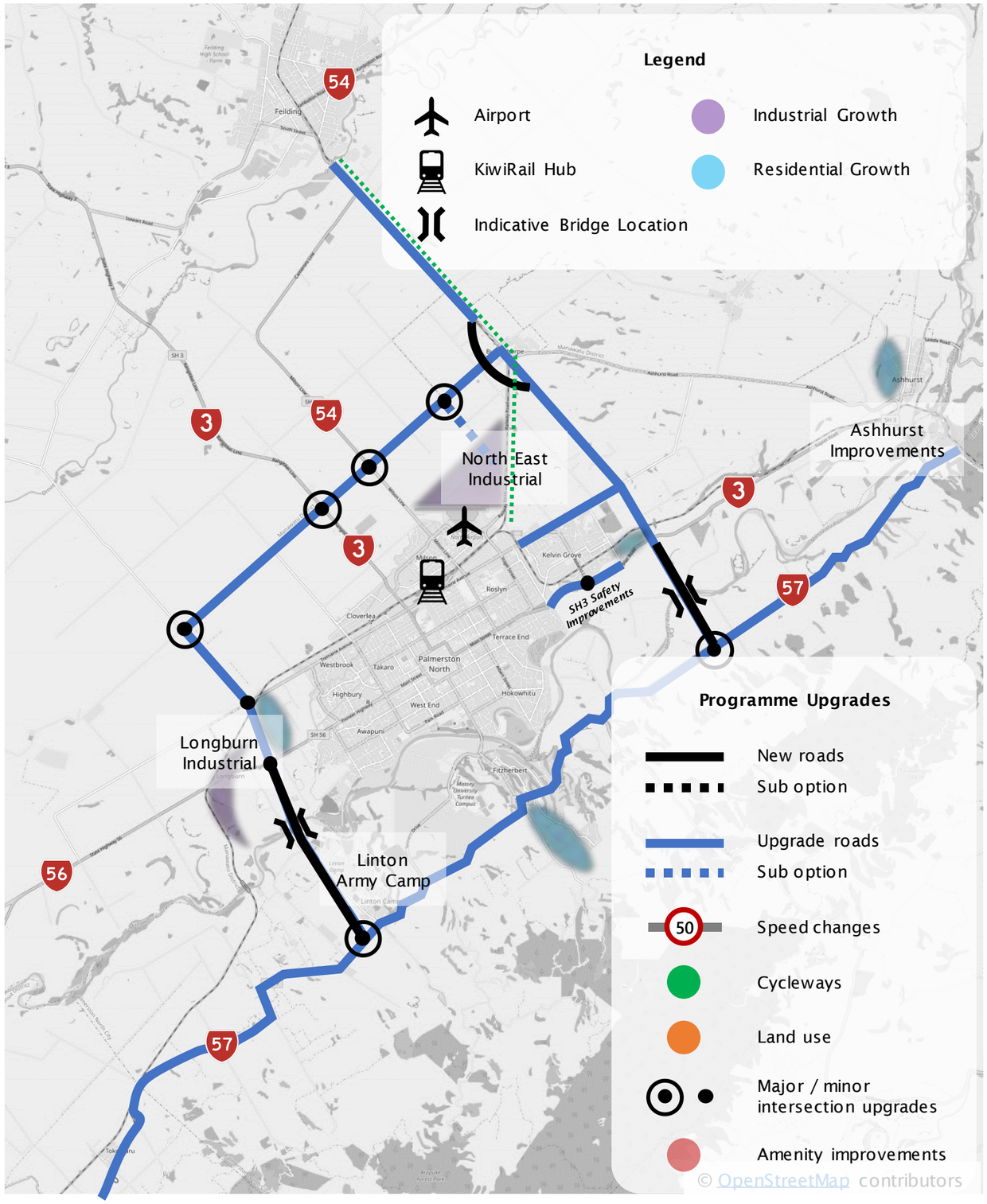
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
High	High	High	M	High	High	High	High	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated	• Consentability	• Feasibility and affordability	• Limited improvement for movements between Manawatu Gorge and the south west



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 8: ACCESS AND ACCESSIBILITY

DESCRIPTION

- Similar to programme 6 but with additional treatments at key freight intersections.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	3	3	2	1	3	-2	2

Key outcomes of the programme assessment:

- Good achievement of the identified investment objectives - e.g. access
- Attempts to shift movements to the north of Palmerston North
- Supports planned developments such as FoodHQ
- New road and bridge will impact adjacent land uses

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

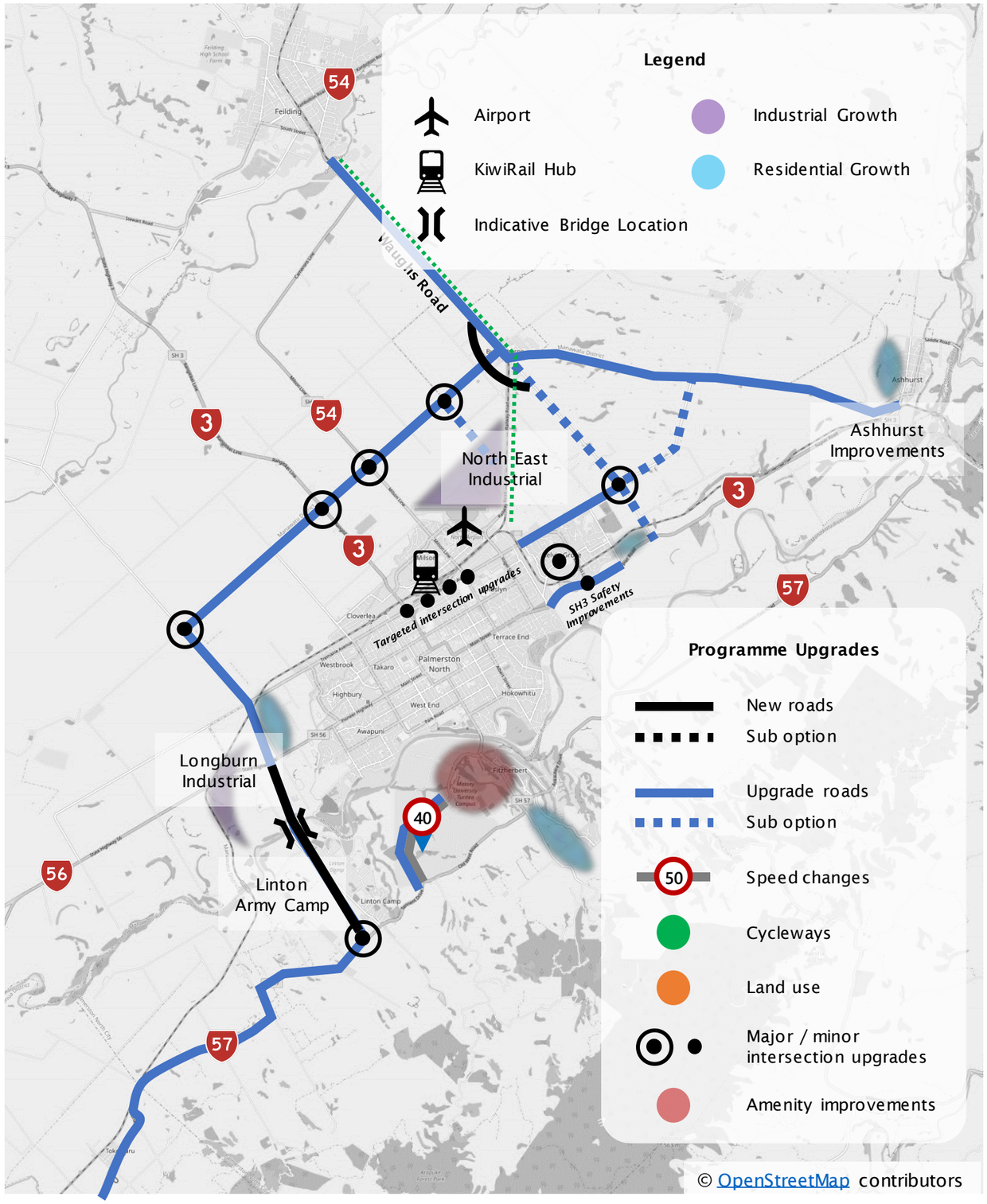
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
High	High	High	M	High	High	High	High	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Identified problems remain or worsen - e.g. land use issues	• Stakeholder expectations	• Feasibility and affordability	



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 9: SAFETY

DESCRIPTION

- A programme that addresses identified parts of the network with safety issues. The programme will include several projects that will combine to create a safer system. Additionally, by improving higher risk corridors freight operators may be more likely to use them
- Addressing High Risk Rural Roads, High Risk Intersections, known pinch points and implementing safer speeds
- For example: Safety improvements to intersections such as SH3/Kairanga Bunnythorpe Road, Stoney Creek / Kelvin Grove, No 1 Line / Longburn Rongotea Road, and corridors such as Ashhurst Road and State Highway 57. The programme could also include addressing pinchpoints and using safer speed tools such as reducing speed in urban streets such as Te Awe Awe Street.
- Programme includes Do-Min elements, and Safer Speeds Programme.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	1	1	1	1	1	1	-2	3

Key outcomes of the programme assessment:

- High risk safety locations addressed
- Potential to improve mode provisions through safety treatments (such as intersection improvements)

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

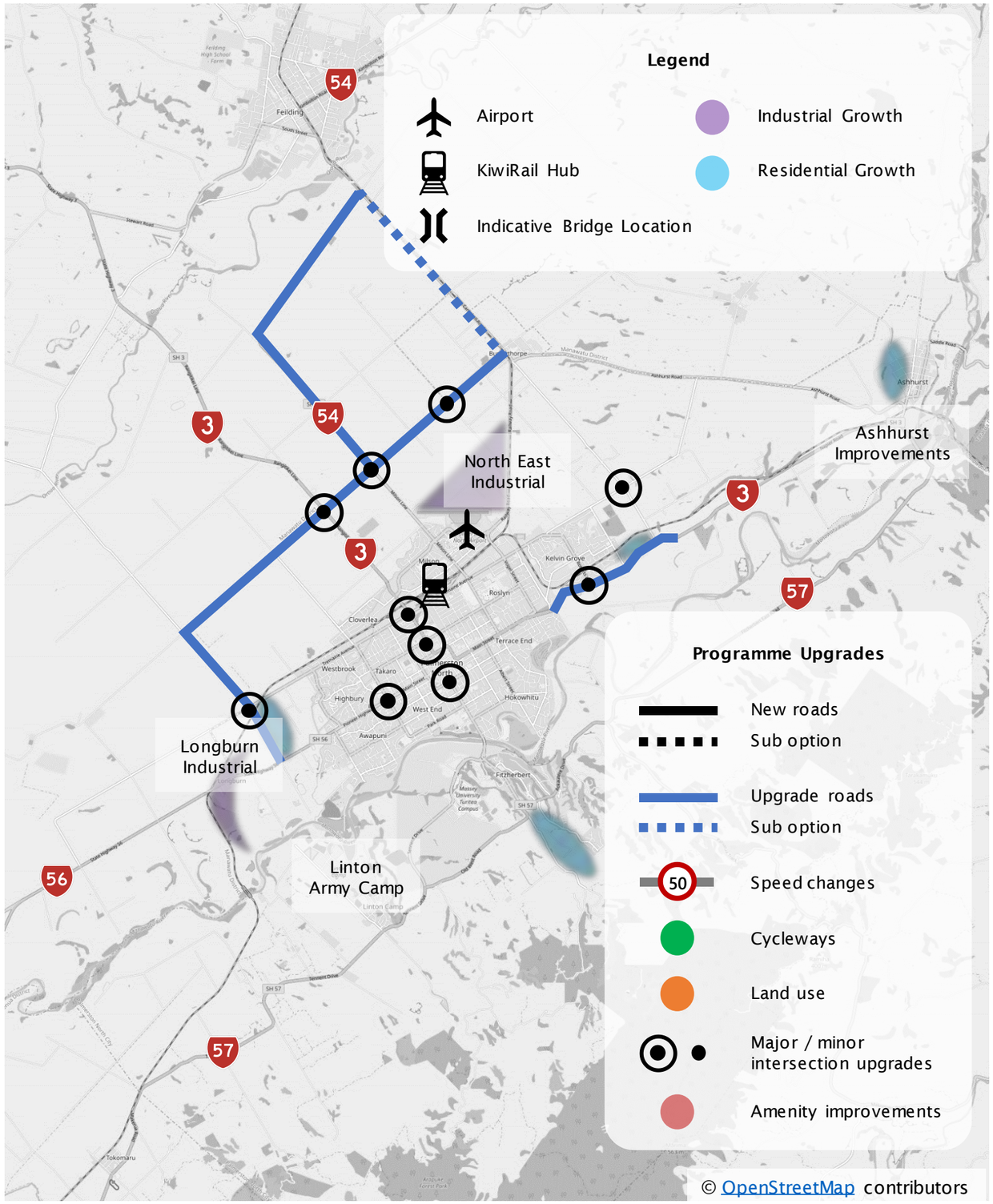
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Low	Low	Low	M	M	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS	CONSTRAINTS	OTHER
• Identified problems remain or worsen - e.g. land use issues and heavy vehicle traffic volumes on residential streets)		• Limited improvement to access and amenity



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report

PROGRAMME 10: AMENITY

DESCRIPTION

- This programme focuses primarily on addressing the amenity investment objective of having fewer HCVs on residential and 'place' streets, and improving pedestrian and cycle connections. To do this it will use land use, and safer speed tools, and a downstream bridge to move traffic out of the CBD.
- For example: Changing Kelvin Grove from industrial to residential, expanding NEIZ and Longburn, and Tremaine Avenue to become commercial but not industrial (or possibly residential), reducing the speed limit at Te Awe Awe Street and Albert Street.
- Programme includes Do-Min elements.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
1	2	1	0	2	1	3	-2	2

Key outcomes of the programme assessment:

- New southern bridge, with potential to develop greater ring-road in future
- Allows for amenity treatments at Tennent Drive to occur
- Supports planned developments such as FoodHQ, and housing at Aokautere.

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

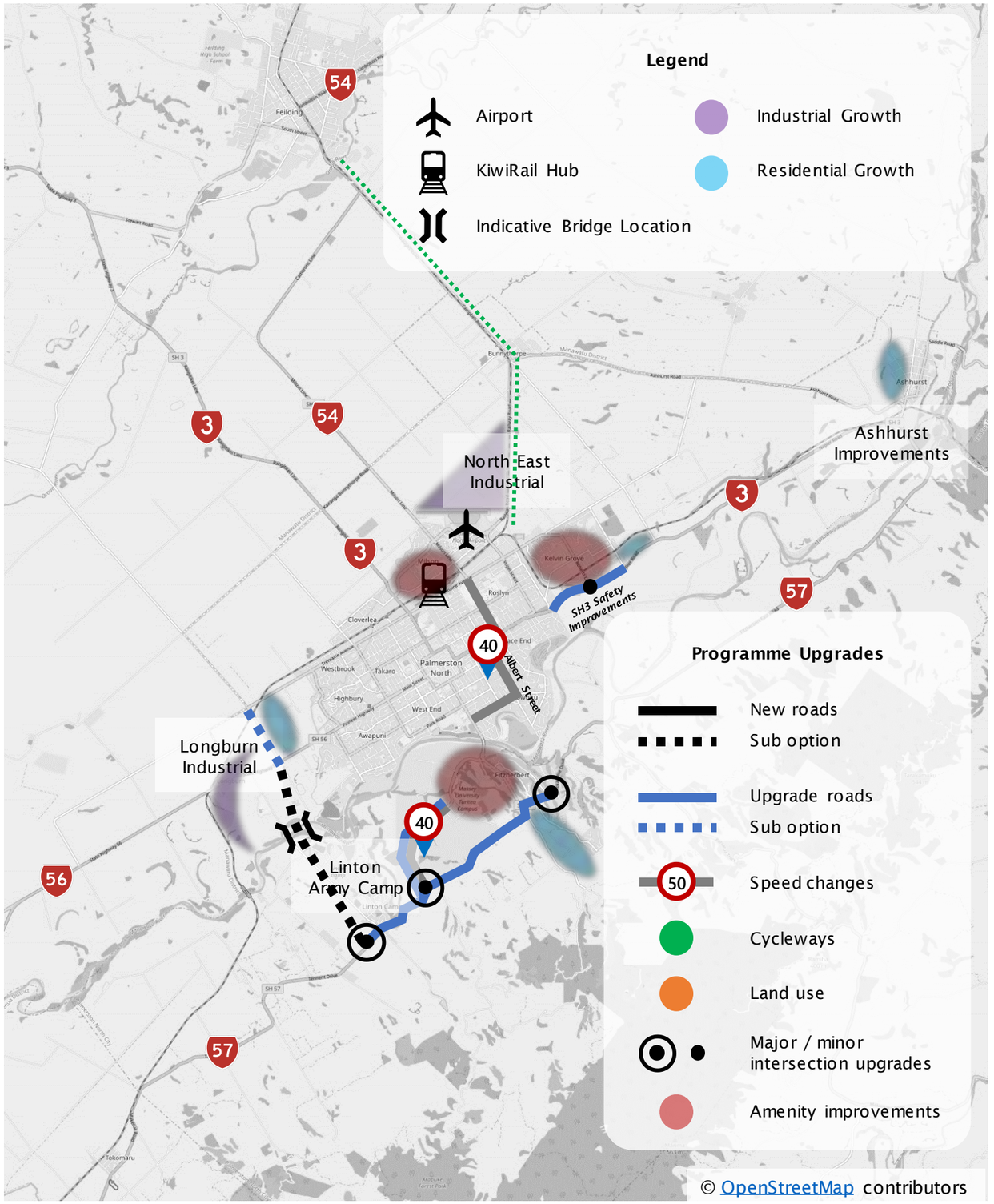
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC					
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	P2 SAFE SPEEDS	P3 FREIGHT & LOCAL ACCESS	P4 HIGHWAY NETWORK PRIORITISATION	P5 SAFE AND PREDICATABLE TRAVEL	P6 MAJOR NETWORK IMPROVEMENTS
Medium	Low	Low	Low	Low	Medium	Medium	Medium	Medium

OTHER INTER-DEPENDENCIES

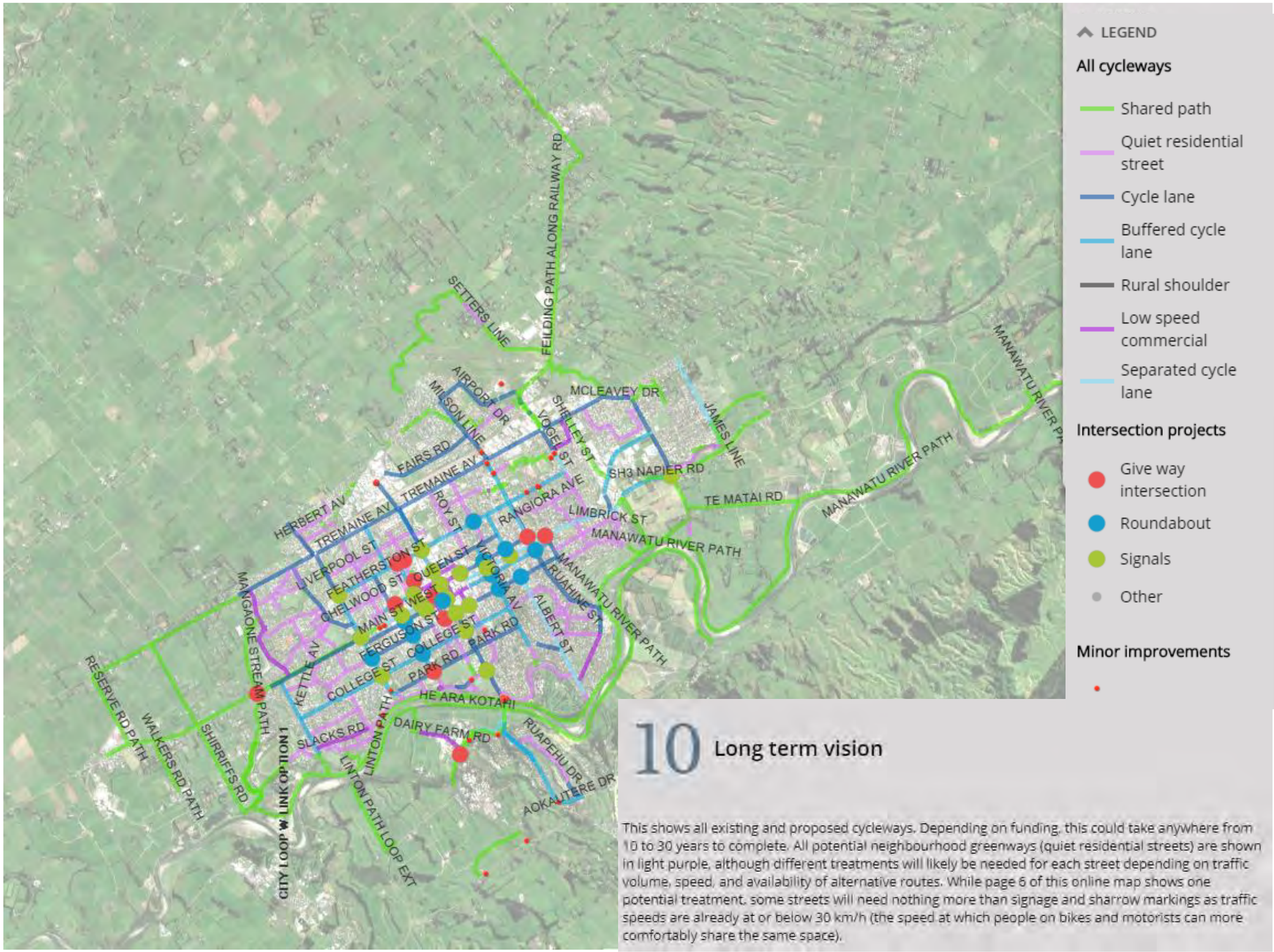
- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, and Palmerston North City speed limit changes

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS	CONSTRAINTS	OTHER
• Identified problems remain or worsen	• Feasibility and affordability	• Some key corridors (such as Kairanga Bunnythorpe Road) may receive less attention



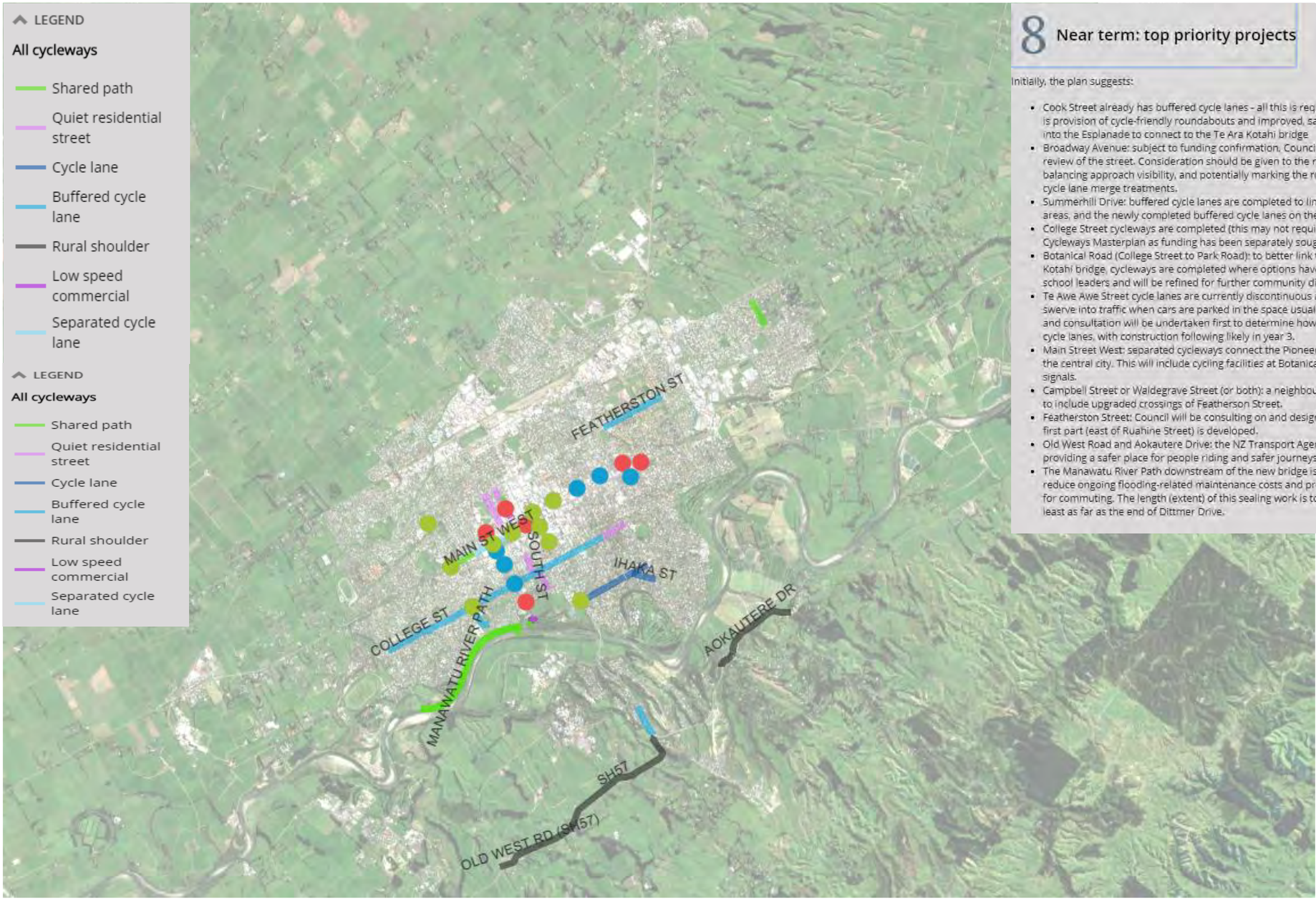
Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report



10 Long term vision

This shows all existing and proposed cycleways. Depending on funding, this could take anywhere from 10 to 30 years to complete. All potential neighbourhood greenways (quiet residential streets) are shown in light purple, although different treatments will likely be needed for each street depending on traffic volume, speed, and availability of alternative routes. While page 6 of this online map shows one potential treatment, some streets will need nothing more than signage and sharrow markings as traffic speeds are already at or below 30 km/h (the speed at which people on bikes and motorists can more comfortably share the same space).

Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report



8 Near term: top priority projects

Initially, the plan suggests:

- Cook Street already has buffered cycle lanes - all this is required to complete the corridor is provision of cycle-friendly roundabouts and improved, safer access across Park Road into the Esplanade to connect to the Te Ara Kotahi bridge
- Broadway Avenue: subject to funding confirmation, Council proposes a safety-focused review of the street. Consideration should be given to the roundabout lane widths, balancing approach visibility, and potentially marking the roundabouts with sharrows and cycle lane merge treatments.
- Summerhill Drive: buffered cycle lanes are completed to link between IPU, residential areas, and the newly completed buffered cycle lanes on the hill part of Summerhill Drive.
- College Street cycleways are completed (this may not require funding from the Urban Cycleways Masterplan as funding has been separately sought from the NZTA)
- Botanical Road (College Street to Park Road): to better link to the newly opened Te Ara Kotahi bridge, cycleways are completed where options have already been discussed with school leaders and will be refined for further community discussion.
- Te Awe Awe Street cycle lanes are currently discontinuous and require people on bikes to swerve into traffic when cars are parked in the space usually used for riding. Investigation and consultation will be undertaken first to determine how to better link the existing cycle lanes, with construction following likely in year 3.
- Main Street West: separated cycleways connect the Pioneer Highway Shared Path with the central city. This will include cycling facilities at Botanical / Main signals and Pitt / Main signals.
- Campbell Street or Waldegrave Street (or both): a neighbourhood greenway is developed to include upgraded crossings of Featherson Street.
- Featherston Street: Council will be consulting on and designing the entire corridor; the first part (east of Ruahine Street) is developed.
- Old West Road and Aokautere Drive: the NZ Transport Agency plans to widen shoulders, providing a safer place for people riding and safer journeys for drivers as well.
- The Manawatu River Path downstream of the new bridge is sealed with concrete to reduce ongoing flooding-related maintenance costs and provide an all-weather surface for commuting. The length (extent) of this sealing work is to be determined, but will go at least as far as the end of Dittmer Drive.

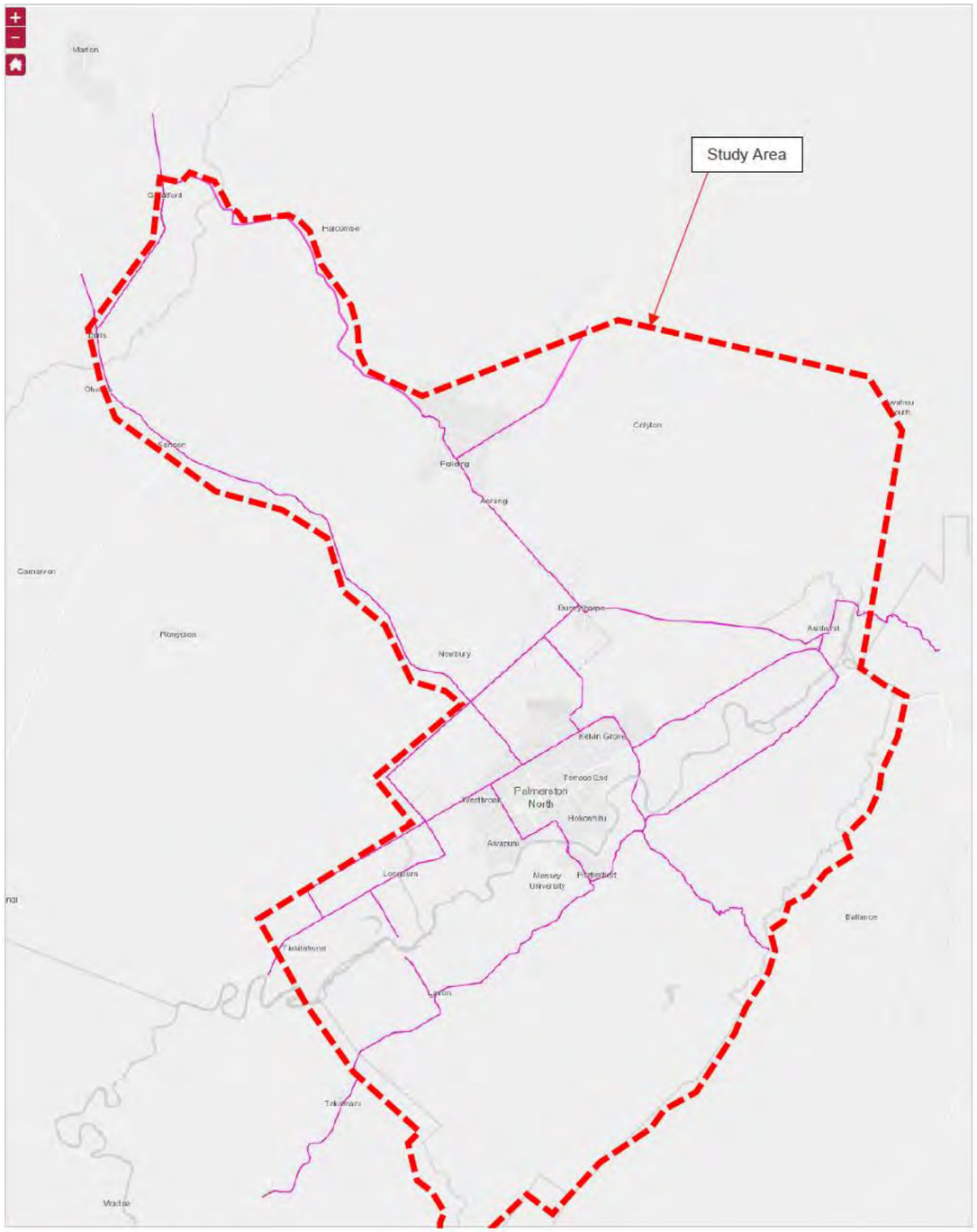
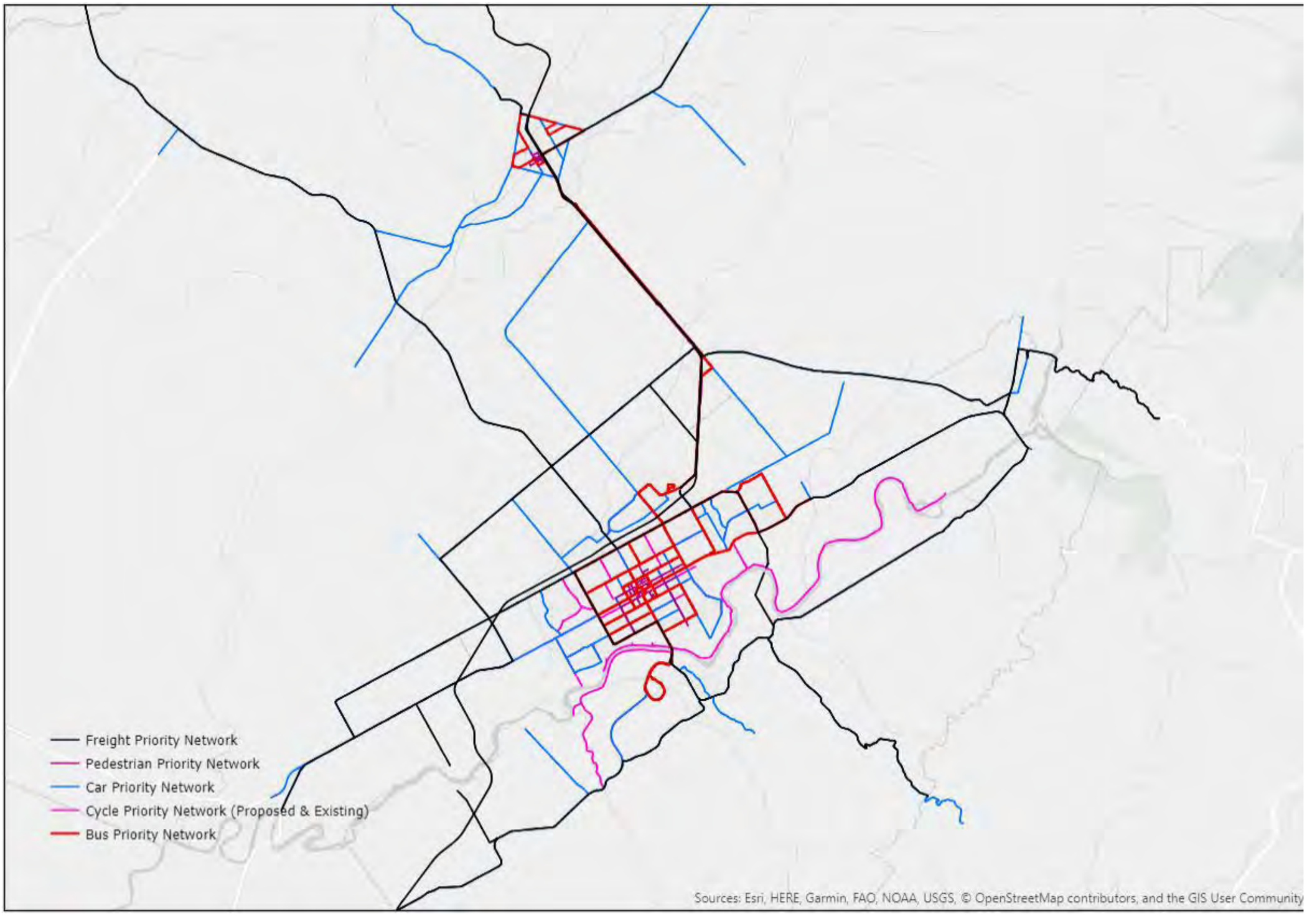


Figure B6.1 Priority Routes – Freight

Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report



Mapping the Future

Sustainable Growth (Industrial)

1. Wastewater Treatment Plant Upgrade
2. Regional Ring Road, Rail, Airport & multi-modal infrastructure to enable industrial growth: Longburn & North East Industrial Zone (NEIZ)
3. Water Storage & Drainage*

** City-wide*

Sustainable Growth (Residential)

4. Infrastructure for residential growth: Whakarongo (our own city development), Aokautere, City West, Urban Intensification, Ashhurst

City Centre Transformation

1. City Centre Streetscape Plan & Redesign
2. Te Manawa 2025 Redevelopment
3. Central Library Upgrade (Library of the Future)
4. Central Energy Trust Arena Masterplan & Projects
5. Heritage Protection Package*
6. Initiatives with City Business Partners

** Across City Centre*

Manawatū River Network

1. Central Energy Trust Wildbase Recovery Centre
2. Victoria Esplanade Masterplan & Projects
3. He Ara Kotahi Bridge & Shared Pathway
4. Manawatū River Shared Pathway (Ashhurst to City)
5. Te Apiti Biodiversity & Recreation
6. Ahimate Park (Waitoetoe Park)

City-wide Partners:

Rangitāne*, Central Economic Development Agency (CEDA), Central & Local Government, Massey University, Research & Food HQ, NZ Defence, MidCentral DHB, Airport

** City-wide*

Manawatū River & Tributaries

Biodiversity Corridors

Urban Areas

Rail

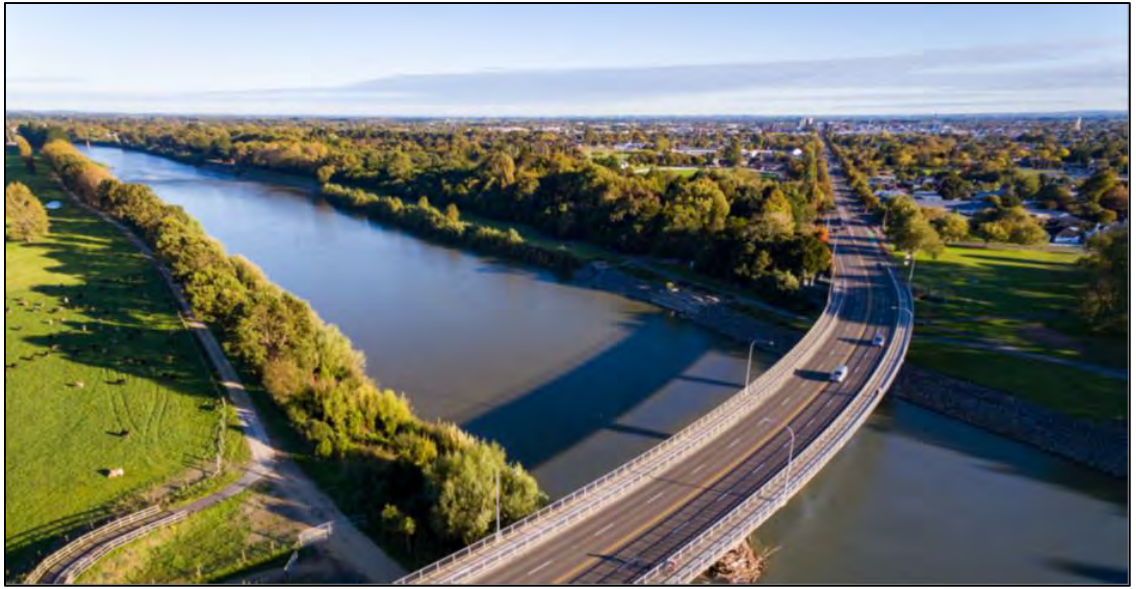
Regional Freight Ring Road

Regional Freight Ring Road Options

City Boundary

Palmerston North Integrated Transport Initiative Business Case

Workshop 2 – Post Workshop Pack



WAKA KOTAHI NZ TRANSPORT AGENCY

Stantec

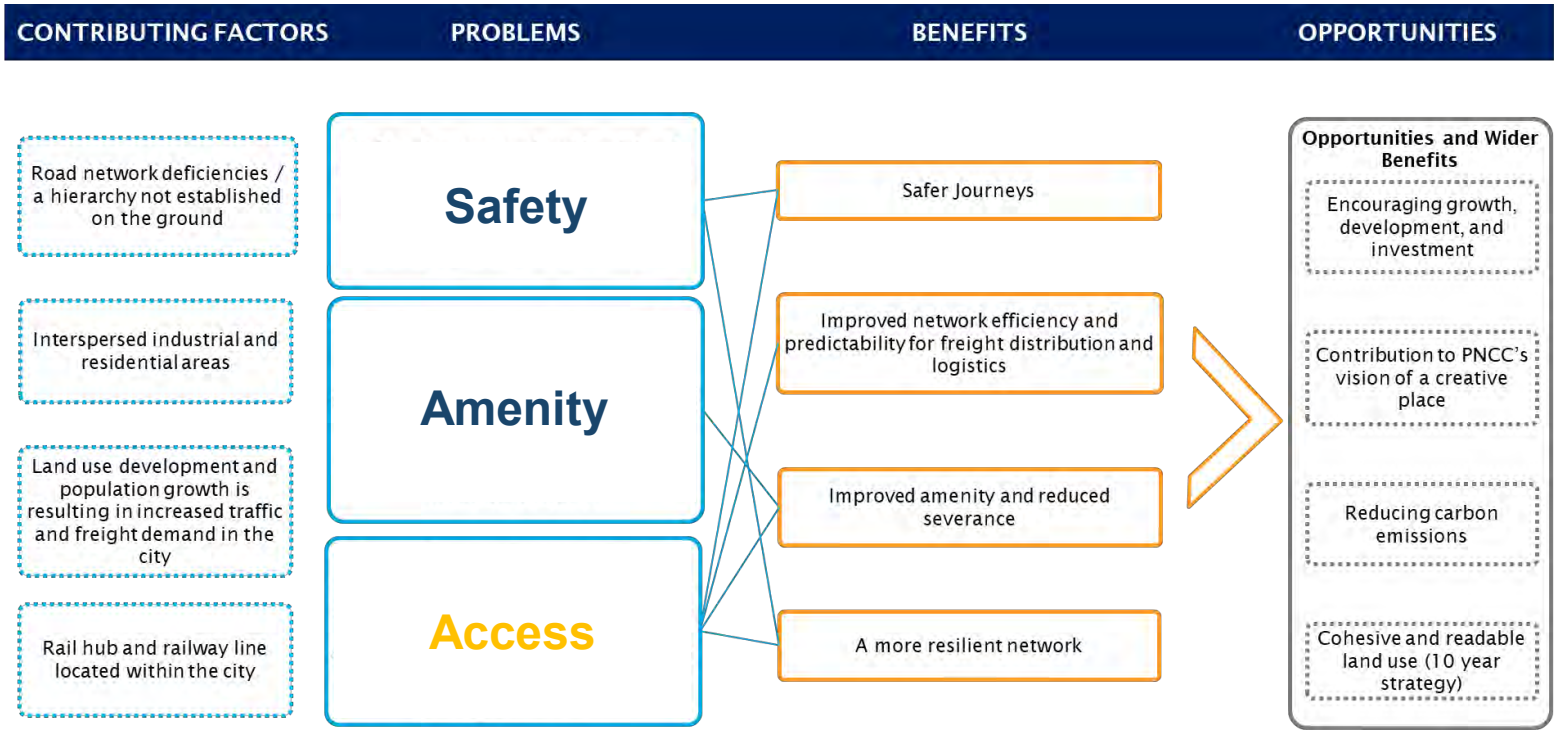
New Zealand Government

Workshop Outcomes

- For attendees to have provided input in the programme development and shortlisting processes.
- To agree a short list of programmes to take forward for further assessment.
- For everyone to understand what the next steps are.

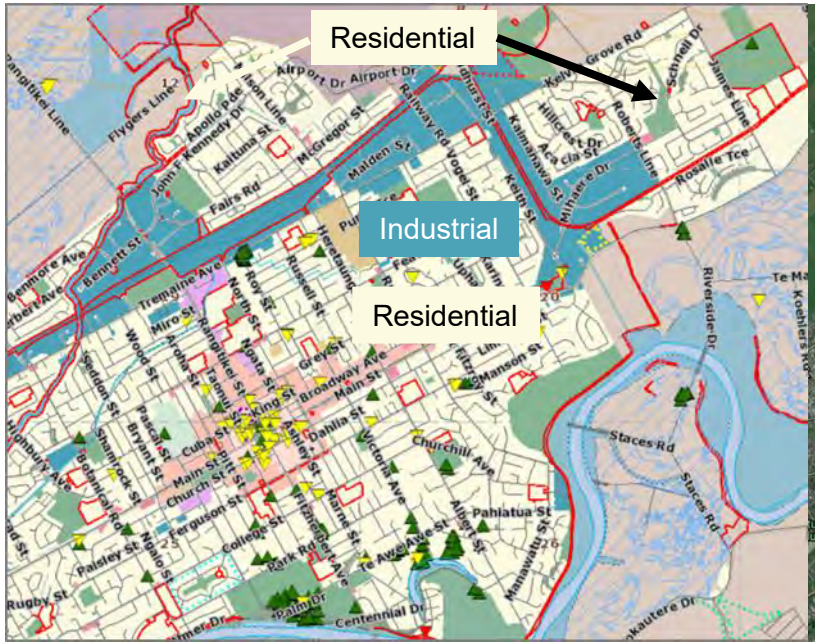
Problems

Problems and Benefits Mapping



Amenity Problem

Cause: **Interspersed Industrial and Residential Areas**

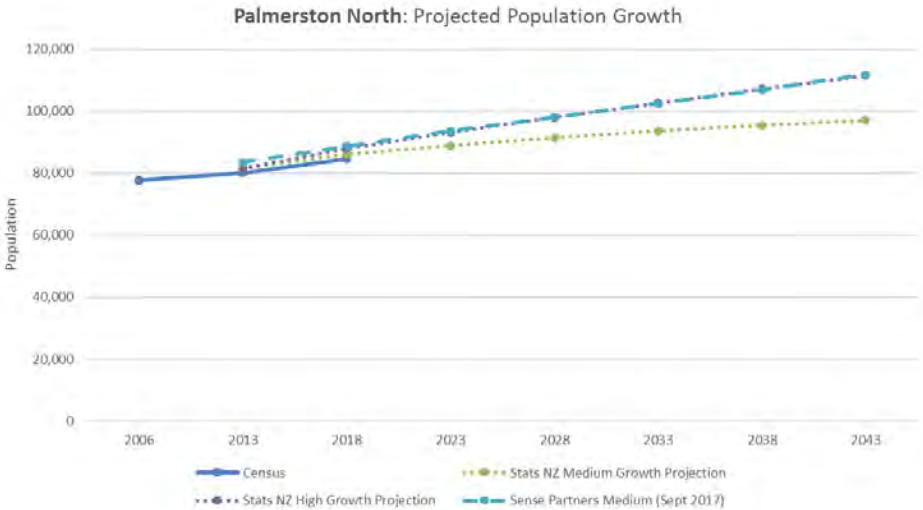


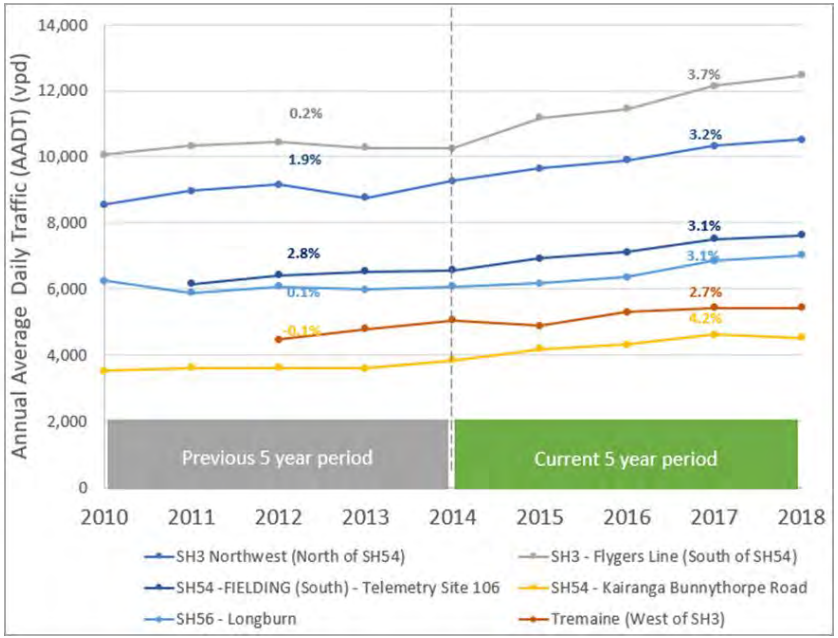
Amenity Problem

Cause: **Rail Hub and Railway Line located in the City**

Amenity Problem

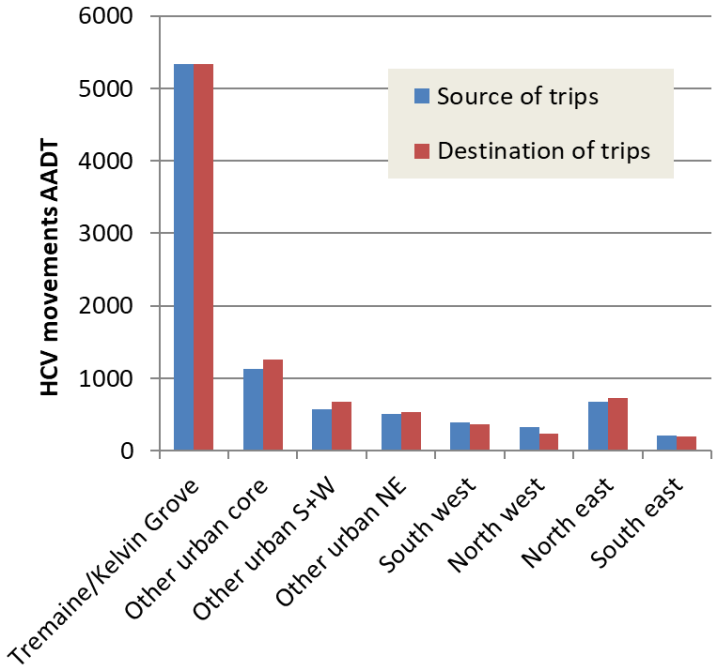
Cause: **Population and Employment Growth**





Amenity Problem

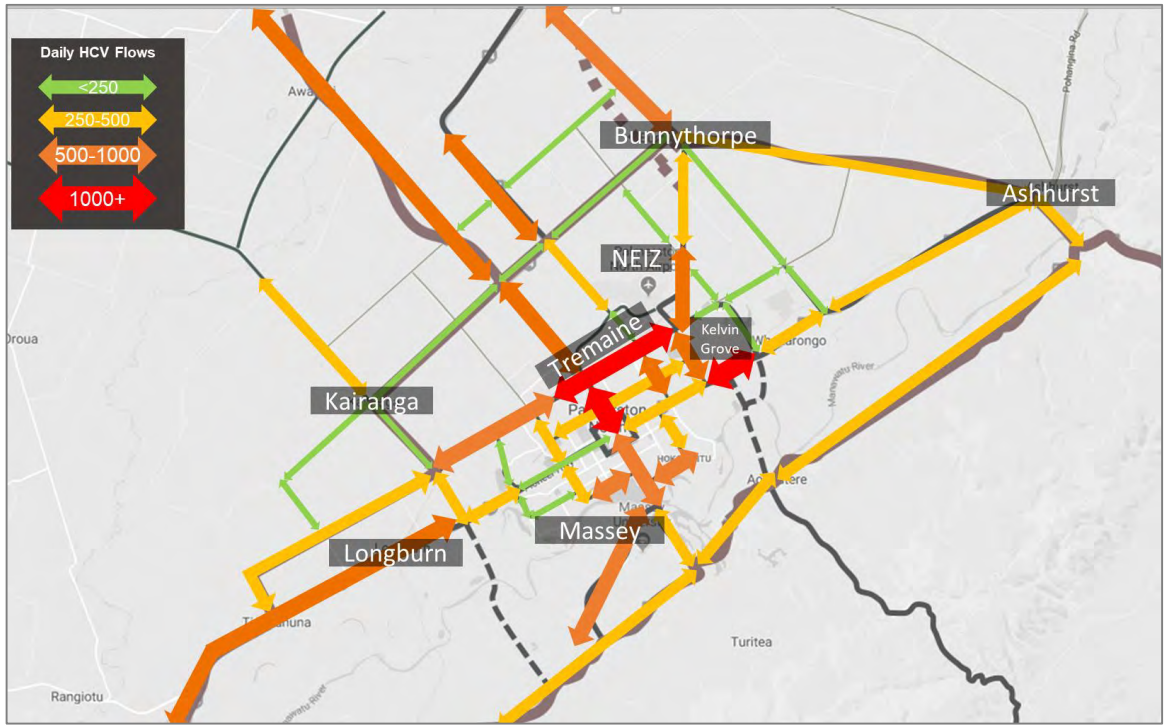
Cause: **Freight Demands**



- High proportion of HCV trips are internal to the project area
- 70% short distance (internal or linking to rest of urban core)
- About 4,000 trips to or from areas external to the city
- Growth also focused around Tremaine Ave/Kelvin Grove, NEIZ, and Feilding (NE)

Amenity Problem

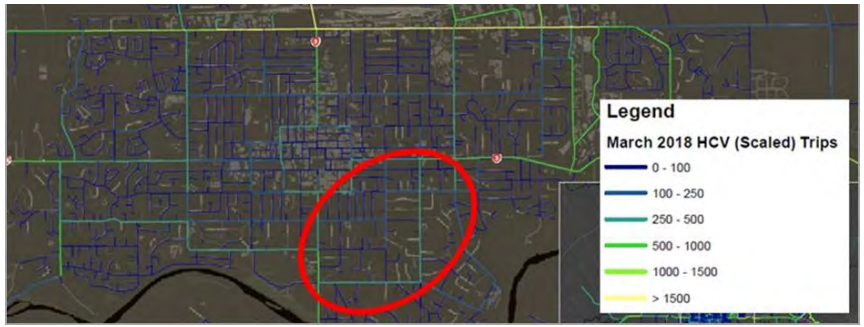
Cause: **Freight Demands**



Existing freight demands

Amenity Problem

Effect: **Heavy Vehicles on High Place Value Streets**



Te Awe Awe Street – HCV Trips

Te Awe Awe Street – Google Street View

Amenity Problem

Consequence: **Poor Amenity Values**

Healthy Street Indicators

- Te Awe Awe Street - arterial (ONRC) but not a priority freight route in the Network Operating Framework (NOF).
- Other streets with amenity impacted by freight:
  - Albert Street
  - College Street
  - Maxwells Line
  - Keith Street
  - Shelly Street
  - Kaimanawa Street
- Growth in traffic will further exacerbate issues

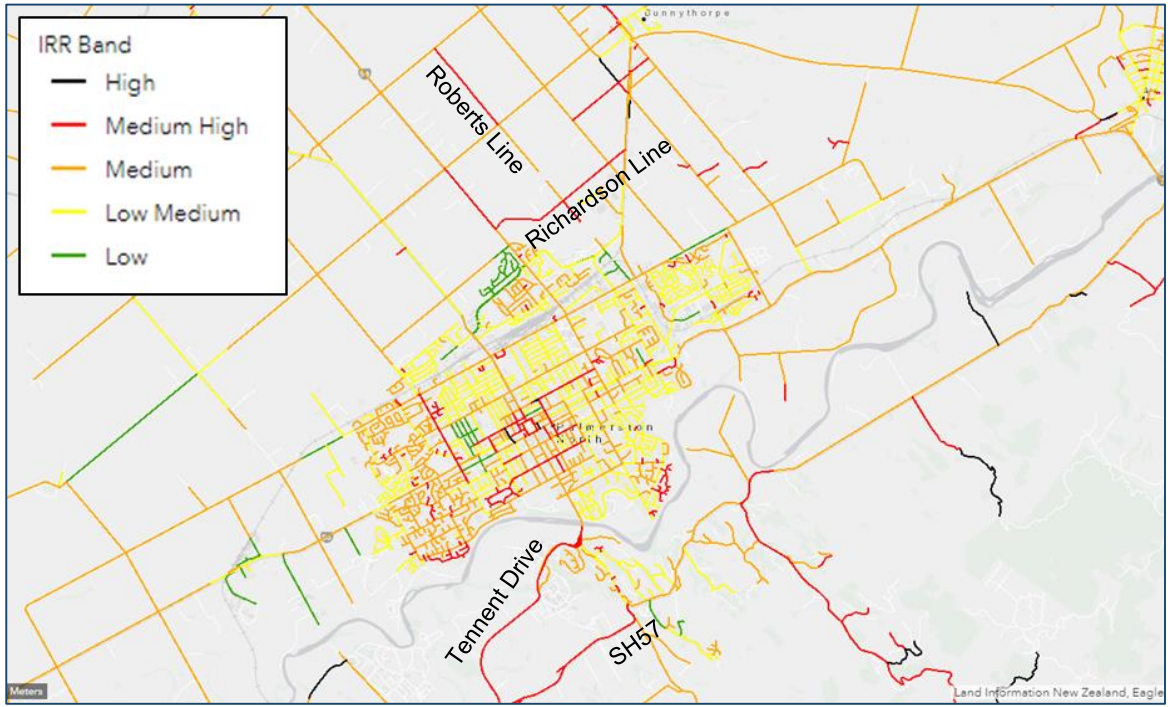
Safety Problem

Cause: **Road Network Deficiencies**

- Intersection form and configuration (rural and urban)
- High number of conflicting movements (rural and urban)
- High speed environments
- Narrow carriageways and roadside hazards

Safety Problem

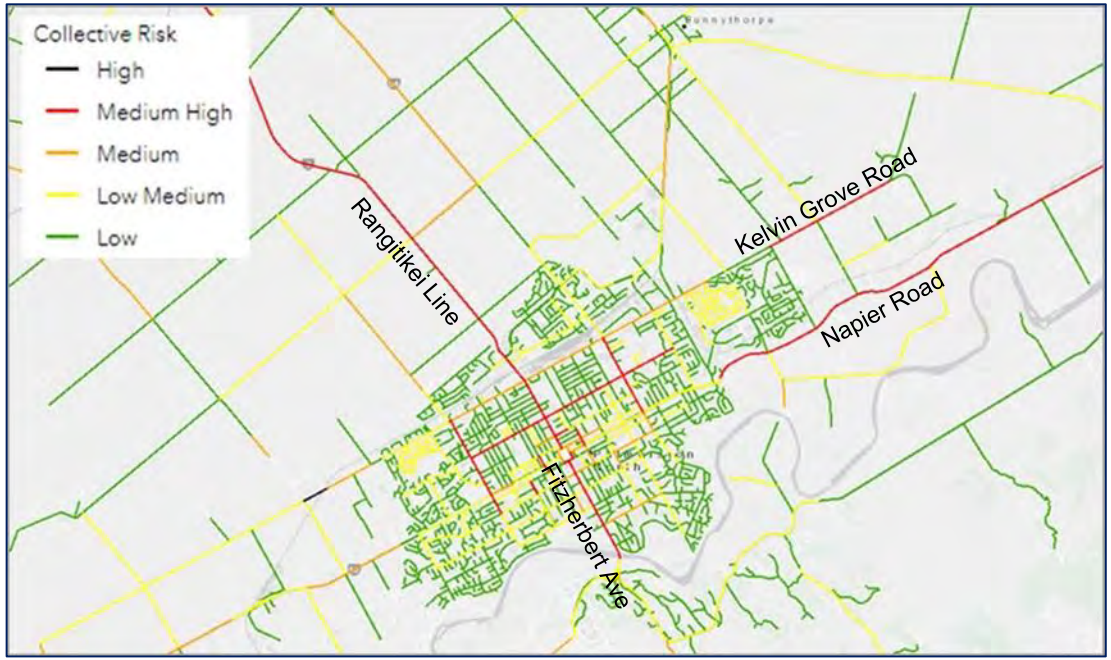
Cause: **Infrastructure Risk Rating**



Infrastructure Risk Rating

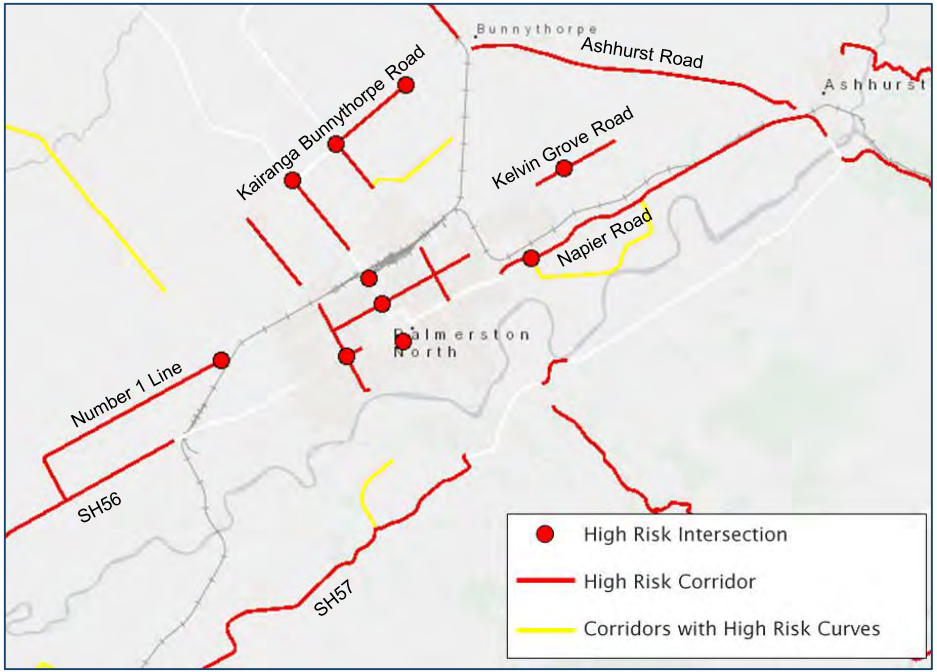
Safety Problem

Consequence: **Collective Risk**



Safety Problem

Consequence: **High Risk Intersections and Corridors**

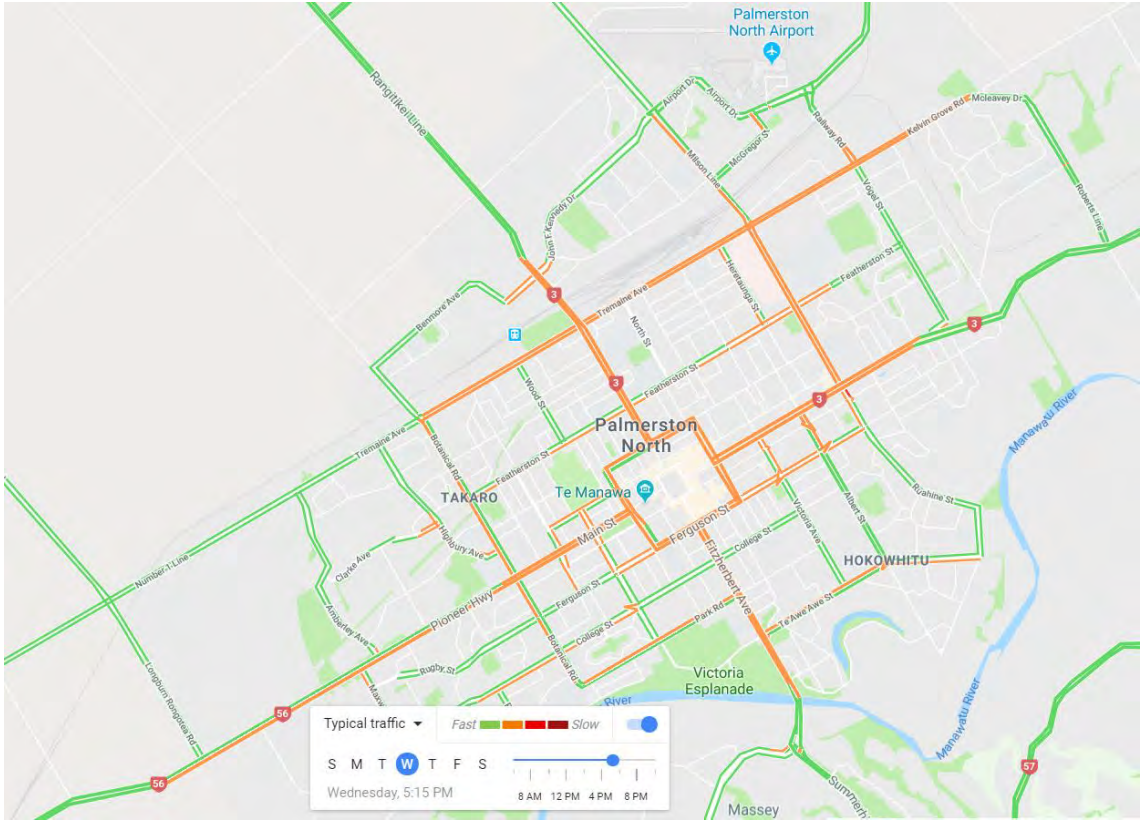


Safety Problem

Consequence: **Freight Vehicle Crashes on Priority Freight Routes**

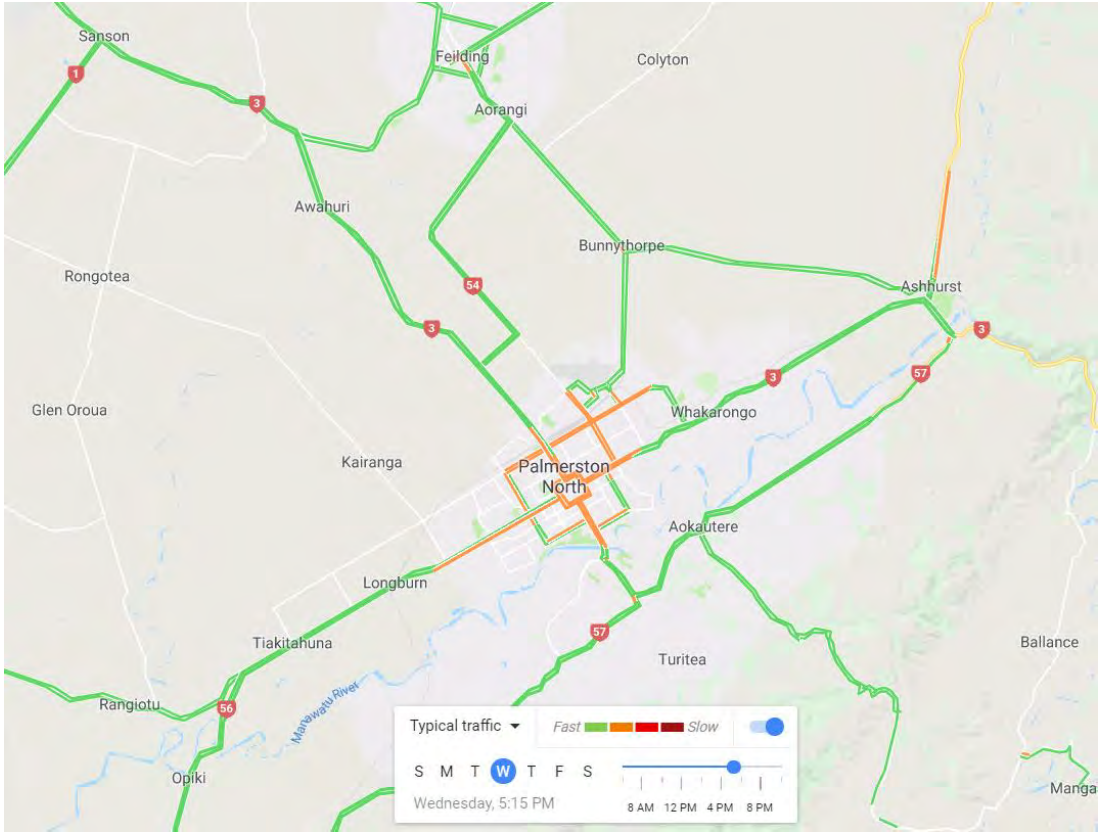
Access Problem

PM Peak – Typical Traffic



Access Problem

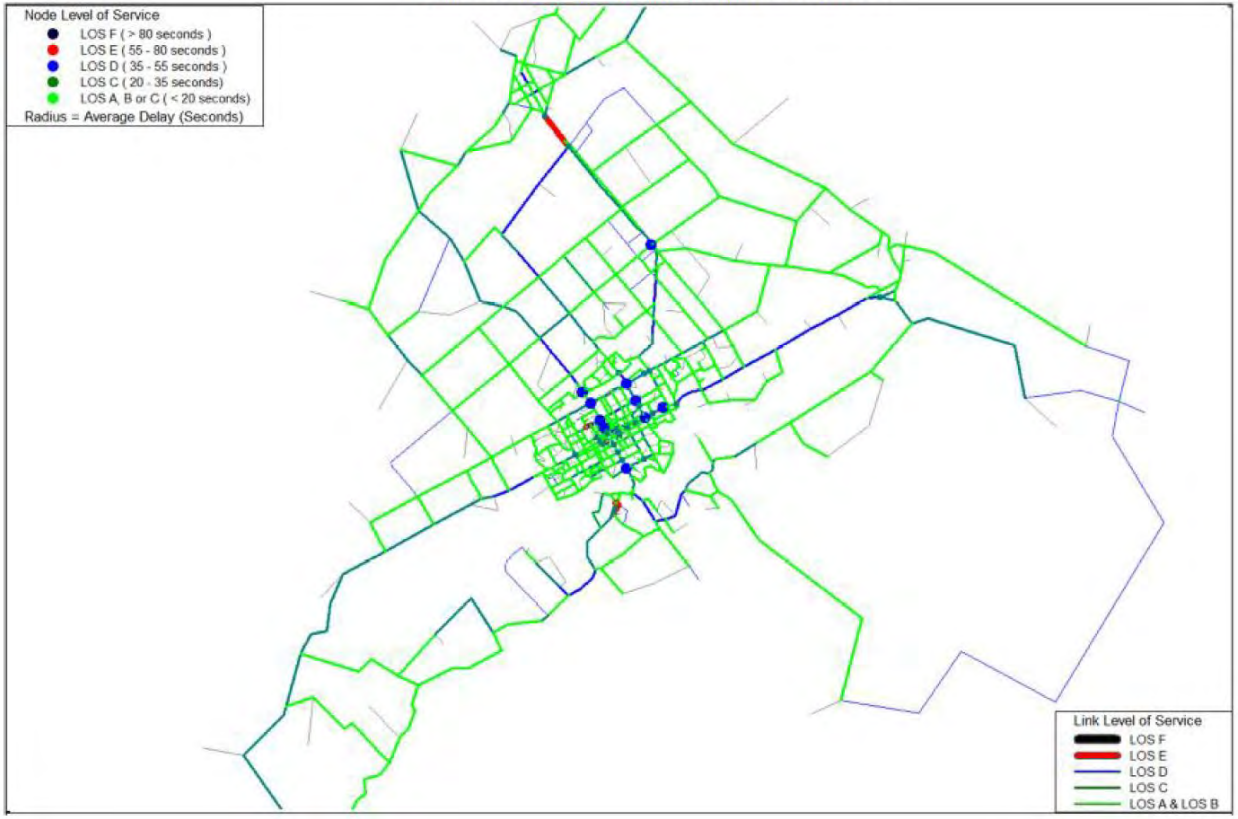
PM Peak – Typical Traffic



Access Problem

2013 Modelling Results

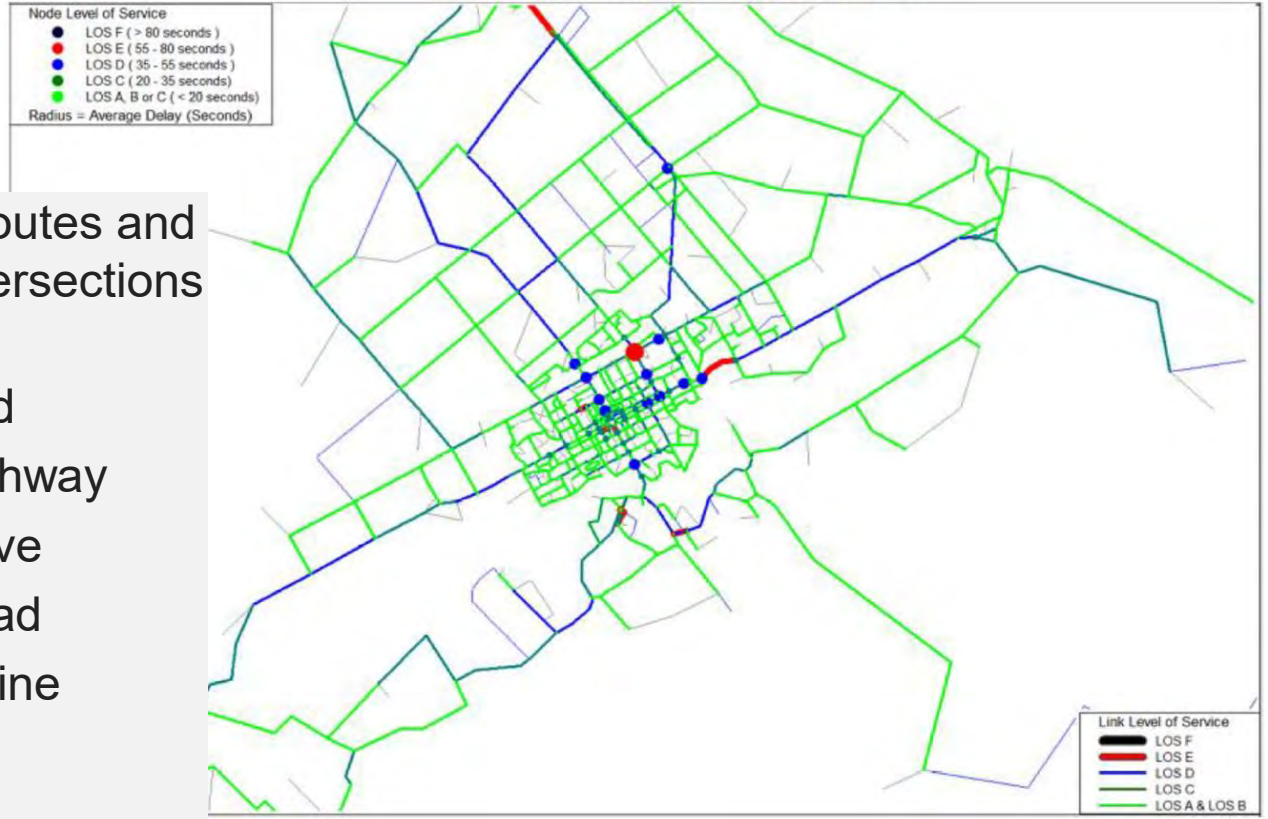
Figure A-1 LOS Plot for Link and Intersection in 2013



Access Problem

2021 Modelling Results

Figure A-2 LOS Plot for Link and Intersection in 2021

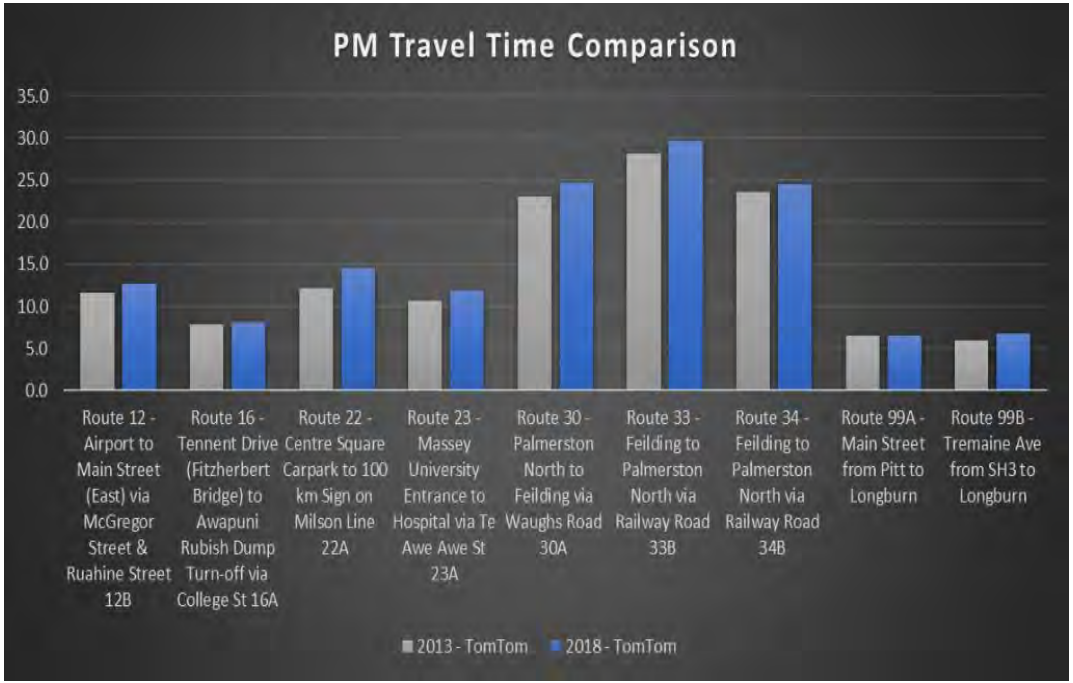


Main arterial routes and associated intersections will deteriorate

- Napier Road
- Pioneer Highway
- Tennent Drive
- Railway Road
- Rangitikei Line

Access Problem

Increase in Travel Times – 2013 vs 2018 (TomTom)



Travel time increases between 2013 and 2018 on key routes by 10% across all three peak periods (AM, IP and PM)

Access Problem

Freight Surveys – Key Identified Issues

- Mainly focussed on traffic conditions within the city on internal links
  - especially Tremaine Avenue and connections to Kelvin Grove

- Need to have reasonable access to rail terminal

Access Problem

Summary

- Some congestion during peak periods
- Access issues along or at key hubs – e.g. Tremaine Avenue, Kelvin Grove
- Travel time increases between 2013 and 2018 on some routes by ~10%
- Significant planned investment in the region will result in both general traffic and freight growth
- Future ‘do nothing’ issues TBD updated traffic modelling and land use scenario development

Investment Objectives and MCA Criteria

Investment Objectives (Draft)

Investment Objective No. 1

A reduction in severance and increase in amenity

Investment Objective No.2

Improve safety in the network

Investment Objective No.3

Improve access to and from key destinations

Investment Objective No.4 / Key Principle

Facilitate economic growth and development

Key Principles

Economic Growth and Development

- Ability to support and align with; existing activities, current and potential growth patterns, other investment (e.g. rail freight hub) and providing access to city work force

Place-Making

- Contribution to existing PNCC strategies, principles and goals

Sustainable Environment

- Transport emissions, walking and cycling, water quality

Resilience

- Ability to respond and recover from events considering the both likelihood and consequence

Long List MCA Criteria

Investment Objectives	**Safety**: Crashes, Safe infrastructure, safe speeds	**Amenity**: Fewer HCVs on "people" and "place" streets, Increased proportion of traffic using desired routes (I.e. NOF)	**Access**: Travel time and variability to key freight nodes	
Key Principles	**Economic Growth and Development**	**Place-Making**: PNCC Principles, Strategies and goals	**Sustainable Environment**: Transport emissions, walking and cycling, water quality	**Resilience**: Likelihood and consequence
Implementability	**Affordability**	**Consentability**	**Constructability**	
Return on investment				

Major Benefit	3
Moderate Benefit	2
Minor Benefit	1
Neutral	0
Minor Disbenefit	-1
Moderate Disbenefit	-2
Major Disbenefit	-3

Long List

Long List of Programmes

- Indicative only at this stage
- Purpose is to identify a short list of programmes for further development and more detailed assessment in the next stage (e.g. traffic modelling)
- The short list could include some new programmes which are a combination of other programmes
- Programmes show future state. Timing and staging of interventions will be considered for shortlisted programmes.
- New route and bridge locations are indicative and to be determined at a later stage
- Programme themes populated with key interventions identified in Workshop 1 and previous work

Long List

Programme Theme	Broad Details
Programme 1: Do-minimum	• Continued maintenance and operations • Committed projects such as Palmerston North City cycle improvements.
Programme 2: Targeted Infrastructure	• Selected infrastructure that addresses existing online issues such as narrow bridges and carriageways
Programme 3: Land Use	• Focuses on changes to the existing land use layout. • Aimed at shifting industrial land uses into areas which can be more easily serviced by existing transport connections.
Programme 4: Safer Speed	• Improve safety and encourage freight to identified routes, and away from residential areas. • Improving selected roads so that the current speed limit is safe • Reducing the speed limit on other roads to match the safety of the current road.
Programme 5: Partial Ring Road Up Stream Bridge	• Partial ring road that connects SH3, Bunnythorpe with State Highway 57 via an upstream bridge.
Programme 6: Partial Ring Road Down Stream Bridge	• Partial ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge.
Programme 7: Full Ring Road with Two Bridges	• Online and offline upgrades to complete a full ring road • Includes two new bridges, one north and one south of the city.
Programme 8: Access and Accessibility	• A ring road variant along with improving access in and out of key hubs and targeted active mode improvements; especially crossing points.
Programme 9: Safety	• Several projects that will combine to create a safer system.
Programme 10: Amenity	• Fewer HCVs on residential and ‘place’ streets, with pedestrian and cycle connections. • Achieved through land use, and safer speed tools, and possibly elements of a ring road.

Short listing Session

Group Session

- Which programmes do not contribute enough to the Investment Objectives or Key Principles?
- Which programmes should be included as part of any short listed programme?
- Which programmes do not need to be considered further?

Summary of Programmes

	INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
	Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
P1 Do Min	0	-1	-1	0	1	1	-1	0	2
P2A Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P2B Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P3 Land Use	0	1	1	1	1	0	-1	-1	0
P4 Safer Speeds	2	1	1	1	1	1	1	-1	2
P5 Partial RR - Upstream	2	1	1	2	1	0	3	-2	1
P6 Partial RR - Downstream	2	2	2	3	2	1	3	-2	2
P7 Full RR inc. two bridges	2	2	2	3	2	1	3	-3	1
P8 Access & Accessibility	2	2	3	3	2	1	3	-2	2
P9 Safety	3	1	1	1	1	1	1	-2	3
P10 Amenity	1	2	1	1	2	1	3	-2	2

Post Workshop 2
Shortlisted Programmes
Indicative – to be developed

Summary of Short Listing

All short listed programmes include key elements from the land use, amenity, safer speeds and safety programmes.

The 3 shortlisted programmes are

- Programme 6: Ring Road with Downstream bridge
- Programme 7: Ring Road with Upstream and Downstream bridge
- Programme 11 (new): Programme based on network improvements from Programme 6, but without a Bridge

PROGRAMME 6

DESCRIPTION

- This programme is based on providing a full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-2	2

Key outcomes of the programme assessment:

- Allows for development and Place Making on Tennent Drive
- Reduction of heavy traffic in residential areas
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre
- Southern bridge allowing for greater certainty future land use planning

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

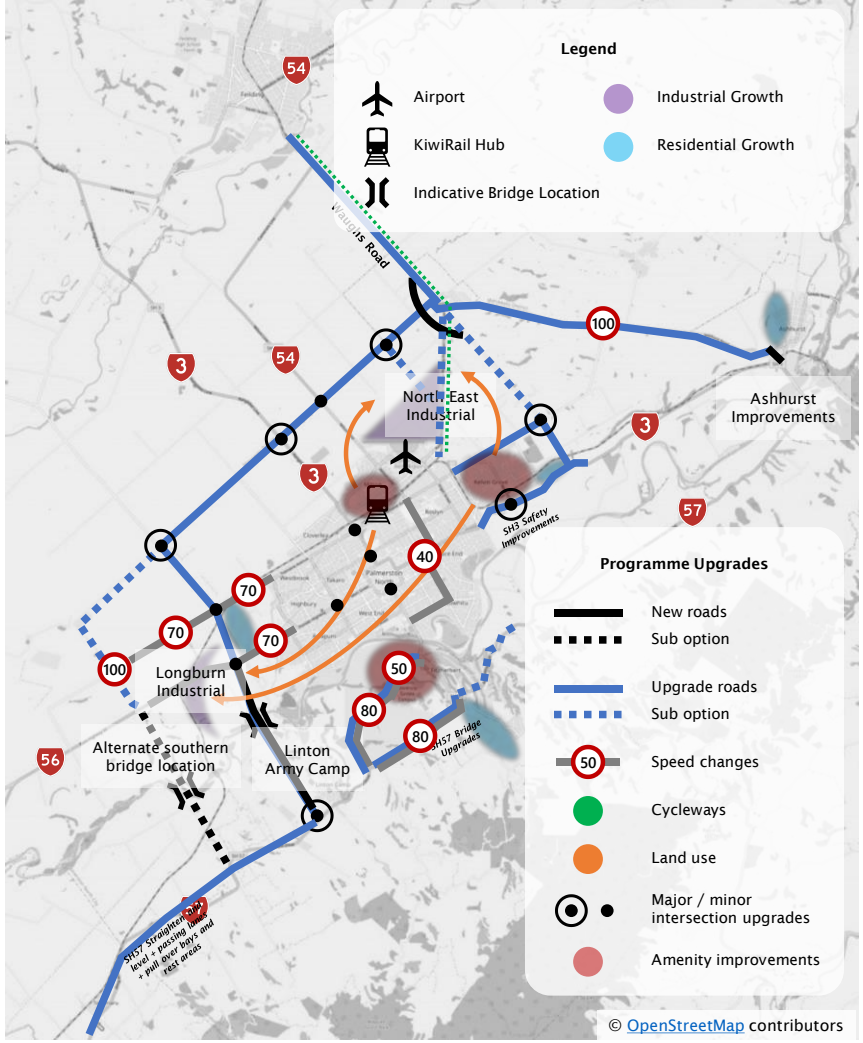
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes and future form and function of SH56 and SH54
- Future upgrade of SH57
- Overweight and Over-dimension routes – current and future
- SH54/KB major intersection upgrade may not be required if SH54 becomes Waughs Rd
- KiwiRail at NEIZ will impact extent of upgrades at Railway, Roberts Line and Bunnythorpe

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated / redistributed • Potential subdivision pressures around new roads, bridges (if delivered)	• Consentability • Conflict between commuter and freight traffic on Waughs / Railway (Fielding to Palmerston commuter traffic)	• Feasibility and affordability • Rongotea Road – Substation, HV lines, Floodplain	• Benefits depend on whether SH56 or SH57 is the preferred route to the west • Potential development around western side of rail at Longburn (TBC) • Programme allows for responsibilities for different roads to be reallocated



PROGRAMME 7

DESCRIPTION

- This programme includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-3	1

Key outcomes of the programme assessment:

- Full ring road allowing for greater certainty future land use planning
- Significant infrastructure improvements on rural network aligning with other infrastructure developments
- Reduction of heavy traffic in residential areas
- Attract Industry
- Allows for reduced investment in SH57 (between the two new bridges) (shown as sub-option)
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

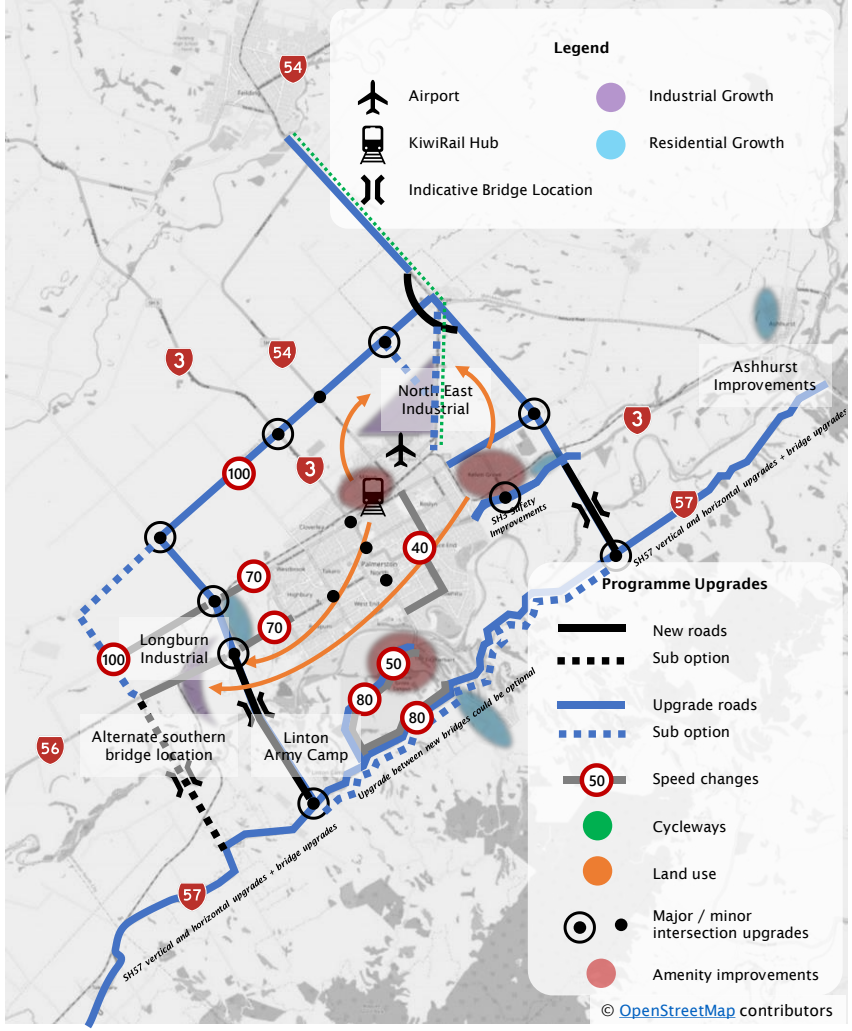
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54
- Delivery sequencing of bridges (if northern bridge delayed then Ashhurst Road might be improved in interim and Northern Bridge may not be delivered). Ashhurst Bridge upgrade may be better use of money instead of upstream bridge

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated • Potential subdivision pressures around new roads, bridges (if delivered) • Programme allows for responsibilities for different roads to be reallocated	• Consentability • Ashhurst Road improvements may still be required • Ashhurst Road might still be used by many instead of a Northern Bridge	• Delivery, feasibility and affordability • Stoney Creek topography and land ownership	• Limited improvement for movements between Manawatu Gorge and the south west • Northern bridge may not be as justifiable as upgrading Ashhurst Road • Ashhurst Road upgrades do not unlock access to Palmerston North as much as a new Northern Bridge



PROGRAMME 11

DESCRIPTION

- Similar to programme 6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	2	2	1	1	1	-1	2

Key outcomes of the programme assessment:

- Good achievement of the identified investment objectives - e.g. access
- Attempts to shift movements to the north of Palmerston North
- Supports planned developments such as FoodHQ

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

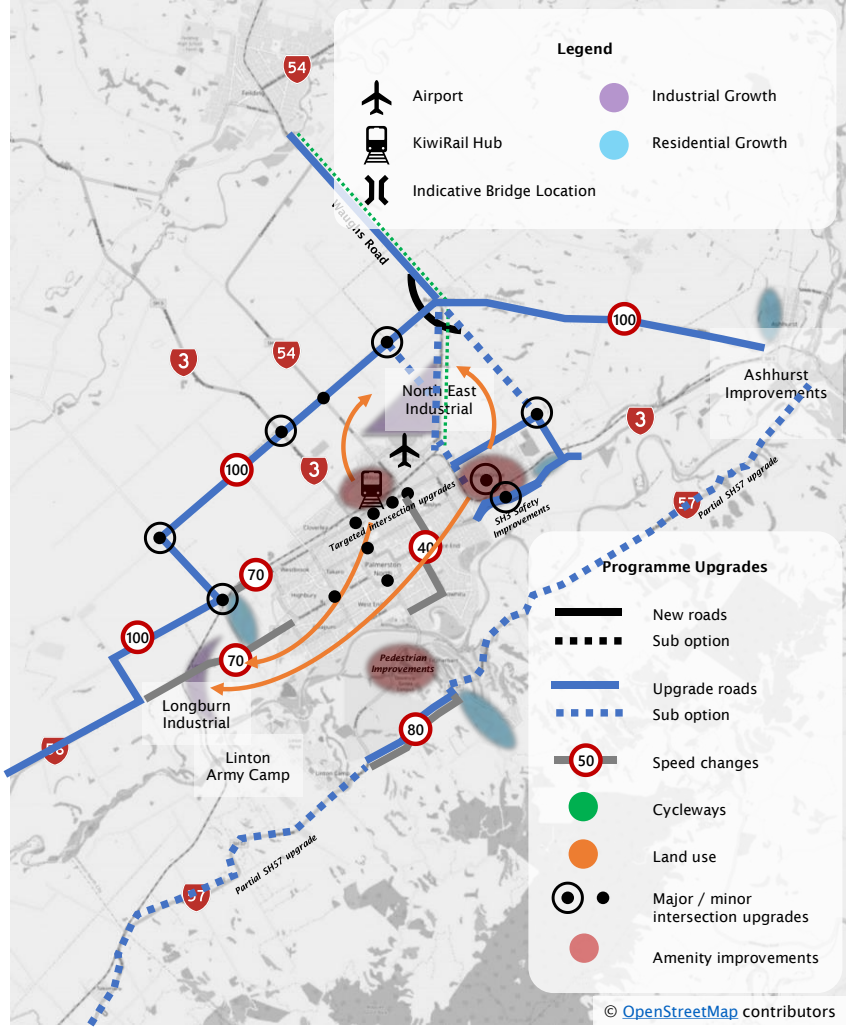
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DOMIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	Low	High	Low	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Does not help address issues at Linton • Resilience – bridge and SH56 flooding	• Stakeholder expectations • Reputational	• Feasibility and affordability	

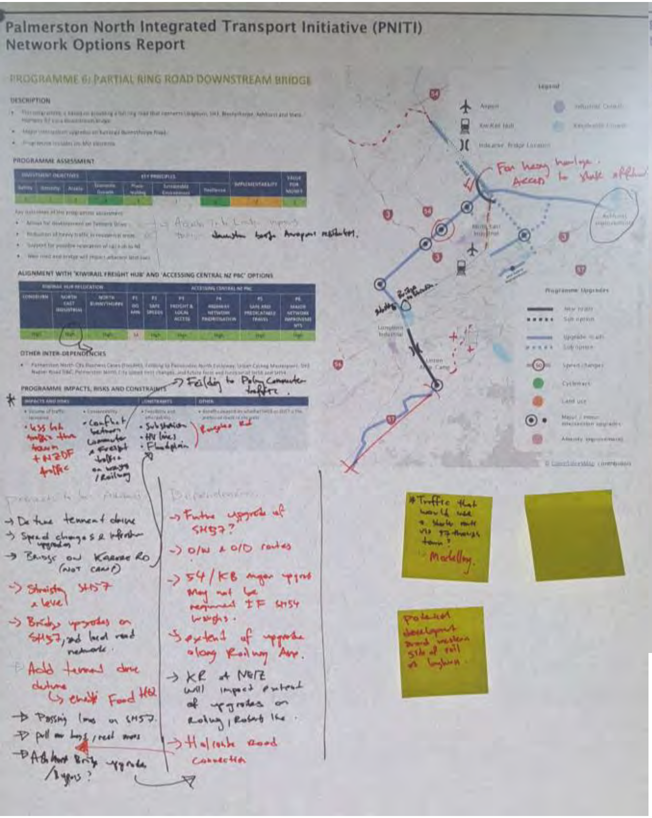


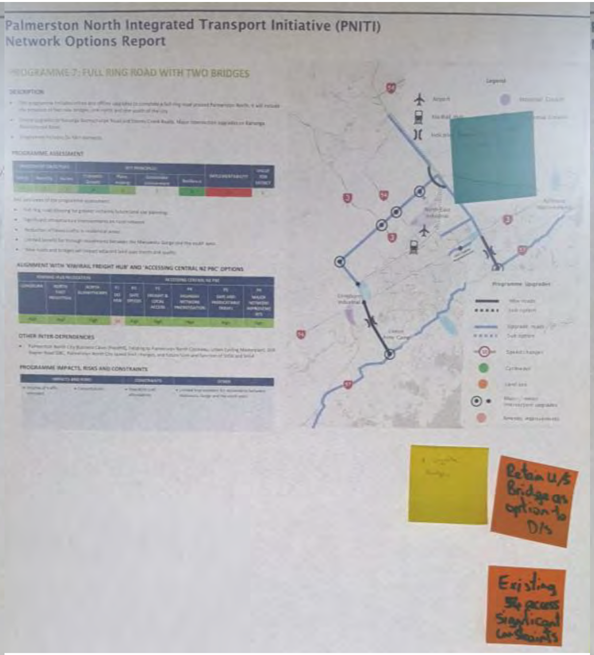
Next Steps

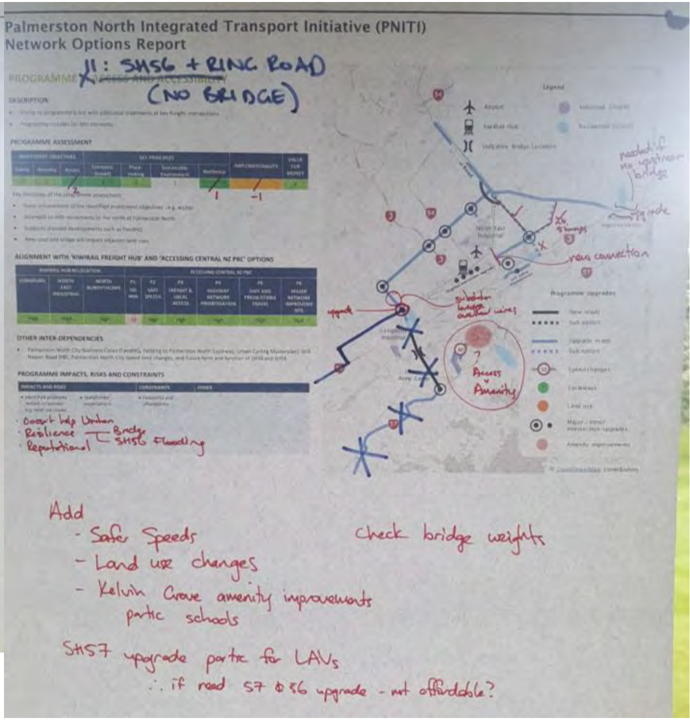
Next Steps

- Further develop short listed programmes
- Ensure consistency between PNITI and ACNZ PBC short lists
- Undertake additional assessments – e.g. Traffic Modelling
- MCA evaluation
- Workshop 3: Short List to Preferred – Dec/Jan

Shortlisted Programmes Photos


Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
PROGRAMME 6: PARTIAL RING ROAD DOWNSTREAM BRIDGE
DESCRIPTION
PROGRAMME ASSESSMENT
ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS
OTHER INTER-DEPENDENCIES
PROGRAMME IMPACTS, RISKS AND CONSTRAINTS
For heavy haulage. Access to Stuck (?)

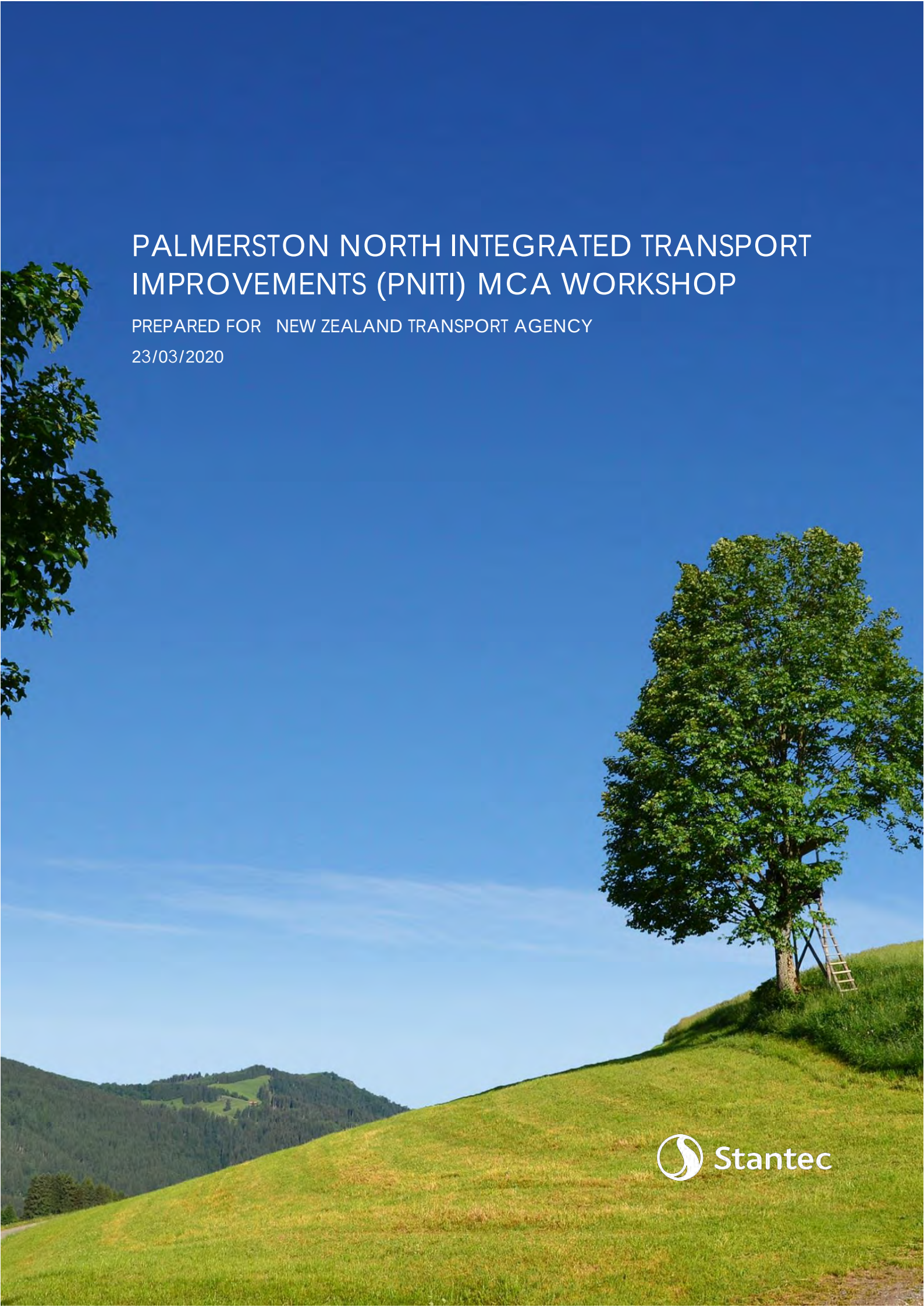

Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
PROGRAMME 7: FULL RING ROAD WITH TWO BRIDGES
DESCRIPTION
PROGRAMME ASSESSMENT
ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS
OTHER INTER-DEPENDENCIES
PROGRAMME IMPACTS, RISKS AND CONSTRAINTS
Retain U/S Bridge as option to D/S


Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
11: SH56 + RING ROAD (NO BRIDGE)
DESCRIPTION
PROGRAMME ASSESSMENT
ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS
OTHER INTER-DEPENDENCIES
PROGRAMME IMPACTS, RISKS AND CONSTRAINTS
Add
- Safe Speeds
- Land use changes
- Kelvin Grove amenity improvements partic schools
Check bridge weights
SH57 upgrade partic for LAVs
∴ if road 57 & 56 upgrade - not affordable?

PALMERSTON NORTH INTEGRATED TRANSPORT IMPROVEMENTS (PNITI) MCA WORKSHOP

PREPARED FOR NEW ZEALAND TRANSPORT AGENCY

23/03/2020



QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Jon England	Phil Peet

PREPARED BY		
Sam Rudge & April Peckham	.....	...../...../...
CHECKED BY		
Dhimantha Ranatunga	.....	...../...../.....
REVIEWED BY		
Phil Peet	.....	...../...../.....
APPROVED FOR ISSUE BY		
Phil Peet	.....	...../...../.....

WELLINGTON
Level 13, 80 The Terrace, Wellington 6011
PO Box 13-052, Armagh, Christchurch 8141
TEL +64 4 381 6700, FAX +64 4 473 1982

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0	21/02/20	Draft for Client Comment	SR, AP	DR	PP	PP
1	23/03/20	Final	DR	JF	PP	PP

Executive Summary

Introduction

The third workshop (WS3) for the NZ Transport Agency's (the Transport Agency's) Palmerston North Integrated Transport Improvements (PNITI) project was held in December 2019. The purpose of this workshop was for stakeholders to review and provide input into the Multi-Criteira Analysis undertaken on the shortlisted programme options and agree on a recommended programme for further development and assessment.

The three shortlisted programme options were:

- Programme 6 – a comprehensive package of improvements including a ring round around Palmerston North and a new southern bridge.
- Programme 7 – a comprehensive package of improvements including a ring road around Palmerston North with both an upstream and downstream bridge.
- Programme 11 – a programme focused on upgrading the existing infrastructure, including bypasses at Ashhurst and Bunnythorpe, but with no additional Manawatu River crossing.

All three programmes featured several common interventions, such as the upgrade of the Kairanga Bunnythorpe Road, speed management, online route upgrades and the longer relocation of several industrial areas to the city outskirts.

Prior to Workshop 3, technical specialists were identified to undertake preliminary investigations and to lead discussion on a range of different criteria at the workshop. An agenda was also circulated to attendees that provided background of the work to date, information on the assessment criteria and how scoring and weighting would be performed.

MCA Criteria

Based on previous analyses for this project, the thirteen criteria were evaluated for the MCA were as follows:

- Safety
- Amenity
- Access
- Economic Growth
- Fit with Strategies
- Sustainable Environment
- Resilience
- Cost
- Engineering Degree of Difficulty
- Archaeology
- Current and Future Land Use
- Value for Money
- Integration with KiwiRail Freight Hub

It is noted that iwi/cultural elements are not currently included (except in elements of the environmental and archaeology criteria) and this needs separate and specific consideration by iwi before selection of a recommended option.

MCA Scoring

The scoring outcomes of the three programme options are set out in the table below (a high number is a good score, a low number is a bad score). While there was general agreement at the workshop, some of the scores differed from those initially proposed by the technical specialist[1]. These were robustly discussed amongst the workshop attendees, who sometimes would offer a point of consideration from their field of expertise that may not have been considered by the technical specialist. All scoring achieved consensus, with the exception of the Fit with Strategy Criteria scoring for Programme 6.

Table 1-1: Scoring of the three programmes

Option	Safety	Access	Amenity	Resilience	Economic Growth	Fit with strategy	Land use	Environment	Archaeology	Engineering degree of difficulty	Cost	Value for Money	Integration with Freight Up
Programme 6	3	2	2	2	2	2/3*	-1	-1	-2	-2	-2	1	2
Programme 7	3	2	2	2	3	3	-3	-1	-2	-3	-3	0	2
Programme 11	3	1	1	0	1	1	0	0	-1	-1	-1	0	1

** Sensitivity testing to be undertaken on Fit with Strategy for Programme 6 scoring a 2 or 3 following discussion at the workshop

NB: dark green means a positive outcome (best) and dark red means a negative outcome (poor).

MCA Weighting System

There were six weighting systems applied to the MCA scores. None of the weighting systems were constrained in terms of an overall weighting, so no 'trade-offs' were made. The systems used were as follows:

- Workshop - based on values of the attendees.
- RMA Balanced – This reflects the aspects that contribute to the overall evaluation of the project under the RMA.
- Community – This weighting system emphasised the aspects likely to be most important to the community.
- Cultural – This weighting system emphasised the aspects likely to be most important to Cultural values.
- Environment – This weighting system emphasised the physical environment.
- Economic – This weighting system placed full weight on the criteria with a significant economic component.

MCA Result

A clear order of preference emerged from the overall analysis using alternative weighting systems. Based on the Workshop Weighting, Programme 6 (with a new southern bridge) was the most-favoured option, having the highest aggregated score. The additional weighting systems which focussed on effects and impacts (RMA Part 2, Natural Environment and Cultural) showed that Programme 11, with the least new infrastructure proposed, was preferred, followed by Programme 6. However, weighting systems which considered benefits (Social, Economics, Workshop) all showed that Programme 6 was preferred.

Programme 6 performed better than Programme 7 (with both an upstream and downstream bridge) under all weighting systems. Figure 3-1 graphically represents the outcome of this process, with the tallest bar indicating the most favoured option.

[1] Note that in some cases the workshop process resulted in scores which were different from those proposed by the technical specialist who provided the base case information. The technical specialists were asked to indicate (as part of the relevant Appendix) where they had any disagreement with the workshop score. This ensures their professional independence, while not affecting the MCA outcome process.

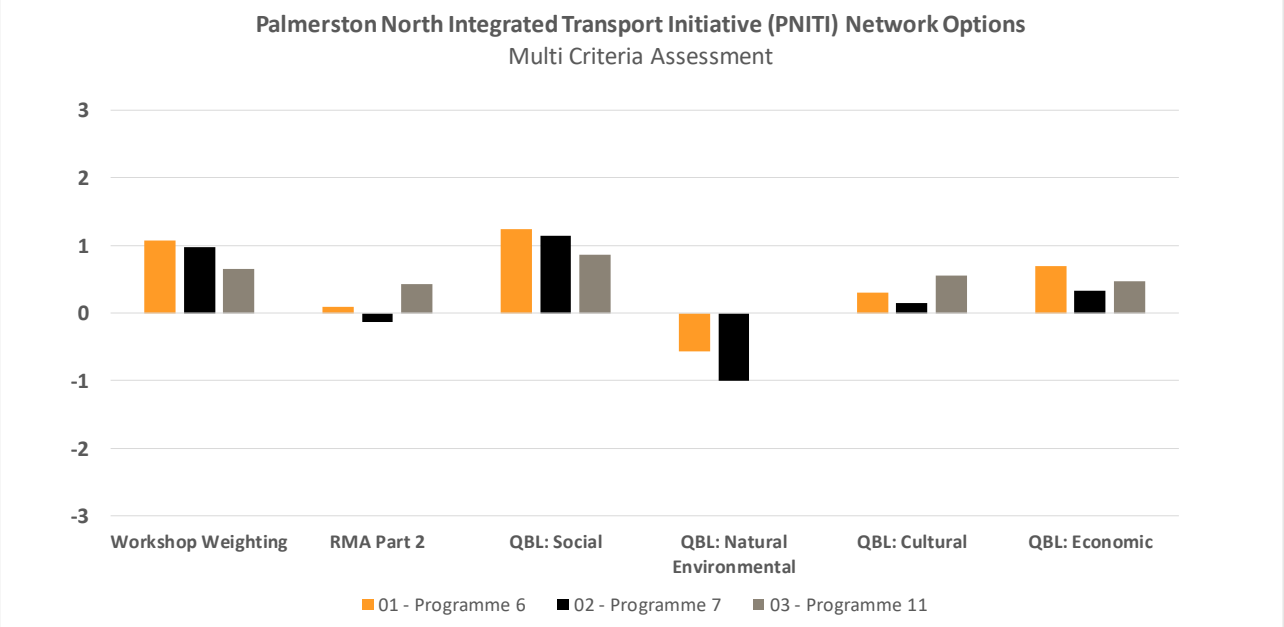


Figure 1-1: Resulting scores from the all weighting systems applied

The analysis was also run with costs excluded, to determine if cost were having an inappropriate impact on the outcomes, and similar results were obtained.

In addition, an alternate higher score for Programme 6 for the 'Fit with Strategy' was undertaken to reflect Workshop 3 feedback but again this did not impact the preferred programme option.

Next Steps

This report has set out the multi-criteria analysis process for the Palmerston North Integrated Transport Improvements short list programme options.

The analysis shows that Programme 6 (a comprehensive package of improvements including a ring round around Palmerston North and a new southern bridge) is the preferred programme option from the consideration of a wide range of criteria through a comprehensive MCA process.

This programme option will be presented to the NZ Transport Agency for their consideration alongside other aspects (including a Cultural Values assessment from Iwi) when deciding on a recommended programme for further development.

New Zealand Transport Agency

Palmerston North Integrated Transport Improvements (PNITI) MCA Workshop

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

1.1 Previous Analyses

This report covers the parameters for, and outcomes of, the short list Multi-Criteria Analysis (MCA) workshop for Waka Kotaki NZ Transport Agency's (The Transport Agency's) Palmerston North Integrated Transport Improvements (PNITI) project held in December 2019.

MCA processes have been used throughout the project to help narrow down the options for inclusion in and the selection of the proposed programmes.

The previous workshops, prior to Workshop 3, proceeded as follows:

1. Workshop 1: This workshop involved the identification of problems, opportunities and constraints, as well as collation of a list of interventions which could address the issues raised. These interventions included a range of physical and non-physical works.

   Based on the outputs of Workshop 1 and consideration of a range of previous work, the project team created several programmes to respond to both the identified problems and opportunities, typically arranged around a theme. All programmes combined a mix of physical and non-physical works and improvements for all modes of transport, focussing on the rural freight network.

2. Workshop 2: The previous MCA workshop (workshop 2) was a comprehensive all-day workshop (October 2019) which included a review of the long list of programmes (including their activities). The stakeholders provided input into and reviewed the draft MCA scoring of ten programmes across nine key criteria and suggested improvements to programmes to ensure that they delivered on the project objectives.

   During the workshop, it was agreed that the following programmes should be shortlisted:

   - Programme 6 – a ring round around Palmerston North, including a new southern bridge.
   - Programme 7 – a compact ring road around Palmerston North, including both an upstream and downstream bridge.

   A programme with just an upstream bridge was not progressed as an upstream bridge was shown to attract significantly less traffic than a downstream bridge, based on previous assessments.

   It was also considered that there were several positive elements in the other programmes but individually they were not achieving the investment objectives, so a combination programme was created:

   - Programme 11 (new) – a programme focused on upgrading the existing infrastructure, including bypasses at Ashhurst and Bunnythorpe, but with no additional Manawatu River Bridge crossing.

   All short listed programmes included key elements from the land use, amenity, safer speeds and safety programmes in particular.

Following Workshop 2, three programmes were shortlisted for further development and assessment in accordance with the feedback received from stakeholders. The shortlisted programmes are presented in Section 2 with the Post Workshop 2 Pack provided in Appendix A.

1.2 Public Consultation and Iwi Involvement

1.2.1 Public Consultation

No public consultation has been undertaken. It has previously been agreed with NZ Transport Agency that public consultation would occur following the selection of the preferred programme.

1.2.2 Iwi Involvement

To date, no formal consultation has been undertaken with iwi. It is noted that Ms Lunch-Karaitiana, a representative from Rangitāne o Manawatū, was present at Workshop 3 *(with Iwi invited to previous workshops*).

In Workshop 3, Ms Lunch-Karaitiana indicated that Iwi are usually involved in projects from the start but have not been in relation to this project. Ms Lunch-Karaitiana stated that iwi are concerned about the location of the southern bridge especially, as there is an urupa in this area. It was noted by Stantec that the alignment of the southern bridge has not been determined and there are different routes that can be taken to avoid cultural areas.

It recommended that NZ Transport Agency liaise with iwi prior to the preferred option being selected.

2. Shortlisted Programmes

As outlined in Section 1 above, Workshop 2 effectively refined down 11 programmes to a shortlist of three based on a review of nine criteria including performance against the investment objectives, impacts and the ability to deliver the programmes.

All three programmes featured several common interventions, such as the upgrade of the Kairanga Bunnythorpe Road, speed management, online route upgrades and the longer term relocation of several industrial areas to the city outskirts.

The shortlisted programme schematic maps are presented in Figure 2-1 to Figure 2-3 below.

- Programme 6 – a comprehensive programme including a partial ring round around Palmerston North with a new southern bridge.
- Programme 7 – a comprehensive programme including a full ring road around Palmerston North with both an upstream and downstream bridge.
- Programme 11 – a programme focused on upgrading the existing infrastructure, including bypasses at Ashhurst and Bunnythorpe but with no additional Manawatu River Bridge.

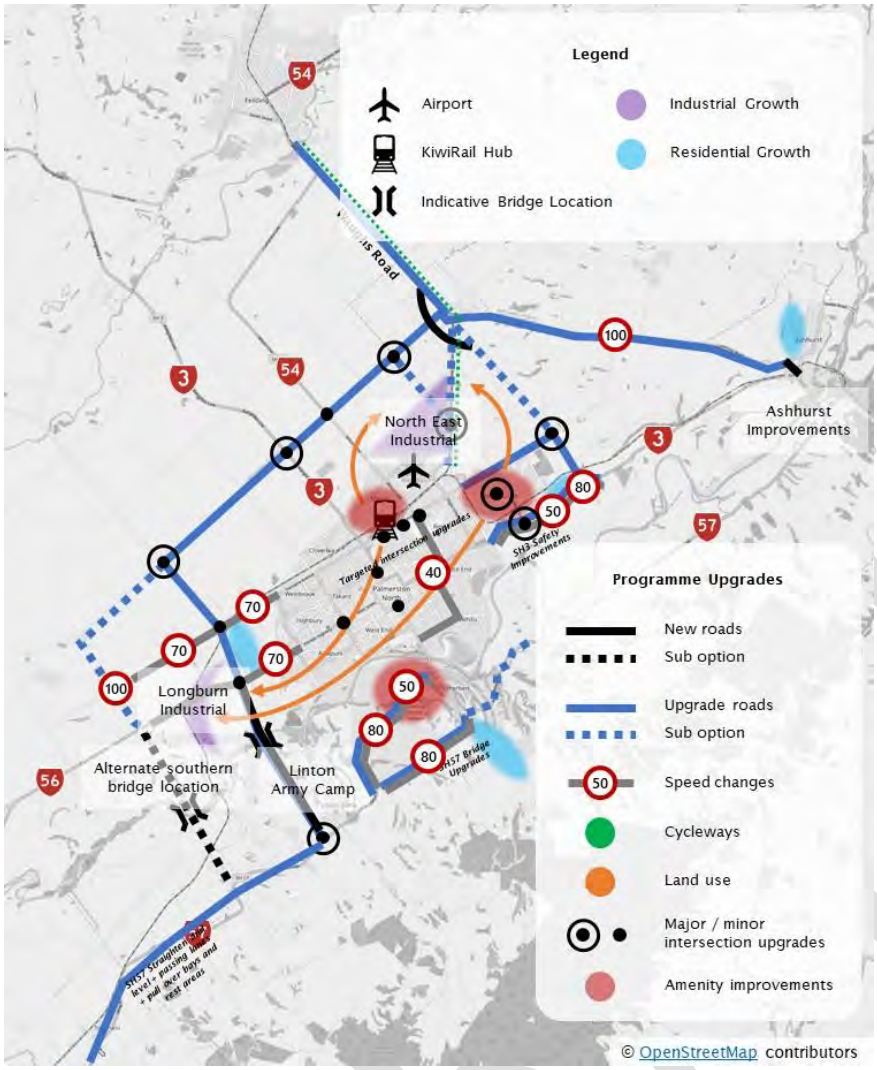


Figure 2-1: Programme 6 proposed interventions

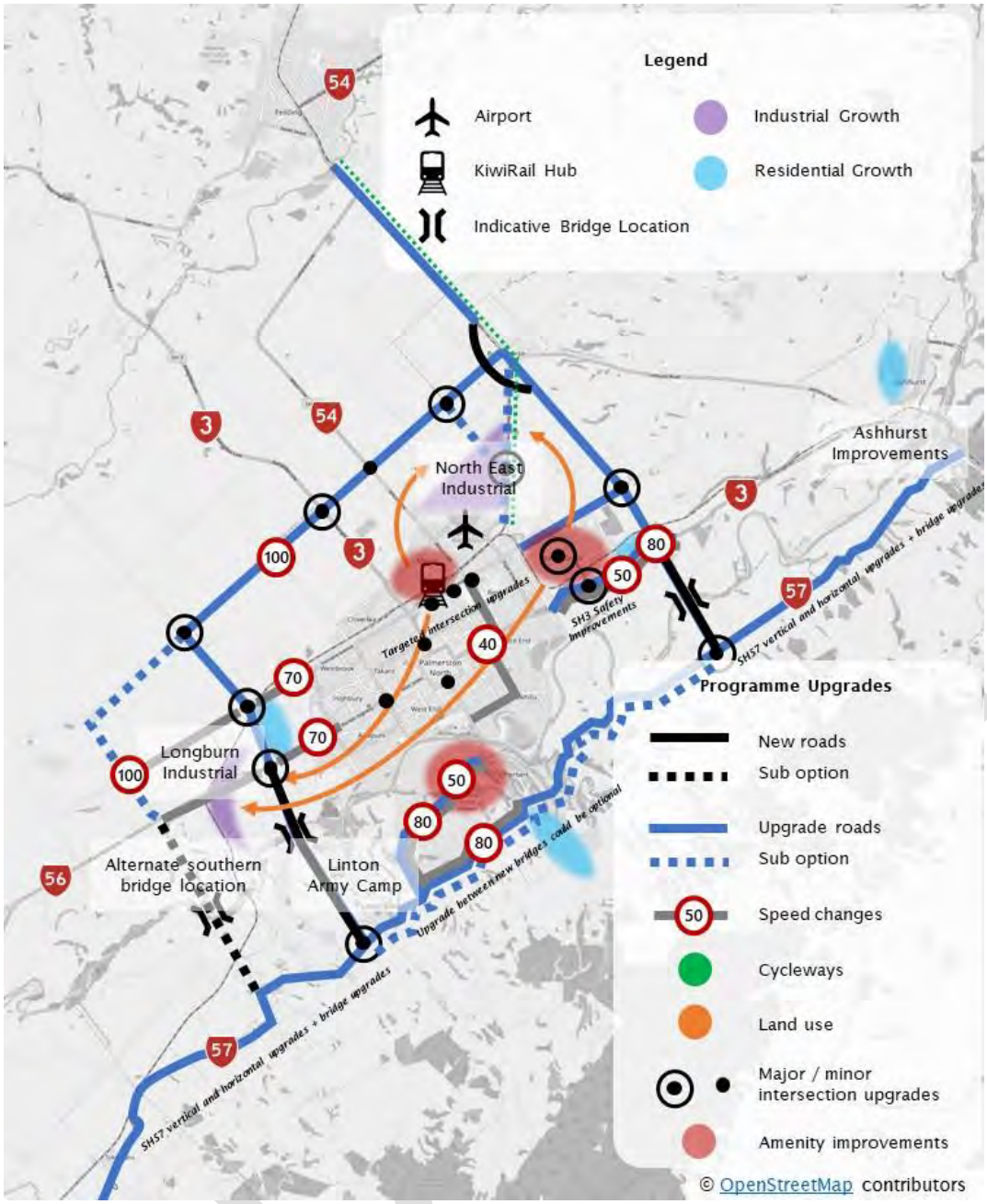


Figure 2-2: Programme 7 proposed interventions

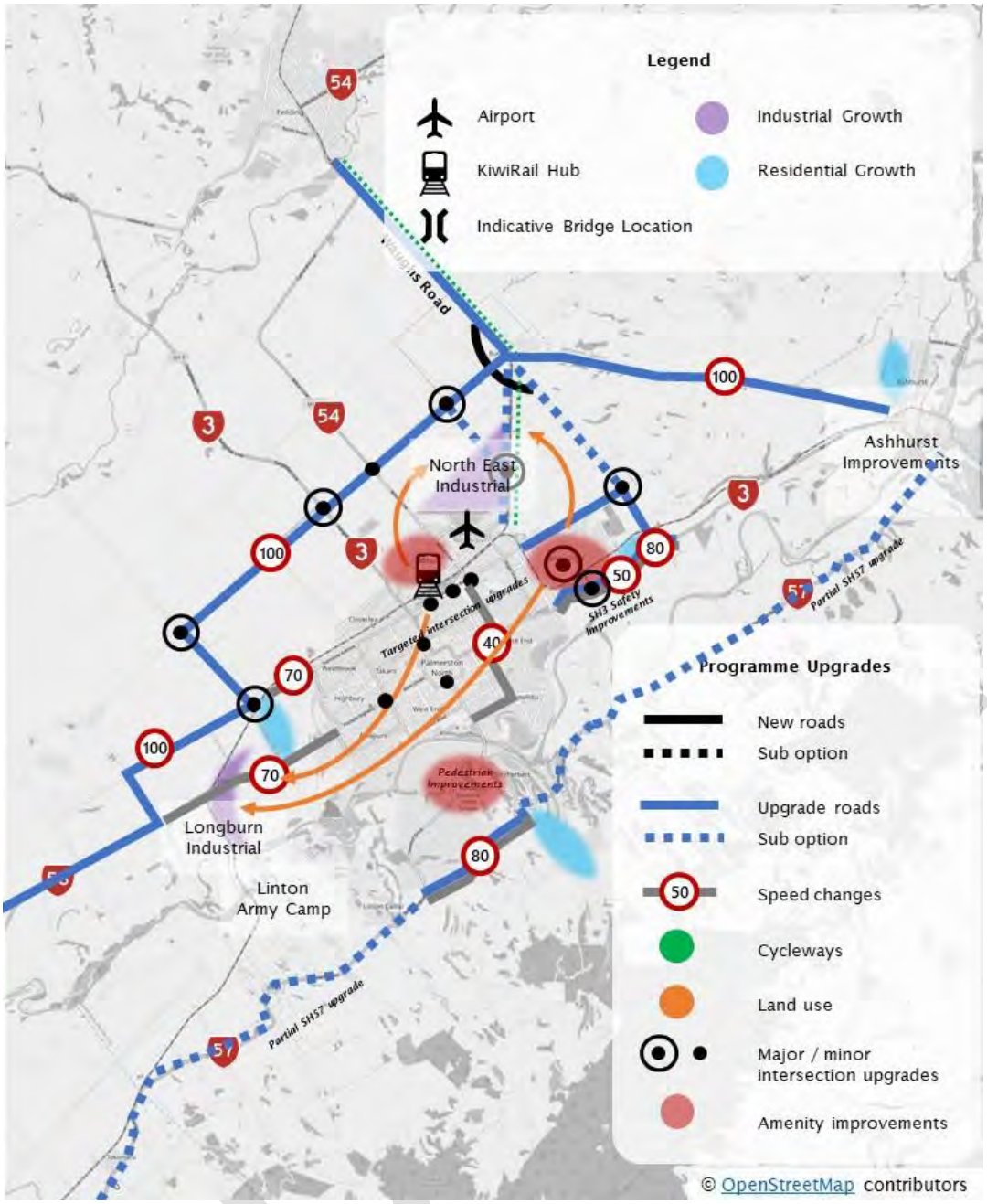


Figure 2-3: Programme 11 proposed interventions

3. MCA Analyses

3.1 Overview

As with earlier analysis, it was necessary to identify relevant criteria. Thirteen criteria were selected and modified to suit the diversity of the programme options. The criteria were discussed in detail with the technical specialists involved in MCA Workshop 3, to ensure the scope of each criterion was sufficient and appropriate to identify the characteristics of the options and any differences between them.

Prior to MCA Workshop 3, technical specialists had been identified to undertake preliminary investigations and to prepare discussion material on each criterion at the workshop. Each technical lead was requested to provide a short background report and evaluative presentation on how each of the three options performed for that criterion. Their findings presented their overall assessment and an indicative score for that criterion for each option, which was then discussed and challenged by the wider workshop group[2]. A final score was then agreed.

The agenda for MCA Workshop 3 was:

- Story – problems, benefits, investment objectives and KPIs
- Workshop 2 Recap – programme long list to short list
- Confirmation of the criteria
- Discussion, definition and scoring of the programme options
- A discussion on the weighting to be applied to each criterion in the analysis.

An early briefing note had been pre-circulated to attendees along with the draft agenda prior to the workshop. Appendix A includes the MCA Workshop 2 summary while Appendix B contains the specialist briefing note, criteria descriptions and Workshop 3 Agenda.

Fatal flaws were not evaluated as this was a key criterion in intervention development and the programme development in earlier workshops.

3.2 Multi-Criteria Analysis Criterion

Thirteen criteria were decided upon and scoped with the assistance of the technical experts. The progression of the MCA criteria between workshop 2 and 3 is shown in Table 3-1 below.

Table 3-1: Evolution in MCA criteria between workshops

Criteria Type	Criteria used in Workshop 2 (Long list criteria)	Workshop 3 Criteria (Short list criteria)	Why Different?
Investment Objective	Safety	Safety	-
Investment Objective	Amenity	Amenity	-
Investment Objective	Access	Access	-
Investment Objective / Key Principle	Economic growth	Economic growth	-
Key Principle	Placemaking	Fits with strategy	Incorporates placemaking and wider policy objectives. Reduces cross over with Amenity criterion

[2] This follows the methodology of "Decision Conferencing", and seeks to reach consensus scores. Where a consensus is not reached, alternative scores are recorded and used as part of the sensitivity analysis.

Criteria Type	Criteria used in Workshop 2 (Long list criteria)	Workshop 3 Criteria (Short list criteria)	Why Different?
Key Principle	Sustainable environment	Sustainable environment	-
Key Principle	Resilience	Resilience	-
Key Principle	KiwiRail Hub Relocation	Integration with KiwiRail freight hub	-
Key Principle	-	Archaeology	A new criterion for Archaeology was included to ensure consideration of archaeological sites.
Implementability	Implementability	Engineering degree of difficulty	Implementability split to consider Engineering Degree of Difficulty and Cost separately
Implementability	-	Cost	
Implementability	-	Current and Future Land Use	An additional criterion of "Current and Future Land Use" was developed to ensure property impacts, productive land and other physical, but non-environmental considerations were included.
Value for money	Value for money	Value for money	-

*Note Iwi/cultural aspects were not assessed but are required before a recommended option is selected.

The criteria are outlined further below (with the nominated technical specialist leading the analysis for each).

- Safety (Jeremy France – Stantec): An overall assessment of the programme covering the safety impacts on state highways and local roads. This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area. The assessment will take cognisance of the KPIs developed for this investment objective.
- Amenity (Matt Soper – Stantec): An overall assessment of the programmes' impact to the local amenity both positive and negative. This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations. The assessment will take cognisance of the KPIs developed for this investment objective.
- Access (Matt Soper – Stantec): This criterion reflects the investment objective and relates to how well the programme improves access between key destinations and access into major areas. The assessment will take cognisance of the KPIs developed for this investment objective.
- Economic (Richard Paling – Paling Consultants): A high level assessment of each programmes' ability to facilitate economic growth. This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications. The assessment will take cognisance of the KPIs developed for this opportunity.
- Alignment with Strategies (April Peckham – Stantec): This criterion assesses the programmes against the relevant documents associated with the strategic direction of the city. The assessment will take cognisance of PNCC's objectives in this space.

- Sustainable Environment (Dhimantha Ranatunga and April Peckham – Stantec): This criterion reflects a key principle and relates to how well the option reduces CO_2 (Dhimantha) and limits the impact on water quality (April).
- Resilience (Sam Rudge – Stantec): This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.
- Cost (Mike Skelton – Stantec): This criterion includes an indicative high-level analysis (note that MCA analysis is run with and without costs).
- Engineering degree of difficulty (Mike Skelton – Stantec): This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.
- Archaeology (Daniel Parker): This criterion covers the potential impact of the programmes on known sites and/or risk areas.
- Current and Future Land Use (April Peckham): This criterion covers the potential impact of the programmes on current and future land uses located on or around the sites.
- Value for Money (Matt Soper and Richard Paling – Stantec and Paling Consultants): This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.
- Integration with KiwiRail Freight Hub (Dhimantha Ranatunga and Richard Paling – Stantec and Paling Consultants): This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.

3.3 Multi-Criteria Analysis of Options

3.3.1 Scoring System

The proposed scoring system had been pre-circulated as part of the agenda and was designed to be consistent with the concurrent Accessing Central New Zealand PBC. This led to the adoption of a 7-point scale. In assigning scores, it was recognised that the project would not proceed unless there were benefits; however, it is more likely the programmes would be distinguished by their adverse effects and difficulties within the criteria. Therefore, the scoring was focussed with this in mind, whilst also capturing where significant benefits were present. The scoring system used is presented below in Table 3-2.

Table 3-2: Basis for Scoring used in the MCA

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

The scale and definitions are consistent with the Transport Agency's business case methodology.

3.3.2 Scoring Process

The overall MCA process was facilitated by Phil Peet. Most attendees at Workshop 3 had also been present at previous workshops, so were familiar with both the processes and the history of the project.

Criteria technical leads or a representative led the discussion on criteria, conducting a short discussion/presentation on the assessment of the criterion and identifying issues relevant to each programme option. Following this, the workshop attendees raised any questions or matters relating to the implications of a programme, or the score proposed by a specialist for each programme. The background notes and assessments of the three programmes for each criterion are presented in Appendix C.

3.3.3 Scoring of Criteria

Table 3-3 sets out the scoring outcomes of the three programmes (a high number is a good score, whilst a negative number is a bad score). While there was general agreement at the workshop, some of the scores were modified from those initially proposed by the technical specialist[3]. These were robustly discussed amongst the workshop attendees, who sometimes would offer a point of consideration from their field of knowledge or expertise that may not have been considered by the technical specialist. All scoring achieved consensus, with the exception of the Fit with Strategy Criteria scoring for Programme 6.

Key points made in the discussion that led to the scores are set out in bullet-point form following on from Table 3-3.

Table 3-3: Scoring of the three programmes

Option	Safety	Access	Amenity	Resilience	Economic Growth	Fit with strategy	Land use	Environment	Archaeology	Engineering degree of difficulty	Cost	Value for Money	Integration with Freight Up
Programme 6	3	2	2	2*	2	2/3**	-1	-1	-2	-2	-2	1	2
Programme 7	3	2	2	2*	3	3	-3	-1	-2	-3	-3	0	2
Programme 11	3	1	1	0	1	1	0	0	-1	-1	-1	0	1

NB: dark green means a positive outcome (best) and dark red means a negative outcome (poor).

* Resilience to be reviewed with respect to Linton Defence Base and weight limits and potential degrading on existing bridges

** Sensitivity testing to be undertaken on Fit with Strategy for Programme 6 scoring a 2 or 3 following discussion at the workshop

While Programmes 6 and 7 score higher in areas such as access and economic growth, they also score worse in terms of cost, engineering degree of difficulty, environmental and archaeological.

Further detail on each assessment is outlined below with Appendix C containing the specialist reports and presentations.

- Safety: The bottom-up safety assessment indicated that all the programmes will likely deliver 'moderately positive' safety benefits. All programmes include significant works, which would result in significant safety benefits. It was noted that this does not necessarily mean that all would result in the same safety benefits. The bridge options were assessed as providing more safety benefits than Programme 11 as they would remove more traffic from key pedestrian and cyclist areas.

  It was noted that a more detailed assessment would highlight differences between the programmes that the current scaling does not permit (i.e. the 7 point scale for benefits ranges from +1 to +3 only).

MOST FAVOURED OPTION: Programme 6 and Programme 7

[3] Note that in some cases the workshop process resulted in scores which were different from those proposed by the technical specialist who provided the base case information. The technical specialists were asked to indicate (as part of the relevant Appendix) where they had any disagreement with the workshop score. This ensures their professional independence, while not affecting the MCA outcome process.

- Access: This assessment concluded that Programme 6 would deliver the highest reduction in overall vehicle distance travelled (peak hours) while Programme 7 would deliver the highest network journey time reduction. Programme 11 would provide the fewest peak period benefits.

  In summary, Programmes 6 and 7 were found to be similar in terms of benefit. Programme 7 is slightly better than Programme 6 in terms of the evaluation of individual aspects of the programme, but slightly lower in terms of reduction in vehicle km travelled. Overall travel time benefits between Programme 6 and Programme 7 are similar.

  This assessment noted that speed limit reductions will increase travel time but will also reduce the number of vehicle km travelled – i.e. reducing the speeds will increase travel time but keep vehicles on the more direct/least cost routes. This potentially provides environmental, amenity and safety benefits and may align better with the desire to 'keep the right traffic on the right road'.

  Modelling showed that, with speed management, the downstream bridge of Programme 6 could attract up to 7,000 vpd in 2031 while Programme 7, with two bridges, was modelled to attract slightly lower volumes on the downstream bridge but less than 3,000 vpd on the upstream bridge.

  Modelling also highlighted that further consideration of speed management, land use, enforcement and wayfinding measures are required in the CBD to give effect to the proposed infrastructure measures and better 'unlock' amenity and safety benefits.

MOST FAVOURED OPTION: Programme 6 and Programme 7

- Amenity: This assessment concluded that there are no significant differences in the amenity improvements that would be delivered by the programmes. As such the assessment was undertaken purely based on the predicted traffic volumes along key streets.

  The main difference between the programmes relates to the extent to which they reduce traffic volumes through the town centre and along Tennent Drive (which currently severs connectivity between Food HQ and Massey). Programmes 6 and 7 would deliver better reductions (giving effect to or enabling potential amenity improvements), and hence were afforded a higher score than Programme 11.

  All options reduced both general and heavy vehicle volumes (to some extent) on the following key routes and areas:

  - Albert Street
  - Ruahine Street
  - Te Awe Awe Street
  - Bunnythorpe Township
  - Tennent Drive

  Any rise in heavy vehicle volumes on other non-freight focussed routes would be negligible.

  For Programmes 6 and 7, generally a +1 score was given on the basis that heavy vehicle volumes are reduced on some of the identified streets, plus a further +1 on the basis that each programme will provide some (currently undefined) town centre amenity benefits. Total = +2.

  For Programme 11, a lower score (when compared to Programme 6 and 7) is provided based on the lower amenity values for the Food HQ/Massey University area, as less traffic would be diverted.

MOST FAVOURED OPTION: Programme 6 and Programme 7

- Resilience: The analysis showed that Programme 7 was the most resilient option. It proposes a new road and bridge outside of the flooding area. It also seeks to improve SH57 which is more resilient than the SH56 alternative. It provides the best routes for travel in all directions in both flooding and earthquake events, including areas such as the Linton Military Camp.

  Programme 6 was the second most resilient option, with a new downstream bridge outside of key flooding areas. The new bridge allows a freight route south of the city to avoid the likely disrupted area. It was considered not as resilient as Programme 7 in an earthquake due to the unknown nature of the disruption to local road bridges on the western ring route. While Programme 6 provides the same

connectivity as Programme 7 in a flood, some routes require a long detour to avoid flooded areas resulting in a lower level of service.

Programme 11 provided no substantial change to the current resilience of the network, with incremental improvements to the existing network and localized improvements to flooding. There were no substantial gains to resilience for both earthquakes or low impact events.

- The resilience scores were reviewed following the Workshop 3 feedback with respect to further consideration of the weight limits and potential degrading on existing bridges and consideration of the Linton Army needing to be able to get out to help with resilience events outside of the region/city. The updated analysis did not change the scoring from the workshop.

MOST FAVOURED OPTION: Programme 7

- Economic: The economic development assessment looked at three key areas, being the ability to support the existing economic activities, the ability to support the current growth patterns and the ability to support specific growth areas.

  Programme 7 will provide the greatest support to the existing freight generating activities, as well as providing the best opportunity to maintain trends seen in freight generating activities and employment. Looking at specific identified growth areas, it provides additional access routes to North East Industrial Zone and improves SH57 which is the primary access point to FoodHQ.

  Programme 6 also provides many of the opportunities as Programme 7. It frequently scored the same or only one below on many of the assessed criteria. Programme 6 also scores highly and will not prevent the achievement of the economic growth potential of the region.

  Programme 11 was deemed to be an improvement on the do minimum but provided marginal benefits for supporting economic development. It provided well for the North East Industrial Zone as well as Longburn, but did not provide as well for FoodHQ due to its inability to re-direct traffic away from Tennent Drive.

MOST FAVOURED OPTION: Programme 7

- Alignment with Strategy: The alignment with strategy criterion assessed the three programmes against the relevant documents associated with the strategic direction of the city. This information was then analysed to identify common themes, outcomes and drivers. The common themes that were identified through the analysis included efficiency, integration and connectivity.

  Programmes 6 and 7 will both provide significant positive impacts through the ring road and bypasses. However, it was determined that Programme 7 would provide the highest alignment as it contains two new bridges.

MOST FAVOURED OPTION: Programme 7

- Current and Future Land Use: The current and future land use assessment looked at four key areas, being the impact on current land uses that may be of value to the wider community; impacts on future land uses, including areas that have been identified as future growth zones or are subject to plan changes; impacts on designations, historic, cultural and natural areas; and impacts on Highly Productive Soils.

  Programme 11 scored the best out of the three programmes as it had the least impacts on both current and future land uses. This is mainly due to works being undertaken on the existing alignments of roads, and due to the fact that no bridges are proposed.

  Programme 7 was scored the lowest as it had the most impacts on current and future land uses in the area. This includes impacts on existing lifestyle blocks. Programme 7 also has the highest impact on works within areas of highly productive land, due to the location of the two bridges.

  Programme 6 has slightly fewer impacts due to only providing the southern bridge.

  It is noted that all three programmes will provide access to future growth areas.

MOST FAVOURED OPTION: Programme 11

- Sustainable Environment: The sustainable environment assessment looked at two key areas, being water quality, and CO_2 emissions.

Effects on water quality was broken down into two parts, being temporary and permanent effects. Temporary effects included effects of the construction works and effects on instream ecology. Permanent effects included effects of ongoing discharges into streams/rivers and the effects on instream ecology.

Programme 11 scored the best in relation to both temporary and permanent effects as no bridges are required to be constructed over the Manawatu River. Programmes 6 and 7 scored the same as they both require the construction of bridges over the Manawatu River.

With regards to CO_2 emissions, the programmes that resulted in a reduced total distance travelled compared to the base network scored better (as a result of less fuel use). The assessment determined that all three programmes result in a slight reduction in total distance travelled compared to the base network (with corresponding CO_2 savings). Programme 6 has the highest reduction in travel distance, followed by Programme 11 and 7 respectively. Programme 7, with the addition of two new Manawatu Bridge crossings, has a lower reduction in network distance travelled.

Overall, while all three programmes show a reduction in total distance travelled, the savings are small and amount to a reduction of less than 1% of total network distance travelled across the network. As such, all three programmes were given the same score for this sub criteria.

MOST FAVOURED OPTION: Programme 11

- Archaeology: The archaeology assessment looked at the potential of archaeological sites within the three programmes areas.

  There are no new bridge crossings included in Programme 11 and the major works are restricted to a bypass of Bunnythorpe. The Bunnythorpe bypass has the potential to affect sites predominantly relating to European/colonial occupation but further research is required at to determine the extent of 19th century occupation.

  Programme 6 includes scope for a new bridge crossing south of the current city and bypasses of Bunnythorpe and Ashhurst. Both of the potential bridge locations are in areas of high archaeological potential and will either directly affect or be in close proximity to historically occupied clearings, hunting and fishing grounds along the banks of the Manawatu River. Connections to SH56 will directly affect or be in close proximity to European sites adjacent to the former railway. Additional constraints are likely to be identified in these areas as the programme develops. The Ashhurst and Bunnythorpe bypasses have the potential to affect sites predominantly relating to European/colonial occupation.

  Programme 7 includes scope for two new bridge crossings to the north and south of the current city and a bypass of Bunnythorpe. All of the potential bridge locations are in areas of high archaeological potential and will either directly affect or be in close proximity to historically occupied clearings, hunting and fishing grounds along the banks of the Manawatu River. Connections to SH56 and SH3 will directly affect or be in close proximity to European sites adjacent to the former railway. Additional constraints are likely to be identified in these areas as the programme develops.

MOST FAVOURED OPTION: Programme 11

- Engineering degree of difficulty: This criterion assessed a number of aspects relating to the engineering complexity of the three programmes, including bridge structures, complexity of the programme, temporary works, access management, unknown risk, construction difficulty and natural hazards.

  The inclusion of river crossing(s) under Programmes 6 and 7 are the principal difference between these and Programme 11. Many other aspects of the works are similar across the 3 programmes - Bunnythorpe bypass, treatments on KB road for transmission lines and flood risk are examples.

  Programme 7 requires further road construction due to the upstream bridge crossing and has an additional 10Km of existing road upgrading to be completed. As a result, this ranks Programme 7 with highest number of (mitigatable) impacts ahead of Programme 6 and 11 which are assessed to be similar, based on the scoring system adopted.

MOST FAVOURED OPTION: Programme 11

- Cost: This criterion considered high level relative costs between programmes, based a combination of the elements that comprise the programmes and the factors considered as part of the Engineering Degree of Difficulty assessment outlined above.

Using Programme 11 as the lowest cost base for comparison, Programme 6 was assessed as having a cost differential of +20-30% whereas Programme 7 had a cost differential of +50-60% (over Programme 11). On the basis of the relative cost differentials, Programme 11 was scored -1, Programme 6 -2 and Programme 7 -3.

MOST FAVOURED OPTION: Programme 11

- Value for money: Programme 6 had a higher value for money than the other two programmes, but was assessed as relatively low given the costs of the scheme. Programme 7 had a lower value for money than Programme 6, with the additional costs of the second river crossing not matched by benefits. The value for money of Programme 11 was lower than Programme 6 due to more limited impact of investments. This programme had similar value for money results to Programme 7.

  It was noted that the assessment did not include safety, walking or cycling or resilience benefits – all of which were determined to be potentially notable. Interventions coupled with safe and appropriate speed changes were also identified as aspects that should be considered in the next stage.

MOST FAVOURED OPTION: Programme 6

- Integration with Freight Hub: Programme 7 provides reasonable economic integration impacts although the benefits of the construction of the additional upstream bridge are offset by the more limited improvements to the direct route to the east. The impact on the forecast traffic flows is higher than for Programme 6 reflecting the additional infrastructure provided.

  Programme 6 also provides reasonable economic development impacts, although in the scenario with urban speed adjustments, the impact on the flows to and from the rail hub is more limited, reflecting the focus on movements to and from the main urban core. The provision of the additional river bridge improves accessibility for cross river traffic to and from the hub, both by providing a new route and reducing the traffic flows and congestion on traffic continuing to use the existing route.

  This contrasts with Programme 11 and its more limited network improvements and in particular the absence of a new river crossing results in a lower impact on economic development opportunities for the hubs and also lower traffic benefits.

MOST FAVOURED OPTION: Programme 6 and Programme 7

3.4 Weighting Systems

3.4.1 Workshop Weighting

It was recognised by the workshop attendees that not all criteria are of equal importance and that different stakeholders may accord them different importance. There was acceptance that the criteria did not represent a "base case" and there was no benefit in an analysis with all criteria accorded equal weight. This approach is consistent with earlier MCA undertaken in relation to the project.

A "workshop" weighting was sought and led to some debate. Participants were not constrained in terms of an overall weighting, so no 'trade-offs' were made. The weightings were based on input from the technical experts and subsequent discussion. The final agreed workshop weightings are presented below in Table 3-4.

Table 3-4: Agreed workshop weighting

Option	Safety	Access	Amenity	Resilience	Economic Growth	Fit with strategy	Land use	Environment	Archaeology	Engineering degree of difficulty	Cost	Value for Money	Integration with Freight Hub
Workshop	10	10	10	5	10	10	5	8	4	5	5	9	10

The workshop participants agreed that there were multiple 'equally most important' criteria, with the four investment objectives (Safety, Access, Amenity, Economic Growth), Fit with Strategy and Integration with the Proposed KiwiRail Freight Hub highlighted as key criteria.

A close second for most important criteria was 'Value for Money'.

The workshop attendees were made aware that additional weighting systems would also be developed after the workshop to ensure robustness of outcome and as a form of sensitivity analysis. The next section explains the basis for these additional weighting approaches.

3.4.2 Additional Weighting Systems

A range of additional weighting systems were developed by Stantec and applied to the workshop scorings. These are based on "quadruple bottom line" considerations. An RMA evaluation was also included to reflect the fact that statutory approvals will need to be obtained for the project. These are described further below and are shown alongside the workshop weighting in Table 3-5.

Table 3-5: Weighting systems applied (including workshop weighting)

Option	Safety	Access	Amenity	Resilience	Economic	Fit with strategy	Current and Future Land use	Environment	Archaeology	Engineering degree of [illegible]	Cost	Value for Money	Integration with Freight Up
Workshop	**10**	**10**	**10**	5	**10**	**10**	5	**8**	4	5	5	**9**	**10**
RMA Part 2	6	0	6	0	0	6	**8**	**10**	**10**	0	0	0	0
QBL: Social	**8**	**8**	**10**	4	2	**8**	**8**	4	4	0	0	0	2
QBL: Natural Environmental	0	0	0	0	0	6	6	**10**	0	6	0	0	0
QBL: Cultural	6	0	6	0	0	6	6	**8**	**8**	0	0	0	0
QBL: Economic	6	**8**	0	0	**10**	4	6	0	0	**8**	5	**10**	0

RMA Part 2 – This reflects the aspects that contribute to the overall evaluation of the project under the RMA. Environment and Archaeology were both identified as critical RMA matters and were weighted a 10 under this system, followed by Current and Future Land Use at 8. Most of the other matters relevant to RMA considerations and have been weighted at 6, as they were difficult to distinguish between in the environment where change can be expected. Engineering Degree of Difficulty, Cost and Value for Money are given less weight as they are effectively transient aspects in RMA terms.

Social – This weighting system emphasised the aspects likely to be most important to the community. This places most emphasis on Amenity, Safety, Access, Fit with Strategy and Current and Future Land Use. Other items which are likely to be important to the community have been allocated either a weighting of 4 or 2.

Environment – This weighting system emphasised the physical environment. In this respect, the Environment Criteria had a weighting of 10. The next three criteria which most closely reflect environmental outcomes were Fit with Strategy, Current and Future Land Use and Engineering Degree of Difficulty, with each given a weighting of 6.

Cultural – This weighting system emphasised the cultural aspects and mixes the considerations from both the social and environmental weighting systems. The two criteria which most closely reflect cultural outcomes were Archaeology and Environment with each given a weighting of 8, followed by Safety, Amenity, Fit with Strategy and Current and Future Land Use with a weighting of 6. Note that no Iwi involvement has been undertaken to date as discussed in Section 1 and further in Section 3.5 below.

Economic – This weighting system placed high weight on criteria with a significant economic component e.g. Economic Growth, Value for Money, Engineering Degree of Difficulty and Access. Cost was given a lower rating as it is indirectly included in both the Value for Money and Engineering Degree of difficulty criteria.

3.5 Additional Criterion Noted

It was indicated at Workshop 3, that "Cultural Values" should be rated separately and have its own criterion. Further discussions with Ms Siobhan Lynch-Karaitiana, a representative of Rangitāne o Manawatū, has resulted in her stating that an MCA assessment around cultural values for Rangitāne o Manawatū should be prepared.

3.6 Results of Multi-Criteria Analysis Process

A clear order of preference emerged from the overall analysis using alternative weighting systems. Based on the Workshop Weighting, Programme 6 (Network improvements including a Downstream Bridge) was the most-favoured option, having the highest aggregated score.

The additional weighting systems which focussed on effects and impacts (RMA Part 2, Natural Environment and Cultural) showed that Programme 11, with the least new infrastructure proposed, was preferred, followed by Programme 6. However, weighting systems which considered benefits (Social, Economics, Workshop) all showed that Programme 6 was preferred.

Programme 6 performed better than Programme 7 (Full ring road with two bridges) under all weighting systems.

Figure 3-1 graphically represents the outcome of this process, with the tallest bar indicating the most favoured option.

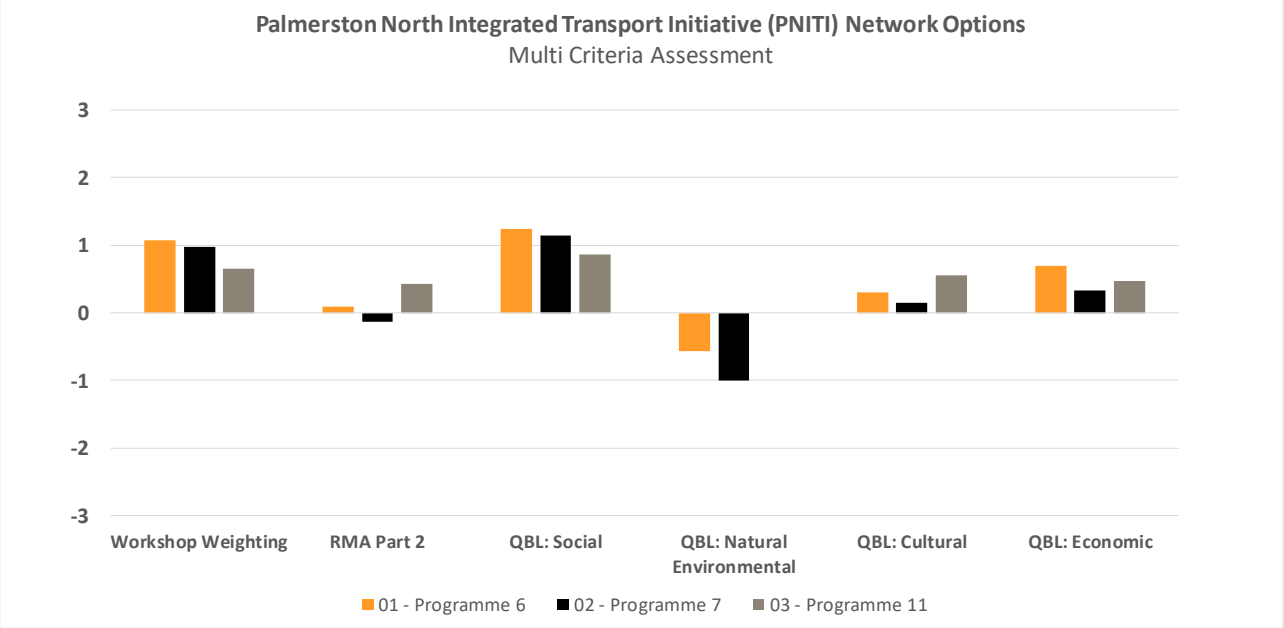


Figure 3-1: Resulting scores from the all weighting systems applied

The analysis was also run with costs excluded and similar results were obtained. In addition, an alternate higher score for Programme 6 for the 'Fit with Strategy' was undertaken to reflect Workshop 3 feedback but again this did not impact the preferred programme option.

4. Conclusion

This report has set out the multi-criteria analysis process for the Palmerston North Integrated Transport Improvements short list programme options.

It is clear from the analysis that Programme 6 (Network improvements including a Downstream Bridge) is the preferred programme option from the consideration of a wide range of criteria through a comprehensive MCA process.

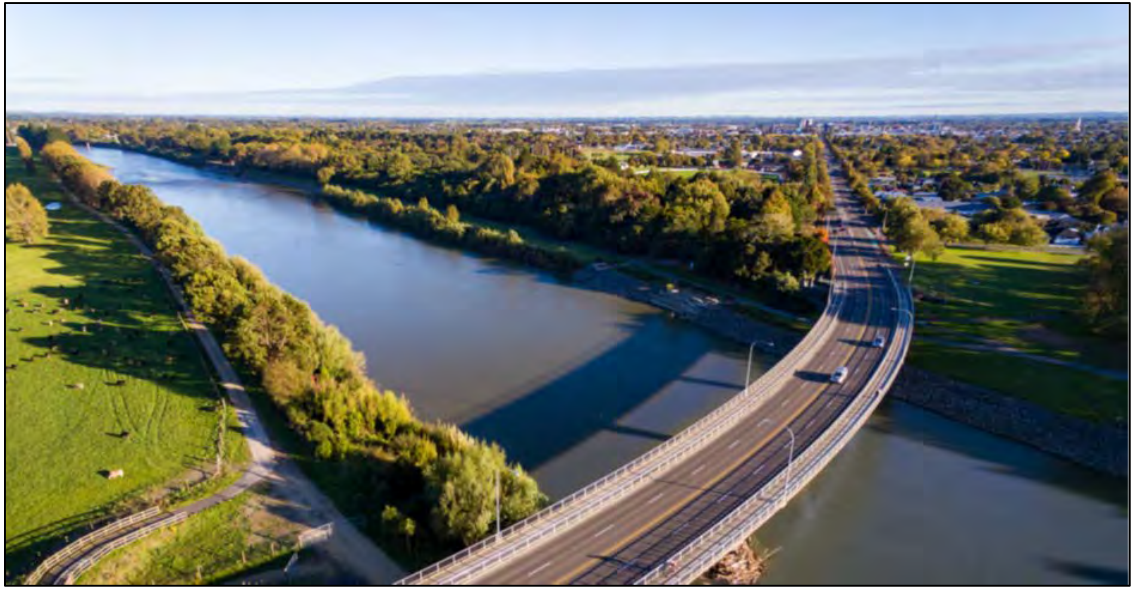
This programme option will be presented to the NZ Transport Agency for their consideration alongside other aspects (including a Cultural Values assessment from Iwi) when deciding on a recommended option for further development.

Appendices

Appendix A Workshop 2 Summary

Palmerston North Integrated Transport Initiative Business Case

Workshop 2 – Post Workshop Pack



WAKA KOTAHI NZ TRANSPORT AGENCY

Stantec

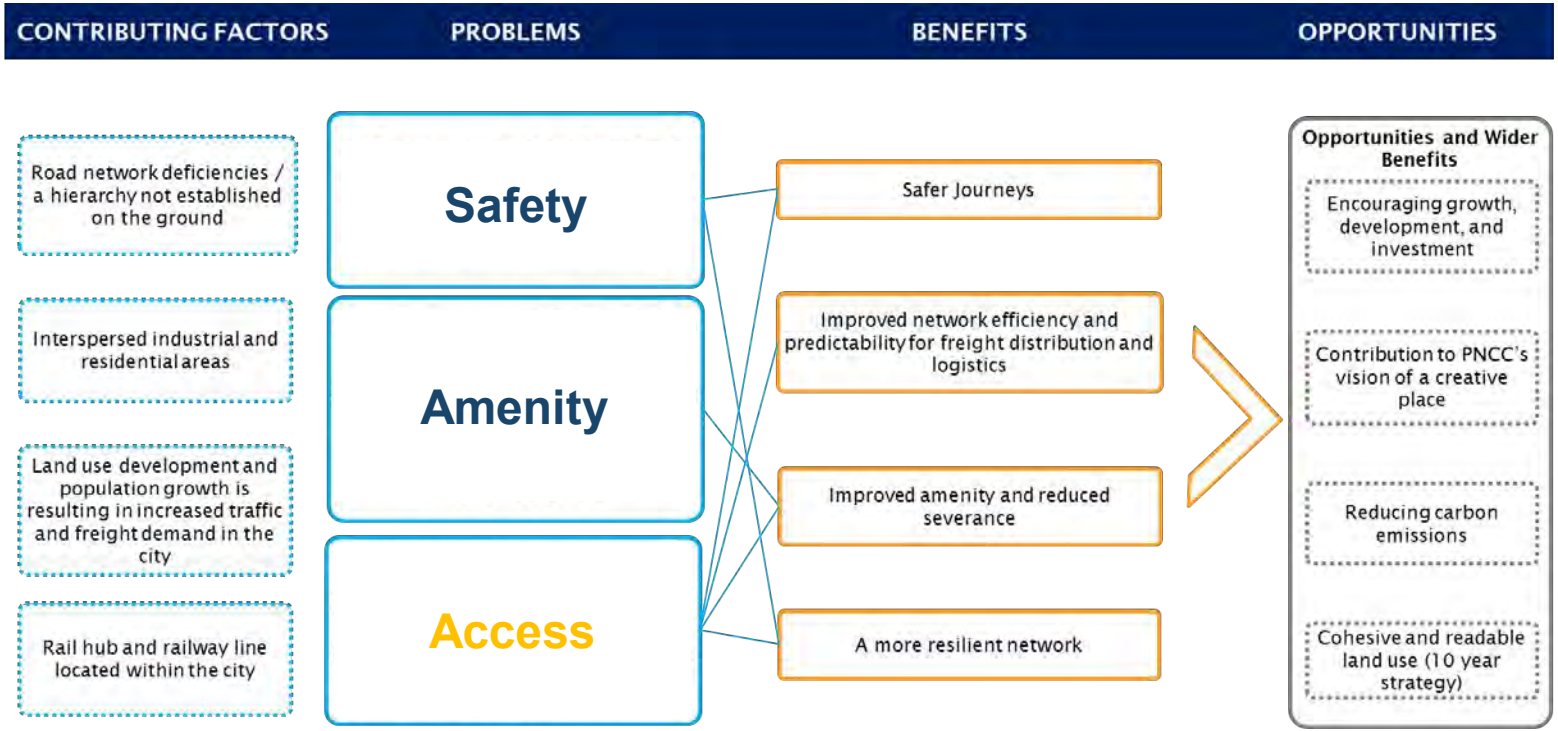
New Zealand Government

Workshop Outcomes

- For attendees to have provided input in the programme development and shortlisting processes.
- To agree a short list of programmes to take forward for further assessment.
- For everyone to understand what the next steps are.

Problems

Problems and Benefits Mapping



Amenity Problem

Freight Demands

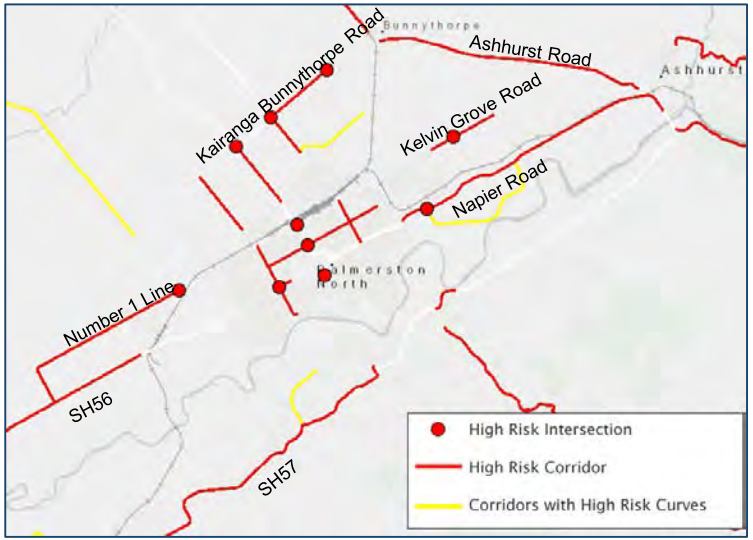
Interspersed Industrial and Residential Areas

Safety Problem

Road Network Deficiencies

- Intersection form and configuration (rural and urban)
- High number of conflicting movements (rural and urban)
- High speed environments
- Narrow carriageways and roadside hazards

High Risk Intersections and Corridors



Access Problem

Summary

- Some congestion during peak periods
- Access issues along or at key hubs – e.g. Tremaine Avenue, Kelvin Grove, NEIZ
- Travel time increases between 2013 and 2018 on some routes by ~10%
- Significant planned investment in the region will result in both general traffic and freight growth
- Future ‘do nothing’ issues TBD updated traffic modelling and land use scenario development
- Access is both a problem and opportunity

Investment Objectives and MCA Criteria

Investment Objectives (Draft)

Investment Objective No. 1

A reduction in severance and increase in amenity

Investment Objective No.2

Improve safety in the network

Investment Objective No.3

Improve access to and from key destinations

Investment Objective No.4 / Key Principle

Facilitate economic growth and development

Key Principles

Economic Growth and Development

- Ability to support and align with; existing activities, current and potential growth patterns, other investment (e.g. rail freight hub) and providing access to city work force

Place-Making

- Contribution to existing PNCC strategies, principles and goals

Sustainable Environment

- Transport emissions, walking and cycling, water quality

Resilience

- Ability to respond and recover from events considering the both likelihood and consequence

Long List MCA Criteria

Investment Objectives	**Safety**: Crashes, Safe infrastructure, safe speeds	**Amenity**: Fewer HCVs on "people" and "place" streets, Increased proportion of traffic using desired routes (I.e. NOF)	**Access**: Travel time and variability to key freight nodes	
Key Principles	**Economic Growth and Development**	**Place-Making**: PNCC Principles, Strategies and goals	**Sustainable Environment**: Transport emissions, walking and cycling, water quality	**Resilience**: Likelihood and consequence
Implementability	**Affordability**	**Consentability**	**Constructability**	
Return on investment				

Major Benefit	3
Moderate Benefit	2
Minor Benefit	1
Neutral	0
Minor Disbenefit	-1
Moderate Disbenefit	-2
Major Disbenefit	-3

Long List

Long List of Programmes

- Indicative only at this stage
- Purpose is to identify a short list of programmes for further development and more detailed assessment in the next stage (e.g. traffic modelling)
- The short list could include some new programmes which are a combination of other programmes
- Programmes show future state. Timing and staging of interventions will be considered for shortlisted programmes.
- New route and bridge locations are indicative and to be determined at a later stage
- Programme themes populated with key interventions identified in Workshop 1 and previous work

Long List

Programme Theme	Broad Details
Programme 1: Do-minimum	• Continued maintenance and operations • Committed projects such as Palmerston North City cycle improvements.
Programme 2: Targeted Infrastructure	• Selected infrastructure that addresses existing online issues such as narrow bridges and carriageways
Programme 3: Land Use	• Focuses on changes to the existing land use layout. • Aimed at shifting industrial land uses into areas which can be more easily serviced by existing transport connections.
Programme 4: Safer Speed	• Improve safety and encourage freight to identified routes, and away from residential areas. • Improving selected roads so that the current speed limit is safe • Reducing the speed limit on other roads to match the safety of the current road.
Programme 5: Partial Ring Road Up Stream Bridge	• Partial ring road that connects SH3, Bunnythorpe with State Highway 57 via an upstream bridge.
Programme 6: Partial Ring Road Down Stream Bridge	• Partial ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge.
Programme 7: Full Ring Road with Two Bridges	• Online and offline upgrades to complete a full ring road • Includes two new bridges, one north and one south of the city.
Programme 8: Access and Accessibility	• A ring road variant along with improving access in and out of key hubs and targeted active mode improvements; especially crossing points.
Programme 9: Safety	• Several projects that will combine to create a safer system.
Programme 10: Amenity	• Fewer HCVs on residential and ‘place’ streets, with pedestrian and cycle connections. • Achieved through land use, and safer speed tools, and possibly elements of a ring road.

Short listing Session

Group Session

- Which programmes do not contribute enough to the Investment Objectives or Key Principles?
- Which programmes should be included as part of any short listed programme?
- Which programmes do not need to be considered further?

Summary of Programmes

	INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
	Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
P1 Do Min	0	-1	-1	0	1	1	-1	0	2
P2A Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P2B Targeted Infrastructure	2	1	1	1	1	0	1	-1	2
P3 Land Use	0	1	1	1	1	0	-1	-1	0
P4 Safer Speeds	2	1	1	1	1	1	1	-1	2
P5 Partial RR - Upstream	2	1	1	2	1	0	3	-2	1
P6 Partial RR - Downstream	2	2	2	3	2	1	3	-2	2
P7 Full RR inc. two bridges	2	2	2	3	2	1	3	-3	1
P8 Access & Accessibility	2	2	3	3	2	1	3	-2	2
P9 Safety	3	1	1	1	1	1	1	-2	3
P10 Amenity	1	2	1	1	2	1	3	-2	2

Post Workshop 2 Shortlisted Programmes
Indicative – to be developed further

Summary of Short Listing

During the workshop the initial ten longlisted programmes were narrowed to shortlist of 3 programmes. A good proportion of the discussion during this process concerned the role of bridge(s) across the Manawatū River.

The 3 shortlisted programmes are:

- Programme 6: Ring Road with Downstream bridge
- Programme 7: Ring Road with Upstream and Downstream bridge
- Programme 11 (new): Programme based on network improvements from Programme 6, but without a Bridge

All short listed programmes include key elements from the land use, amenity, safer speeds and safety programmes.

PROGRAMME 6

DESCRIPTION

- This programme is based on providing a full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME ASSESSMENT WS2 Scoring

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-2	2

Key outcomes of the programme assessment:

- Allows for development and Place Making on Tennent Drive
- Reduction of heavy traffic in residential areas
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre
- Southern bridge allowing for greater certainty future land use planning

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

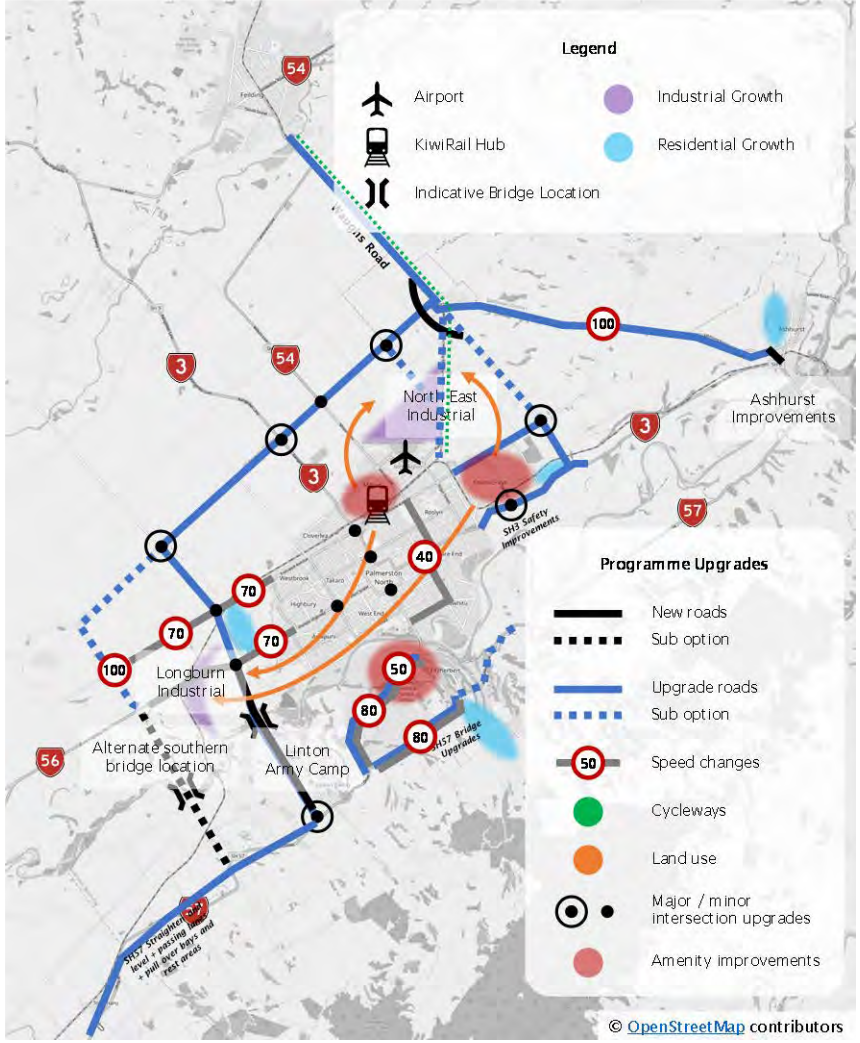
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes and future form and function of SH56 and SH54
- Future upgrade of SH57
- Overweight and Over-dimension routes – current and future
- SH54/KB major intersection upgrade may not be required if SH54 becomes Waughs Rd
- KiwiRail at NEIZ will impact extent of upgrades at Railway, Roberts Line and Bunnythorpe

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated / redistributed • Potential subdivision pressures around new roads, bridges (if delivered)	• Consentability • Conflict between commuter and freight traffic on Waughs / Railway (Fielding to Palmerston commuter traffic)	• Feasibility and affordability • Rongotea Road – Substation, HV lines, Floodplain	• Benefits depend on whether SH56 or SH57 is the preferred route to the west • Potential development around western side of rail at Longburn (TBC) • Programme allows for responsibilities for different roads to be reallocated



PROGRAMME 7

DESCRIPTION

- This programme includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME ASSESSMENT WS2 Scoring

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-3	1

Key outcomes of the programme assessment:

- Full ring road allowing for greater certainty future land use planning
- Significant infrastructure improvements on rural network aligning with other infrastructure developments
- Reduction of heavy traffic in residential areas
- Attract Industry
- Allows for reduced investment in SH57 (between the two new bridges) (shown as sub-option)
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

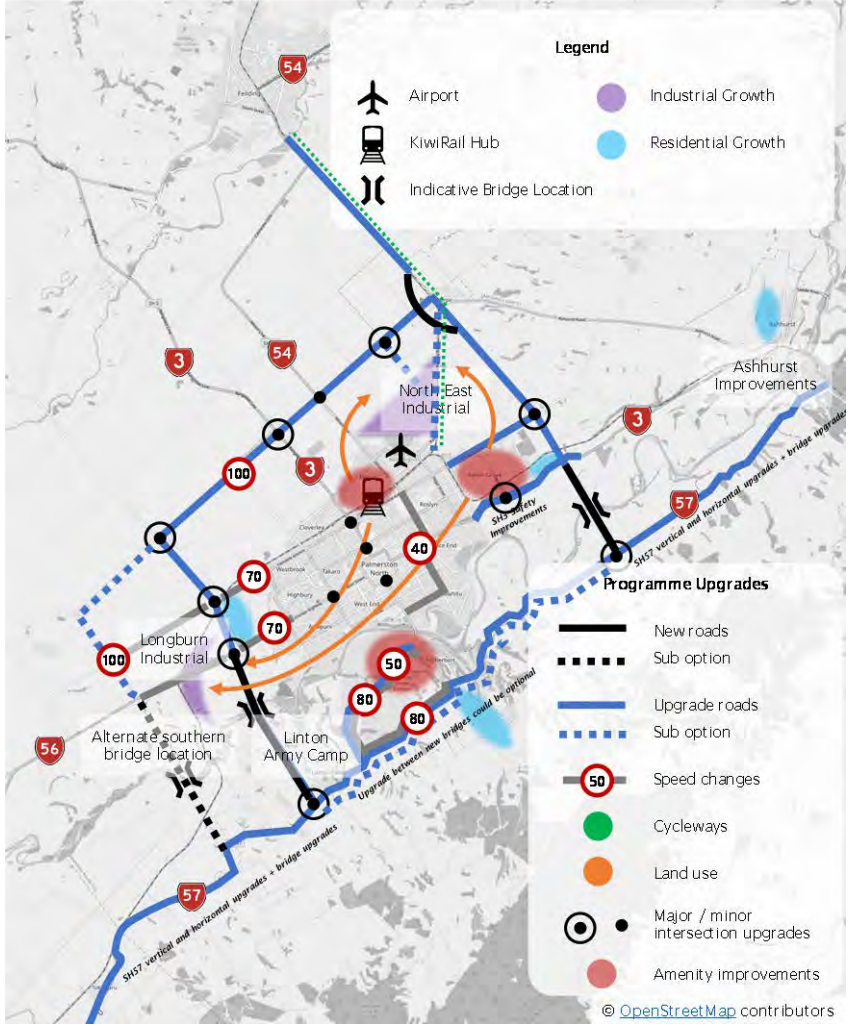
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54
- Delivery sequencing of bridges (if northern bridge delayed then Ashhurst Road might be improved in interim and Northern Bridge may not be delivered). Ashhurst Bridge upgrade may be better use of money instead of upstream bridge

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated • Potential subdivision pressures around new roads, bridges (if delivered) • Programme allows for responsibilities for different roads to be reallocated	• Consentability • Ashhurst Road improvements may still be required • Ashhurst Road might still be used by many instead of a Northern Bridge	• Delivery, feasibility and affordability • Stoney Creek topography and land ownership	• Limited improvement for movements between Manawatu Gorge and the south west • Northern bridge may not be as justifiable as upgrading Ashhurst Road • Ashhurst Road upgrades do not unlock access to Palmerston North as much as a new Northern Bridge



PROGRAMME 11

DESCRIPTION

- Similar to programme 6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

PROGRAMME ASSESSMENT WS2 Scoring

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	2	2	1	1	1	-1	2

Key outcomes of the programme assessment:

- Good achievement of the identified investment objectives - e.g. access
- Attempts to shift movements to the north of Palmerston North
- Supports planned developments such as FoodHQ

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

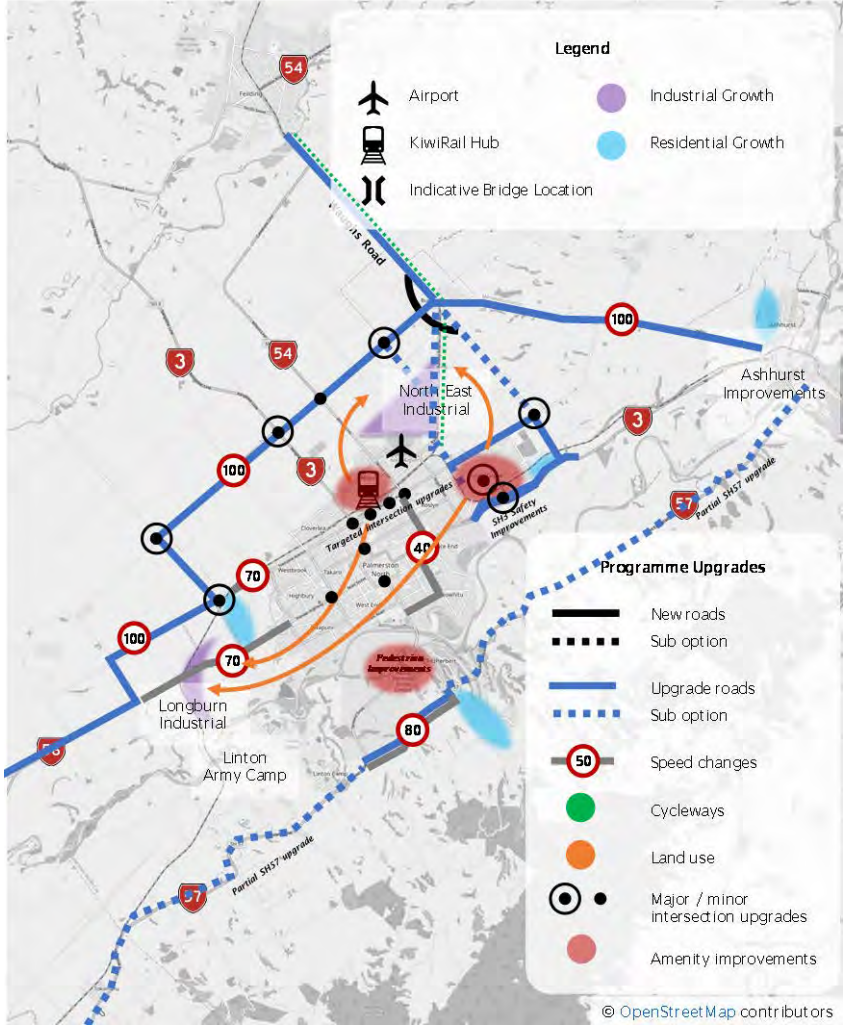
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DOMIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	Low	High	Low	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Does not help address issues at Linton • Resilience – bridge and SH56 flooding	• Stakeholder expectations • Reputational	• Feasibility and affordability	

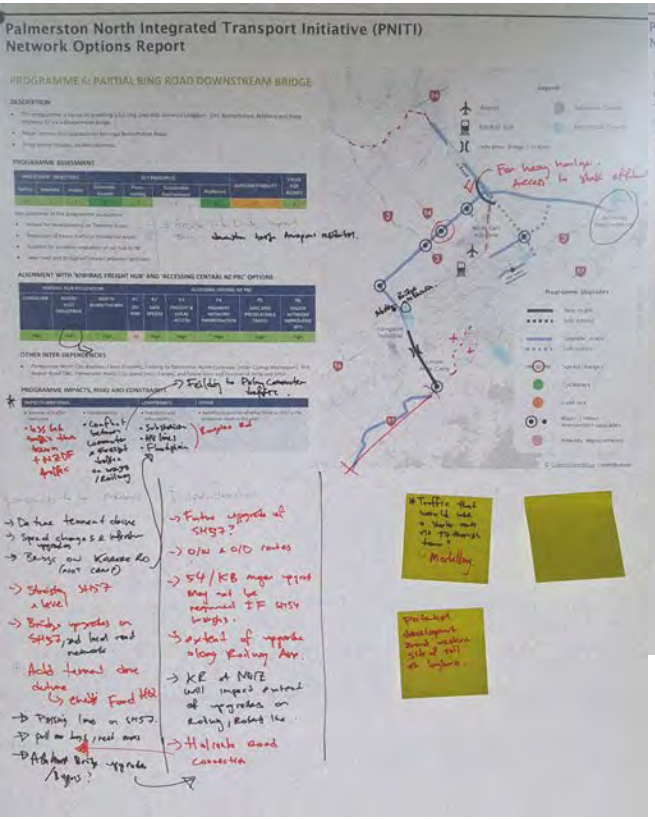


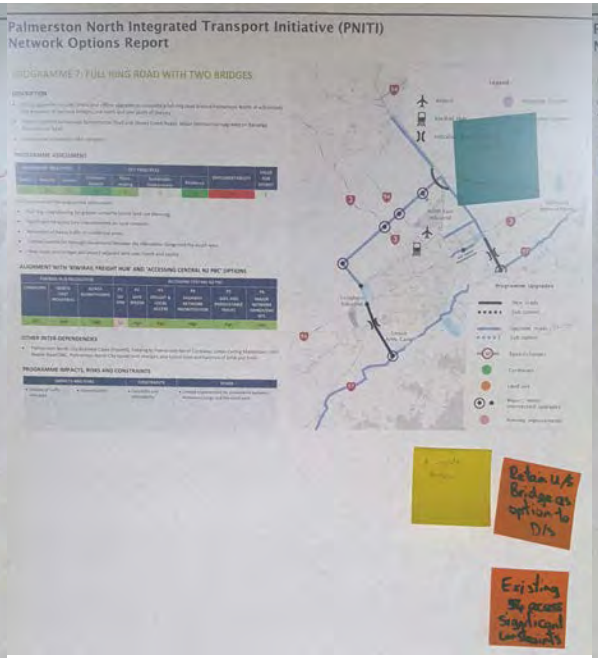
Next Steps

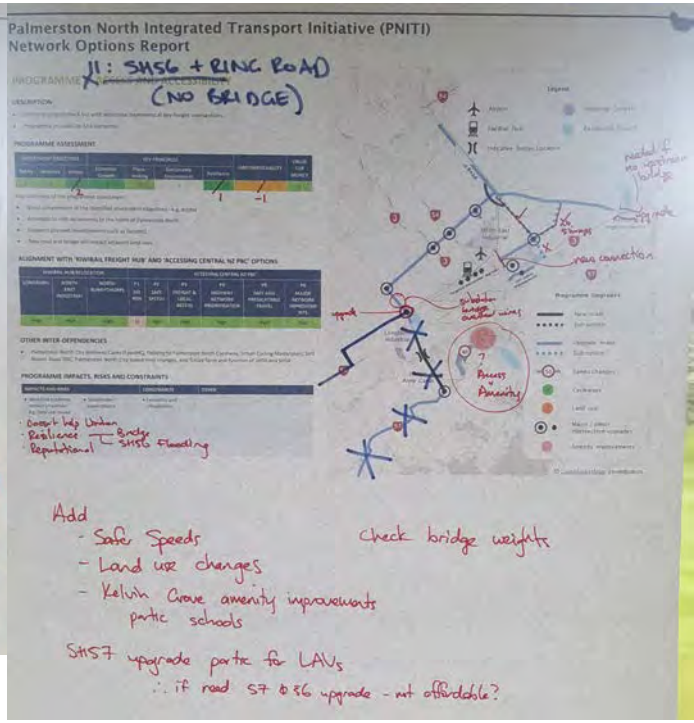
Next Steps

- Further develop short listed programmes
- Ensure consistency between PNITI and ACNZ PBC short lists
- Undertake additional assessments – e.g. Traffic Modelling
- MCA evaluation
- Workshop 3: Short List to Preferred – Dec/Jan

Shortlisted Programmes – WS2 Photos


Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
PROGRAMME 6: PARTIAL RING ROAD DOWNSTREAM BRIDGE


Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
PROGRAMME 7: FULL RING ROAD WITH TWO BRIDGES


Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report
J1: SH56 + RING ROAD
(NO BRIDGE)
Add
- Safe Speeds
- Land use changes
- Kelvin Grove amenity improvements
parte schools
check bridge weights
SH57 upgrade parte for LAVs
∴ if road 57 & 86 upgrade - not affordable?

Appendix B Workshop 3 Background

B.1 Specialist Briefing Note

Stantec

Memo

To:	Criteria Specialists	From:	Phil Peet Wellington
File:	PNITI MCA Briefing	Date:	November 14, 2019

Palmerston North Integrated Transport Initiative
Briefing Notes for Multi Criteria Analysis

1. These notes provide background for the specialists in preparing their assessments for the multi-criteria analysis of the three shortlisted programme options.

2. The three programme options are attached to this memo alongside a list of the interventions within each option.

3. Criteria have been identified and are presented below with the name of the nominated specialist alongside. We will be weighting the criteria later in the process, so if some seem less important, they can be given a lower weighting at that time.

4. In terms of "scoping" the criteria and what needs to be considered under each heading, we are relying on each specialist to guide the team on that. However, we ask that you provide your assessment methodology back to the team prior to undertaking the assessment. Specialists may want to break down and analyse a single criterion under several headings (using some secondary criteria) and recombine them with a single overall score per option. We can make any changes to the scope of each criterion as set out below as part of the workshop record.

5. The proposed criteria (not in any particular order) are:

   Safety (Jeremy) – This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area. The assessment will take cognisance of the KPIs developed for this investment objective.

   Amenity (Matt) – This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations. The assessment will take cognisance of the KPIs developed for this investment objective.

   Access (Matt) – This criterion reflects the investment objective and relates to how well the option improves access between key destinations and access into major areas. The assessment will take cognisance of the KPIs developed for this investment objective.

   Economic (Richard) – This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications. The assessment will take cognisance of the KPIs developed for this opportunity.

   Placemaking (April) – This criterion reflects a key principle and relates to how well the option enables fewer vehicles in defined "place" areas around the city. The assessment will take cognisance of PNCC's objectives in this space.

Sustainable Environment (Dhimantha and April) – This criterion reflects a key principle and relates to how well the option reduces CO2 (Dhimantha) and limits the impact on water quality (April).

Resilience (Sam) – This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.

Cost (Mike) – This criterion will be based on indicative high-level analysis (note that MCA analysis will be done both with and without costs).

Engineering degree of difficulty (Mike) - This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.

Cultural and Heritage (April and Daniel) – This criterion covers the potential impact of the options on knowns sites and or risk areas.

Value for Money (Matt and Richard P) – This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.

Integration with KiwiRail Freight Hub (Dhimantha and Richard P) – This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.

Scoring System

6. To be consistent with the concurrent Accessing Central New Zealand PBC, we are proposing to apply a 7-step numerical scale to scoring. The descriptions of the scores are set out below.

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

7. The whole range of scoring does not need to be used for any criterion, and sometimes there is little difference between options under one criterion (but it is important to retain the criterion to demonstrate that it has been considered).

Reporting

8. Each specialist needs to produce a short report for their criterion outlining
    a. The scope of the criterion
    b. How it was assessed
    c. The scores for each option
    d. Why each option was assigned that score
    e. Key differences between options in relation to that criterion

9. This report needs to be back with the project team no later than 4 December 2019

Workshop

10. A workshop is proposed with Key Stakeholders on Wednesday 11 December 2019 to review and support the multi-criteria analysis (MCA) on the three options that have been developed.

11. Not all specialists will be able to attend so we have assigned people to lead the discussions on a set of criteria. These are:

    Dhimantha - Amenity, Access, Integration with KiwiRail
    Jeremy – Safety, Resilience
    April – Placemaking, Sustainable Environment, Cultural and Heritage
    Richard P – Economic, Value for Money
    Phil – Cost, Engineering Degree of Difficulty

12. We are asking each listed person above to come prepared to explain their criteria and discuss the preliminary scoring for each option. There will be a maximum of about 10 minutes per criterion for presentation, discussion and scoring. There will be option plans, aerials; etc available for people to refer/talk to, but if people wish to present additional information through short presentations, that will be fine.

13. We are asking each presenter to outline the specialists initial score for each option, on a -3 to +3 scale as set out below. Ideally, the workshop attendees will agree with the scores, but changes can be made if consensus is reached. If consensus is not reached, we will note the different views and use that for sensitivity analysis at a later stage. We will review the scores after the session with the specialists to make sure that we are all comfortable with them.

14. We will be endeavoring to develop a "workshop-agreed" weighting system for the criteria towards the end of the workshop. This will be complemented in later analyses by other weighting systems to make sure we have a robust outcome.

Conclusion

15. The following actions are needed:
    - All specialists to provide their initial thinking on how to evaluate their criteria by 20 November 2019
    - All specialists to provide a short report on approach and scoring by 4 December 2019
    - Presenters to be prepared to come to the workshop on 11 December 2019 to present the criteria and answer any questions.

16. If you have any questions regarding the above, please get in touch with me on 027 211 8246 or Dhimantha on 021 123 0557. Otherwise, we look forward to seeing your initial thinking on the 20th.

Thanks,

Phil

Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report – *Post Workshop 2 – Indicative To Be Developed*

PROGRAMME 6

DESCRIPTION

- This programme is based on providing a full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-2	2

Key outcomes of the programme assessment:

- Allows for development and Place Making on Tennent Drive
- Reduction of heavy traffic in residential areas
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre
- Southern bridge allowing for greater certainty future land use planning

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

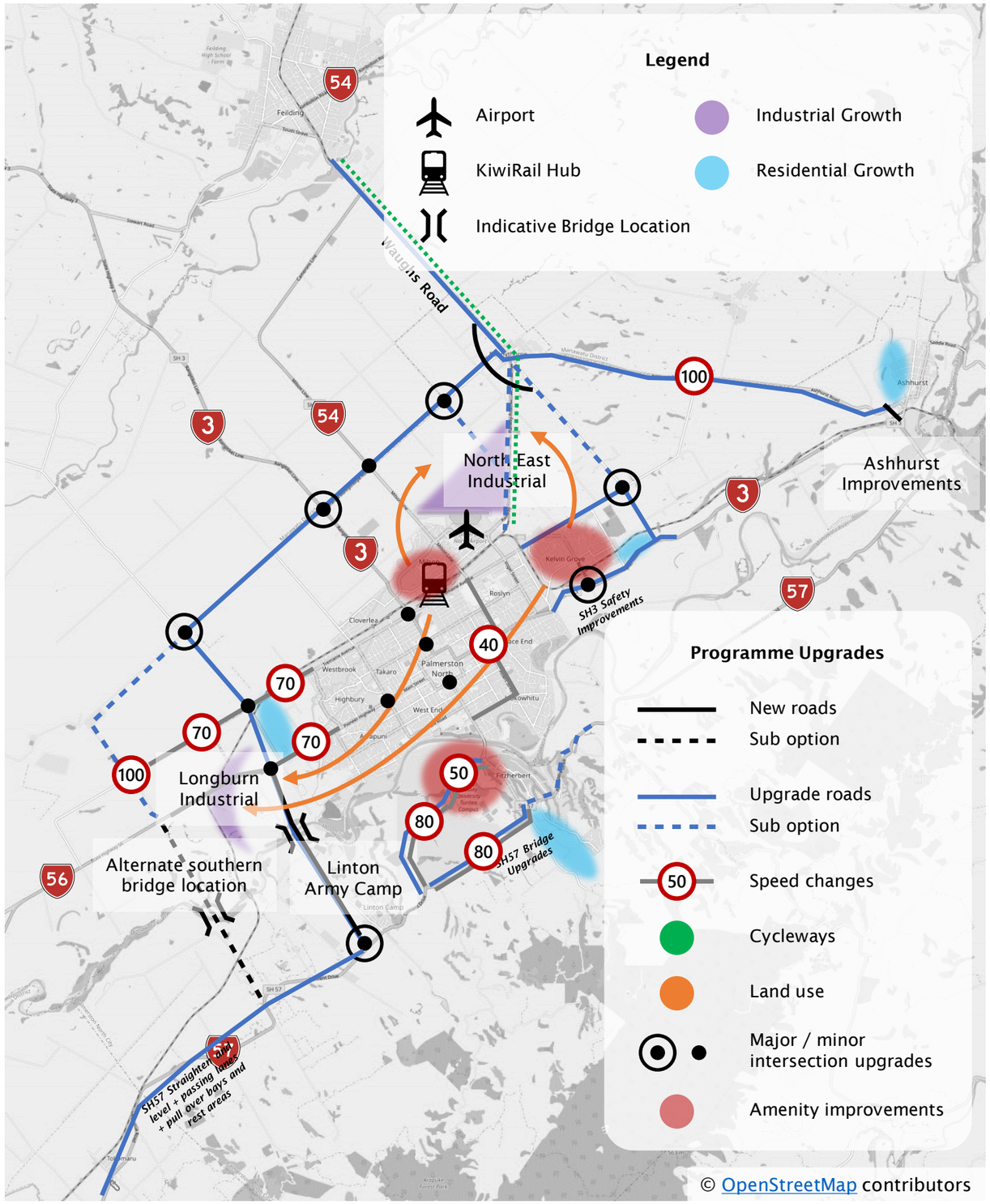
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes and future form and function of SH56 and SH54
- Future upgrade of SH57
- Overweight and Over-dimension routes – current and future
- SH54/KB major intersection upgrade may not be required if SH54 becomes Waughs Rd
- KiwiRail at NEIZ will impact extent of upgrades at Railway, Roberts Line and Bunnythorpe

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated / redistributed • Potential subdivision pressures around new roads, bridges (if delivered)	• Consentability • Conflict between commuter and freight traffic on Waughs / Railway (Fielding to Palmerston commuter traffic)	• Feasibility and affordability • Rongotea Road – Substation, HV lines, Floodplain	• Benefits depend on whether SH56 or SH57 is the preferred route to the west • Potential development around western side of rail at Longburn (TBC) • Programme allows for responsibilities for different roads to be reallocated



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report – *Post Workshop 2 – Indicative To Be Developed*

PROGRAMME 7

DESCRIPTION

- This programme includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
3	2	3	3	2	1	3	-3	1

Key outcomes of the programme assessment:

- Full ring road allowing for greater certainty future land use planning
- Significant infrastructure improvements on rural network aligning with other infrastructure developments
- Reduction of heavy traffic in residential areas
- Attract Industry
- Allows for reduced investment in SH57 (between the two new bridges) (shown as sub-option)
- Access to Linton improves through downstream bridge, resulting in less NZDF traffic through the city centre

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

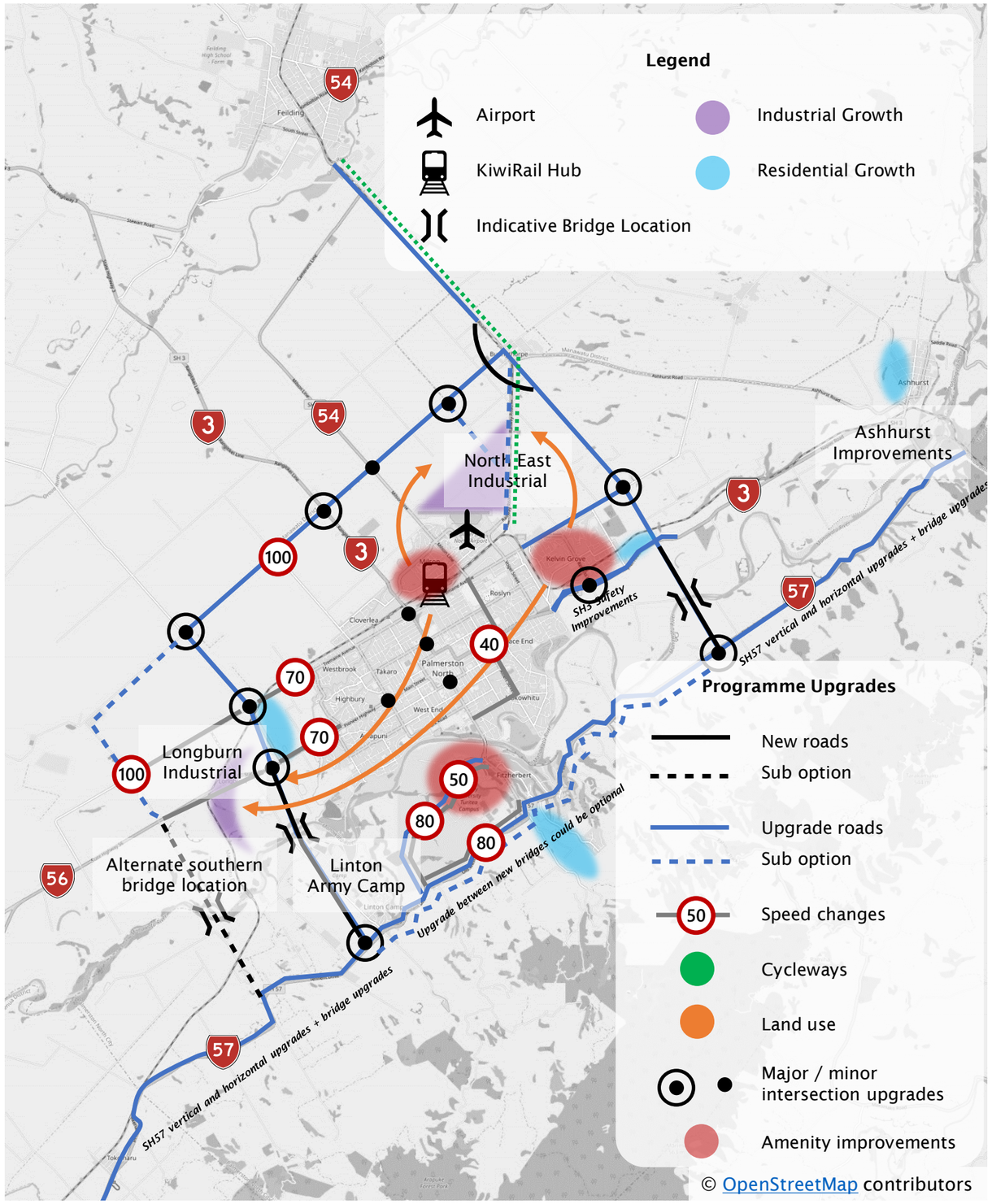
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DO MIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	High	Low	High	Low

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54
- Delivery sequencing of bridges (if northern bridge delayed then Ashhurst Road might be improved in interim and Northern Bridge may not be delivered). Ashhurst Bridge upgrade may be better use of money instead of upstream bridge

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Volume of traffic relocated • Potential subdivision pressures around new roads, bridges (if delivered) • Programme allows for responsibilities for different roads to be reallocated	• Consentability • Ashhurst Road improvements may still be required • Ashhurst Road might still be used by many instead of a Northern Bridge	• Delivery, feasibility and affordability • Stoney Creek topography and land ownership	• Limited improvement for movements between Manawatu Gorge and the south west • Northern bridge may not be as justifiable as upgrading Ashhurst Road • Ashhurst Road upgrades do not unlock access to Palmerston North as much as a new Northern Bridge



Palmerston North Integrated Transport Initiative (PNITI)
Network Options Report – *Post Workshop 2 – Indicative To Be Developed*

PROGRAMME 11

DESCRIPTION

- Similar to programme 6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

PROGRAMME ASSESSMENT

INVESTMENT OBJECTIVES			KEY PRINCIPLES				IMPLEMENTABILITY	VALUE FOR MONEY
Safety	Amenity	Access	Economic Growth	Place-making	Sustainable Environment	Resilience		
2	2	2	2	1	1	1	-1	2

Key outcomes of the programme assessment:

- Good achievement of the identified investment objectives - e.g. access
- Attempts to shift movements to the north of Palmerston North
- Supports planned developments such as FoodHQ

ALIGNMENT WITH 'KIWIRAIL FREIGHT HUB' AND 'ACCESSING CENTRAL NZ PBC' OPTIONS

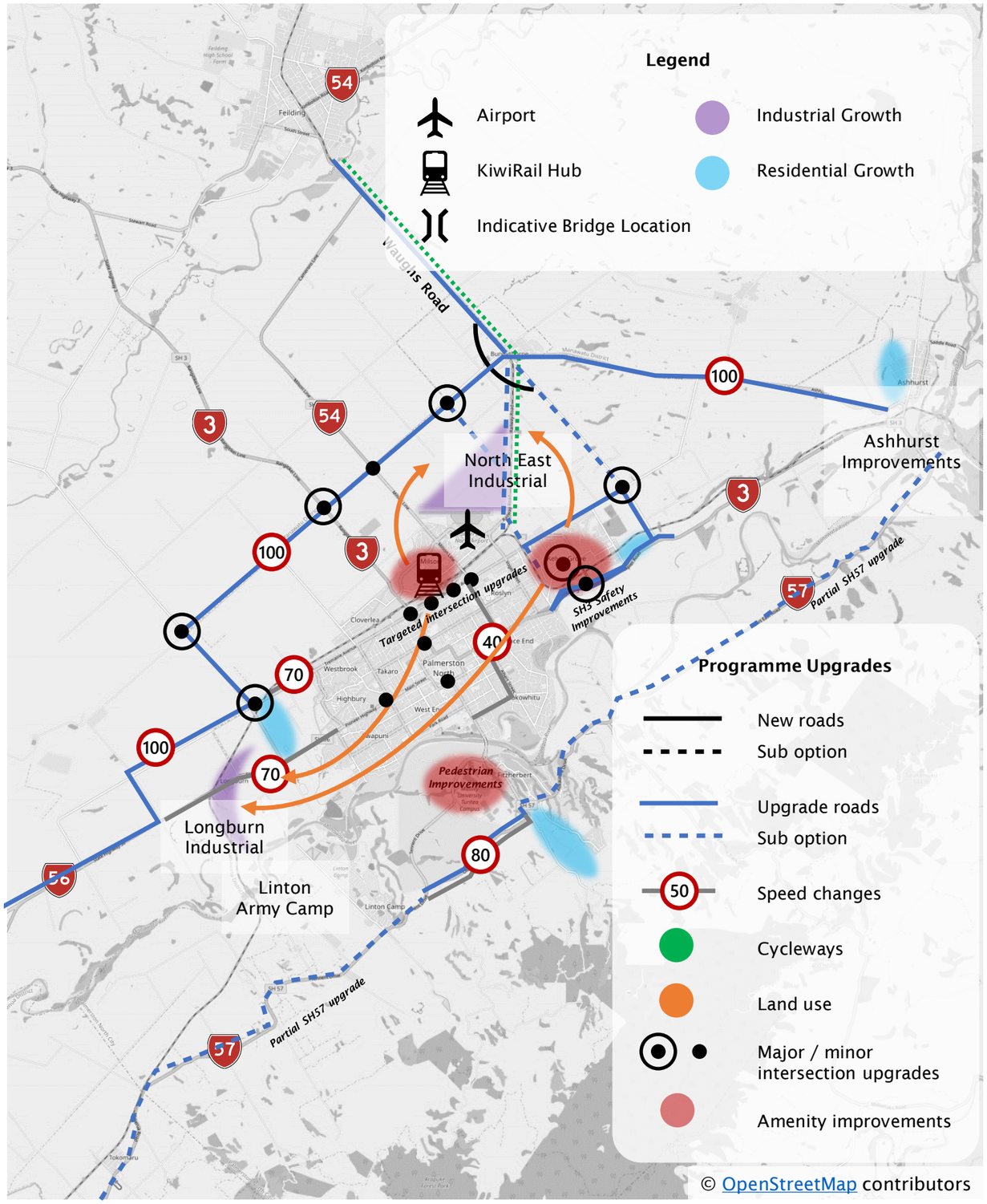
KIWIRAIL HUB RELOCATION			ACCESSING CENTRAL NZ PBC				
LONGBURN	NORTH EAST INDUSTRIAL	NORTH BUNNYTHORPE	P1 DOMIN	PROGRAMME 2A	PROGRAMME 2B	PROGRAMME 3A	PROGRAMME 3B
High	High	High	M	Low	High	Low	High

OTHER INTER-DEPENDENCIES

- Palmerston North City Business Cases (FoodHQ, Feilding to Palmerston North Cycleway, Urban Cycling Masterplan), SH3 Napier Road DBC, Palmerston North City speed limit changes, and future form and function of SH56 and SH54

PROGRAMME IMPACTS, RISKS AND CONSTRAINTS

IMPACTS AND RISKS		CONSTRAINTS	OTHER
• Does not help address issues at Linton • Resilience – bridge and SH56 flooding	• Stakeholder expectations • Reputational	• Feasibility and affordability	



B.2 Workshop 3 Agenda

Accessing Central New Zealand Programme Business Case
Palmerston North Integrated Transport Initiative

Workshop 3 Agenda

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

Morning Agenda

10:00 Welcome, introductions and purpose of workshop

10:10 Programme business case process and project update, including KiwiRail

10:20 Long list assessment review / recap

10:30 Short list programmes assessment criteria overview

10:45 Short list programme options and assessment break out sessions

11:45 Short list report back, review and discussions

12:00 Lunch

Afternoon Agenda

12:30	Story – problems, benefits, investment objectives, and KPIs
12:45	Long list to Short list (WS2 Recap)
13:00	Short list MCA criteria
13:10	Short list MCA assessments
15:10	Criteria weightings
15:20	Next steps

Appendix C Workshop 3 Specialist Assessments

C.1 Safety

Stantec

Memo

File: MCA – Safety Date: 10th December 2019

PNITI MULTI-CRITERIA ASSESSMENT
APPROACH TO EVALUATION OF SAFETY

This memo outlines the approach taken to rate the shortlisted programmes of the PNITI DBC in terms of safety outcomes. The approach was largely qualitative, with some quantitative checks. The process was undertaken by Jeremy France and Courtney McCrostie.

The specialists were briefed prior to the multi criteria analysis. The task requirements for the safety specialists is repeated here:

> *"This [safety] criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area. The assessment will take cognisance of the KPIs developed for this investment objective."*

SAFETY KEY PERFORMANCE INDICATORS

1. Reduce the number of death and serious injury crashes per vehicle kilometre travelled in the study area to XX by 20XX.
   Measure: DSi crashes per year
2. Improve intersection collective and personal safety risk at key intersections to X by 20XX.
   Measure: KiwiRAP / High Risk Intersection Guide
3. Improve proportion of state highways in the study area that meet their SaAS to XX% by 20XX
   Measure: Percentage of SH network at its safe and appropriate speed

OPTIONS BEING ASSESSED

PROGRAMME 6 (FULL RING ROAD – ONE BRIDGE)

- Full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME 7 (FULL RING ROAD - TWO BRIDGES)

- Includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME 11 (PROGRAMME 6 WITHOUT BRIDGE + KEY FREIGHT INTERSECTION UPGRADES)

- Like P6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

SCORING SCALE

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

ASSESSMENT

- Step 1 - a holistic look at the options (without drilling down into the interventions) and establish what would we expect the safety results to be, and how would we expect the modelling results to impact.

  Notes from this step: We expected nearly all options, and therefore programmes, to deliver some safety benefits, as either new infrastructure is being built, or the existing upgraded.

- Step 2 – review the list of interventions and score each project on an individual basis. For those that would provide benefits, what would the scale of the benefit be (giving a ranking of low, medium or high). This will be more of a quick qualitative assessment, with also checks using NZTA's Standard Safety Intervention Toolkit.

  Notes from this step: Generally, we considered long corridor treatments, which included elements of hazard protection and widening to be more beneficial than major intersection upgrades. The rationale for this was that a long corridor upgrade would have a greater exposure to traffic, and may include minor access, or minor road intersection improvements. However, it was noted that major intersections have conflict points where crashes can occur. It also may be the case that with more detailed analysis that the safety benefits of improving (especially the large, well-used) intersections could be scored higher. We tested the results by increasing the two intersections on Kairanga Bunnythorpe Road (SH3, and Milson) to 3s, but this did not significantly impact the overall scores to the programmes.

- Step 3 – review the modelling outputs. Are they in line with expectations? Do these change the ratings we gave in Step 2, and if so, to what degree?

  Notes from this step: We looked at some of the volume changes on key routes and it appeared most of the key changes were related to the provision on a new (southern) bridge – a new bridge relocated movements from the existing bridge and Tennent Drive to the new bridge.

- Step 4 – The primary consideration, as per the specialist briefing, was that of DSI reduction. We considered this at corridors and intersections. In rating the options we considered the SaAS at the top 10% identified sites – to check these results, along with any impact from traffic volume changes we undertook some IRR tests (using MegaMaps tool) to see the sensitivity of traffic volume changes and treatments on corridors.

  Notes from this step: The traffic volume banding in the IRR assessment tool is <1,000, 1,000-6,000, 6,000-12,000, and 12,000+. Based on the modelling results we had seen we considered that in general given the size of these bands that many (but not all) corridors would remain in the same traffic volume band. We therefore considered that while traffic volume increases would raise DSI through greater exposure, it's impact on the SaAS and IRR may be more limited.

- Step 5 – based on the information gained from the above three steps, we derived an overall score. We used a basic aggregation method (averaging the ratings across the programme components), and then tested the results with our engineering knowledge. We then adjusted the scores by qualitatively weighting the results – considering some of the key difference between the programmes (notes on this process listed in the rationale and comments below).

SCORING

Programme	Score
Programme 6	3
Programme 7	3
Programme 11	3

Rationale

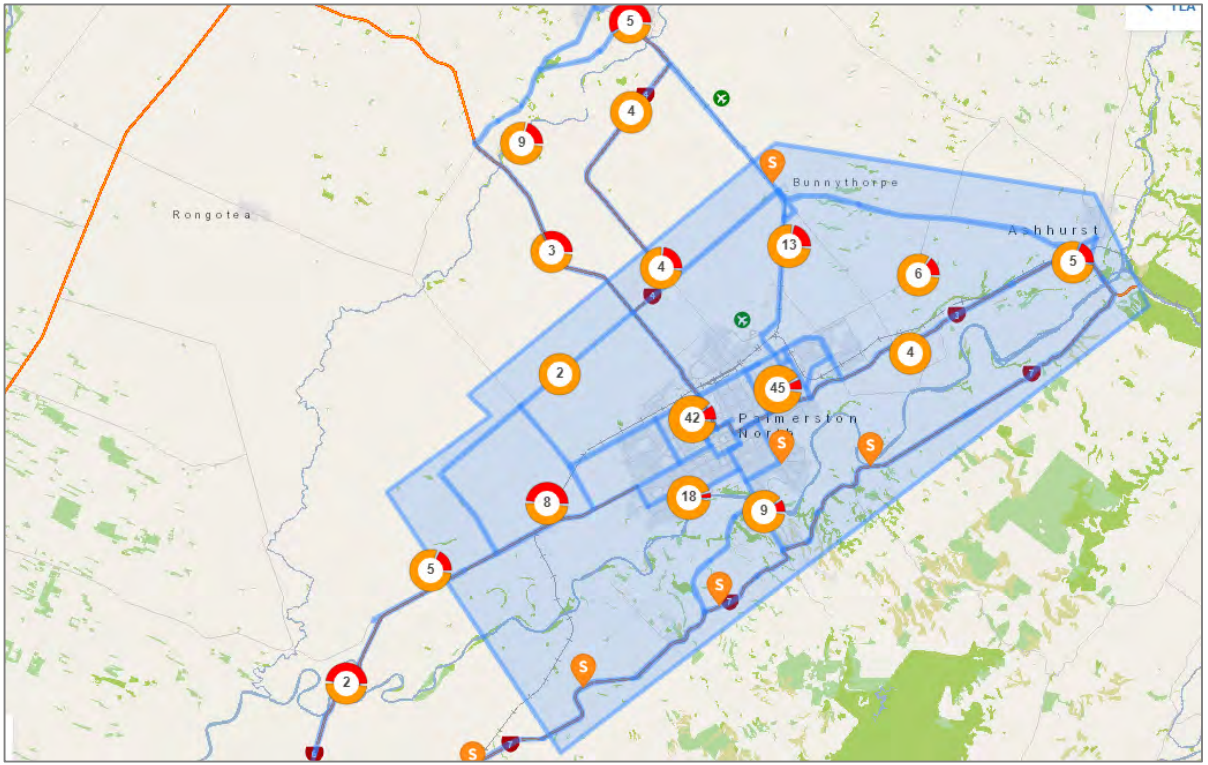
- Overall the aggregated scores indicated that all the programmes will likely deliver 'moderately positive' safety benefits. We felt that simply aggregating the scores did not properly represent the impact(s), as projects vary in size, location, and scope. Therefore, some consideration on weighting was needed.
- On the whole, we considered that all programmes include significant works, which we consider would result in significant safety impacts. We did, however, note that this does not necessarily mean all would result in the same safety benefits. We considered the bridge options will likely bring more safety benefits than Programme 11. This was because Programme 11 has less green-field infrastructure, and that the new southern would relocate traffic away from Tennent Drive, and potentially some city streets. We consider a more detailed assessment would highlight these differences between the programmes.
- We considered rating Programmes 6 and 7 as 3s, and Programme 11 as a 2 to show the difference, however we felt all programmes would have a significant safety benefit.
- A summary of key differences between the options were:

<table>
<tr><th>Programme</th><th>Key commonalities</th><th>Key differences</th></tr>
<tr><td>6</td><td rowspan="3">High risk intersections treated:
SH3/54, Milsons Line / SH54, Roberts Line / Kairanga Bunnythorpe, Kelvin Grove / Stoney Creek, SH3 / Roberts Line, urban intersections
High risk corridors treated:
SH57 southern section, SH3 (between Stoney Creek and Roberts Line) Kairanga Bunnythope (SH3 section)</td><td>Not as much work done on SH57 (northern section), or SH56.</td></tr>
<tr><td>7</td><td>No Ashhurst Road, not as much on SH56.</td></tr>
<tr><td>11</td><td>No new bridges over the Manawatū River – this does not redistribute traffic away from city</td></tr>
</table>

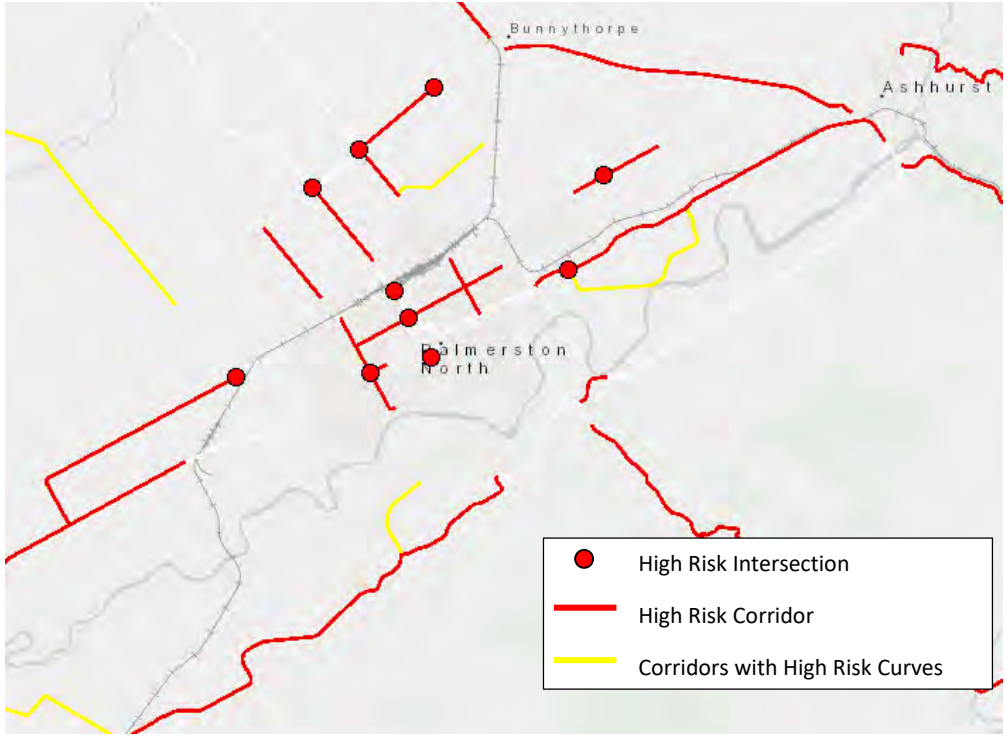
Other Comments

- We also felt that if the scoring scale was broader (i.e. +1 to +5) then some of these differences may be more apparent. It may be the case that Programme 6 and Programme 7 could be more thoroughly differentiated under such a scale.

Safety – Death and Serious Injury Crashes

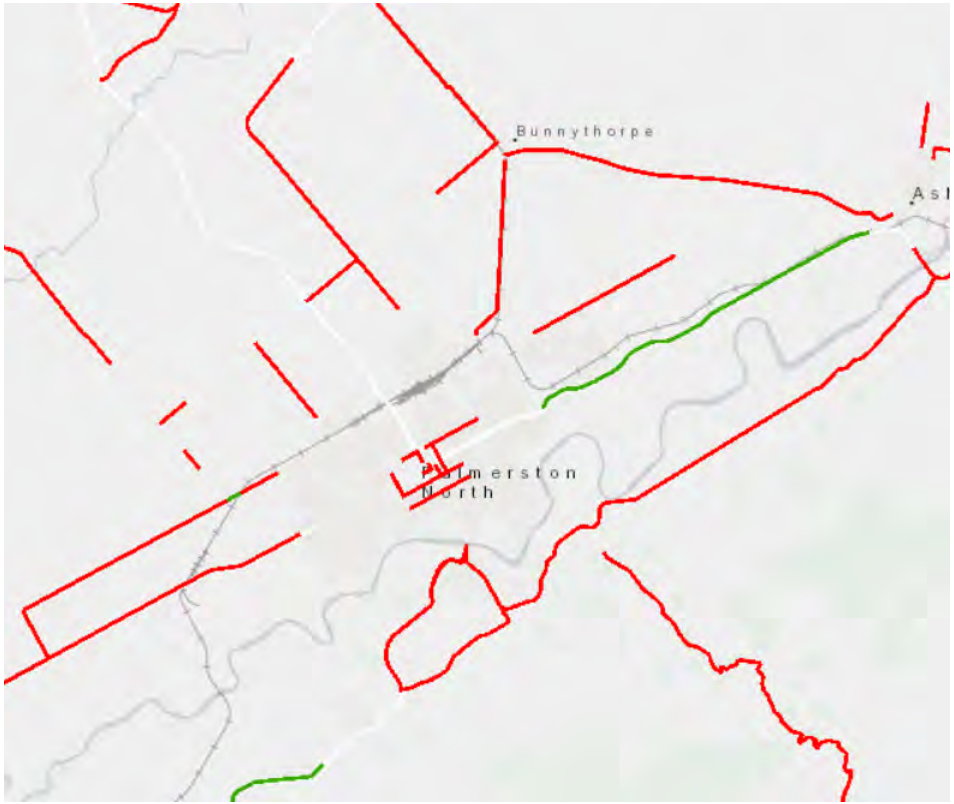


Safety – High risk intersections and corridors



Safety – High benefit speed management

Top 10% DSI Savings Network (18-21 target)



Safety

Programme	Score
6	3
7	3
11	3

C.2 Access and Amenity

Stantec

Memo

File: MCA – Access and Amenity Date: 04 December 2019

PNITI MULTI-CRITERIA ASSESSMENT: ACCESS AND AMENITY

This brief memo outlines the approach to, and scores for, the access and amenity criteria of the multi-criteria assessment of the short-listed PNITI options.

INVESTMENT OBJECTIVES (THEMES)

For context, the Investment Objectives are:

1. A reduction in severance and increase in amenity
2. Improve safety in the network
3. Improve access to and from key destinations
4. Facilitate economic growth and development

KEY PERFORMANCE INDICATORS

For context, the Key Performance Indicators (KPIs) are:

Investment Objective	Key Performance Indicator		Modelling Required
Amenity	1	Reduce freight volumes on selected residential streets. Measure: HCV numbers (AADT) to be consistent with ONRC classifications by 20XX.	✓
Safety	1	Reduce the number of death and serious injury crashes per vehicle kilometre travelled in the study area to XX by 20XX. Measure: DSi Crashes Per Year	✓
	2	Improve intersection collective and personal safety risk at key intersections to X by 20XX. Measures: KiwiRAP / High Risk Intersection Guide	-
	3	Improve proportion of state highways in the study area that meet their SaAS to XX% by 20XX Measure: Percentage of SH network at its safe and appropriate speed	-
Access	1	Reduce journey times between key destinations at peak AM periods to XX minutes by 20XX Measure: Journey times / distance between key locations.	✓
	2	Improve intersection levels of service at key origins and destinations in AM peak by 20XX Measure: Intersection LoS	✓
	3	Reduce heavy vehicle km travelled	✓
Economic Growth	1	Increased % annual regional GDP growth in transport, postal and warehousing industry; and manufacturing industry by 20XX Measure: Census, Stats NZ	-
	2	Increased combined regional employment in the: transport, postal and warehousing industry; and manufacturing industry to XX,XXX people by 20XX Measure: Census, Stats NZ	-
	3	Increased number of building consents issued (applied for?) by 20XX Measure: PNCC, MDC, RDC annual reporting	-

MCA CRITERIA

AMENITY - how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations. The assessment will take cognisance of the KPIs developed for this investment objective, namely the expected heavy vehicle volumes along key local streets.

ACCESS - how well the option improves access between key destinations and access into major areas. The assessment will take cognisance of the KPIs developed for this investment objective; namely:

- Reducing journey times between key locations;
- Intersection LOS at key locations; and
- Heavy vehicle km travelled.

OPTIONS BEING ASSESSED

PROGRAMME 6 (FULL RING ROAD – ONE BRIDGE)

- Full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and State Highway 57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME 7 (FULL RING ROAD - TWO BRIDGES)

- Includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME 11 (PROGRAMME 6 WITHOUT BRIDGE + KEY FREIGHT INTERSECTION UPGRADES)

- Like P6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

SCORING SCALE

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

ACCESS - APPROACH TO ASSESSMENT

- Consider a score of 0 as the status quo. On this basis, I would expect all options to deliver some access benefits, as simply more infrastructure is being built. The assessment therefore looks more at how to differentiate between options. Given the limitations of the scoring scale, it is likely that the options will be scored by assessing the comparative benefits of each option.
- Step 1 - a holistic look at the options (without drilling down into the interventions) and establish 'what would I expect the modelling results to show' – where are the best travel time benefits likely to be provided, and will journeys between key destinations be shorter and quicker? At this stage, I would expect journey time improvements for Programme 7 to be highest – but not necessarily the overall network travel distance statistic. Programme 7 also appears to be the option that would reduce severance (by providing two new bridges), noting that is may reroute some traffic through residential areas (creating local severance)
- Step 2 – review the list of interventions, and on an individual basis which treatment would I expect to deliver the highest access benefits. For those that would provide benefits, what would the scale of the benefit be (giving a ranking of low, medium or high). This will be more of a quick qualitative assessment and give me a better appreciation of where benefits might come from.
- Step 3 – review the modelling outputs. Are they in line with my expectations? If not, why not? Where are the best travel time benefits being gained?
- Step 4 – based on the information gained from the above three steps, provide an overall score. Potentially the scores may be very similar (e.g. all score as a +2), but if at a later stage we want to drill in further (or change the scoring scale) we'll have information to hand and be able to adapt.

AMENITY - APPROACH TO ASSESSMENT

One focus of the amenity KPI is around freight volumes – i.e. ideally reducing the number of trucks using local roads, or passing through more commercial/town centre like areas. The proposed process is:

- Step 1 - establish/map out where those areas are where we desire freight volumes to reduces.
- Step 2 – as above, taking a holistic look at the options, what would I expect the modeling to show.
- Step 3 – review the modelling outputs, and ideally overlay the modelling outputs with the 'where we want freight reductions map'.

The second focus would look at how the options would improve the urban realm:

- Step 4 – review each intervention against the healthy street indicators. Which boxes would each intervention tick?

- Step 5 – collate the overall programme scores for the 'healthy street indicators'. Identify any major differences between the various programmes.
- Step 6 – consider both the healthy street indicators and freight volumes, provide overall score.

SCORING – ACCESS

Programme	Score
Programme 6	2
Programme 7	2
Programme 11	1

Rationale:

- Programme 6 and 7 are similar in terms of benefit.
  - Derived from modelling outputs and review of the separate interventions.
- Programme 7 slightly better than Programme 6 in terms of the evaluation of individual aspects of the project, but slightly lower in terms of reduction in vehicle km travelled.
- Overall travel time benefits between Programme 6 and Programme 7 also similar.
- Some interventions within P6 and P7 will reduce travel time and access (reducing speed and LILO), so not appropriate to give it the maximum score.

Other Comments

Speed limit reductions will reduce the travel time benefit but will also reduce the number of vehicle km travelled – i.e. reducing the speeds will reduce travel time but keep vehicles on the more direct routes. This potentially provides environmental benefits and may align better with the desire to 'keep the right traffic on the right road'.

SCORING – AMENITY

Programme	Score
Programme 6	2
Programme 7	2
Programme 11	1

Rationale:

- There are no specific identified differences in the specific amenity improvements that would be delivered by the individual options. As such assessment purely based on the traffic volumes along key streets (identified in Figure 1).
- The main difference between the options relate to the extent to which they reduce traffic volumes through the town centre and along Tennent Drive (which currently acts as a severance between Food HQ and Massey. Programmes 6 and 7 deliver the better reductions (giving effect to potential amenity improvements), and hence have been afforded a higher score than Programme 11.
- All options reduce heavy vehicle volumes (to some extent) on the following key routes:
  - Albert Street
  - Ruahine Street
  - Te Awe Awe Street
- Any rise in heavy vehicle volumes on other key routes appear to be negligible.
- For Programmes 6 and 7, generally a +1 score was given on the basis that heavy vehicle volumes are reduced on some of the identified streets, plus a further +1 on the basis that each programme will provide some (currently undefined) town centre amenity benefits. Total = +2.
- For Programme 11, a lower score (when compared to Programme 6 and 7) is provided based on the lower amenity values for the Food HQ/Massey University area.

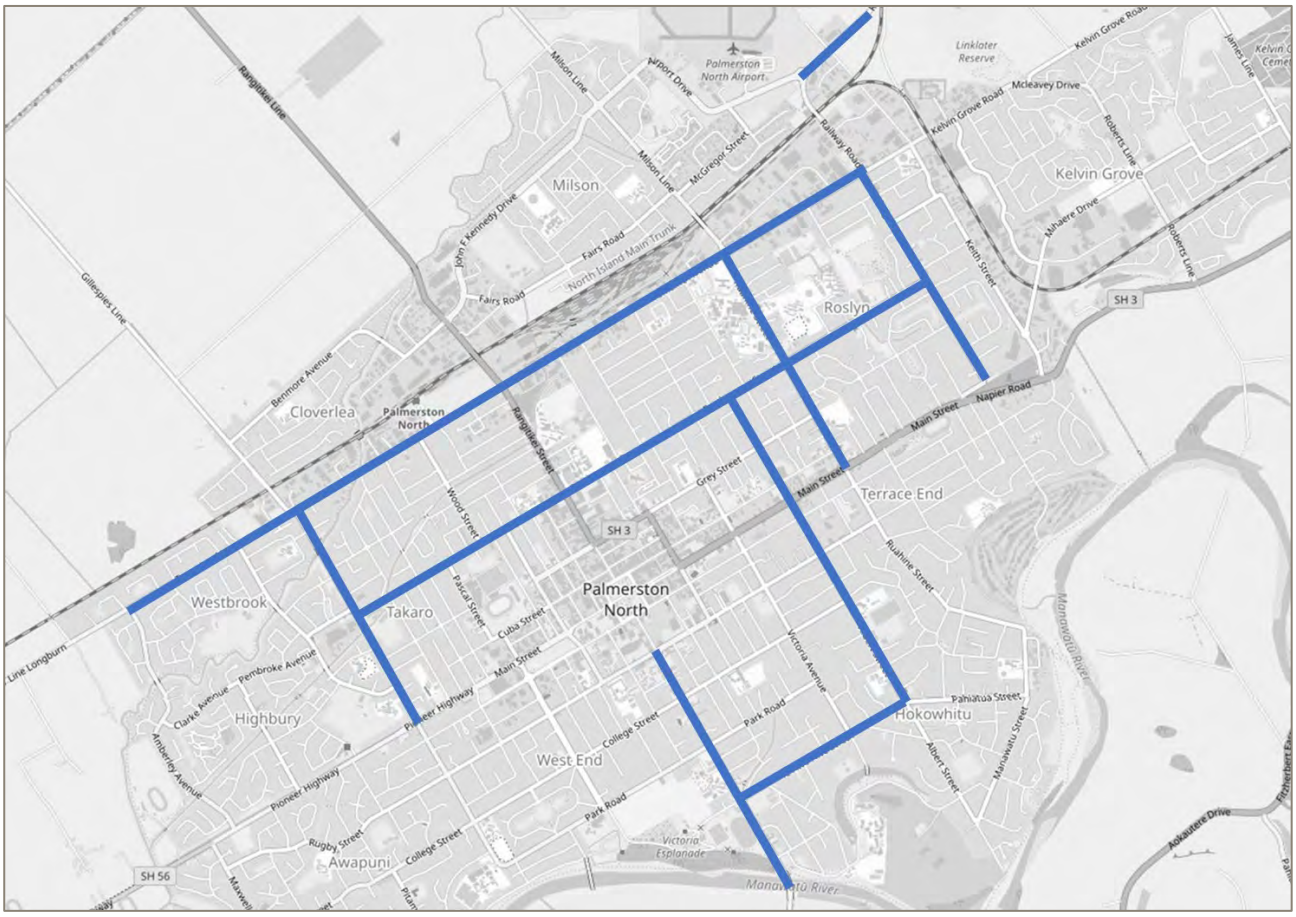


Figure 1: Roads where the Heavy Vehicle Volume Exceeds the ONRC Threshold

Palmerston North Integrated Transport Initiative (PNITI)

Modelling

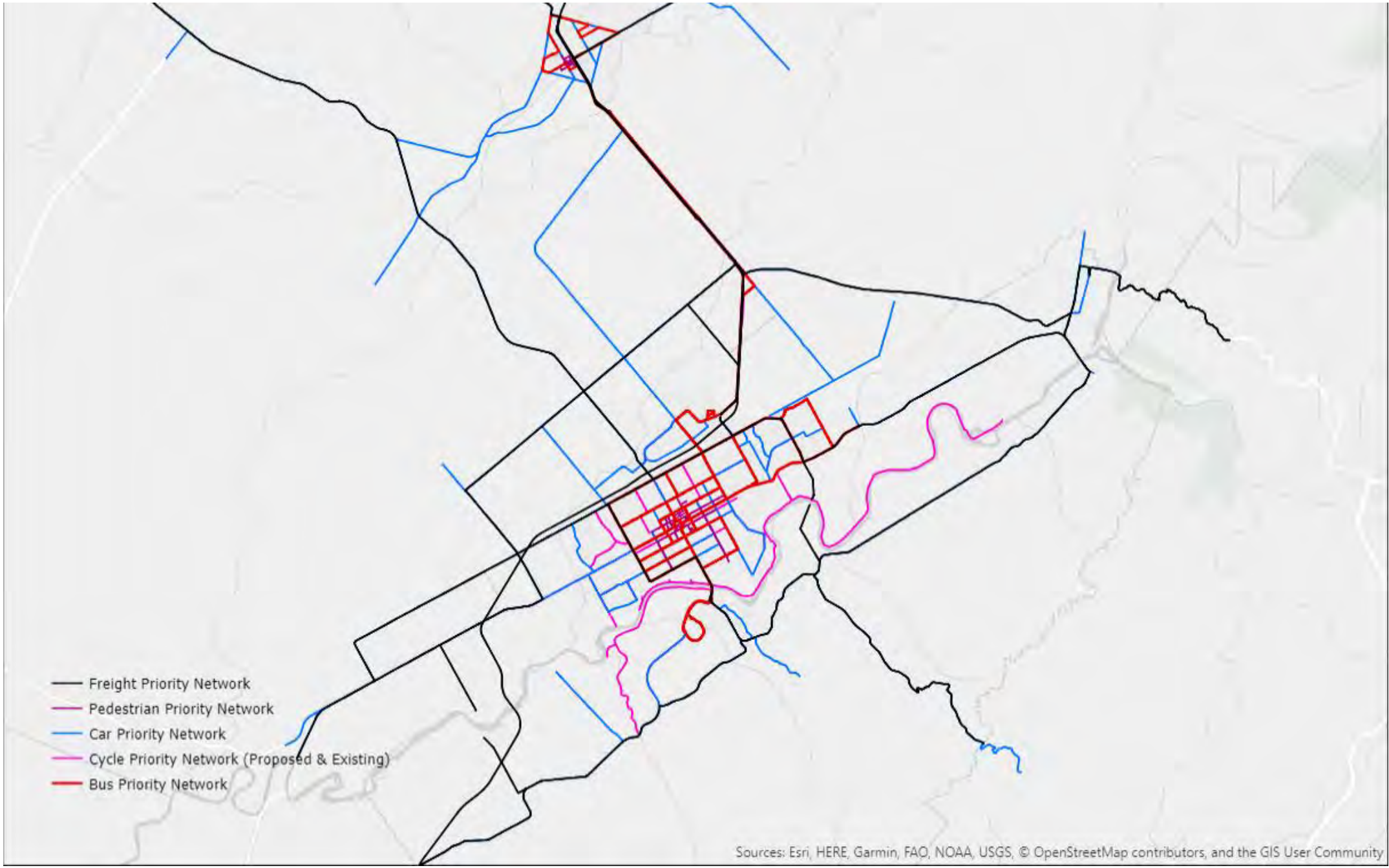
Stantec

Regional Freight Ring Road

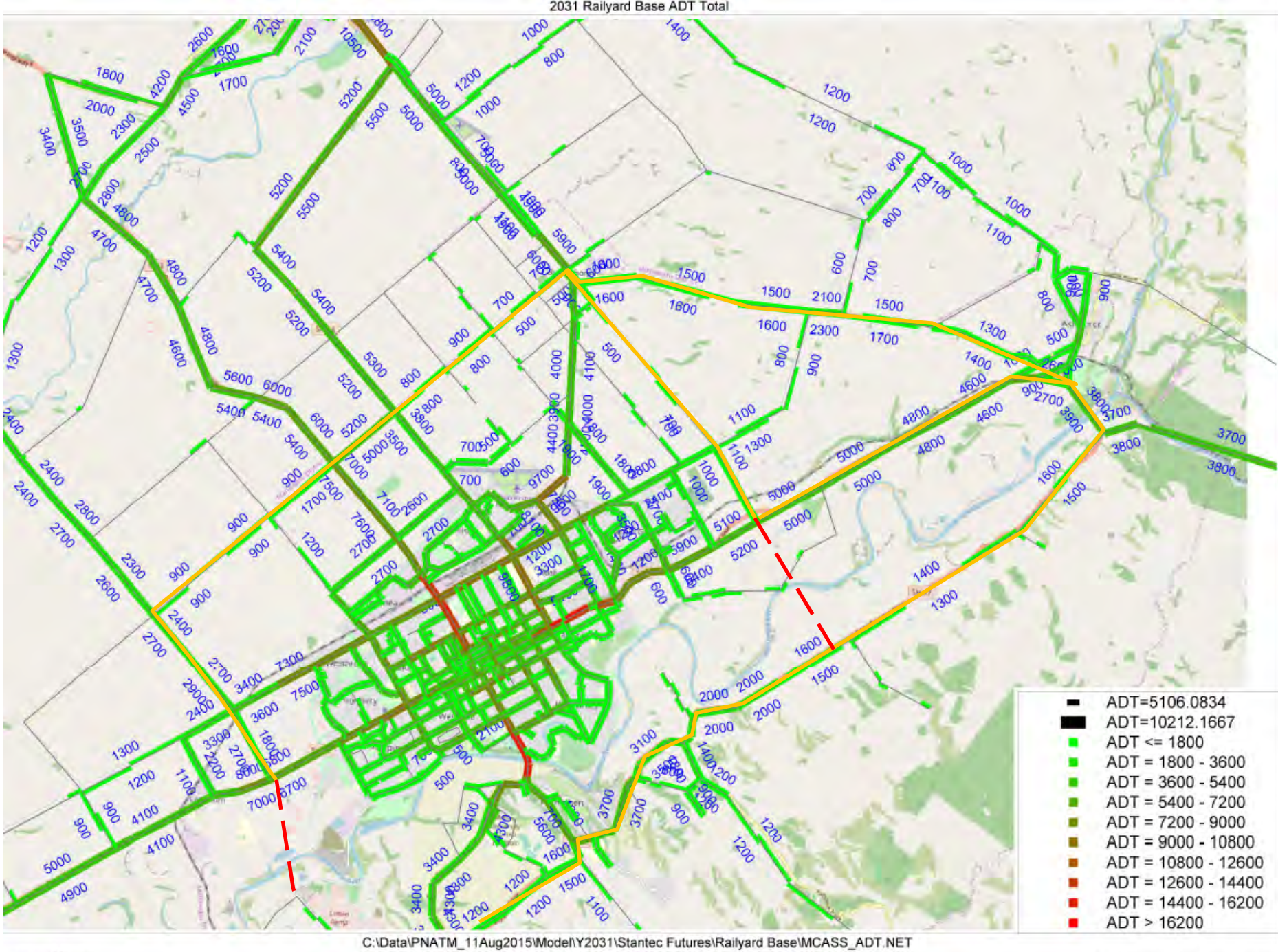
PNCC Objectives:

- Reduce heavy traffic in residential areas
- Divert traffic out of the city centre and reduce congestion
- Improve the safety, efficiency and effectiveness of the transport network
- Improve access into and out of existing hubs (e.g NEIZ)
- Service housing development areas
- Support existing activity and economic development at Food HQ/Linton
- Promote regional economic development

Network Operating Framework



ADT– 2031
Base Network

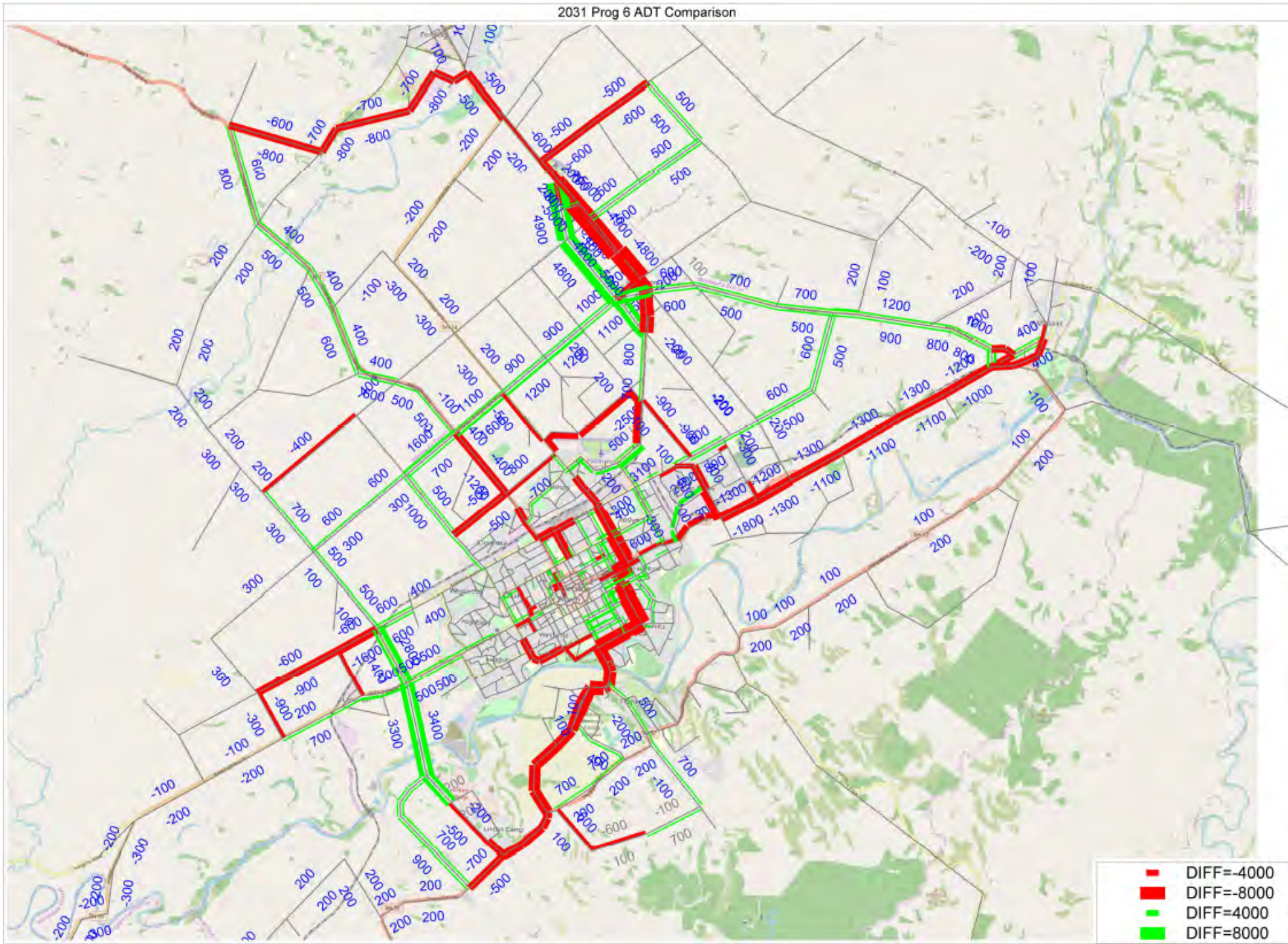


ADT– 2031
Programme 6

(Flow Difference vs Base)

Green = Increase
Red = Reduction

- Downstream Bridge (6,700vpd)
- Bunnythorpe bypass (<10,000vpd)
- SH3 & KB vs Feilding route (up to 2,000 vpd)
- SH3 vs Ashhurst Rd (dependent on speed reduction on SH3)
- Similar trend for HCV



ADT– 2031
Programme 7

(Flow Difference vs Base)

Green = Increase
Red = Reduction

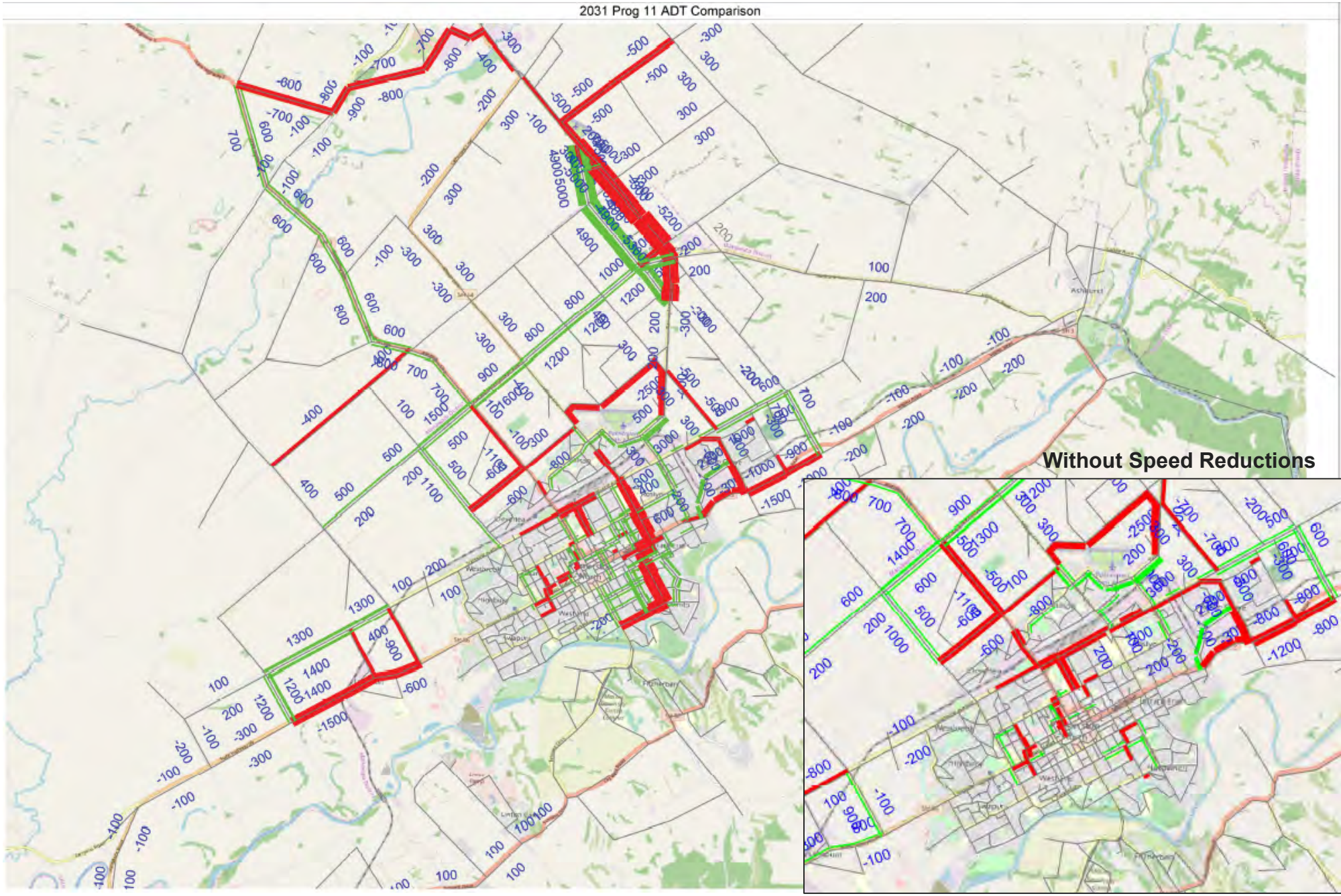
- Downstream Bridge (6,500 vpd)
- Upstream Bridge (2,800 vpd)
- SH3 vs Ashhurst Rd
- Bunnythorpe bypass (similar to 6)
- SH3 & KB vs Feilding route (as per 6)
- Similar trend for HCV

ADT– 2031
Programme 11

(Flow Difference vs Base)

Green = Increase
Red = Reduction

- No Bridge, but speed reductions through CBD
- SH3 vs Ashhurst Rd
- Bunnythorpe bypass (similar to 6)
- SH3 & KB vs Feilding route (as per 6)
- Similar trend for HCV



Route Choice
Downstream Bridge
– Prog 6 vs 7

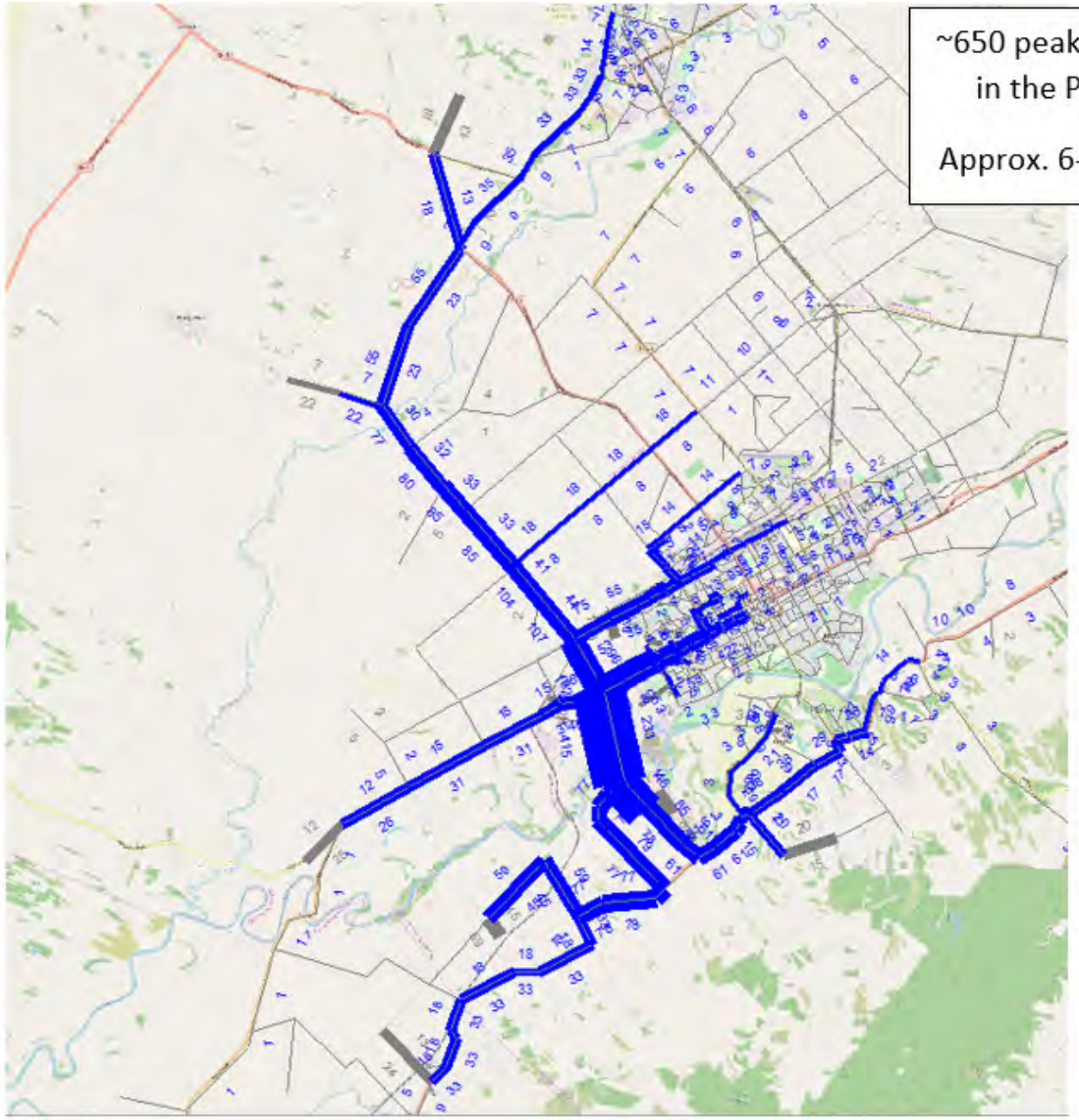


Figure 1: Prog6_CampBridge

~650 peak hour trips
in the PM peak

Approx. 6-7,000 vpd

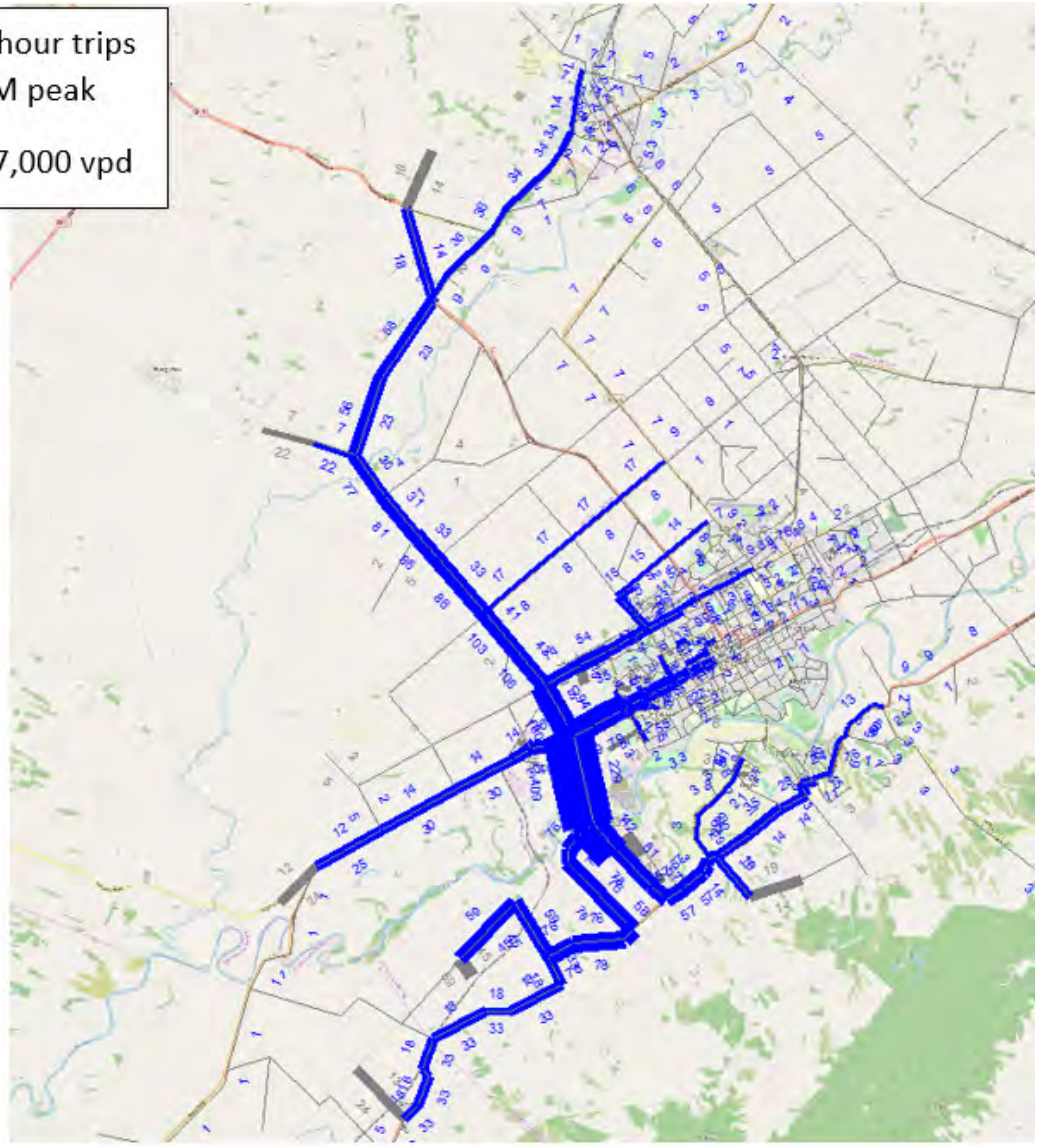
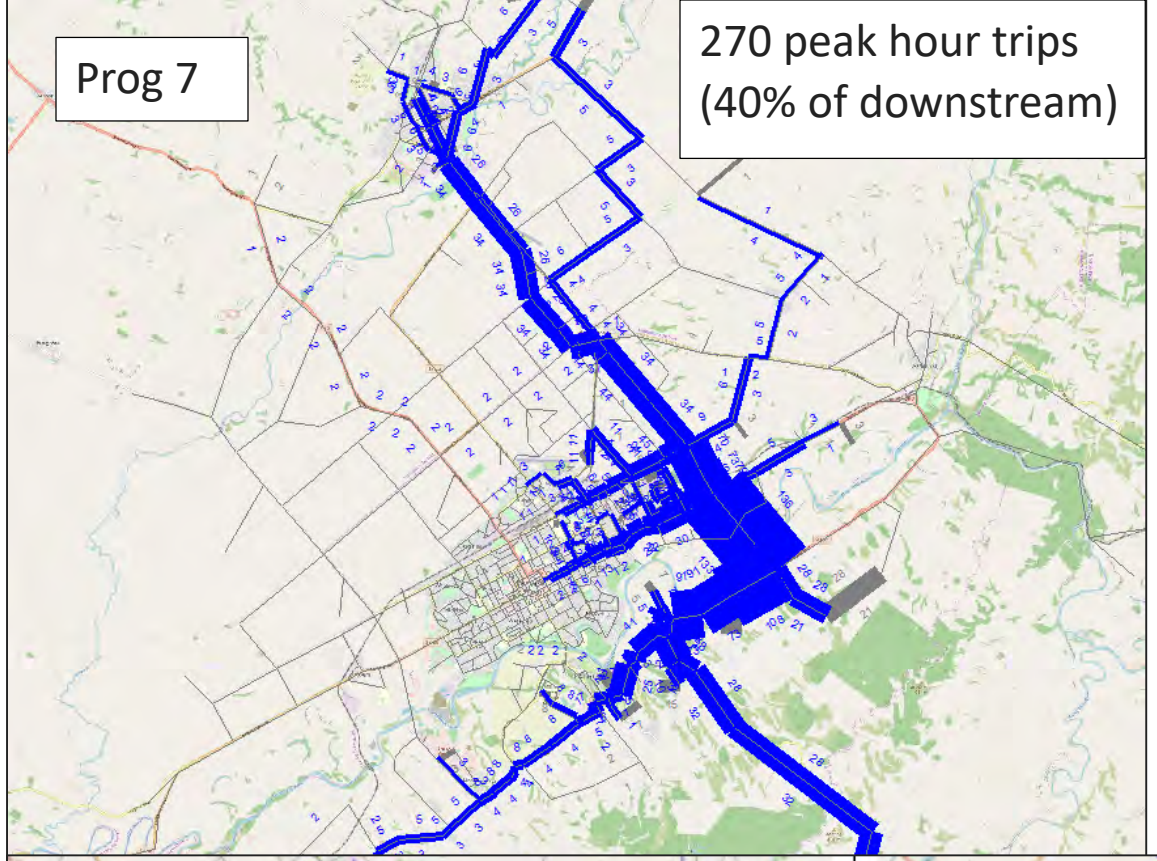
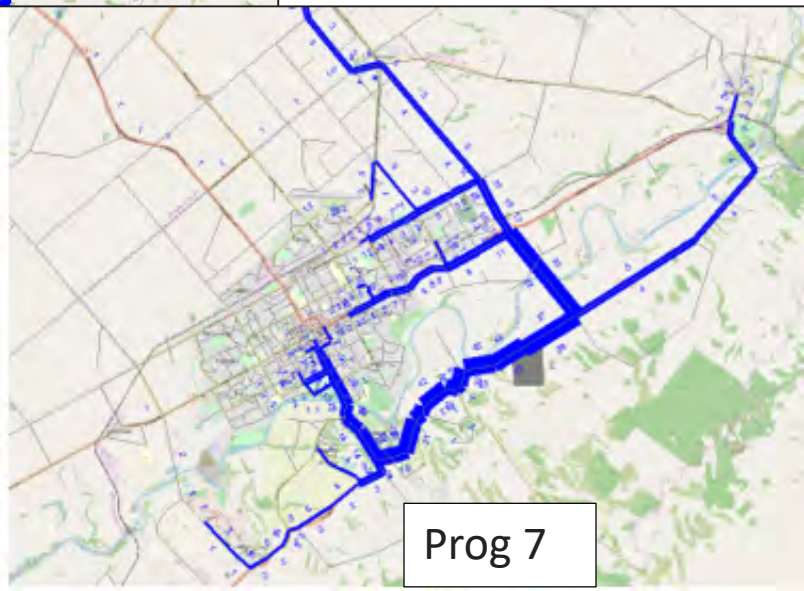


Figure 2: Prog7_CampBridge

Route Choice
Upstream Bridge – Prog 7

- All trips using upstream bridge
  - Trips from CBD (SH3, Tremaine/Kelvin Gr) to SH57 Aokautere /south (50%)
  - Trips from Feilding/North (26%)
  - Trips to Pahiatua Track (19%)
  - Limited journeys further south along SH57 (3%)
- Trips accessing Aokautere that previously used the Fitzherbert bridge now use the upstream bridge

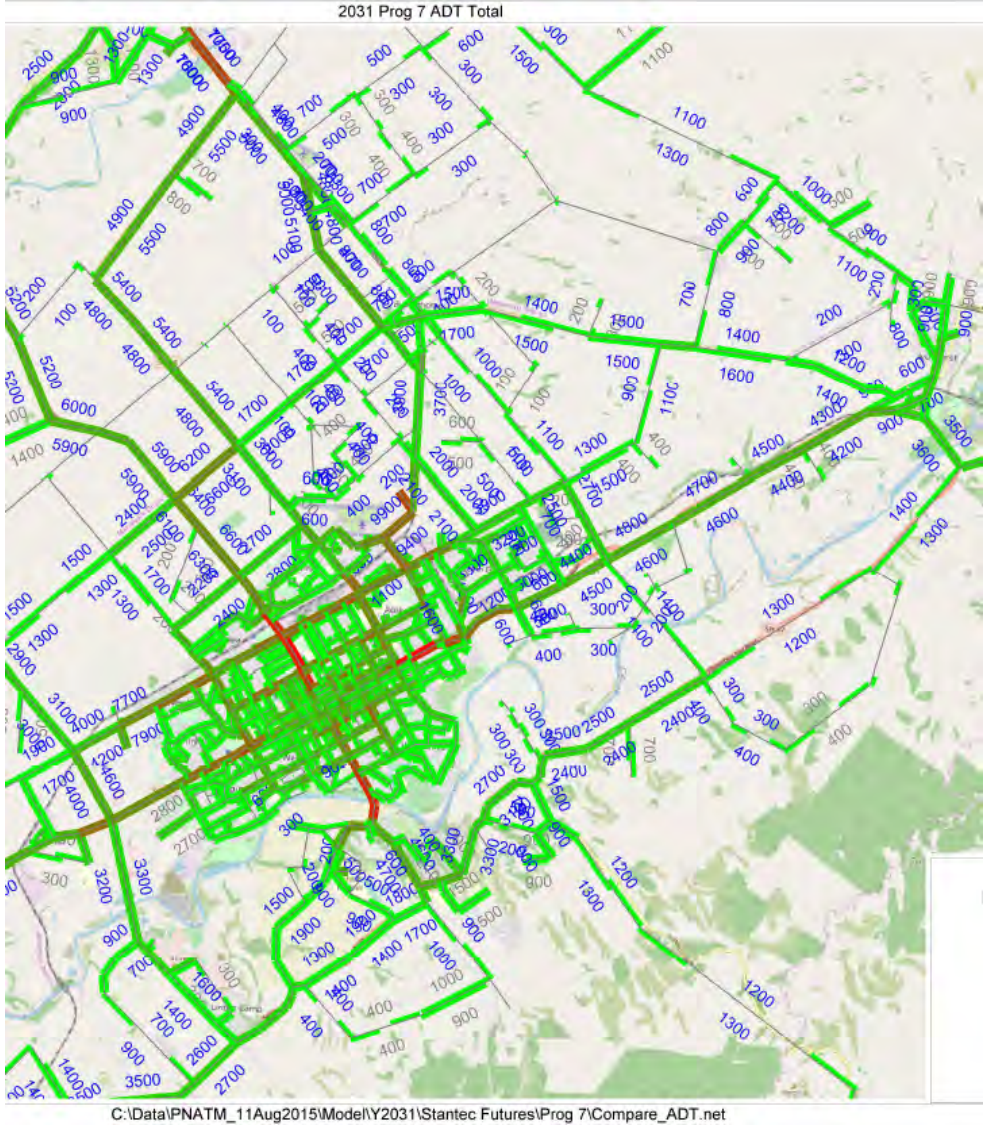


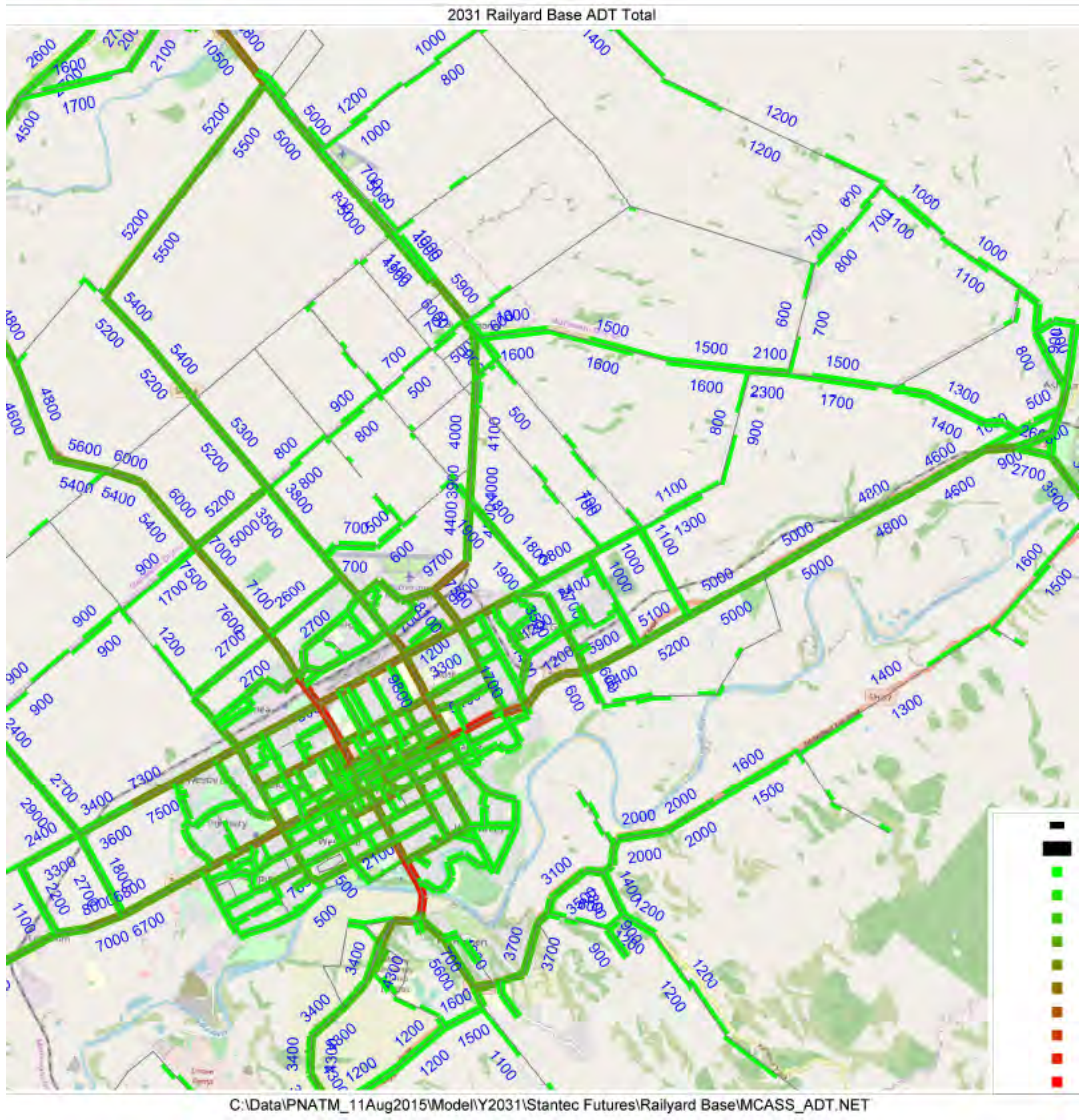


ADT– 2031
Programme 7

Total ADT vs Base

ADT <= 1800
ADT = 1800 - 3600
ADT = 3600 - 5400
ADT = 5400 - 7200
ADT = 7200 - 9000
ADT = 9000 - 10800
ADT = 10800 - 12600
ADT = 12600 - 14400
ADT = 14400 - 16200
ADT > 16200





- Programme 7 Full Ring Road shows there is still significant traffic through the PN – arterials and the CBD are still origins and destinations in their own right (e.g. Tremaine, SH3, Railway Ave, square).

- Modelling shows further consideration of speed management, land use, enforcement and wayfinding measures are required in the CBD to better ‘unlock’ and give effect to the proposed infrastructure measures

Palmerston North Integrated Transport Initiative (PNITI)

Access

Stantec

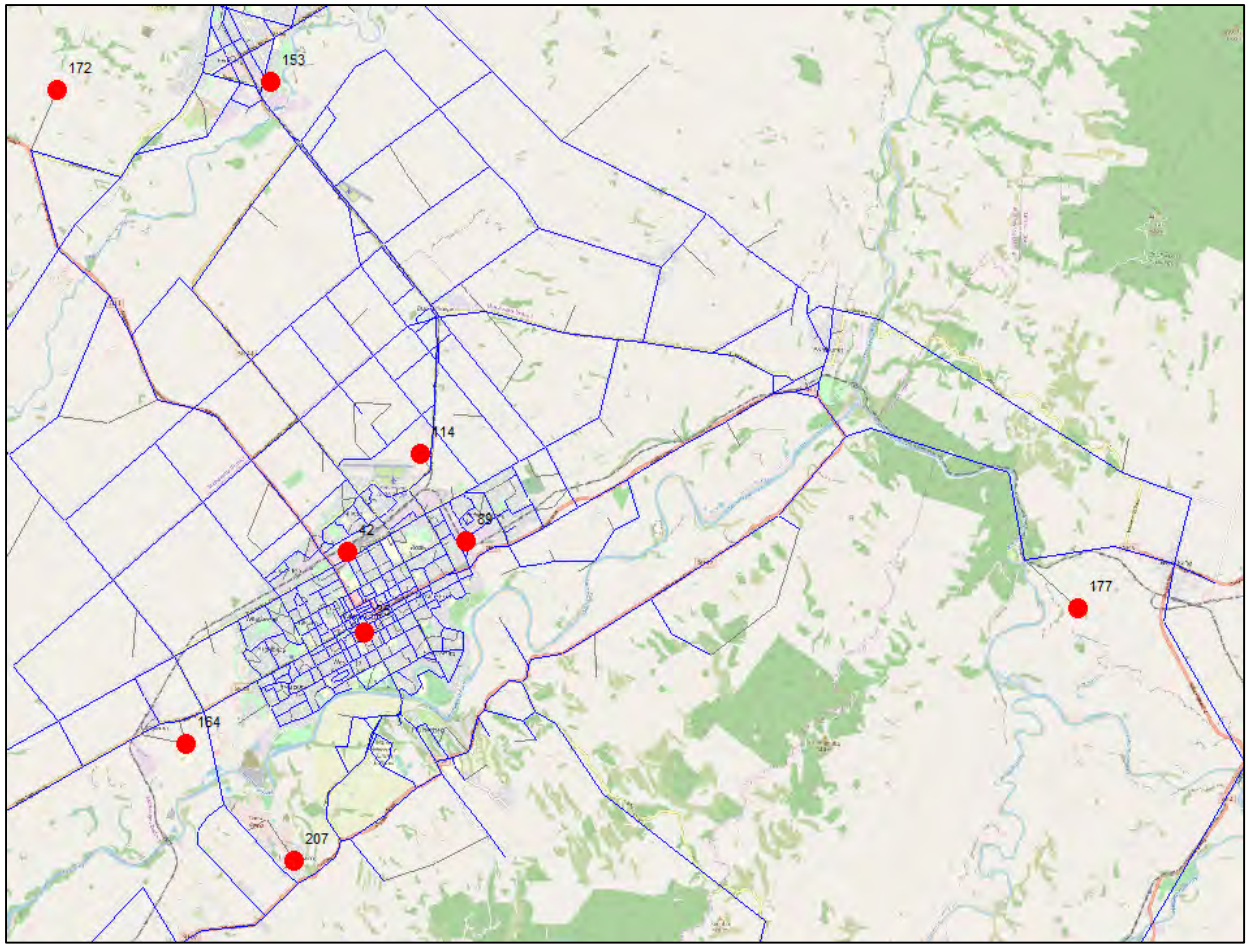
Access

"How well the option improves access between key destinations and access into major areas"

Key considerations:

- Travel time improvements between key locations
- Intersection levels of service
- Vehicle km travelled – cars and trucks

Each of the individual alternatives that form the programmes were scored from +3 to -3 based on how well they would help achieve the Access IO.



Key Destinations

Access

"How well the option improves access between key destinations and access into major areas"

Network Vehicle KM / Vehicle Hours

Daily Benefit vs Do Nothing

	0700 – 1900	
	Veh-kms	Veh-hrs
Prog 6	-5,200	-370
Prog 7	-3,200	-510
Prog 11	-4,300	-260

- All options provide a reduction in network distance travelled and a reduction in travel time, particularly in the AM and PM peaks.
  - Network Distance travelled reductions are minimal <1%
  - Network PM travel time savings are ~5% for 6 and 7 and <3% for P11
- In terms of travel times to key destinations;
  - both programmes 6 and 7 provide very similar TT benefits
  - programme 11 provides just 25% of the savings to key routes (predominately due to the bridge)
- Some interventions within P6 and P7 will reduce travel time and access (e.g. reducing speed)

Travel Times between Key Destinations

Programme 6 vs Do Nothing 2031

Origin Zone	Location	Destination Zone									
		35	177	42	164	153	114	175	89	172	207
35	PN Square (The Square/Fitzherbet)		2	0	1	0	0	1	0	1	1
177	East of Ashhurst (SH3/George St)	1		1	-2	-1	1	0	2	-3	0
42	Tremaine (Tremaine/North St)	-1	-1		-1	-1	-1	-1	-1	-1	-3
164	Longburn (SH56/Reserve Road)	1	-3	0		0	0	0	1	0	-11
153	Fielding (SH54/East St)	0	-2	0	-1		0	0	0	0	-9
114	NEIZ (Railway/El Prado Drive)	-12	-11	-12	-11	-11		-10	-10	-10	-15
175	Southwest (SH56/SH57 Intersection)	1	0	1	0	1	1		1	1	0
89	Kelvin Grove (Roberts/Mlharere Dr)	0	2	0	0	0	1	1		0	0
172	Northwest (SH3/Stewart Road)	0	-3	0	0	0	0	0	0		-10
207	Linton Army Base (SH57/Camp Road)	1	0	-3	-11	-9	-2	0	1	-10	

Access - Scoring

Programme	Score
Programme 6	2
Programme 7	2
Programme 11	1

Access Summary

- Programme 6 and 7 are similar in terms of benefit and provide a step change compared to Programme 11.
- Further consideration of speed management, land use, enforcement and wayfinding measures are required in the CBD to better ‘unlock’ and give effect to the proposed infrastructure measures.

Palmerston North Integrated Transport Initiative (PNITI)

Amenity

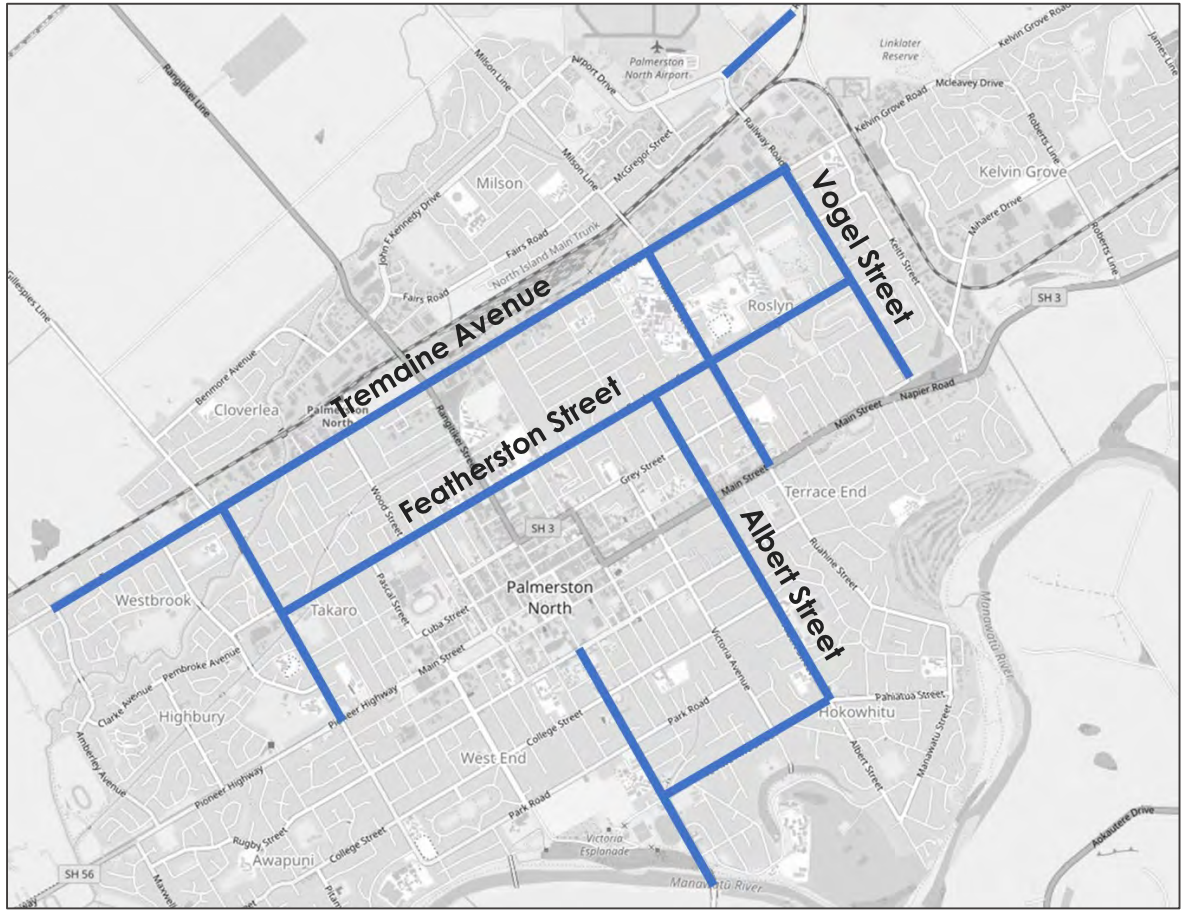
Stantec

Amenity

"How well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations"

Key considerations:

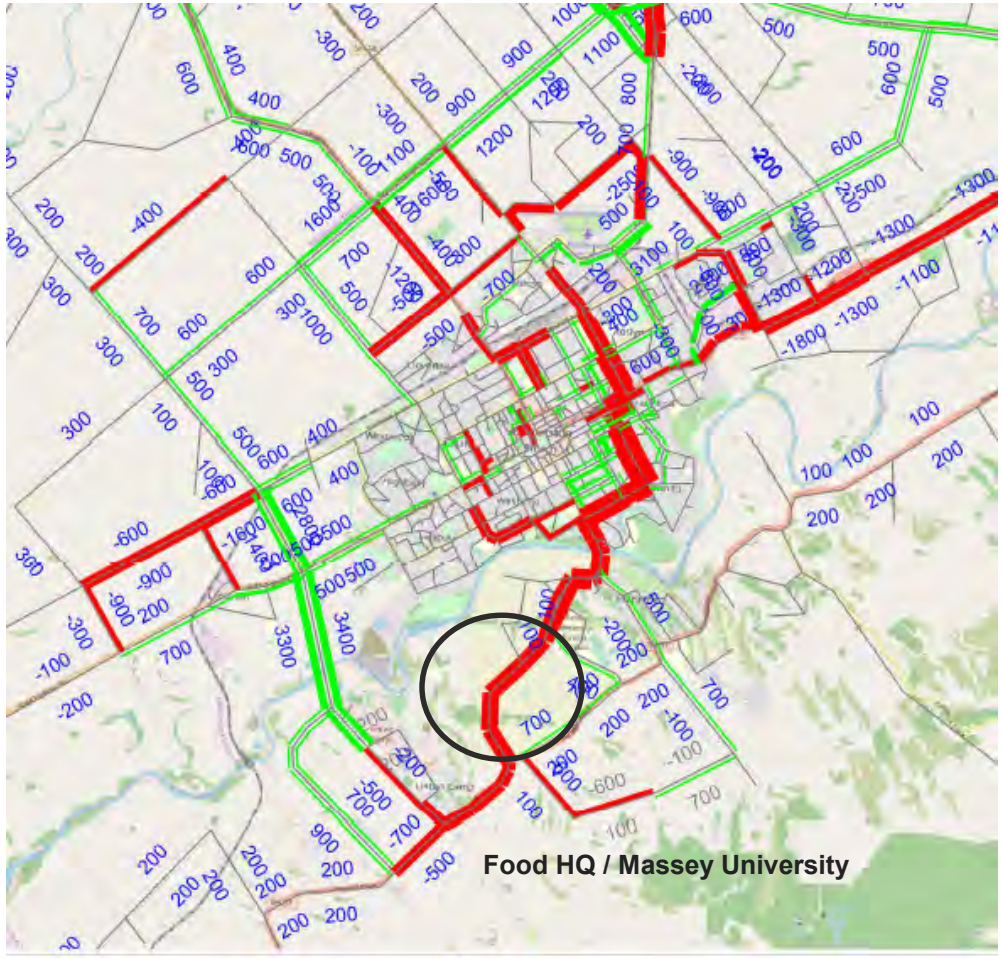
- Freight volumes on streets with higher amenity value
- General traffic through the CBD and past key facilities (such as Massey University)
- Healthy street indicators



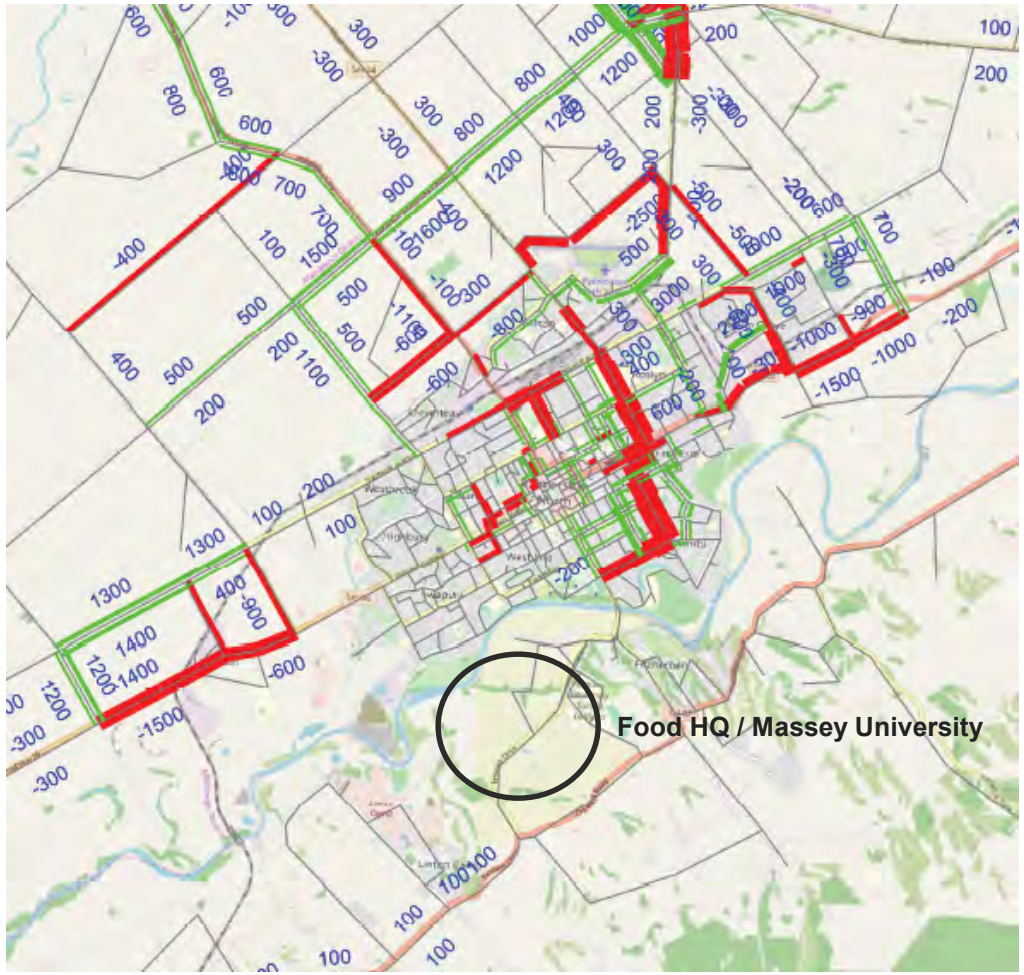
Roads where the Heavy Vehicle Volume Exceeds the ONRC Threshold

Amenity

Impact to traffic volumes...



Do Nothing – Programme 6 (2031)
reduction of 4,000 + trips per day (~60%)



Do Nothing – Programme 11 (2031) – No difference

Amenity

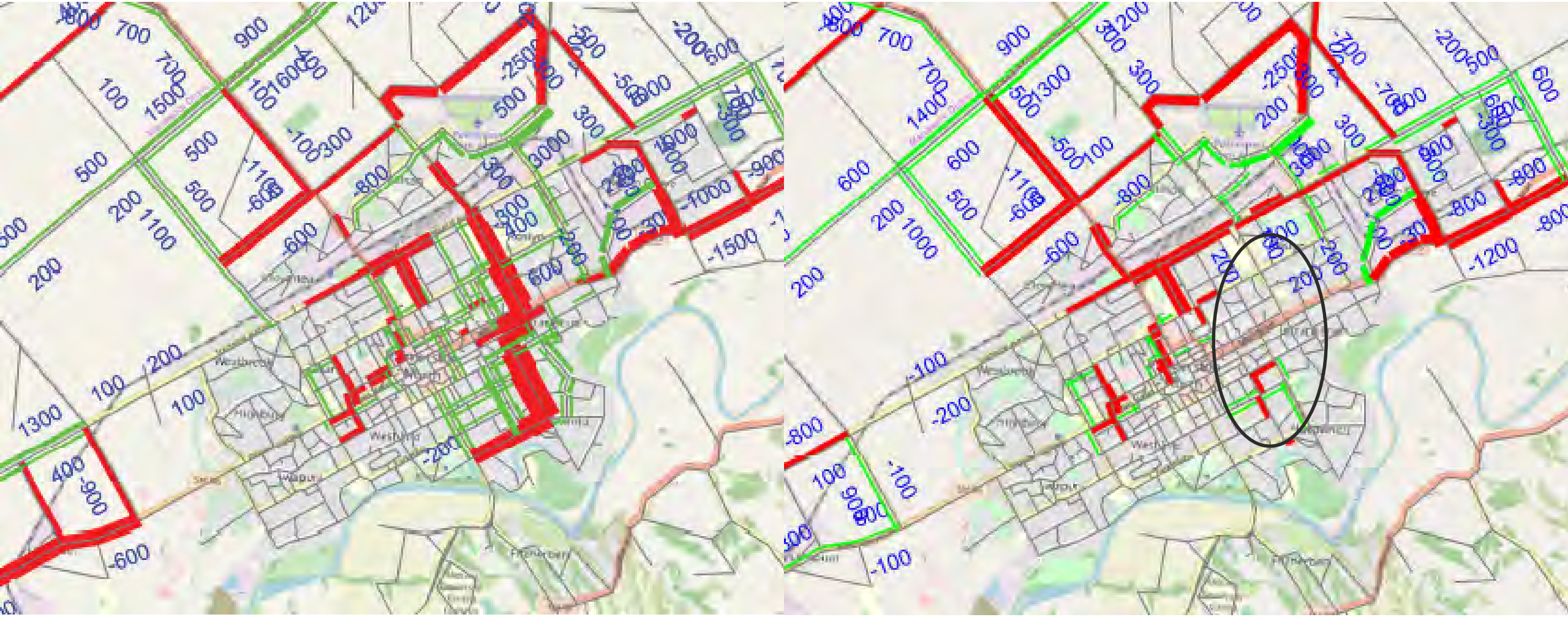
Impact to traffic volumes... & Speed

Do Nothing – Programme 11 (2031)

CBD Reductions dependent on speed changes, rather than infrastructure led trip change

With CBD 40km/h

Without CBD 40km/h



Amenity - Scoring

Programme	Score
Programme 6	2
Programme 7	2
Programme 11	1

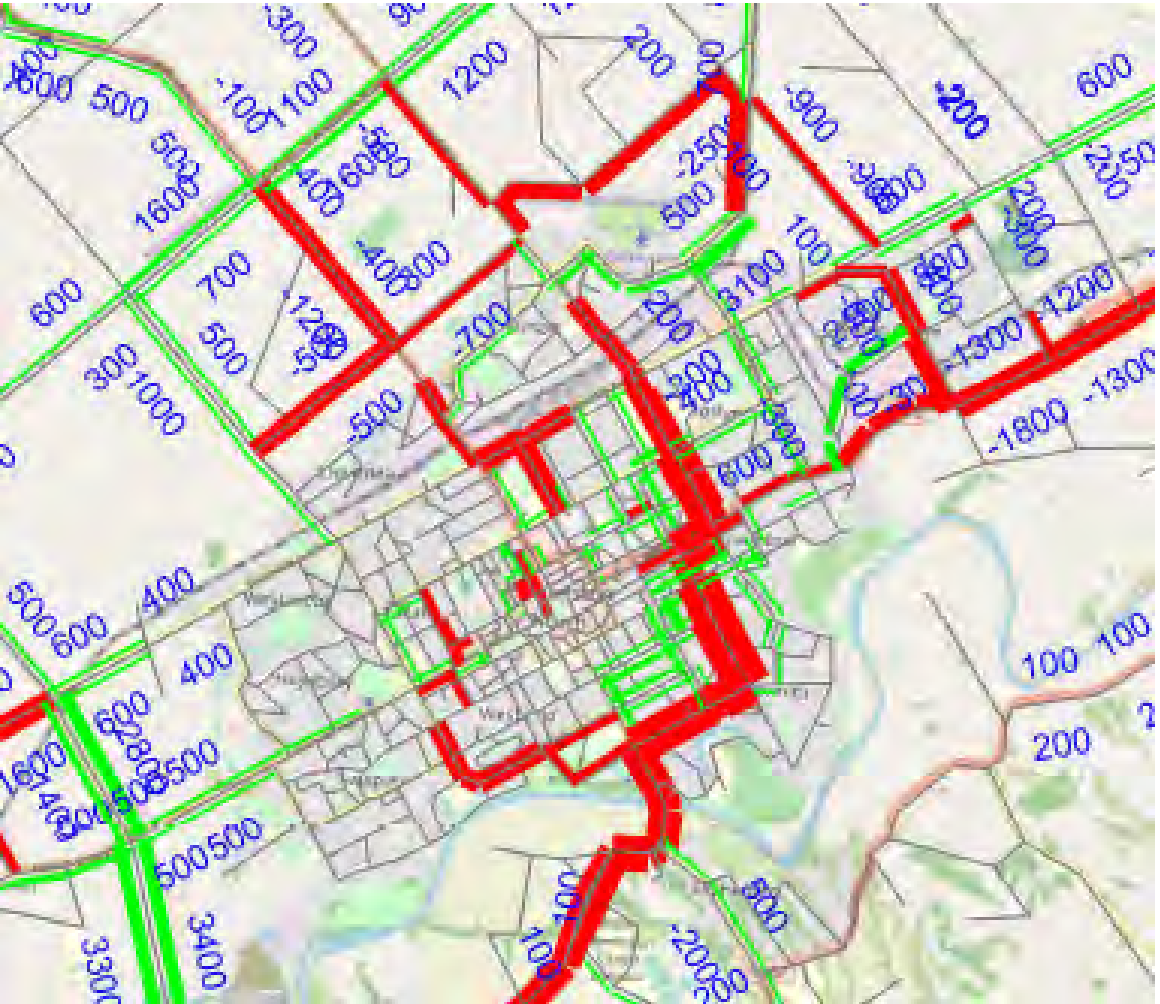
- The main difference between the options relate to the extent to which they reduce traffic volumes through the town centre and along Tennent Drive (which currently severes Food HQ and Massey).
- Programmes 6 and 7 deliver the better reductions (giving effect to potential amenity improvements), and hence have been afforded a higher score than Programme 11.
- All options reduce heavy vehicle volumes (to some extent) on the following key routes; Albert Street, Ruahine Street, Te Awe Awe Street (*Programme 11 dependent on speed limit changes*)

Amenity

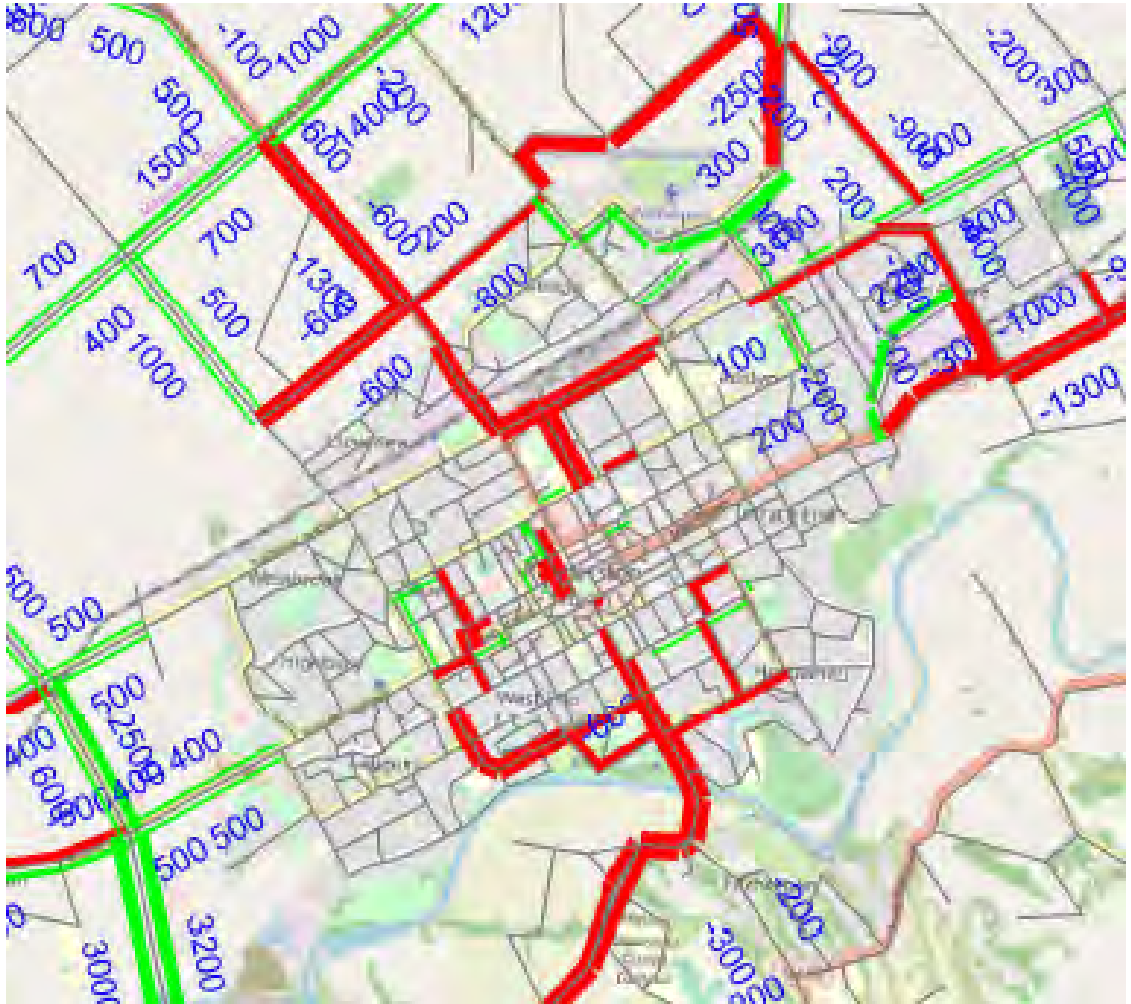
Impact to traffic volumes... & Speed

Do Nothing – Programme 6 (2031)

With CBD 40km/h



Without CBD 40km/h



C.3 Economic Growth

PN Integrated Transport Initiative

Framework for evaluation for December MCA workshop

Economic Development

1 Approach

A framework that is similar to that developed earlier for the previous PN ITI workshop which itself is based on the approach used for the assessment of the rail terminal options has been developed. The approach for the rail hubs was very much based on the movement of freight and while this is important for the ring road options, they will also have an impact on more general movements in the PN area. These have now been taken into account in the revised assessment. For this the following subcriteria have been developed.

- Support existing economic activities in the PN area
  - Freight generating activities
  - General employment
- Support current growth patterns
  - Freight generating activities
  - General employment
- Support potential specific growth areas (NEIZ, Longburn, FoodHQ)
- Support possible rail hub locations. While this was originally included in the list of subcriteria, it has now been transferred to the separate criterion of supporting the rail hub options and so has been excluded from this analysis

All of these have been assessed on a qualitative basis using the 7 point scale developed for the Accessing Central New Zealand PBC.

In assembling the overall scores, appropriate weights have been chosen for the individual categories.

The scores are based on the framework used for the Accessing Central New Zealand PBC analysis with a 7 point scoring scale from -3 for options with significant adverse impacts to +3 for options with a significant positive impact.

2 Background to the evaluation

The evaluation has taken into account:-

- Current patterns of employment in the Palmerston North area taking into account both general employment and also employment in industries which are considered likely to have a high freight generating potential
- The growth in these industries over recent years

Details of these are set out in Figures 2.1 - 2.4. Typically general employment is focussed on central area locations whereas the growth in freight generating activities is typically further away from the urban core.

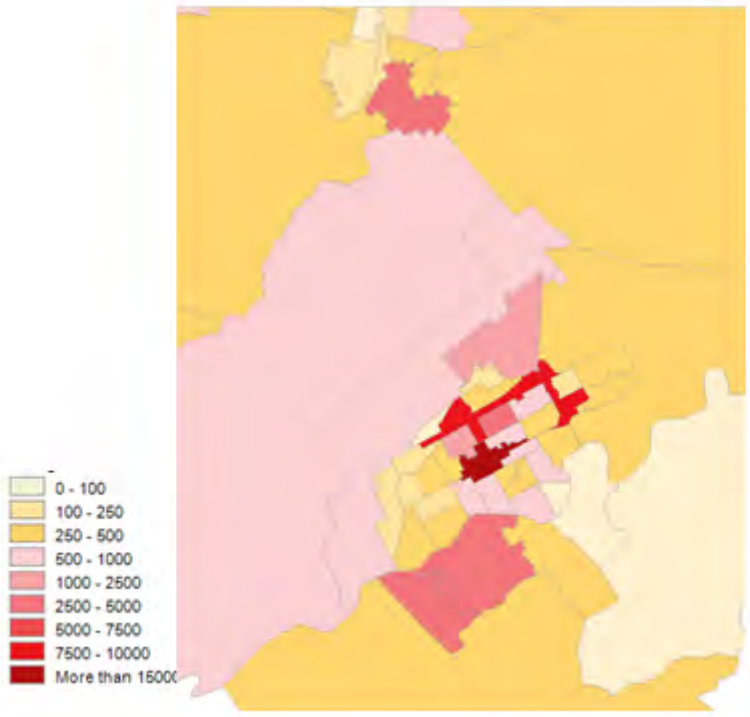


Figure 2.1
Distribution of total employment 2018

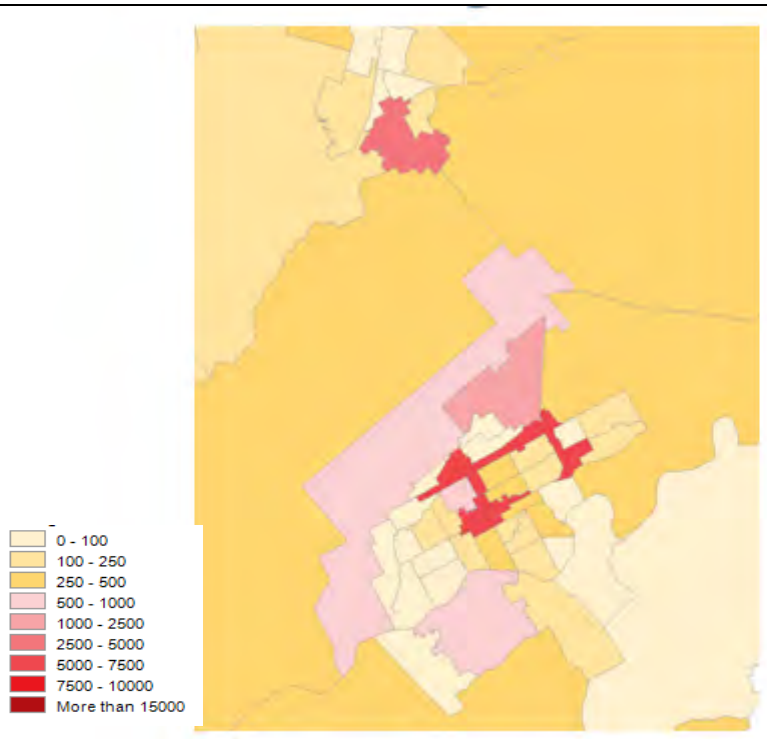


Figure 2.2
Distribution of total employment in primary and secondary sectors 2018

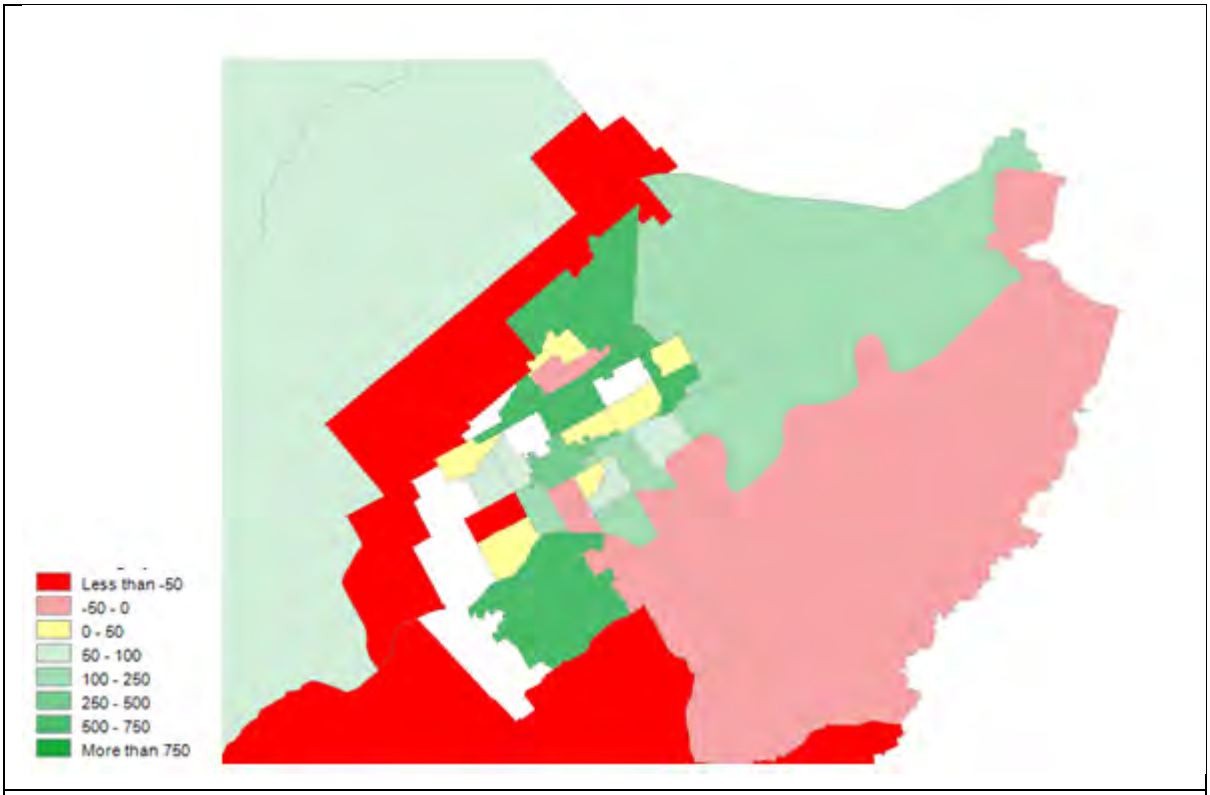


Figure 2.3
Total employment growth 2013-2018

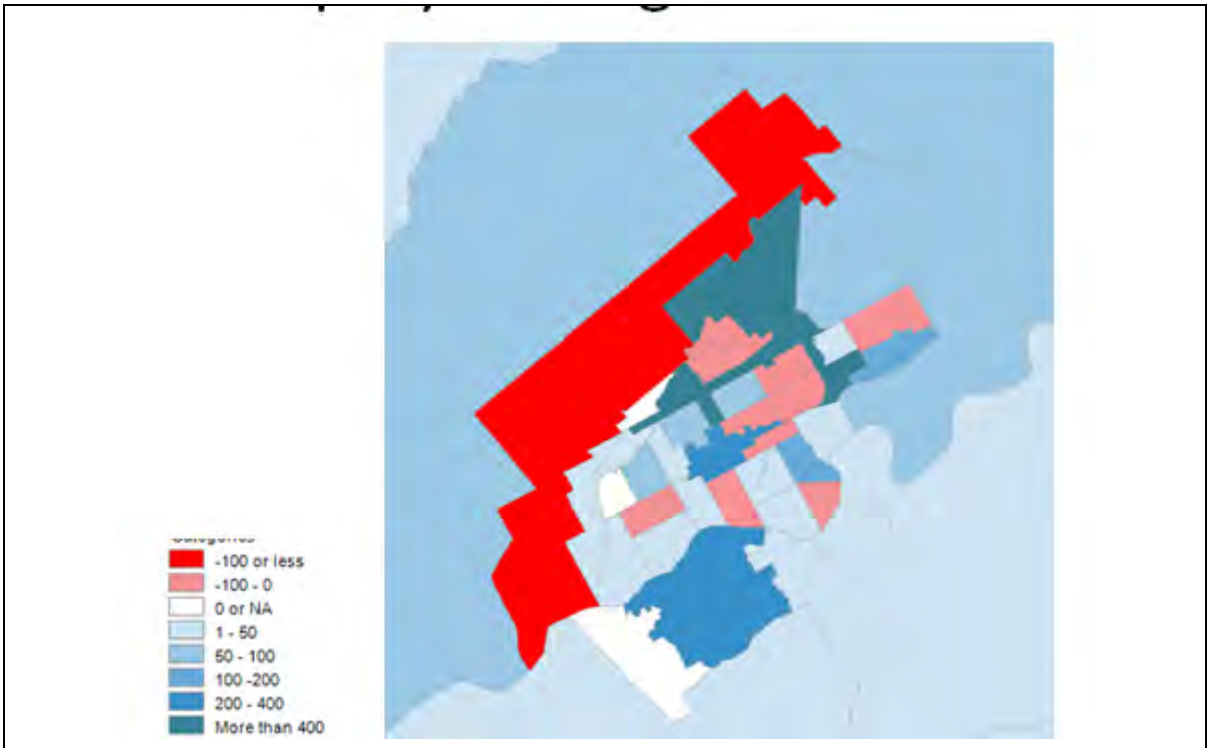


Figure 2.4
Total primary and secondary sector employment growth 2013-2018

For the element supporting growth at identified development sites, separate ratings have been developed for each identified location.

In addition, account has been taken of the typical pattern of changes in traffic flows based on the assessment undertaken by Beca. For the current analysis Option 6 has been taken to be broadly equivalent to Beca Scenario 1, Option 7 to Beca Scenario 1c and Option 11 broadly equivalent to Beca Scenario 1e. While there are some differences in the detail, the Beca scenarios selected reflect the main assumptions about the number and locations of any new river crossings.

3 Results of the appraisal

The results of the appraisal are set out in Table 3.1.

Table 3.1 Assessment of Economic Development Impacts				
	Ring Road Programmes			
	6	7	11	Weight
Support existing economic activities in the PN area				
o Freight generating activities	2	3	1	1
	Improvements on Tremaine Avenue New river crossing to west	Improvements on Tremaine Avenue Better access to the east and two river crossings	Improvements on Tremaine Avenue but no new river crossings	
o General employment	2	2	2	1
	Improved access to central area from south of river with diversion	Improved access to central area from south of river with diversion	Improved access along Tremaine Avenue	
Support current growth patterns				
o Freight generating activities	2	3	1	1
o General employment	2	2	1	1
	Good access to south west No change on Tremaine	Good access to south west No change on Tremaine	No new river crossing in west but upgrades to Tremaine	
Support potential specific growth areas				
NEIZ	2	3	2	0.5
		2 river crossings		
Longburn	3	3	2	0.25
	Links Longburn to full route inc cross-river accessibility	Links Longburn to full route inc cross-river accessibility	No cross river accessibility	
Food HQ	2	3	1	0.25
	New river crossing plus minor imp to SH57	New river crossing plus full imp of SH57	Limited imp of SH57	
Total scores	2	3	1	

This would give the following ratings

Programme 6	2
Programme 7	3
Programme 11	1

Programme 7 with the 2 new river crossings scores the highest. Programme 6 with a single river crossing ranks the second highest with a score of 2 with Programme 11 with no river crossings getting a score of 1

Economic Development

Richard Paling

Scope of Economic Development

- Assessment covers the potential of the programmes to support economic growth
- Similar framework to that used for earlier assessments
- Considers wider impacts not just those related to movement of freight.
- Impact on employment of all types

Approach

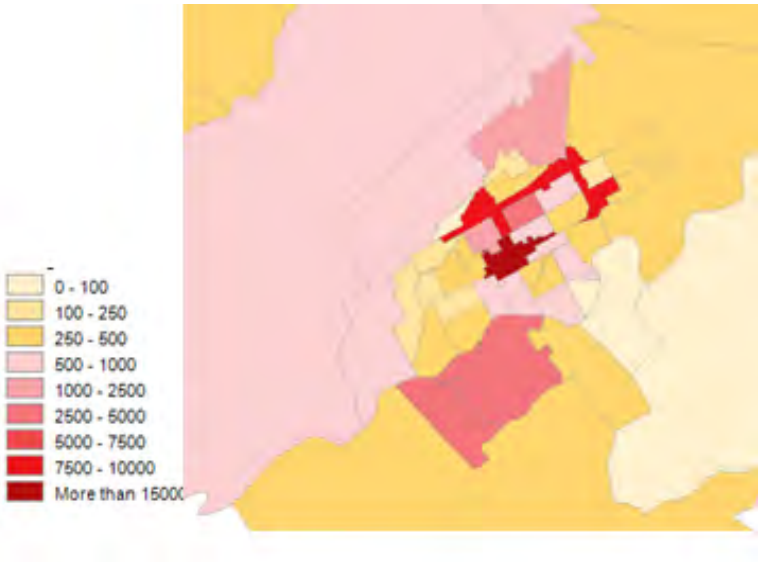
- Approach is essentially qualitative.
- Takes into account current patterns of economic activity and changes over the recent past
- Also considers the extent to which the proposed new programmes with result in changes in traffic flows on the existing network
- Relief of congestion on critical links

Key criteria

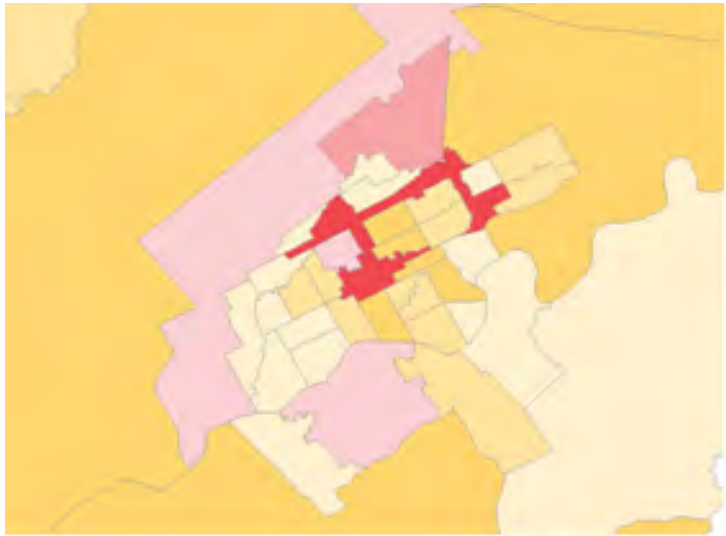
- Support existing economic activities in the PN area
  - Freight generating activities
  - General employment
- Support current growth patterns
  - Freight generating activities
  - General employment
- Support potential specific growth areas (NEIZ, Longburn, FoodHQ)
- Support possible rail hub locations.
  - Originally included but now transferred to separate “supporting the rail hub” criterion

Employment levels

Total employment 2018



Primary and secondary sector employment 2018



Scoring

Table 3.1 Assessment of Economic Development Impacts					
		Ring Road Programmes			
		6	7	11	Weight
Support existing economic activities in the PN area					
	o Freight generating activities	2	3	1	1
	o General employment	2	2	2	1
Support current growth patterns					
	o Freight generating activities	2	3	1	1
	o General employment	2	2	1	1
Support potential specific growth areas					
	NEIZ	2	3	2	0.5
	Longburn	3	3	2	0.25
	Food HQ	2	3	1	0.25
Total scores		2	3	1	

Assessment

- Programme 6 2
- Programme 7 3
- Programme 11 1
- Programme 7 with 2 new river crossings scores the highest - 3
- Programme 6 with a single river crossing ranks second
- Programme 11 with no river crossings score of 1

C.4 Resilience

Palmerston North Integrated Transport Initiative Resilience Multi Criteria Analysis

Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
1	02/12/2019	First Draft	Sam Rudge			
2	10/12/2019	Second Draft	Sam Rudge	JF	PP	
3	13/12/2019	Post workshop update	Sam Rudge	DR	PP	PP

1 Purpose

This report outlines and documents the evaluation process and considerations for the resilience criteria for the Multi-Criteria Asessment workshop for the preferred programmes.

For the purposes of this report and analysis, the definition of resilience is taken from the NZ Transport Agencys 2018 resilience framework, specifically:

Resilience is the transport system's ability to enable communities to withstand and absorb impacts of unplanned disruptive events, perform effectively during disruptions, and respond and recover functionality quickly. It requires minimising and managing the likelihood and consequences of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disruptive events, caused by natural or manmade hazards.[1]

This is shown graphically in Figure 1-1 below.

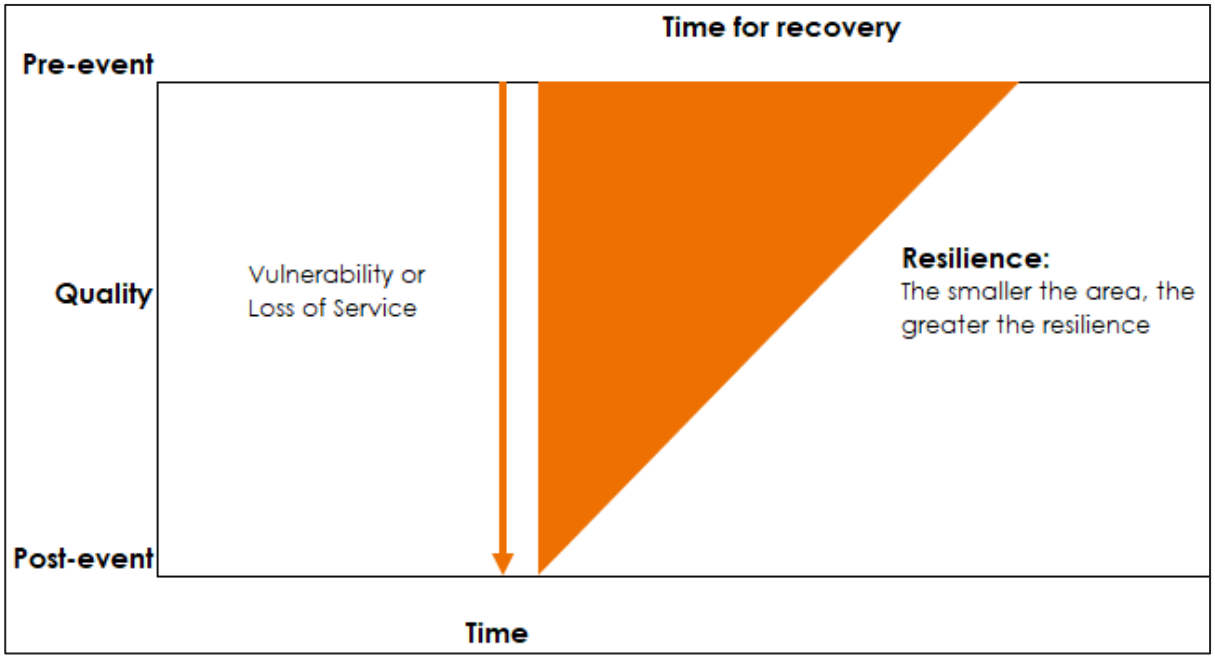


Figure 1-1: Resilience of Network Illustration

For the purposes of this report the event which causes the deterioration in level of service is assumed to not be able to be controlled. The evaluation of each programme focuses on the ability to withstand the drop in level of service or provide an alternative route minimising the drop in level of service. Restoration times are not evaluated due to this being unknown at this stage of the assessment.

Finally, all committed projects within the region have been assumed to be completed with respect to the resilience assessment.

2 Considerations

2.1 Overview

The assessment is a weighted procedure looking at the programmes ability to maintain or reinstate the appropriate level of service during both local low impact high probability and regional high impact low probability events.

The regional events considered as part of the assessment, in accordance with the Horizons Regional Councils top regional risks are:

[1] https://www.nzta.govt.nz/assets/Highways-Information-Portal/Technical-disciplines/Resilience/Resilience-response-framework/Transport-Resilience-Framework-v3-final-2018.pdf

- Earthquake
- Flood

As the probability of these events is unable to be managed, each programme will be assessed only from the perspective of the ability of the programme to maintain or restore the expected level of service. These events will have multiple transport links removed at the same time. For example, the upgrade of the seismic performance of a structure will count positively towards maintaining the expected level of service.

Local events look at the ability of the transport networks ability to cope with a single linkage being removed.

The ability for the programme to facilitate additional services across the river is excluded from the analysis due to this forming part of the business case for the He Ara Kotahi Manawatu River Bridge[2].

The role of the Linton Military Camp was considered in an indirect way however was not given specific consideration. The ability for a programme to serve the army camp was analysed by the provision of an improved level of service to and from the Linton area contributing positively to the score, with a deterioration in level of service resulting in a negative score.

Operability of bridges has been assessed with the data available for flood risk and seismic risk only. While there are thoughts that some bridges in the area are considered 'under strengthened' by some, the operation of them is considered 'business as usual' and any operational improvements with regarding to strengthening is considered to be dealt with as part of the councils and NZTA's Asset Management Plans. While technically not a high probability event, the loss of a key link such as a bridge is considered under the local low impact high probability events.

Considerations about the impact of any detours implemented to avoid disruptions to amenity etc. are excluded from analysis.

2.2 Local Low Impact High Probability Events

These events are local events such as a crash, breakdown or minor flooding or slips, which causes a small disruption to the road network with limited impact. For this assessment, only the impact to the road users is considered as safety has its own MCA criteria and frequently minor flooding events are related to maintenance regimes etc. This means that an improvement to an area with crashes is not evaluated as highly compared to an option which creates an accessible alternative route.

Figure 2-1 below shows the collective risk for the network, which is a metric on the density of crashes and has therefore been used to estimate the impact of crashes.

[2] https://www.pncc.govt.nz/media/3128991/detailed-business-case-july-2016.pdf

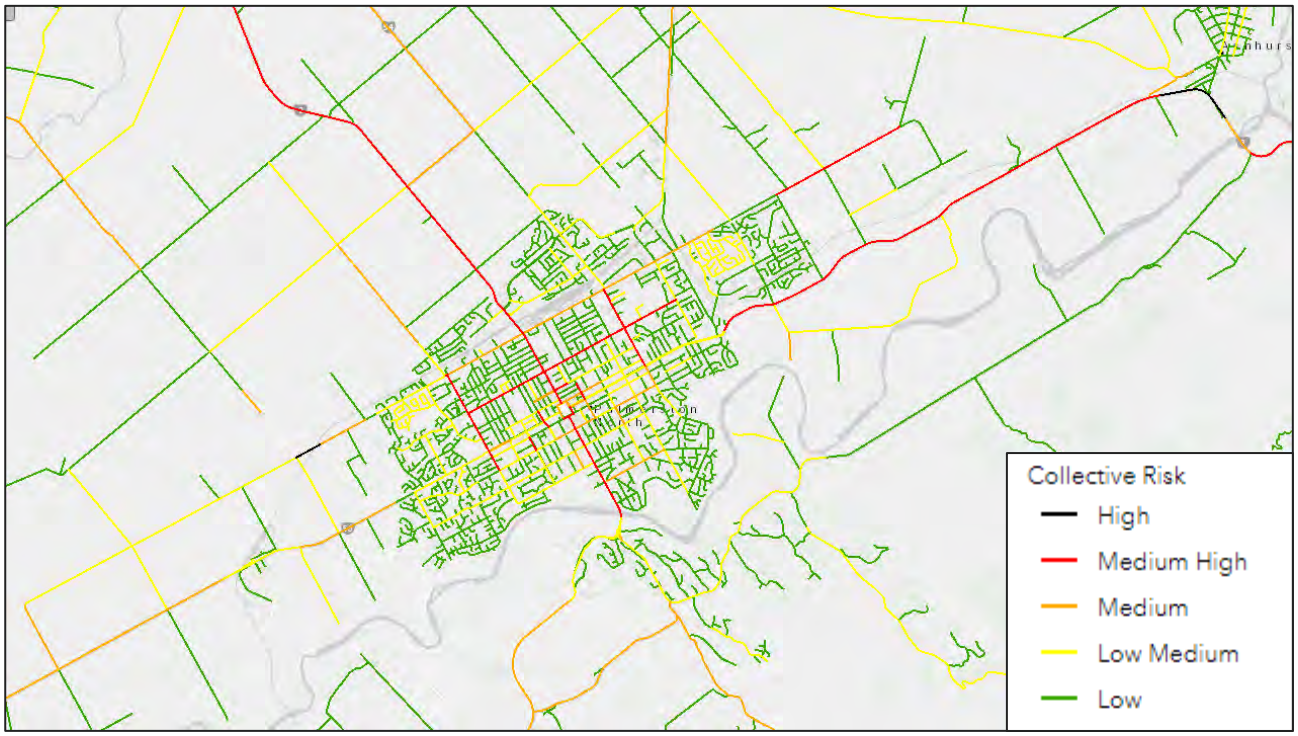


Figure 2-1: Collective risk on the Palmerston North road network

It can be seen that the highest crash risk occurs on SH3, Featherston, Fitzherbert and Ruahine Streets as well as No 1 Line Longburn.

PNCC has Flood Prone areas available as a GIS layer, however, this related to large scale overland flooding opposed to more localised impacts which have regular occurrences and was therefore not used to inform potential small scale closures. Large scale flooding is discussed later in section 2.4.

2.3 Earthquake Scenarios

While the exact impact of an earthquake on the transport network cannot be known, to assess the impact of a seismic event the NZTA seismic disruption state and the liquefaction potential of the study area have been assessed.

The NZTA disruption state data taken from the resilience web portal, which combines the outage state and availability state into a single metric. The portal also notes bridges which have been assessed for risk to seismic events. An output for the disruption state is below in Figure 2-2.

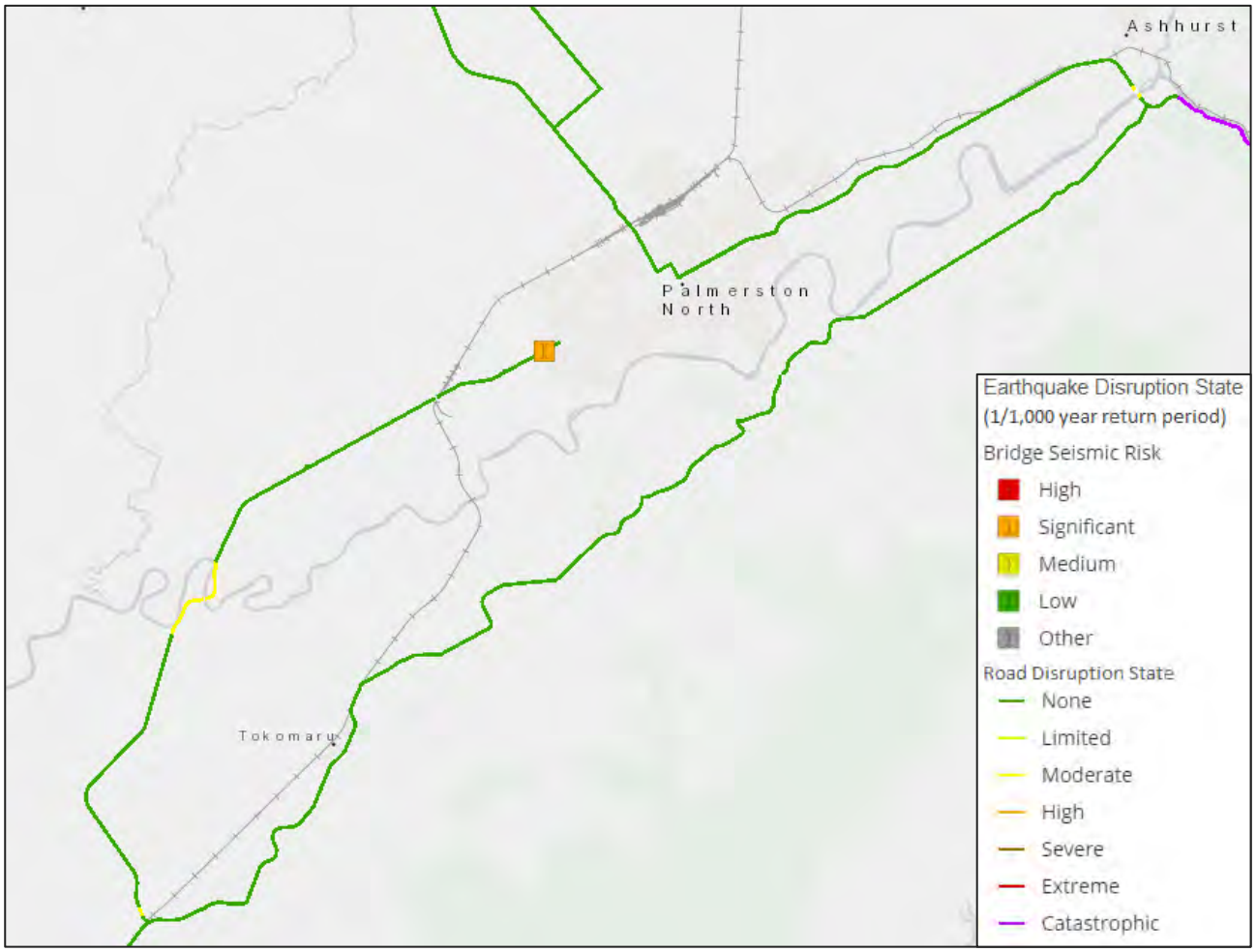


Figure 2-2: Seismic disruption state for state highways

It can be seen that there is a moderate impact to the SH56 road availability and a significant seismic risk to the bridge immediately south of the city. On the crossing of the Manawatu River, the approaches are expected to be in a difficult state to cross and remain in the state for up to two weeks. North of the city, there is a very small section of road expected to have moderate disruption.

Areas within a high liquefaction area are likely to be impacted on a various scale. For the purpose of this analysis, small sections of high liquefaction potential are not deemed to have a significant impact, however, large areas are deemed to have a negative impact. This is an attempt to account for the fact that it is a potential, and therefore the balance of probability is more likely to have impacts on roads with significant lengths in highly liquefiable areas.

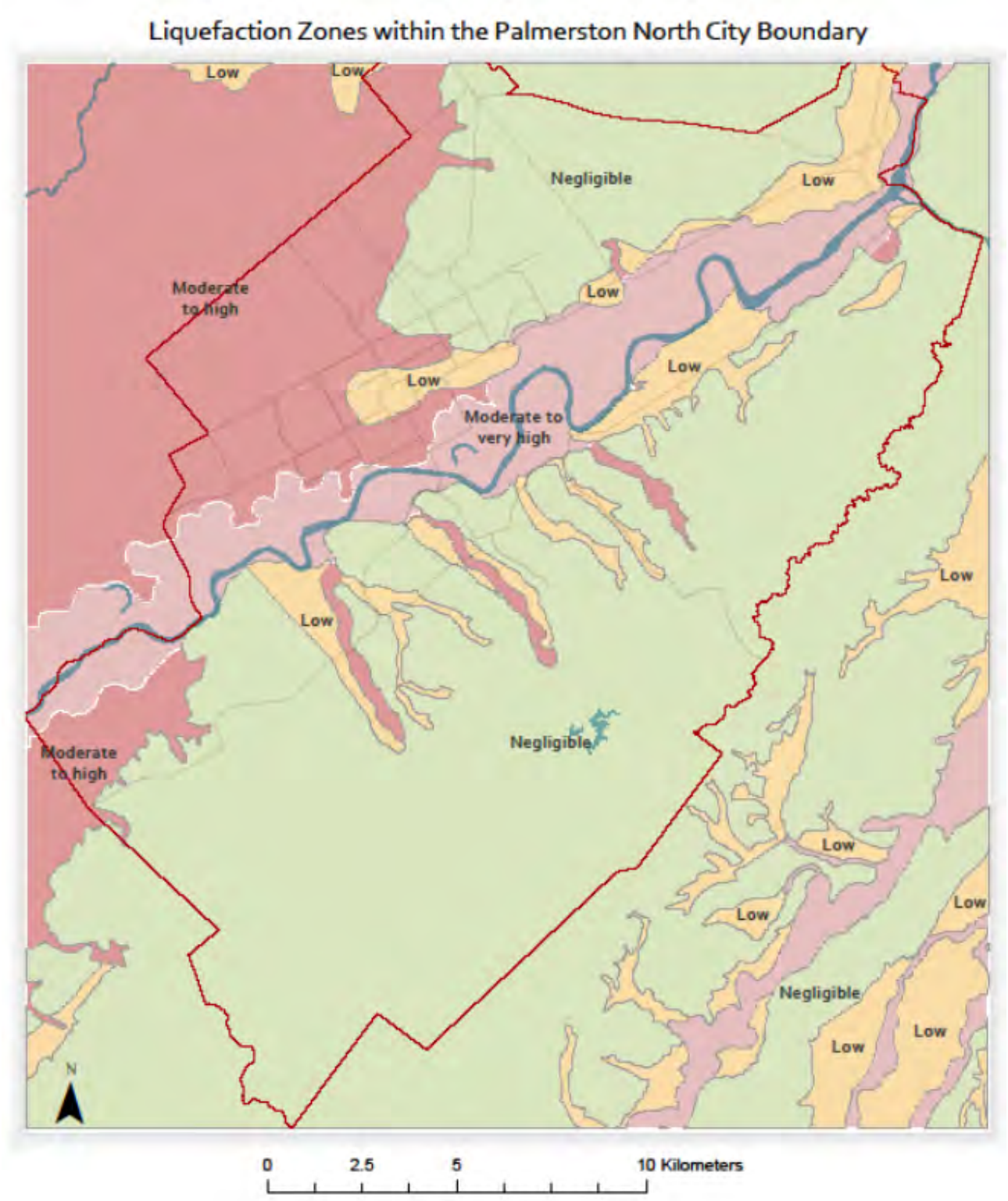


Figure 2-3: Liquefaction potential within the Palmerston North City boundary[3]

This highlights that for a seismic event the majority of impacts are most likely to be to the south and west of the city.

No specific slope stability data was able to be found, however it is noted that NZTA's earthquake resilience disruption state has slope stability as a factor into its calculation.

[3] https://www.pncc.govt.nz/media/3130908/palmerston-north-and-liquefaction-june-2018.pdf

The Palmerston North City Council notes that the Saddle Road Bridge and the Fitzherbert Bridge are the critical structures to the city. In both cases this is due to the impoartance of the structure to the city opposed to the likelihood of failure. The PNCC Asset Management Plan notes that both have a high level of resilience for the structure, however, the Fitzherbert Bridge only has a moderate seismic level of service for the approach.

For the purposes of the analysis from a seismic perspective, the following network state has been assumed:

- SH56 closed or limited access to emergency services and response vehicles
- Reduced levels of service in moderate to high liquefaction zones to the west of the city
- Limited access on SH3 on the Manawatu River crossing
- Limited access across the Fitzherbert Bridge

While the Fitzherbert Bridge is expected to remain open as it is designed for a 1 in 2,500-year earthquake, the social-economic loss of the bridge has been estimated at $430,000 per day[4]. The bridge currently carries the services across the Manawatu River which may also be disrupted in a seismic event. Due to the large impact, the loss of the bridge has to the city, it has been noted that an alternative crossing does improve the resilience of the network. It is noted that there are overpass structures located immediately to the south of the bridge as well which could make using the bridge practically impossible, even if the Fitzherbert Bridge itself is fine.

2.4 Flooding Scenario

Flood modelling from Horizons regional council has been taken to estimate the impacts to the transport network as well as the NZTA Resilience mapping. At a regional level the flooding is expected to occur primarily to the west and the south of the city as demonstrated below in Figure 2-4.

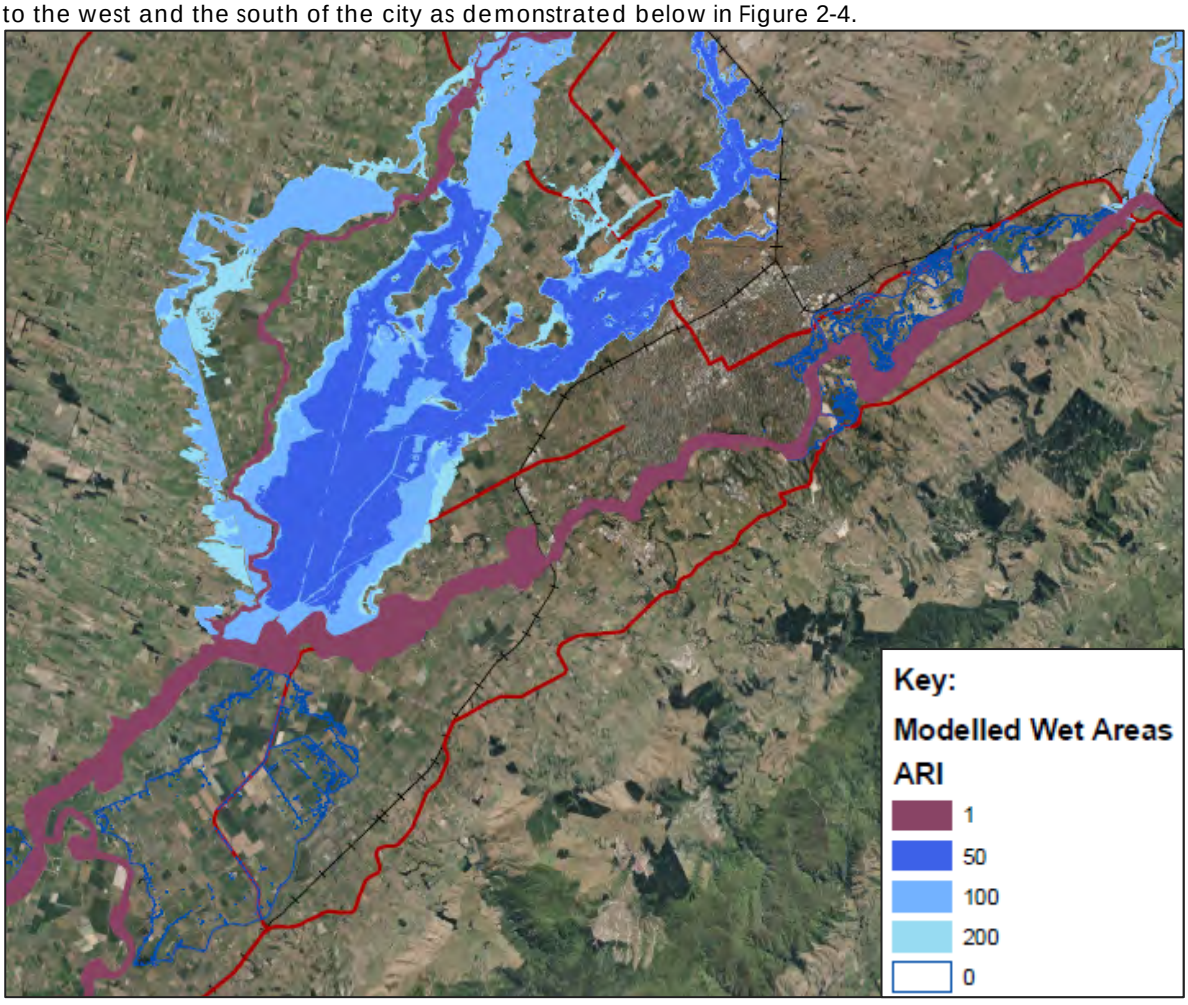


Figure 2-4: Regional overview of flood affected areas (Horizons Regional Council)

When combining the data with the State Highway data disruption state data, we see a slightly different picture: The disruption state of the state highways

[4] https://mro.massey.ac.nz/bitstream/handle/10179/5725/Measuring%20Transport%20Resilience.pdf

The highway disruption state for flooding shows that while SH57 on the whole is less likely to be fully available, with two at risk bridges as well as pockets of moderate disruption. SH56 has a significant section of road with moderate disruption. This is in contradiction to the Horizons data and is discussed below

The highway disruption state for the 1:100 year flood was reviewed, however as there appears to be slightly contradictory data between the NZTA and Horizons Regional Council data. As flood management is fully within the realms of the regional councils purview, for the purposes of this report, the HRC data takes precedence over NZTA data for the impacts to the road. With that in mind, NZTA does have suitable information on the capacity of their structures. This has led to noting that SH57 has two structures, emmediately east and north-east of the city which are high risk for a 1 in 100 year flood event.

For the purposes of the analysis, from a flooding perspective the following network state has been assumed for the do-minimum:

- SH56 to the south closed
- SH3 to the northwest of the city is impassable
- SH3 to the northeast of the city having mild disruptions
- Kairanga-Bunnythorpe Road closed for the majority of its length
- SH57 having localized issues due to bridge constraints
- SH3 crossing of the Manawatu River having localized flooding

3 Weightings and Scoring Treatments

The weightings for the analysis are as follows:
Local low impact high probability event: 20%
Regional flood event 40%
Earthquake event 40%
Weightings have been assigned on the basis of the impacts to the region will be far greater for a regional event than a high probability impact event. It is also noted that Palmerston North has a grid layout, which in turn leads to a high state of resilience for the low impact events.

Programmes were scored on a -3 to +3 evaluation for each event type where -3 represents a significant reduction in level of service compared to the do minimum. A score of 0 represents a similar level of service to the do minimum and a score of +3 represents a significant improvement in the resilience of the network. Scores were made in 0.5 increments

No options scored negatively as none of the options result in a decreased resilience state compared to the do-minimum.

4 Evaluation

Table 4-1 overleaf outlines the scoring including the justification for all of the scores given. Some of the high level trends are discussed here.

No single programme provided a substantially higher level of service for high probability events. This is in part due to the grid like nature of the PNCC Road network resulting in a high level of service already. Programmes 6 and 7 with their alternative river crossings scored higher in this regard as they were considered able to cope with an event on the Fitzherbert Bridge better than Programme 11 or the do minimum. Programme 6 also provided an alternative new route at Ashurst.

Seismic events provided a similar story, however the disruption to SH56 near the Manawatu River crossing indicated that routes which prioritized SH57 over SH56 received a higher score. It was noted from the PNCC AMP that the approaches to the Fitzherbert Bridge had a higher risk, so options which provided a second crossing again scored higher. Seismic events primarily impacted travel to and from the south. The Programmes and the expected areas with disruption are

Flooding posed that greatest impact to the road network operating with parts of SH3 (west), SH56 and Kairanga-Bunnythorpe Road all expected to be flooded. This has a substantial impact of most inter regional journeys in all directions. In this regard Programme 7 scored highest as it facilitated travel in all directions with

minimal detours. While programme 6 and 11 provided travel in all directions, however for some journeys there are significant detours.

Programmes 6 and 7 provide a clear improvement on the resilience state of the transport network. They provide a second river crossing and enable travel in all directions in all events. The differences between them are relatively minor, however, Programme 7 provides a higher level of service for many key journeys by having a second bridge available resulting in smaller detours from the preferred route.

Programme 7 only provides a minor improvement over the do-minimum.

Table 4-1: Evaluation of the resilience impacts for the investment programmes

Programme Number	Low impact high probability (20%)		Earthquake (40%)		Flooding (40%)		Total Score
	Score	Justification	Score	Justification	Score	Justification	
6	1	Programme 6 provides an incremental upgrade to resilience against high probability events by means of an alternative route. Key positive resilience contributions are: • A new downstream bridge in case there is an event on the Fitzherbert Bridge • A bypass of Bunnythorpe • An improved Ashurst Road • An improved Kairanga-Bunnythorpe Road • Intersection improvements on key corridors • A new connection at Ashurst bypassing several intersections Much of the network performs similar to the Do-minimum, however, there is an increased capacity from higher quality roads.	1.5	Programme 6 provides an improvement to seismic resilience for the transport network. This is primarily achieved by the second Manawatu River Crossing. Key positive resilience contributions are: • A new downstream bridge bypassing the likely disrupted Manawatu River crossing on SH56 • An upgrade of SH57 to the south Negative aspects of the route include: • The majority of improved roads/intersections are located on highly liquefiable land	2	Programme 6 provides an improvement to flood management by means of the provision of an improve route on SH57 to the south. Key positive resilience contributions are: • Upgrading of Ashurst Road • New downstream bridge outside of key flooding areas • Upgrade of SH57 to the south of the new bridge	2
7	1	Programme 7 provides an incremental upgrade to resilience against high probability events by means of alternative routes. Key positive resilience contributions are: • A new downstream bridge in case there is an event on the Fitzherbert Bridge • A new upstream bridge in case there is an event on the Fitzherbert Bridge • A bypass of Bunnythorpe • An upgrade of SH57 • An improved Kairanga-Bunnythorpe Road • An improved Ashurst Road • Intersection improvements on key corridors	1.5	Programme 7 provides an improvement to seismic resilience for the transport network. This is achieved by two crossings of the Manawatu River as well as the upgrade of SH57. Key positive resilience contributions are: • Two crossings of the Manawatu River, bypassing the likely disrupted Manawatu River crossing on SH56 • An upgrade of SH57 further reducing the likelihood of closures Negative impacts to resilience include: • Roads serving local industrial areas are on the western side	2.5	Programme 7 provides a recognisable improvement to the flooding resilience of the transport network. This is achieved primarily by the upgrading of SH57, which has two bridges at risk during the 1 in 100 year flood. Key positive resilience contributions are: • Upgrading SH57 – allows access east and south with a small detour if there are improvements to flood capacity • New downstream bridge outside of key flooding areas • Upgrade of Stoney Creek Road allows for access north	2
11	0.5	Programme 11 provides a minor improvement on resilience by improving key intersections and upgrading of the western ring route. It does not provide a new bridge across the river. Key positive resilience contributions are: • A bypass of Bunnythorpe • An improved Ashurst Road • An improved Kairanga-Bunnythorpe Road • Intersection improvements on key corridors	0	Programme 11 provides no substantial upgrade to the seismic resilience of the road network above the do minimum. With only minor improvements on the southern crossing of the Manawatu River on SH56. Positive impacts to the resilience include: • Upgrade of SH56 may improve the disruption state at the Manawatu River crossing	0.5	Programme 11 provides minimum change to the level of service compared to the do-minimum. Key positive resilience contributions are: • Upgrading of Ashurst Road Should the sub option of improving SH57 be taken, this will improve the resilience of the option significantly from a flooding perspective	0

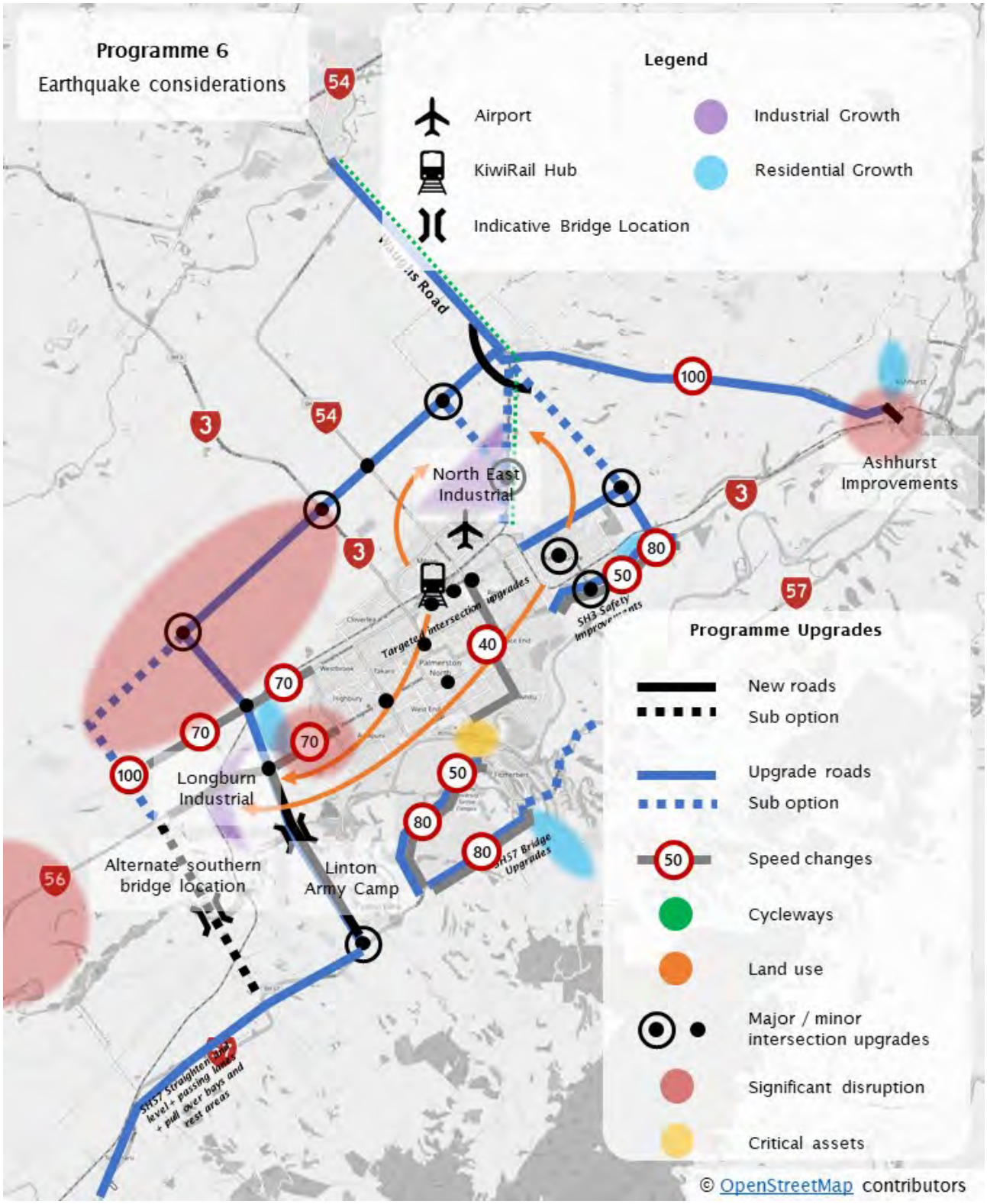
5 Conclusion

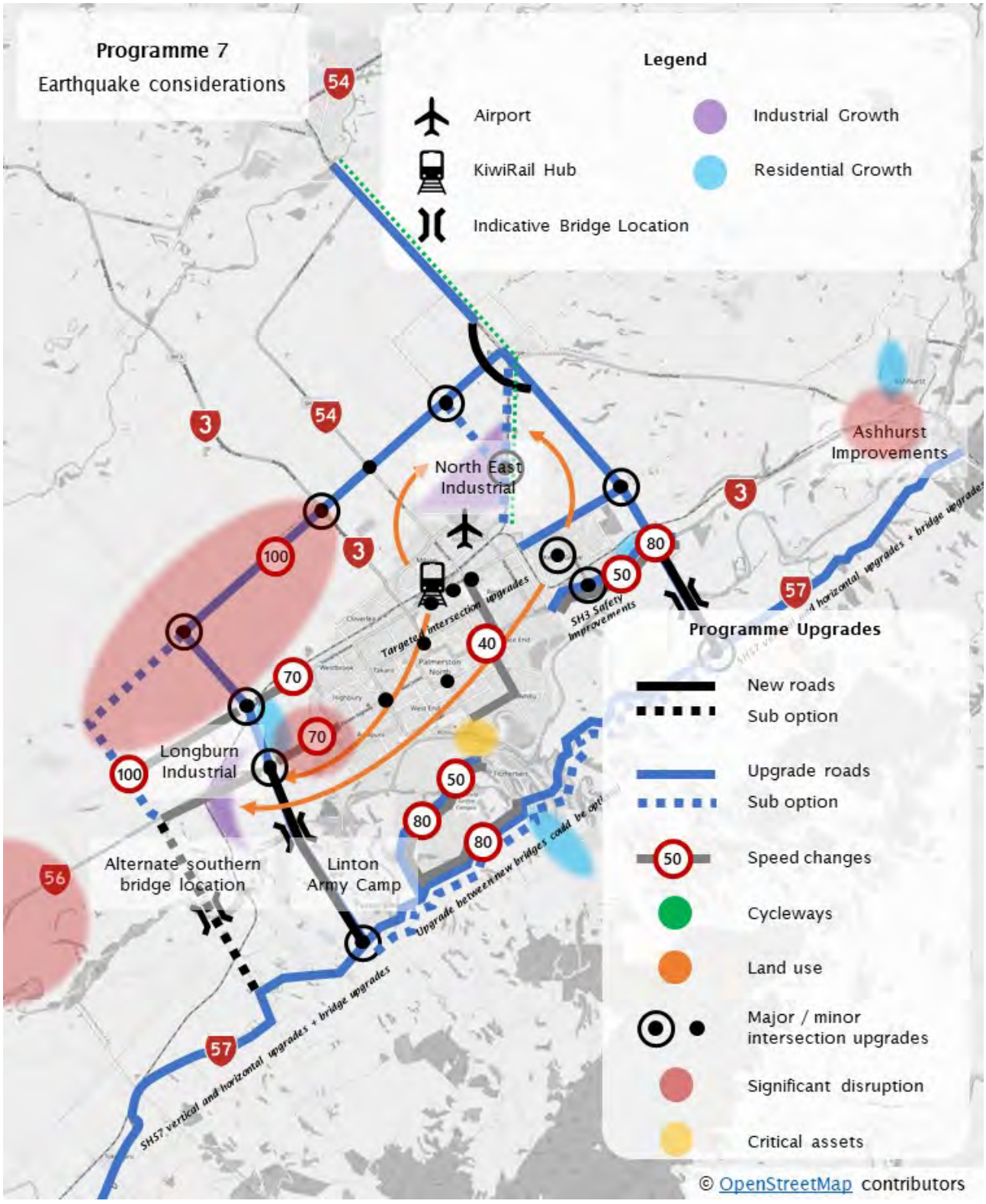
The analysis showed that Programme 7 was the most resilient option. It proposes a new road and bridge outside of the flooding area. It also seeks to improve SH57 which is only prone to localised flooding events and has no seismically vulnerable sections according to NZTA data. It scored a +2 on the scale from -3 to +3. It best provides routes for travel in all directions in both flooding and earthquake events.

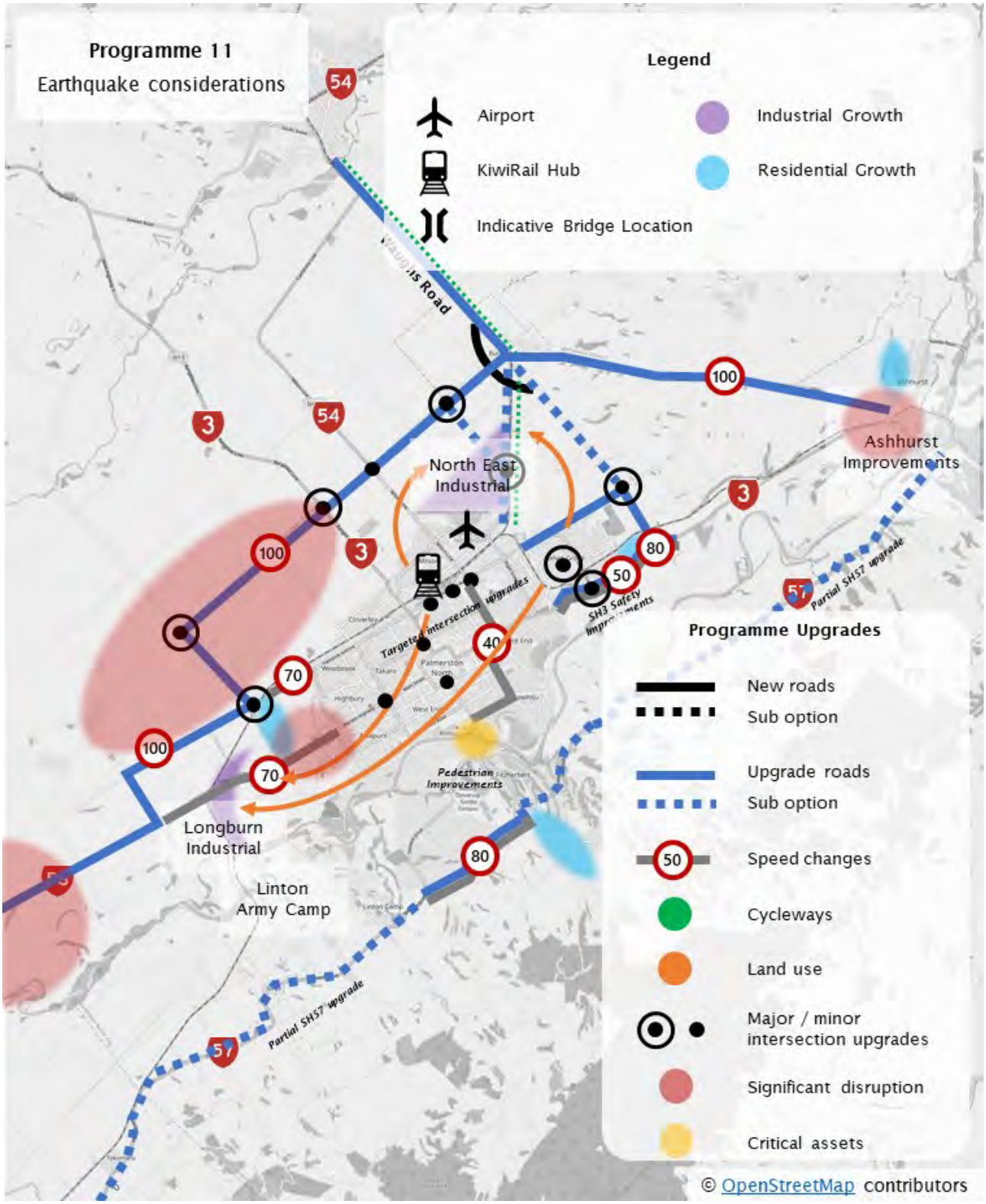
Programme 6 was the second most resilient option, with a new downstream bridge outside of key flooding areas. The new bridge allows a freight route south of city to avoid the likely disrupted area. It was considered not as resilience as programme 7 in an earthquake due to the unknown nature of the disruption to local road bridges on the western ring route provided which it has a greater reliance on compared to Programme 7. While it provides the same connectivity as Programme 7 in a flood, some routes require a long detour to avoid flooded areas resulting in a lower level of service. While it scored a +2 on the scale from -3 to +3, it provides a slightly lower level of service than Programme7, however this is only a slight reduction.

Programme 11 provided no substantial change to the resilience of the network, with incremental improvements to the existing network and localized improvements to flooding. There were no substantial gains to resilience for both earthquakes and low impact events. It scored a 0 on the scale from -3 to +3.

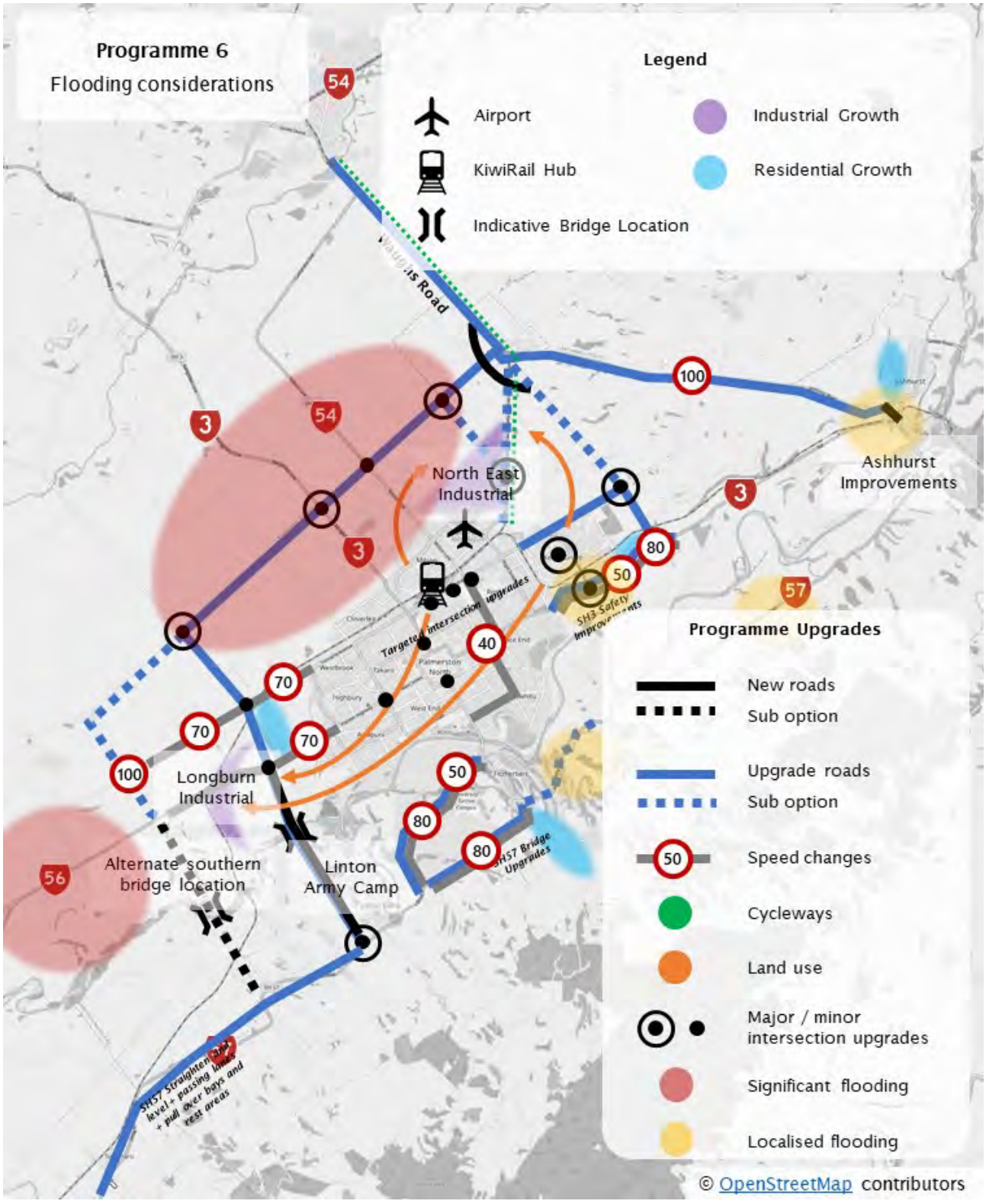
Appendix A: Earthquake Areas and Programmes

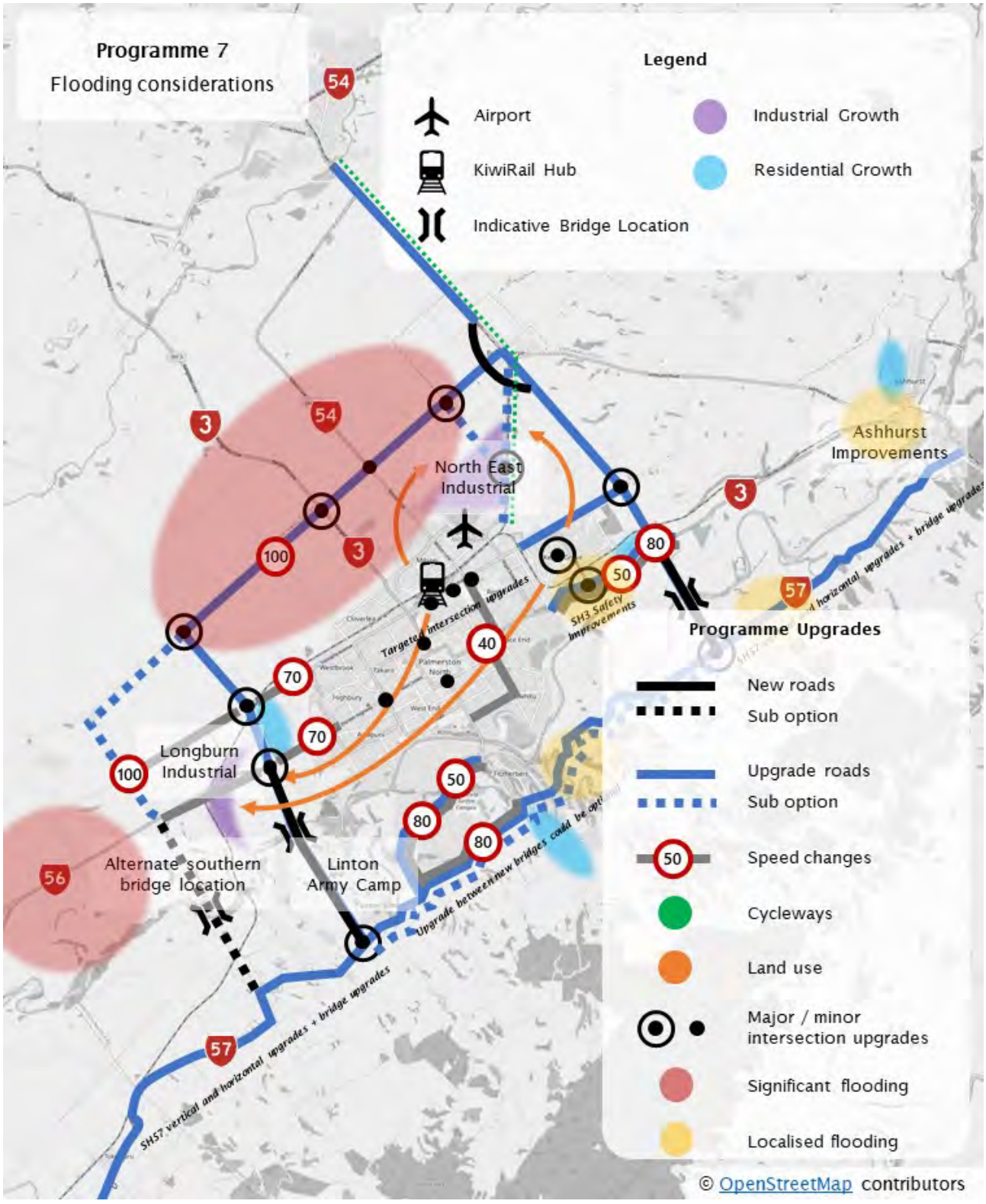

Programme 6
Earthquake considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
Vaughts Road
North East Industrial
Ashhurst Improvements
Targeted intersection upgrades
SH3 Safety Improvements
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant disruption
Critical assets
Longburn Industrial
Alternate southern bridge location
Linton Army Camp
SH57 Bridge Upgrades
SH57 Straighten out, level + passing lanes + pull over bays and rest areas
© OpenStreetMap contributors

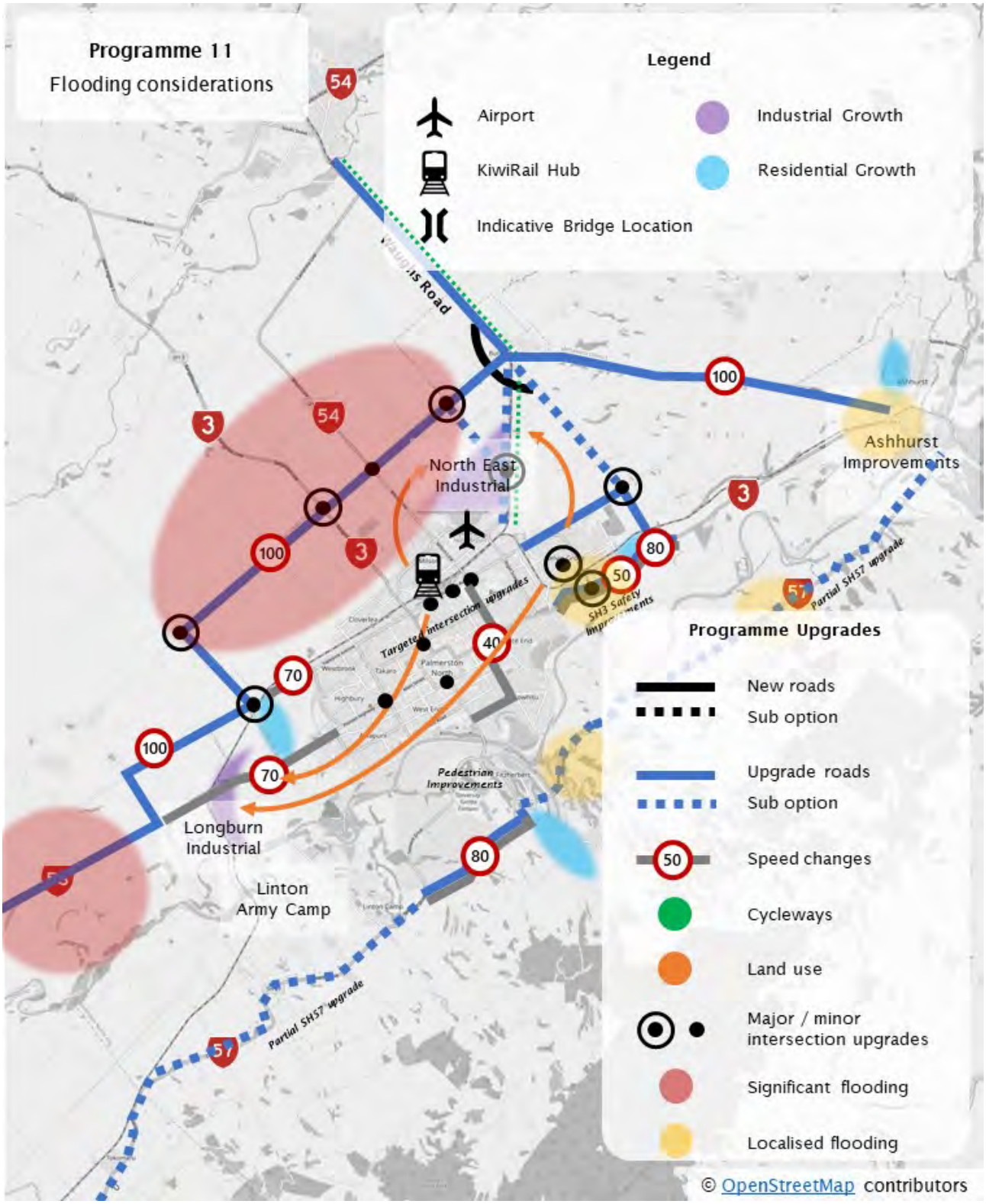

Programme 7
Earthquake considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
North East Industrial
Ashhurst Improvements
Longburn Industrial
Alternate southern bridge location
Linton Army Camp
Targeted intersection upgrades
SH3 Safety Improvements
Upgrade between new bridges could be opt
SH57 vertical and horizontal upgrades + bridge upgrades
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant disruption
Critical assets
© OpenStreetMap contributors


Programme 11
Earthquake considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
Vaughans Road
North East Industrial
Ashhurst Improvements
Longburn Industrial
Linton Army Camp
Pedestrian Improvements
Partial SH57 upgrade
SH3 Safety Improvements
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant disruption
Critical assets
© OpenStreetMap contributors

Appendix B: Flooding Areas and Programmes


Programme 6
Flooding considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
Vaughans Road
North East Industrial
Ashhurst Improvements
SH3 Safety Improvements
Targeted intersection upgrades
Longburn Industrial
Linton Army Camp
Alternate southern bridge location
SH57 Bridge Upgrades
SH57 Straighten curves, level + passing lanes + pull over bays and rest areas
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant flooding
Localised flooding
© OpenStreetMap contributors

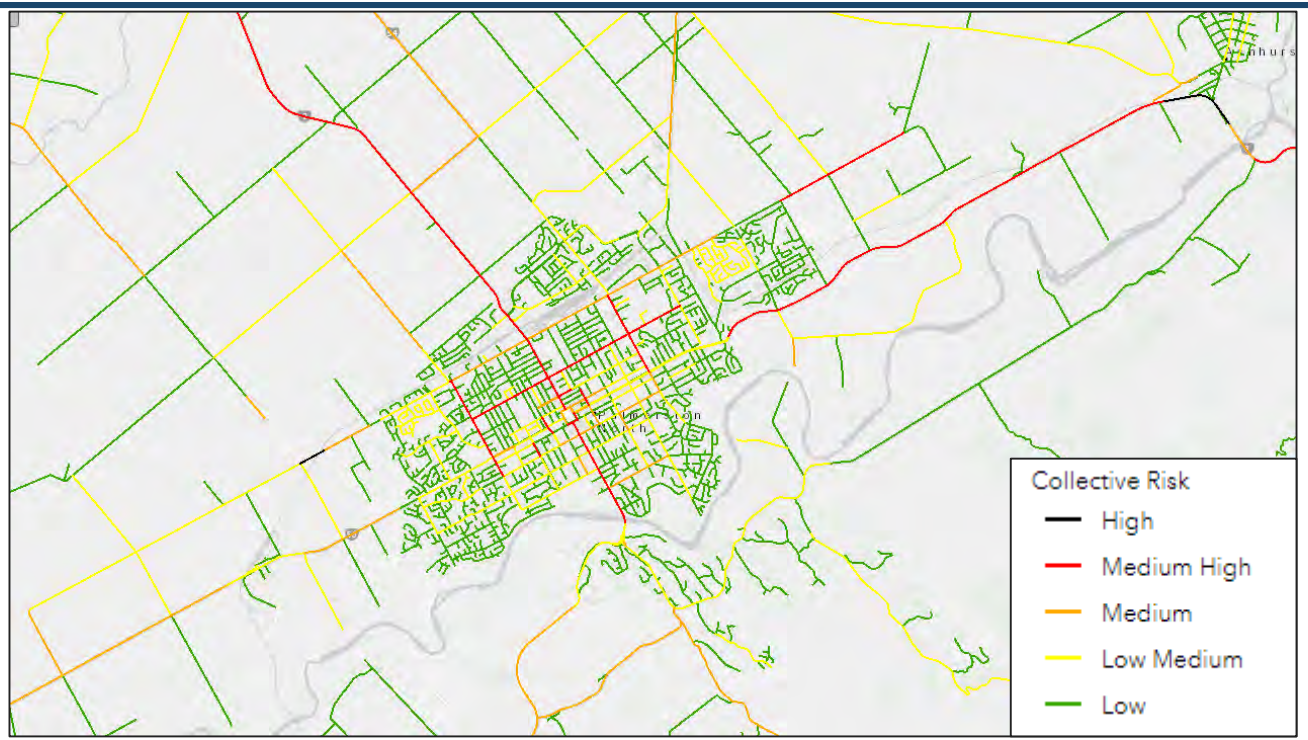

Programme 7
Flooding considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
North East Industrial
Ashhurst Improvements
SH3 Safety Improvements
Targeted intersection upgrades
Longburn Industrial
Alternate southern bridge location
Linton Army Camp
Upgrade between new bridges could be opti
SH57 vertical and horizontal upgrades + bridge upgrades
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant flooding
Localised flooding
© OpenStreetMap contributors


Programme 11
Flooding considerations
Legend
Airport
KiwiRail Hub
Indicative Bridge Location
Industrial Growth
Residential Growth
Waughs Road
North East Industrial
Ashhurst Improvements
Partial SH57 upgrade
SH3 Safety Improvements
Targeted intersection upgrades
Pedestrian Improvements
Longburn Industrial
Linton Army Camp
Partial SH57 upgrade
Programme Upgrades
New roads
Sub option
Upgrade roads
Sub option
Speed changes
Cycleways
Land use
Major / minor intersection upgrades
Significant flooding
Localised flooding
© OpenStreetMap contributors

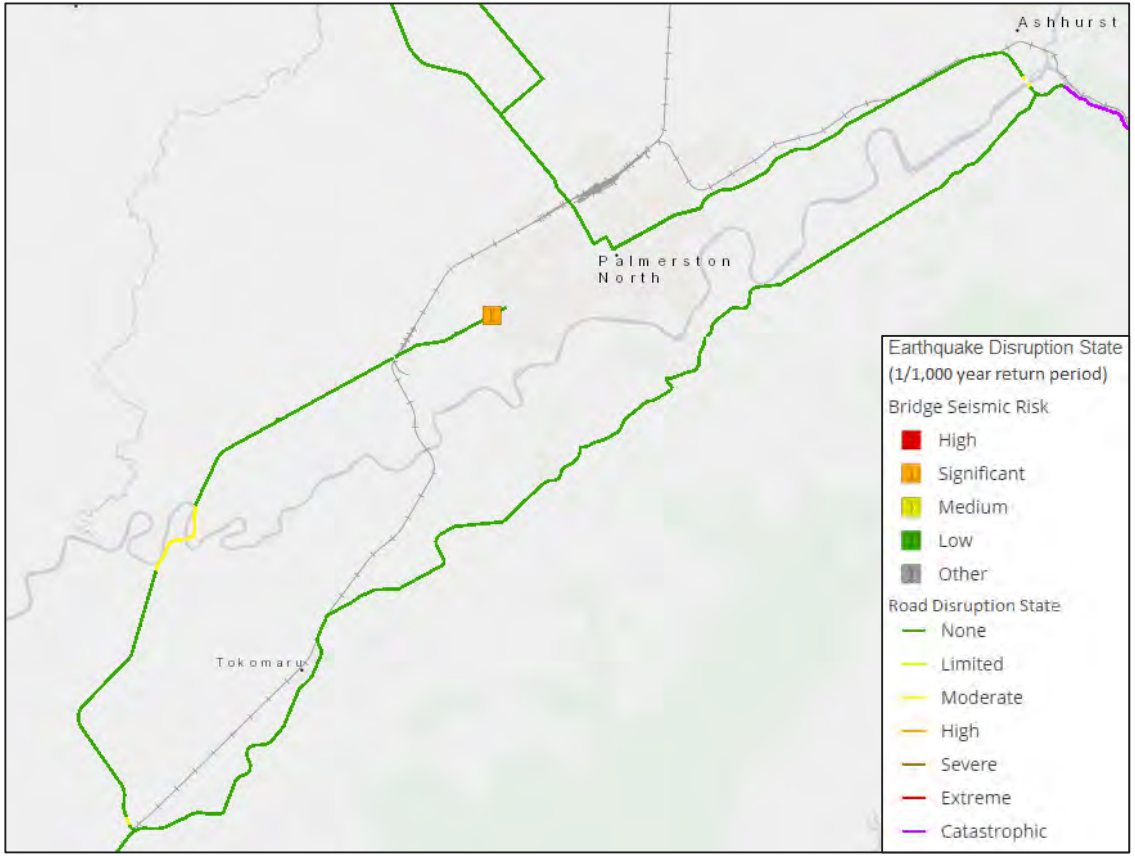
Resilience

- Weighted procedure looking at programmes ability to maintain or reinstate appropriate LoS
- Low Impact High Probability
- Regional High Impact Low Probability

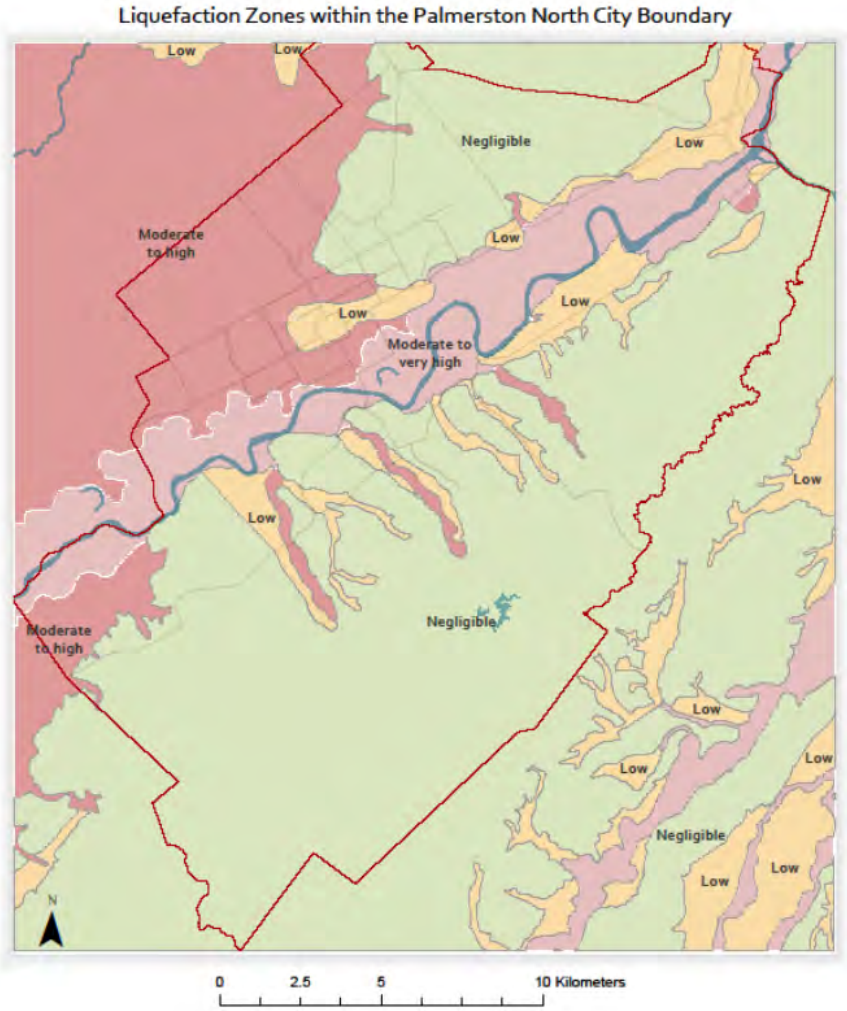
Resilience – Collective Risk



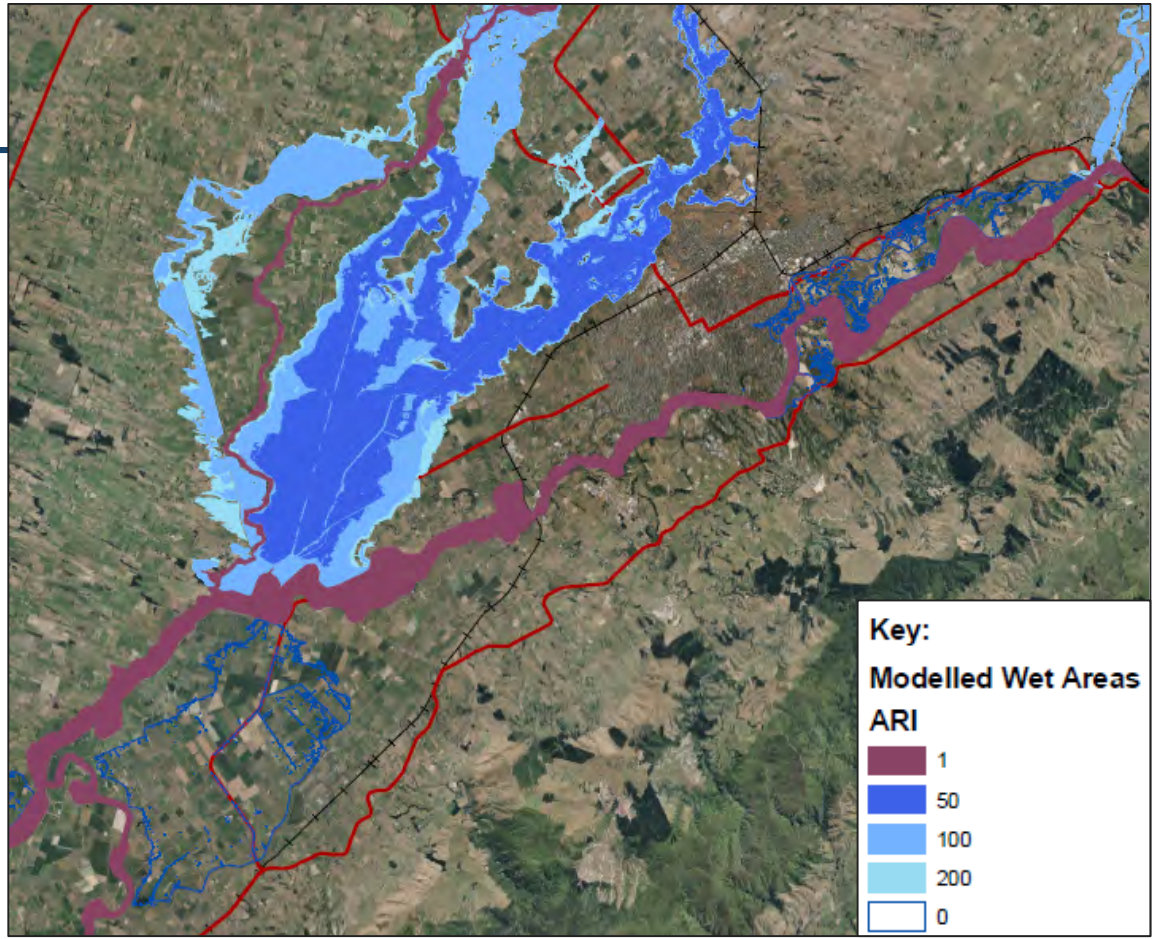
Resilience – SH Seismic (NZTA)



Resilience – Liquefaction (PNCC)



Resilience – Horizons Regional Council



Safety

Programme	Score
6	2
7	2
11	0

C.5 Fit with Strategy

Palmerston North Integrated Transport Initiative – MCA Assessment – Alignment with Strategies

1. Introduction

Date: 3 December 2019

Author:

April Peckham BRP (Hons), NZPI – Intermediate

The following is a high-level comparative assessment of the three options to inform the MCA workshop for the Palmerston North Integrated Transport Initiative (PNITI).

This assessment relied on the following information:

Palmerston North City Council documents

- Palmerston North City Council Strategic Transport Plan 2018
- Palmerston North City Council City Development Strategy 2018
- Palmerston North City Council Growth Infrastructure Plan 2018
- Palmerston North City – Vision and Strategic Direction
- City Shaping Moves map

Manawatu District Council documents

- Manawatu District Council Economic Development Strategy 2017

Horizons Regional Council documents

- Accelerate25 – Manawatu-Whanganui Growth Study – Economic Action Plan 2016
- Regional Land Transport Plan 2015 – 2025 (2018 review)
- Accessing Central New Zealand Project

2. Criteria being assessed

Alignment with Strategies

This criterion assesses the option against the relevant documents associated with the strategic direction of the city, including:

- PNCC's strategies
- Regional Transport strategies

Approach to the assessment

A review of the above listed documents and plans was undertaken to identify how well the option aligns with the strategic direction of the city, through references in the documents relating to the PNITI, the ring road, transport network, and freight and logistics hubs.

This information was then analysed to identify common themes, outcomes and drivers. A summary of the common themes that were identified through the analysis and the implications for the scoring the options are set out in the table below:

Theme	**Outcomes/Drivers**	**Scoring Implications**
Efficiency	• Deliver infrastructure in an integrated way that is efficient and focused on the future needs of the growing city • Building connections to make it easier for people and businesses to get where they need to be • Reduce vehicles travelling through the city centre • Reduce heavy vehicles on urban road and (promote walking and cycling) • Less vehicles and slower speeds on Tennant Drive (promote Food HQ super campus) • Slower speeds alongside urban growth areas, particularly at Napier Road (SH3) and Pioneer Highway (SH56) • Make it easy for Palmerston North citizens to connect with each other and to the services, infrastructure, facilities and opportunities that support individual development, health and prosperity and wellbeing, for the greater good of our community as a whole	The programmes that provided good efficiency scored higher
Integration	• Deliver infrastructure in an integrated way • Improvements in rail and roading infrastructure to provide better connectivity to the expanding North-East Industrial zone and Longburn inland port (including the associated freight and distribution activities) • Improve regional transport links to optimise links between the city, region and wider markets • A transport system that provides a choice of intermodal transport connections and integration of modes of transport that are resilient, safe, efficient and gets freight, services, and people where they need to be	The programmes that provided good integration with other facilities scored higher

	• Service parts of the city intended to be developed for housing	
Connectivity	• Increasing connectivity is a key factor in Palmerston North's future prosperity • Distribution and transport connections to make it easier to get business done. • Completing the regional freight ring road with bridge connections to reduce car and heavy vehicle transport flows in the main urban area • Improve links to national and international markets • Improved air service options and connectivity for passengers and freight	The programmes that provided good connectivity scored higher

3. Comparative assessment

The following 7-step numerical scale was used to score the options:

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated and managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long-term effects	-3

A summary of the options against the relevant themes and assessment criteria to provide a scoring is illustrated in the table below.

Area for Investigation	Assessment of the option			Overall score
	Efficiency	Integration	Connectivity	
Programme 6	+3	+2	+3	+2
Programme 7	+3	+3	+3	+3
Programme 11	+1	+2	+2	+1

Note: Although Programmes 6 and 7 will both provide significant positive impacts, Programme 7 would provide the highest in relation to positive impacts, and therefore would be ranked 1st.

4. Assessment explanations

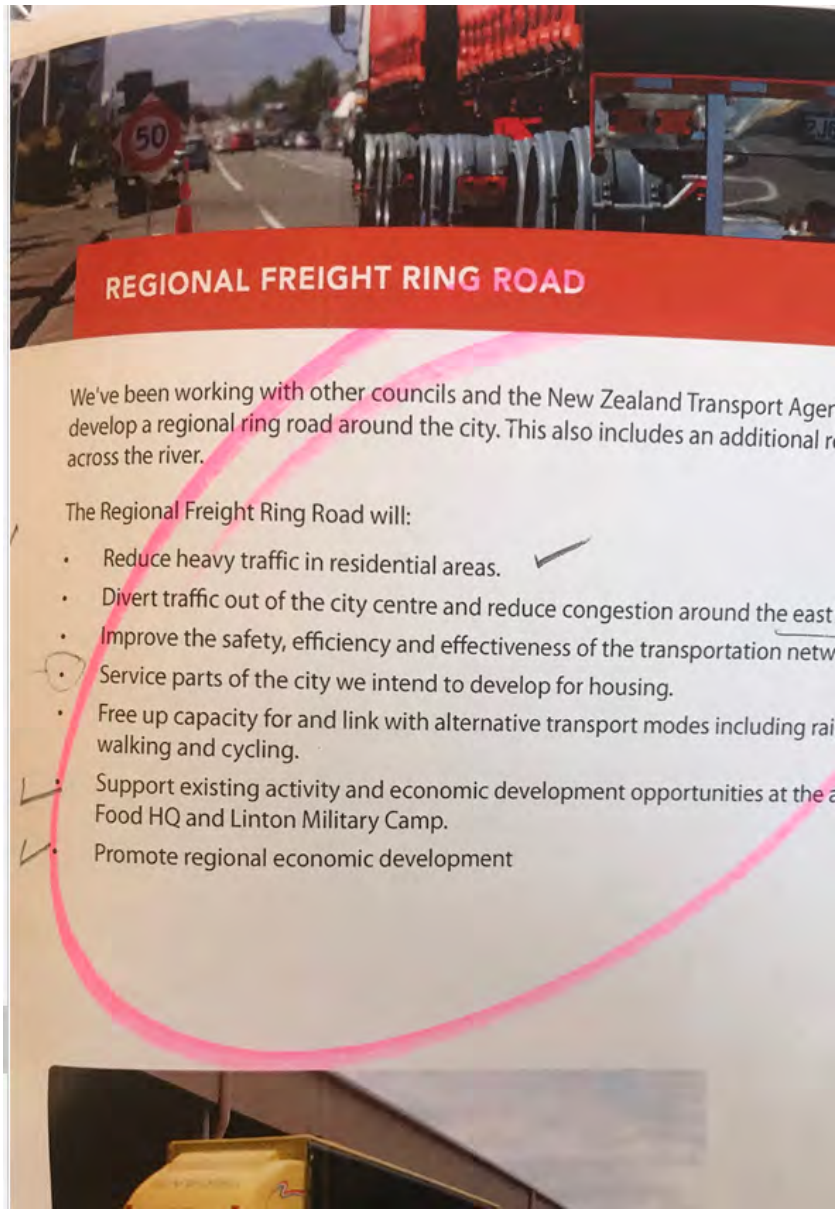
The reason why the options were given the score listed above, is explained in the table below.

Option	Reasons
Programme 6	• 1 bridge • Reduces traffic flow through Palmerston North • Good connection between North East Industrial Area, Longburn and Food HQ. All able to use the ring road and southern bridge. • Removes heavy freight traffic from city centre • Increases efficiency and connectivity for Palmerston North citizens travelling through / into the city centre • Increases efficiency and connectivity for Palmerston North citizens to access services and infrastructure • Improves regional transport links between city, region and wider markets • Traffic from Ashhurst still required to travel around the northern side of Palmerston North to access Linton and Food HQ • Less vehicles travelling through the City Centre (with no intention to stop). • Less heavy vehicles on urban roads (promote more walking and cycling). • Less vehicles and slower speeds on Tennent Drive (promote FoodHQ super campus). • Slower speeds alongside urban growth areas, particularly at Napier Road (SH 3) and Pioneer Highway (SH 56)
Programme 7	• 2 bridges • Reduces traffic flow through Palmerston North • Good connection between North East Industrial Area, Longburn and Food HQ. All able to use the ring road and southern bridge. • Removes heavy freight traffic from city centre • Increases efficiency and connectivity for Palmerston North citizens travelling through / into the city centre • Increases efficiency and connectivity for Palmerston North citizens to access services and infrastructure • Improves regional transport links between city, region and wider markets • Provides good connections between Ashhurst and southern bridge area, including Linton and Food HQ • Reduces traffic on northern side of ring road as direct access provided between Ashhurst and southern section of SH57 • Less vehicles travelling through the City Centre (with no intention to stop). • Less heavy vehicles on urban roads (promote more walking and cycling). • Less vehicles and slower speeds on Tennent Drive (promote FoodHQ super campus). • Slower speeds alongside urban growth areas, particularly at Napier Road (SH 3) and Pioneer Highway (SH 56) • Good connections to residential areas
Programme 11	• No proposed bridge(s) • Positive impact of ring road around the northern side of Palmerston North • Connectivity between North East Industrial Area and Longburn Industrial Area • Removes traffic from city centre • Traffic from Linton and Food HQ will still be required to travel through city centre

	• Traffic accessing northern end of the Palmerston North to southern side of river still required to travel through city centre • Traffic flows will remain the same • Freight still required to travel through city centre to access Linton and Food HQ • Does not improve efficiency within Palmerston North itself

Appendix 1 – Palmerston North City Council Documents

- **Palmerston North City – Vision and Strategic Direction**



- Service parts of the city intended to be developed for housing
- Easy to move around

- **Strategic Transport Plan 2018/21**

Connectivity

- Increasing connectivity is a key factor in Palmerston North's future prosperity
- Distribution and transport connections to make it easier to get business done.
- Completing the regional freight ring road to reduce car and heavy vehicle transport flows in the main urban area
- Improve links to national and international markets

- Improved air service options and connectivity for passengers and freight
- Regional ring road with downstream bridge connection, that provides reliable and resilient interconnections for heavy vehicle traffic to the northeast and west of the city, the State Highways, and the express way to Wellington

Integration

- Deliver infrastructure in an integrated way
- Improvements in rail and roading infrastructure to provide better connectivity to the expanding North-East Industrial zone and Longburn inland port
- Improve regional transport links to optimise links between the city, region and wider markets
- Incorporate freight and distribution activities in the NE Industrial Zone and Longburn
- Resilient and reliable interconnected intermodal transportation of goods, services and people
- A transport system that provides a choice of intermodal transport connections and integration of modes of transport that safely and efficiently gets freight, services, and people where they need to be
- Make it easy for PNth citizens to connect with each other and to the services, infrastructure, facilities and opportunities that support individual development, health and prosperity and wellbeing, for the greater good of our community as a whole

Efficiency

- Deliver infrastructure in an integrated way that is efficient and focused on the future needs of the growing city
- Building connections to make it easier for people and businesses to get where they need to be
- Reduce traffic that travels through the city centre

➢ **City Development Strategy 2018**

Goal 1: An innovative and growing city

1. Introduction

- A connected and safe community
- Clear planning framework to promote growth and urban development
- Council will provide infrastructure in a timely way
- City to build on transport network and accessible freight and logistics hub
- Integrating land use planning and infrastructure can be a powerful economic development tool

2. Priorities

Priority 1: Create and enable opportunities for employment and growth

Housing

- Transitioning Roxburgh Crescent from industrial to residential
- New greenfield housing at Whakarongo to help meet housing demand
- Rezoning of the Racecourse land
- Substantial greenfield housing capacity remains at Aokautere
- Affordable and first homes at Ashhurst

Industrial

- Industrial land available to the north-east of the city and at Longburn
- Both locations are well placed for the new regional ring road
- Direct future investment in rail at the north-east and Longburn.
- Integrating rail to form a significant intermodal freight and distribution hub.

- Traffic flows compromise the industrial land adjacent to the rail corridor at Tremaine Ave
- Specific planning has been done to support the future growth of Fonterra's industrial activities at Longburn

Strategic Partnerships

- Council's particular deliverables are for traffic calming Tennent Drive to better connect the campus with the city via the Manawatu River
- Opportunities exist to support Linton by improving connections along the river corridor and the proposed regional ring road. These opportunities include a southern downstream road bridge, which will allow defence convoys travelling north to training bases in Waiouru to directly connect with the ring road rather than needing to travel through the city

Urban design

- City Centre Streetscape Plan and Manawatu River Framework

Priority 2: Provide infrastructure to enable growth and a transport system that links people and opportunities

Strategic transport and parking

- The strategic roading infrastructure needed to support the growth and development of Palmerston North is well researched and understood. Numerous strategic reports have stressed the need for a regional ring road that connects regional traffic with projected growth to the city's north-east and west, while also removing traffic from increasingly congested urban corridors. Good progress has been made, with the Government supporting investment in the first stages of the regional ring road via the joint Accessing Central NZ project. This momentum needs to be maintained over the next three to six years.
- The north-east industrial zone and Longburn are well located to leverage off the presence of rail within the city, but a plan is needed to make sure rail forms a key part of future freight, distribution, and logistics activities in these locations.
- The airport is an asset of regional significance and well located to support further growth in air freight and distribution activities, with the ability to operate around the clock. Planning is well advanced to support the growth of the airport and its operational requirements.
- Planned investment in the city centre's streetscapes will help reinforce its identity, while also supporting the inner-city ring road's role in reducing the traffic that travels through the centre.

3. Strategic Themes

Sustainable Practices

- Intermodal freight, distribution and logistics: Use Palmerston North's central location and access to road, rail and air transport to build a significant future-proofed freight and distribution hub.

- **Growth Infrastructure Plan 2018/21**

The purpose of the Growth Infrastructure Plan is to provide infrastructure to enable growth and a transport system that links people and opportunities (Priority 2, City Development Strategy)

- **National Land Transport Programme 2018-21; NZTA**
  Manawatu / Whanganui

Transport Objectives

- investment in the region will improve safety and access for local communities, along with regional connectivity for freight movements, linking up to the new SH3 across the Ruahine Ranges, and diverting traffic, including freight, from central Palmerston North and other communities.
- Working with industry, local government and local communities, the Transport Agency will look to progress the Palmerston North Integrated Transport Improvements project, to assist in building the region's resilience and provide a safer, more effective connection between some of the region's key industrial areas and improve access and safety for pedestrians and cyclists.

Future Activities

- Efficient and well-serviced hubbing – the region needs to have the capacity to efficiently collect, package and redistribute product, and to reduce costs and increase the speed of getting products to market, when compared to other international suppliers.
- Palmerston North is a major intersection requiring more investment in streamlined transport movements. The city is at the centre of rail, road and air networks. This intersection of multi-modal and large product and traffic volumes must be as well designed and efficient as possible.

Activities that support these aspirations and industry include:

- regional connectivity initiatives (Palmerston North integrated transport Improvements) - work is underway to complete a detailed business case for the roading initiatives required to unlock the freight hub and distribution potential of the region. Two projects already being developed are SH3 Napier Road and SH3/54 Kairanga Bunnythorpe Road
- rail– the Transport Agency will be looking for further opportunities to move freight by rail and improving multi-modal freight connections

Case Study

A Transport Hub for Central New Zealand

Along with addressing the need for resilience in key Manawatū/Whanganui road corridors, an opportunity presents itself to improve safety and increase efficiency in the roading network to further enable the role of the region as a hub for freight distribution. The Manawatū-Whanganui region is strategically located at the crossroads of much east-west and north-south freight movement serving the lower North Island, and the Transport Agency is working collaboratively with local government in the Manawatū Region to investigate options for moving freight across and through the region. The options will consider the areas of growth in Palmerston North and how the movement of freight is managed on the local road and state highway network. The Manawatū-Whanganui Regional Economic Action Plan (Accelerate25) identified distribution and transport as key enablers to realise the economic opportunities identified in the action plan. Palmerston North, as the hub of many freight movements, requires investment to streamline transport movement, particularly east-west movement to the Port of Napier. Putting in place the replacement route for the Manawatū Gorge will re-establish a key strategic transport and freight link that supports the needs of the people and economies of central New Zealand, while the Palmerston North Integrated Transport Improvements project will unlock regional economic development opportunities, providing a safer and more effective connection between some of the region's key industrial areas and removing heavy trucks from Palmerston North's city centre. Together, these projects will provide economic and social opportunities for the community, creating a thriving, more liveable Palmerston North, with a reduction in freight moving through the central area of the city.

- **Economic Development Strategy 2018**

- Priority 1: create and enable opportunities for employment and growth
- Priority 2: provide infrastructure to enable growth and a transport system that links people and opportunities
- Completing the regional freight ring road will reduce car and heavy vehicle transport flows in the main urban area and improve links to national and international markets.
- Further improvements in rail and roading infrastructure are needed to provide better connectivity to the expanding North- East industrial zone and Longburn inland port. Council wants to improve regional transport links, to optimise links between the city, the region and wider markets.
- Priority 3: diversify the economy to reduce reliance on traditional industries
- The city's natural advantages include its central location in the North Island, the availability of key infrastructure (for example, the road and rail hub and the airport's 24-hour freight operations are key factors in the growth of the city's logistics sector), the highly qualified workforce, and the relative affordability of land. These advantages form a basis for Palmerston North's case for regional, national and international investment and partnerships.

Appendix 2 – Horizon Regional Council Strategies

- **Accelerate 25 - Manawatū-Whanganui Growth Study**

Economic Action Plan 2016

Enablers - Distribution and Transport

The region has a mature transport network but with specific future requirements:

 Efficient and well-serviced hubbing. The region needs to have the capacity to efficiently collect, package and redistribute product – and in so doing, reduce costs and increase the speed associated with getting products to market, when compared to other international suppliers

 Palmerston North is a major intersection requiring more investment in streamlined transport movement. Palmerston North is at the centre of rail and road networks which go toward all four points of the compass. This intersection of multi modal and large product and traffic volumes must be as well designed and efficient as possible.

- **Regional Land Transport Plan 2015 - 2025 (2018 Review)**

Regional issues

Issue 1: land use pressures

Recent development throughout the region has outpaced the planned strategic land transport network, resulting in a network that is no longer fit for purpose and does not function as effectively as intended.

Issue 2: network efficiency

Access to and from other regions linking north-south and east-west are under pressure, becoming less predictable, resulting in inefficiencies which could restrict anticipated future growth in the freight distribution logistics chain. Pressures on the roading network are further compounded by an underutilised rail network that lacks integration.

Issue 3: economic development, tourism and growth

Predicted population and economic growth in the central New Zealand sub-area associated with the growth in freight, tourism and people movements will impact on the functioning of the transport network.

Objectives

1. An optimised road, rail and public transport network that provides efficient, reliable access and movement for people and freight to and from key destinations, within and outside the region.

2. Maximise the strategic advantage of central New Zealand through efficient and well-serviced hubbing and freight distribution activities, including better utilisation of rail corridors.

3. A safe land transport system increasingly free of death and serious injury.

4. A reliable multi-modal transport system with less modal conflict, including walking and cycling, that mitigates potential environmental effects and improves environmental outcomes.

5. A resilient transport network with secure inter- and intra-regional routes that can perform following an unplanned event.

6. A transport system that provides for the increase in low carbon emission vehicles and other practices to reduce carbon emissions and environmental effects associated with transport.

Strategic priorities

Improve connectivity, resilience and the safety of strategic routes to and from key destinations linking north-south and east-west, while factoring in demographic changes and impacts on land use

Policy 2.1

Maintain and as necessary improve the strategic transport network to ensure safe, efficient intra- and inter-regional accessibility and links with national transport corridors

2.1.5 Encouraging the integration of rail with other transport modes, including but not limited to buses, and walking and cycling, where possible, to ensure the most efficient and effective inter- and intraregional movement of freight and people (NZ Transport Agency, territorial authorities, KiwiRail).

Policy 2.2

Support the provision of effective connections to the region's principal economic growth and productivity areas

2.3.1 Planning, maintaining and developing transport corridors to support and encourage the region's major role in the efficient distribution of freight throughout New Zealand (NZ Transport Agency, territorial authorities, KiwiRail).

2.3.2 Planning for and supporting the integration of modes, where possible, to encourage the most efficient and effective inter- and intra-regional movement of freight (NZ Transport Agency, territorial authorities, KiwiRail).

2.3.4 Supporting the provision of facilities for the transfer of freight between transport modes, as appropriate (NZ Transport Agency, territorial authorities, Horizons Regional Council, KiwiRail).

Actions/Measures:

3. Number of new businesses locating in the freight hub.

Appendix 3 - Manawatu District Council Strategies

- **Manawatu District Council Economic Development Strategy 2017**
- Strategic Outcome One

Our land supports a diverse range of economic activity now and into the future. Through strategic and sustainable initiatives, we will use our land to drive the development of innovative businesses that produce goods that are in demand across New Zealand and the world.

- Strategic Outcome Two

Our infrastructure enables and supports a wide range of economic activity. Utilising our economic development infrastructure, we will develop businesses that improve quality of life and provide employment to attract and retain residents who want to strengthen our communities.

- Strategic Outcome Three

Our central location encourages and attracts business growth now and into the future. Maximising our location, we will grow businesses to service our local community, the broader region, New Zealand and international markets.

- Objectives

3. Maximising our location, businesses will grow to service our local community, the broader region, New Zealand and international markets.

NZ Transport Agency

PNITI
MCA Workshop

Stantec

MCA Workshop - PNITI

Alignment with Strategies

Alignment with Strategies

This criterion assesses the option against the relevant documents associated with the strategic direction of the city, including:

- PNCC's strategies
- Regional Transport strategies

A review of the above listed documents and plans was undertaken to identify how well the option aligns with the strategic direction of the city, through references in the documents relating to the PNITI, the ring road, transport network, and freight and logistics hubs.

The information was then analysed and identified three common themes, being:

- Efficiency
- Integration
- Connectivity

Scoring

Area for Investigation	Assessment of the option			Overall score
	Efficiency	Integration	Connectivity	
Programme 6	+3	+2	+3	+2
Programme 7	+3	+3	+3	+3
Programme 11	+1	+2	+2	+1

Note: Although Programmes 6 and 7 will both provide significant positive impacts, Programme 7 would provide the highest in relation to positive impacts, and therefore would be ranked 1st.

C.6 Current and Future Land Use

Palmerston North Integrated Transport Initiative – MCA Assessment – Current and Future Land use

1. Introduction

Date: 9 December 2019

Author:

April Peckham BRP (Hons), NZPI – Intermediate

The following is a high-level comparative assessment of the three options to inform the MCA workshop for the Palmerston North Integrated Transport Initiative (PNITI).

This assessment has relied on the following information:

- Google Maps
- Palmerston North District Plan, including planning maps
- Manawatu District Plan, including planning maps
- Horizons One Plan
- MCA Briefing Note received from Phil Peet
- Emails and attachments received from Phil Peet and Dhimantha Ranatunga
- Ministry for the Environment and Ministry for Primary Industry
  - Valuing Highly Productive Land: A discussion document on a proposed national policy statement for highly productive land 2019
- Manaaki Whenua Landcare Research "Our Environment" website

2. Criteria being assessed

Current and Future Land Use

This criterion assesses the potential impact of the options on current and future land uses located on or around the option sites. The assessment criterion was broken down into four subsections, as follows:

- Impact on current land uses that may be of value to the wider community.
- Impacts on future land uses. This includes areas that have been identified as future growth zones or are subject to plan changes.
- Impacts on designations, historic, cultural and natural areas. Impacts on some designated sites may be related to potential network effects or disruption of key services that have a benefit for the wider community and may not easily be relocated.
- Impact on Highly Productive Soils.

Approach to the assessment

A review of the above listed statutory planning maps for the District and aerial mapping was undertaken to identify the existing and future land use zoning, and designations in or around the site. Appendices 1 – 5 contain additional information and mapping relevant to the Programme sites.

Note 1: As stated above, the impact on land uses was broken down into four subcategories and were scored. The scoring implications for each category is set out in the table below.

Theme	Scoring Implications (1 best /5 worst)
Impact on current land uses	Areas that contained land uses that may be of value to the wider community, which may be affected, scored lower.
Impact on future expansion areas	Areas of land set aside for future expansion that link up with the programme upgrades, scored higher.
Impact on designations, historic, cultural and natural areas	Areas that contained important designations, historic, cultural and natural areas that could be detrimentally affected, were scored lower.
Impact on Highly Productive Land	Where works would be undertaken within areas classed as Highly Productive Land, scored lower.

3. Comparative assessment

The following 7-step numerical scale was used to score the options:

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated and managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long-term effects	-3

The table below illustrates the scoring of each Programme option against each of the sub criteria.

Area for Investigation	Assessment of the option (impact on…)				Overall Score
	Current land use	Future expansion areas	Designations, historic, cultural and natural areas	Highly Productive Land	
Programme 6	-1	+3	-1	-2	-1
Programme 7	-2	+3	-1	-3	-3
Programme 11	-1	+2	-1	0	0

Assessment explanations

- **Impact on current land uses**
  - Programme 6 will incorporate 2 bypasses, being the Ashhurst and Bunnythorpe bypasses. These bypasses have the potential to impact upon existing residential, rural and commercial properties depending on the alignment.
    There is also the potential for Longburn properties to be affected associated with the construction of the southern bridge, depending on the final alignment.

  - Programme 7 has the potential to impact residential, commercial and rural properties associated with the Bunnythorpe bypass.
    Lifestyle blocks in the vicinity of the northern bridge may be impacted upon by the proposed improvements in that areas, and the resulting increase in traffic.
    As with Programmer 6, there is the potential for Longburn properties to be affected associated with the construction of the southern bridge, depending on the final alignment.
    Programme 7 has the benefit of the upstream bridge.

  - Programme 11. No bridges are proposed with this option and no new roads (apart from the Bunnythorpe bypass), therefore it has been determined that potential impacts on current land uses will be minor, assuming that the upgraded roads will be contained within the existing roading designations.
    As with Programmes 6 and 7, the Bunnythorpe bypass has the potential to impact upon existing land uses.

- **Impact on future expansion areas**

Programmes 6 and 11 has good links to:

- 4 x Residential Growth Areas
  - Waughs Road – East Palmerston North
  - West Palmerston North
  - Fitzherbert South
  - Ashhurst
- Good links to 2x Industrial Growth Areas
  - NE Industrial Zone
  - Longburn Industrial Area

Programme 7 has good links to:

- 3 x Residential Growth Areas
- Waughs Road – East Palmerston North
- West Palmerston North
- Fitzherbert South
- 2x Industrial Growth Areas
- NE Industrial Zone
- Longburn Industrial Area

- **Designations, historic, cultural and natural areas**

As this is a high-level assessment of the options, there is not yet enough information to determine whether the proposed works will be contained within the existing roading designations or will extend beyond the boundaries of that designation.

If the proposed roads are contained within the existing designations or do not extend into designated, cultural / heritage and natural areas listed under both the Palmerston North District Plan and Manawatu District Plan, then there may be no impact on identified sites.

A further assessment can be completed once final designs of the roads have been completed to assess potential effects on heritage / cultural and designated areas.

It is noted that for the purposes of this assessment, there is not enough difference between the options to score the options differently. They therefore have been assessed as having a *"minor adverse impact, which can be mitigated and managed"*. The mitigation in this instance would be avoiding the site altogether.

- **Highly Productive Land**

Options 6 and 7 scored low due to the bridge works that will be required within LUC Class 1, 2, and 3. The location of the northern bridge will be located within Class 1 and 3 land, whilst the location of the southern bridge will be within Class 1 and 2 land. The sub option for the southern bridge, which is within both Programmes 6 and 7, will extend through mostly Class 4 land.

As part of Programmes 6 and 7, new roading is required to connect to the proposed bridges. The new roading will extend through Class 2 and 3 land.

Option 11 scored 'Neutral' as there are no new roads or bridges proposed, therefore will have a *similar impact to do-minimum*. It is assumed that the upgrades to the existing roading network will be contained within the existing roading designations.

Note: The scoring may shift if the bridge locations were shifted upstream or downstream of the Class 1 land = mitigation.

It is noted that the "sub option" bridge would also extend through highly productive land.

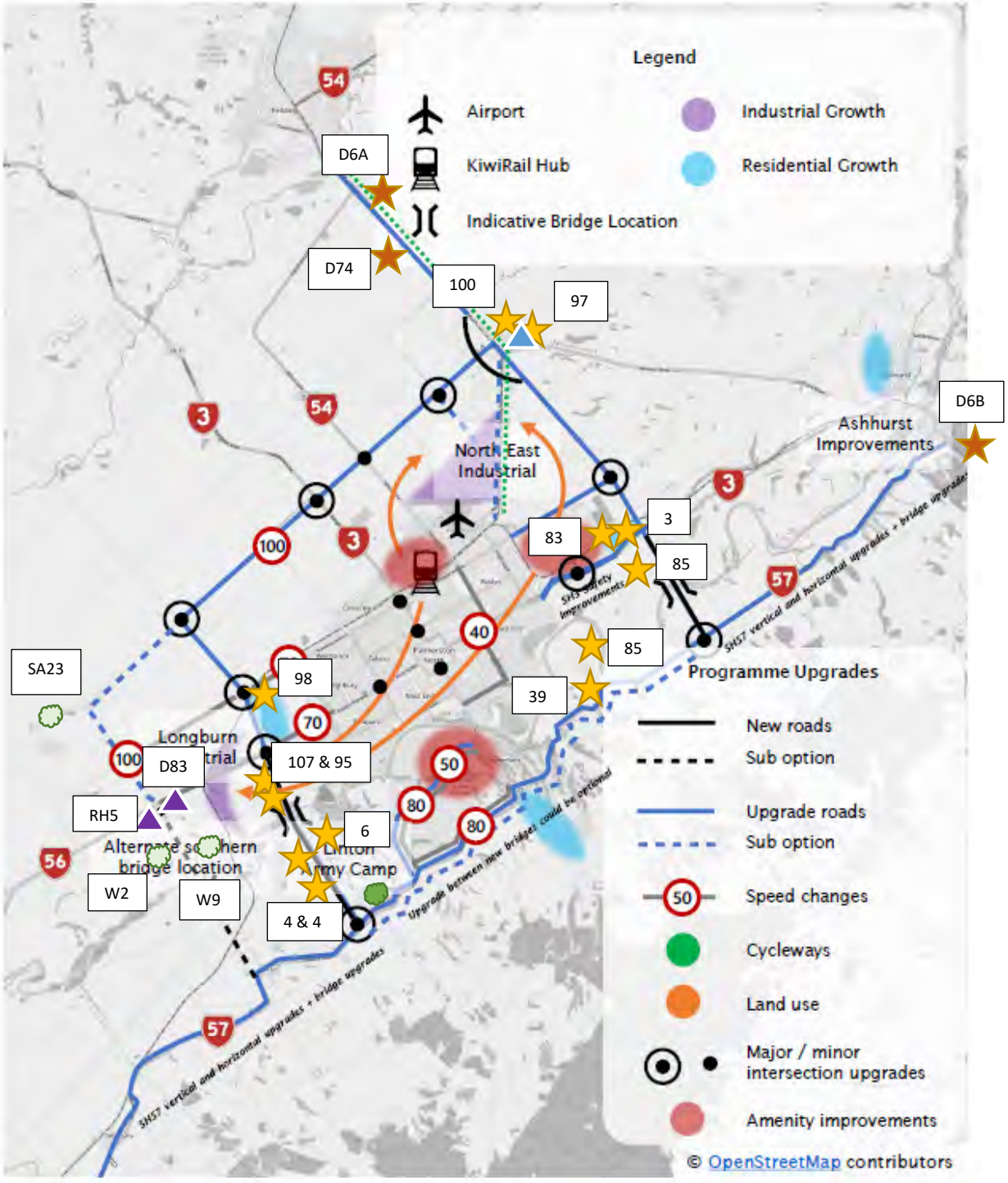
Appendix 1 – Assessment of Land use activities

Area for Investigation	Assessment of the option
Programme 6	**Ashhurst** SH57, SH3 (Napier Rd), Ashhurst to Napier Road Asshurst – Pohangina RFC Lincoln Park Durham Street Park Ashhurst Domain and campground Kindy & Learning Adventures Ashhurst School and sports ground Pony Club - businesses Cattle equipment Cafes Ashhurst Fire Station Library Church Rail station Mechanics Rural surrounding area **Bunnythorpe** Fire station Bunnythorpe substation Bunnythorpe Recreation Ground Owen Street Reserve Bunnythorpe School Businesses – Tavern, food stores, businesses Lifestyle blocks to the south of Bunnythorpe off Railway Rd (Stoney Creek Rd) Dwellings on either side of Campbell Road Rural surrounding area **Longburn**
Programme 7	Mainly rural land. Lifestyle blocks in close vicinity to the northern bridge. **Bunnythorpe** Fire station Bunnythorpe substation Bunnythorpe Recreation Ground Owen Street Reserve Bunnythorpe School Businesses – Tavern, food stores, businesses Lifestyle blocks to the south of Bunnythorpe off Railway Rd (Stoney Creek Rd) Dwellings on either side of Campbell Road Rural surrounding area **Longburn**
Programme 11	**Ashhurst** SH57, SH3 (Napier Rd), Ashhurst to Napier Road

	Asshurst – Pohangina RFC Lincoln Park Durham Street Park Ashhurst Domain and campground Kindy & Learning Adventures Ashhurst School and sports ground Pony Club - businesses Cattle equipment Cafes Ashhurst Fire Station Library Church Rail station Mechanics Rural surrounding area **Bunnythorpe** Fire station Bunnythorpe substation Bunnythorpe Recreation Ground Owen Street Reserve Bunnythorpe School Businesses – Tavern, food stores, businesses Lifestyle blocks to the south of Bunnythorpe off Railway Rd (Stoney Creek Rd) Dwellings on either side of Campbell Road Rural surrounding area

Appendix 2 – City Shaping Moves map

Appendix 3 - District Plan Items (PNCC & MDC)



Key – PNCC District Plan items:

- Heritage
- Designation
- Natural Area

Key – MDC District Plan items:

- Heritage
- Designation
- Natural Area

PNCC District Plan Items

Designation No.	Legal Description and Location	Designation Purposes
3	(i) North Island Main Trunk Railway (NIMTL)	Railway Purposes
4	Camp Road, Linton (See Attachment 1 for full legal description)	Linton Military Camp - Defence Purposes
6	Part Maori Block 2 Kairanga, Section 1 SO 37908	Correction Purposes
39	Pt Section 233TNOF Fitzherbert, Lot 2 DP 89373, Pt Section 233 TN OF Fitzherbert, Section 1 SO 25214 (169 Fitzherbert East Road, Aokautere School)	Education Purposes
83	Lot 85, DP88421 (137 Ruapehu Drive)	Education Purposes
85	Section 201 TN of PN (165 Grey Street)	Education Purposes
95	Lots 1 and 2, DP 88028, Pt Lot 50 DP 526, Pt Sec 21 Karere District. (Carey Street, Longburn Longburn Primary School)	Educational Purposes
97	Pt Sec 1576, Block IX Kairanga SD, Lot 4 DP 18892 (Kairanga Bunnythorpe Road, RD5, Palmerston North Kairanga Primary School)	Educational Purposes
98	Pt Lots 1 and 2 DP 7073 (Gillespies Line, Palmerston North)	Radio communication, Telecommunication & Ancillary Purposes and Land Uses
100	Lot 1 DP 76218, Lots 163-165 DP 217, Lot 33 DP 66580 (4, Redmayne Street, 28 Redmayne Street, 26-88 Dixons Line, Bunnythorpe)	Substation – Electricity Transmission and Telecommunications Networks (Bunnythorpe)
107	The corner of Linton Street and Ferguson Street, legally described as Section 3 SO 463408, Lot 2 DP 41527, Lot 1 DP 41527 and Lot 5 DP 3759	Electricity Substation (Powerco)

MDC District Plan Items

No	Requiring Authority	Designation Site	Designated purpose	Underlying Zoning	Legal Description	Further Details
D83	Chorus New Zealand	Longburn Repeater Station	Radiocommunication, Telecommunication, and Ancillary purposes	Rural 1	Sec 1 SO 24142	
D6A	KiwiRail Holdings Limited	N.Island Main Trunk Railway	Railway Purposes	Various	Various	
D6B	KiwiRail Holdings Limited	P.North – Gisborne Railway	Railway Purposes	Various	Various	
D74	Minister of Education	Taonui Primary School	Educational Purposes	Rural 1	Pt Sec 576 Town of Bunnythorpe, Sec 1 Block II Kairanga SD	

Ref No	Name	Location	Map Grid Reference	Category	Planning Map
W2	Karere Lagoon	Karere Road	S24 245 860	A	19
W9	Willow Island	Karere Road	S24 253 860	B	19
SA23	Clausen Property	Lockwood Road	S24 220 899	QEII B	19
RH5	Voss Farmhouse	SH 56 / Karere Road	Pt Sec 30 Karere Block	C	Entire Building 19

Summary: Designations contained within the 3 Programme options are provided in the table below.

Option	Impact on designations, historic and natural areas
6	- 3 x KiwiRail designations - 6 x Educational Purpose designations - 1 x Natural area designations - 1 x Radio communication and telecommunication designation **Sub option** - 3 x Natural area designations - 1 x Heritage designation - 1 x Longburn Repeater station
7	- 3 x KiwiRail designations - 7 x Educational Purpose designations - 1 x Natural area designations - 1 x Radio communication and telecommunication designation **Sub option** - 3 x Natural area designations - 1 x Heritage designation

	- 1 x Longburn Repeater station
11	- 2 x KiwiRail designations - 1 x Heritage designation - 3 x Substation and telecommunication designations - 4 x Educational purpose designations **<u>Sub option</u>** - 1 x KiwiRail designation - 1 x Educational purpose designation - 1 x Natural area designation

Appendix 4 – Highly Productive Land

Ministry for the Environment and Ministry for Primary Industry
Valuing highly productive land A discussion document on a proposed national policy statement for highly productive land 2019

Under this proposal, councils will need to identify highly productive land as land that is classified as Class 1, 2 or 3 under the LUC system by default, until they are able to complete their own regional or district assessment. When undertaking the assessment of highly productive land councils will be able to consider a number of other factors to exclude some of this land, or to identify additional highly productive land that is not recognised under the LUC system.

Proposed Policy 2: Maintaining highly productive land for primary production

Local authorities must maintain the availability and productive capacity* of highly productive land for primary production by making changes to their regional policy statements and district plans to:

a) prioritise the use of highly productive land for primary production
b) consider giving greater protection to areas of highly productive land that make a greater
c) contribution to the economy and community;
d) identify inappropriate subdivision, use and development of highly productive land; and
e) protect highly productive land from the identified inappropriate subdivision, use and development.

Proposed Policy 3: New urban development and growth on highly productive land

Urban expansion must not be located on highly productive land unless:

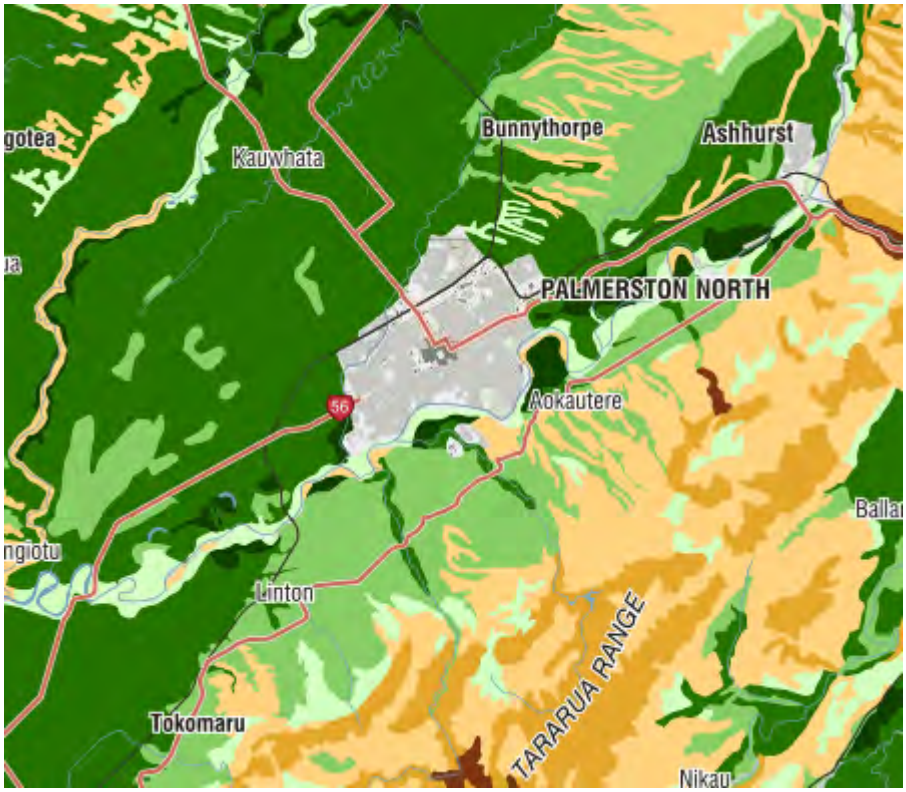
a) there is a shortage of development capacity to meet demand (in accordance with the NPS-UDC methodologies and definitions); and
b) it is demonstrated that this is the most appropriate option based on a consideration of:
    - a cost-benefit analysis that explicitly considers the long-terms costs associated with the irreversible loss of highly productive land for primary production;
    - whether the benefits (environmental, economic, social and cultural) from allowing urban expansion on highly productive land outweigh the benefits of the continued use of that land for primary production; and
    - the feasibility of alternative locations and options to provide for the required demand, including intensification of existing urban areas.

It is anticipated that the NPS will be gazetted in early 2020

Appendix 5 – LUC of Areas of Interest

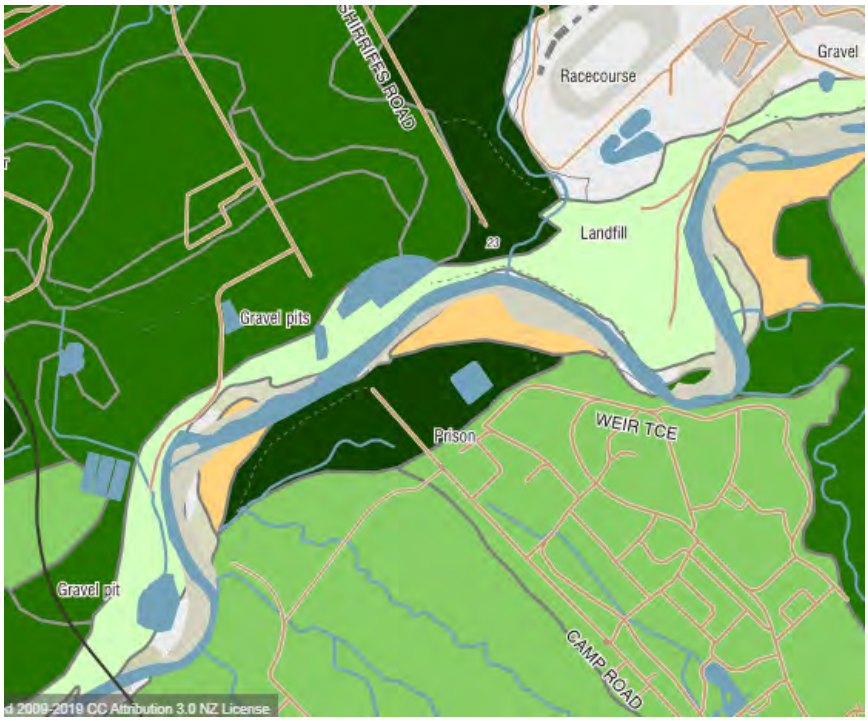
Manaaki Whenua Landcare Research "Our Environment" website

- **General Area**



- **Northern Bridge**

- **Southern Bridge**



- **Southern Bridge – Sub Option**

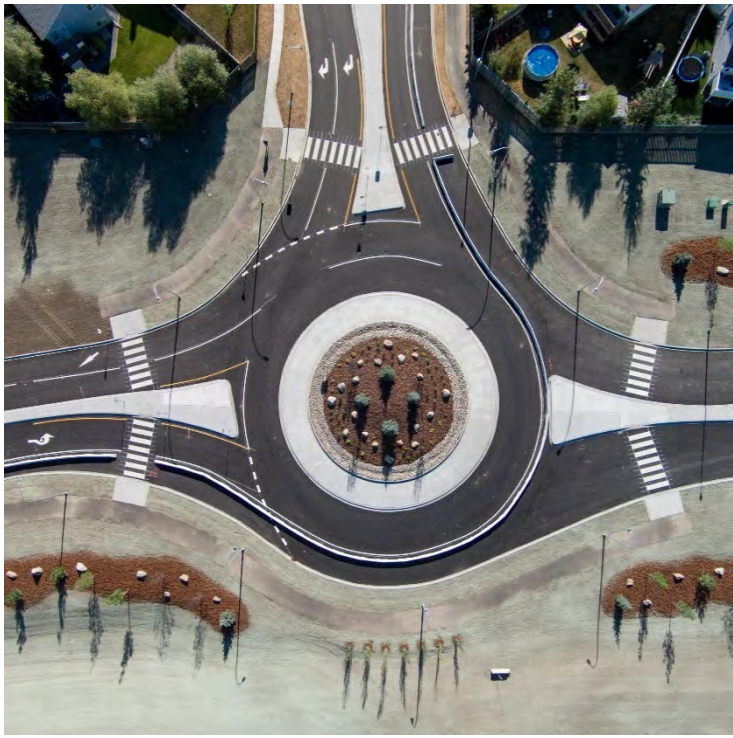
MCA Workshop - PNITI

Current & Future Land Use

Current & Future Land Use

This criterion assesses the potential impact of the options on current and future land uses located on or around the option sites. The assessment criterion was broken down into four subsections, as follows:

- Impact on current land uses that may be of value to the wider community.
- Impacts on future land uses. This includes areas that have been identified as future growth zones or are subject to plan changes.
- Impacts on designations, historic, cultural and natural areas.
- Impact on Highly Productive Soils.

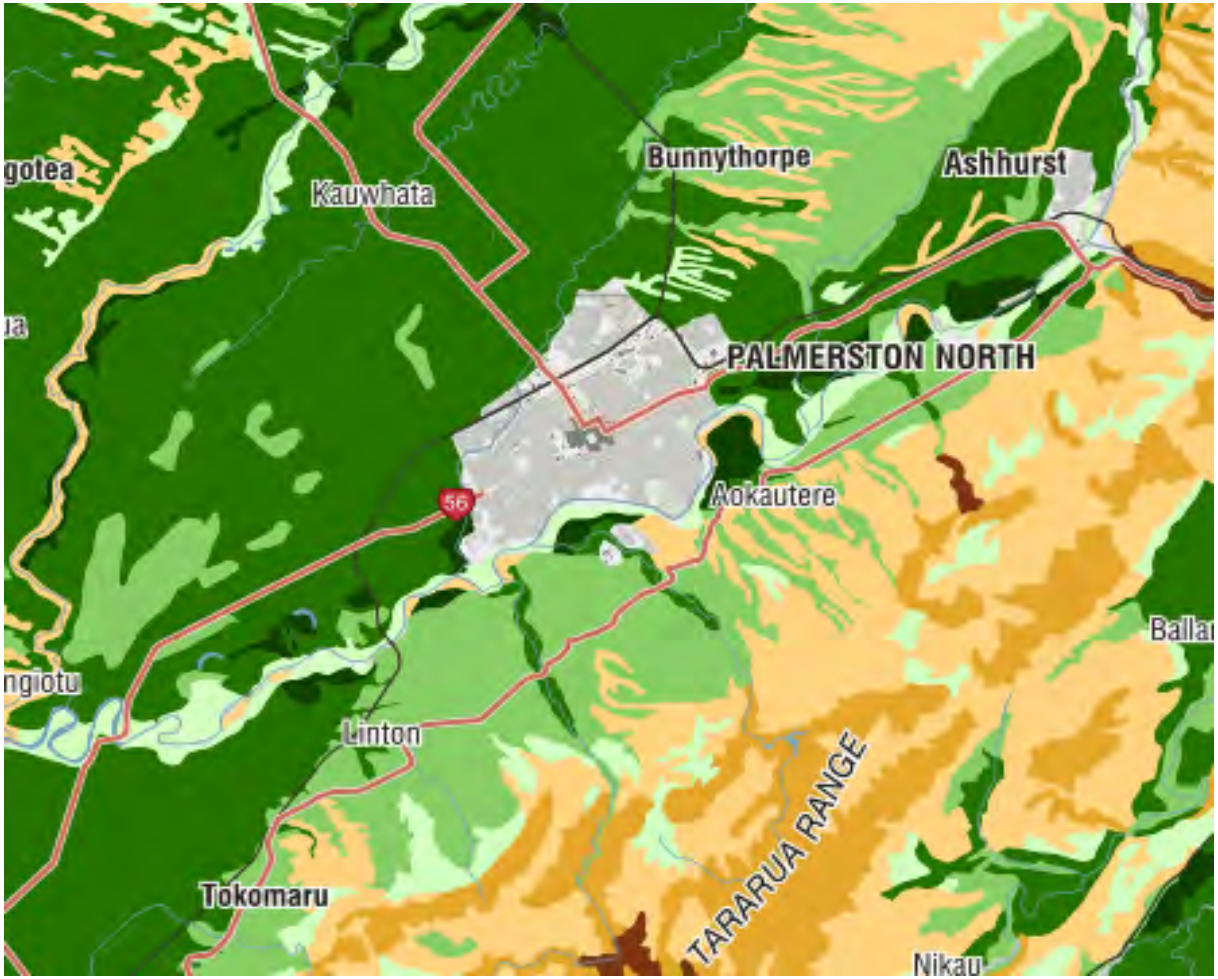


Scoring

Theme	Scoring Implications (1 best /5 worst)
Impact on current land uses	Areas that contained land uses that may be of value to the wider community, which may be affected, scored lower.
Impact on future expansion areas	Areas of land set aside for future expansion that link up with the programme upgrades, scored higher.
Impact on designations, historic, cultural and natural areas	Areas that contained important designations, historic, cultural and natural areas that could be detrimentally affected, were scored lower.
Impact on Highly Productive Land	Where works would be undertaken within areas classed as Highly Productive Land, scored lower.

Area for Investigation	Assessment of the option (impact on…)				Overall Score
	Current land use	Future expansion areas	Designations, historic, cultural and natural areas	Highly Productive Land	
Programme 6	-1	+3	-1	-2	-1
Programme 7	-2	+3	-1	-3	-3
Programme 11	-1	+2	-1	0	0

Highly Productive Land



Land Use

City Shaping Moves map

C.7 Environment

Palmerston North Integrated Transport Initiative – MCA

Assessment – Sustainable Environment; Water Quality & CO2 Emissions

1. Introduction

Date: 4 December 2019

Author:

April Peckham BRP (Hons), NZPI – Intermediate
Dhimantha Ranatunga BE (Hons), MENGNZ

The following is a high-level comparative assessment of the three options to inform the MCA workshop for the Palmerston North Integrated Transport Initiative (PNITI).

This assessment has relied on the following information:

- Google Maps
- Horizons One Plan
- MCA Briefing Note received from Phil Peet
- Emails and attachments received from Phil Peet and Dhimantha Ranatunga

2. Criteria being assessed

Sustainable Environment – Water Quality and CO2 Emissions

This criterion assesses the potential impact of the options on water quality. The assessment criterion was broken down into two parts, as follows:

1. Water Quality (assessed by April Peckham)
   This assessment is undertaken in Part 1 below.

2. CO2 Emissions (assessed by Dhimantha Ranatunga)
   This assessment is undertaken in Part 2 below.

Part 1: Water Quality

Approach to the assessment

A review of the above listed documents and plans was undertaken to identify the issues in relation to water quality. Appendix 1 and 2 lists the relevant sections of the Horizons One Plan that have assisted with this assessment.

The impact on water quality was broken down into subcategories. Each subcategory is listed below and assessed in the following tables.

The implications for the scoring the options are set out in the table below:

Theme	Outcomes/Drivers	Scoring Implications
Temporary Effects	• Construction of bridges	Sites where the construction of new bridges are required score worse than those where works within or adjacent to a stream are limited
	• Construction works, including road widening and safety improvements, that extend over rivers and streams along the roading alignment	
	• Effects of instream ecology	
Permanent Effects	• Permanent discharges into stream/rivers	Sites where effects on water quality will be permanent were scored worse
	• Effects of instream ecology	

Comparative assessment

The following 7-step numerical scale was used to score the options:

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated and managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long-term effects	-3

A score of the **temporary** effects on water quality as a result of each option is provided in the table below.

Assessment of the options on water quality – Temporary Effects	
Area for Investigation	**Overall score**
Programme 6	-2
Programme 7	-2
Programme 11	-1

A score of the **permanent** effects on water quality as a result of each option is provided in the table below.

Assessment of the options on water quality – Permanent Effects	
Area for Investigation	**Overall score**
Programme 6	-1
Programme 7	-1
Programme 11	0

Assessment explanation

With regards to **temporary** effects, as Programme 11 does not require the construction of a new bridge, it is given a higher scoring as there will be fewer impacts. However, as works will still be required within the vicinity of rivers and/or streams, there may still be adverse effects on water quality, which should be able to be managed and mitigated (provided the proposal complies with the relevant conditions within the Horizons One Plan).

Programmes 6 and 7 have been given the same overall score as they both require the construction of a new bridge(s). Although Programme 7 would require the construction of two new bridges, the impacts on water quality would be the same at each location and should be able to be appropriately managed and mitigated.

With regards to **permanent** effects, the construction of bridges will have a permanent impact on water quality due to discharges. It is assumed however, that the bridges and infrastructure will be designed to mitigate potential effects where possible.

Part 2: CO2 Emissions

Approach to the assessment

The Palmerston North Area Traffic Model (PNATM) outputs were utilised to estimate the impact of each programme option on the change in total network vehicle kilometres travelled (VKT) compared to the base network, as a proxy for CO2 emissions.

The implications for the scoring the options are set out in the table below:

Theme	Outcomes/Drivers	Scoring Implications
Permanent Effects	• Total network vehicle kilometres travelled (difference between option and base network)	Options with a reduced total distance travelled compared to the base network score better (as a result of less fuel use).

Note that the assessment does not directly consider the impacts of speed change cycles or the vehicle operating costs resulting from congestion.

Comparative assessment

The following 7-step numerical scale was used to score the options:

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated and managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long-term effects	-3

A score of the effects of CO2 emissions as a result of each option is provided in the table below.

Assessment of the options on CO2 Emissions	
Area for Investigation	**Overall score**
Programme 6	1
Programme 7	1
Programme 11	1

Assessment explanation

The model outputs, summarised in Appendix 3, show that all three programme options result in a slight reduction in total distance travelled compared to the base network (with corresponding CO2 savings). Programme 6 has the highest reduction in travel distance, followed by Programme 11 and 7 respectively. Programme 7, with the addition of two new Manawatu Bridge crossings, has a lower reduction in network distance travelled. This could be due to the additional infrastructure and upgrades attracting trips that are now quicker, but have a slightly longer trip length, compared to the base network.

Overall, while all three options show a reduction in total distance travelled, the savings are small and amount to a reduction of less than 1% of total network distance travelled across the network. As such, scores of +1 or 'slightly positive' have been adopted for all three options.

3. Weighting and Final Scores

A weighting has been given to the 3 separate sub criteria that have been assessed as follows:

Water Quality – Temporary 20%

Water Quality – Permanent 40%

CO2 Emissions – Permanent 40%

The weighting provides the final scores of each Programme option in the following table:

OVERALL SCORES (WITH WEIGHTING)	
Area for Investigation	**Overall score**
Programme 6	-1
Programme 7	-1
Programme 11	0

Appendix 1 – Horizons One Plan – Schedule B

Schedule B:
Surface Water Management Values

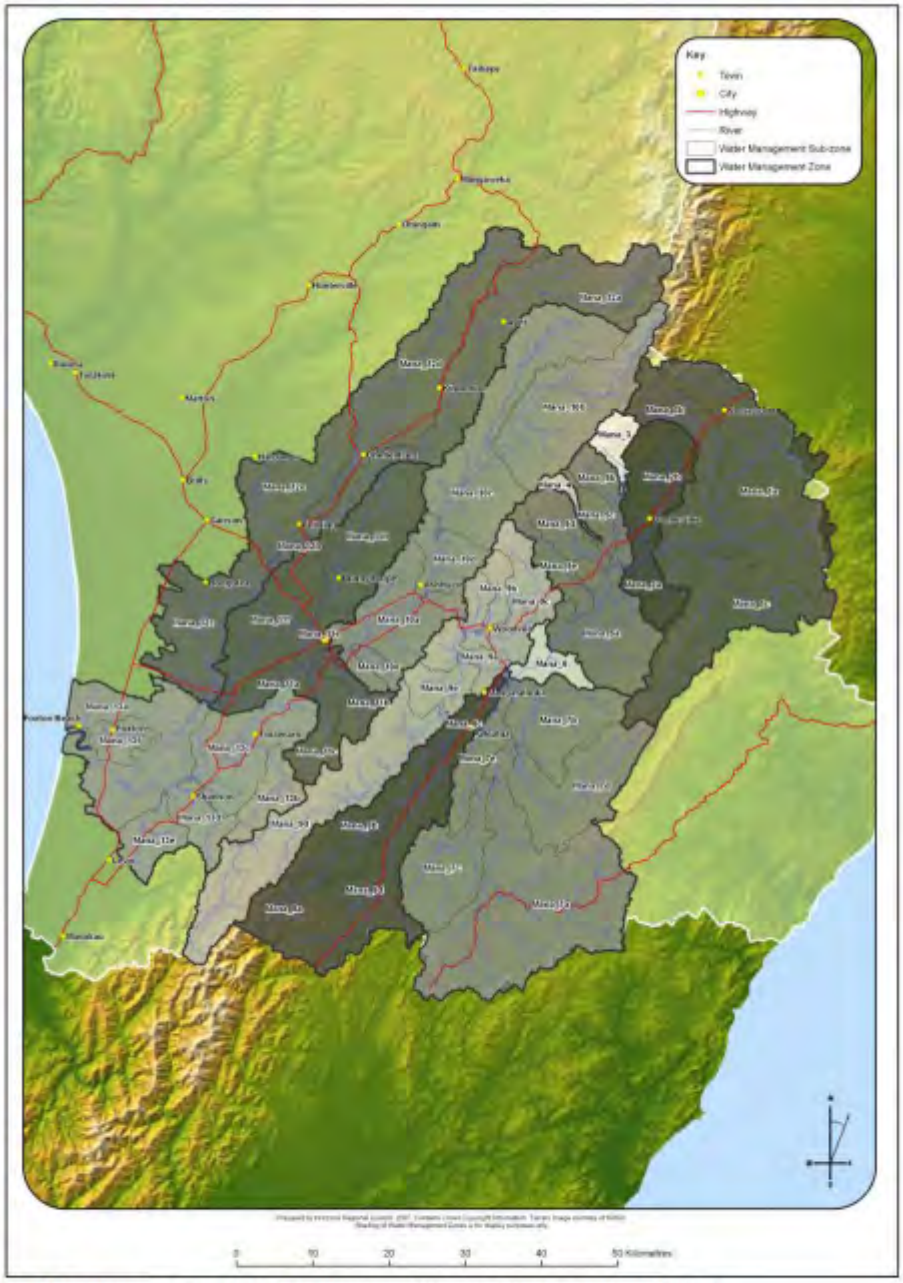


Figure A:2 Manawatu Catchment - Surface *Water Management Zones** and *Sub-zones** (refer to Table A.2 for details)

Part B.1: Surface *Water*^ Management Values listed by *Sub-zone**

Legend:
Table Headings: **LSC**: Life-supporting Capacity; **AE**: Aesthetics; **CR**: Contact Recreation; **Mau**: Mauri; **IA**: Industrial Abstraction; **I**: Irrigation; **SW**: Stockwater; **EI**: Existing *Infrastructure*^; **CAP**: Capacity to Assimilate Pollution; **NS**: Natural State; **SOS-A**: Sites of Significance - Aquatic; **SOS-R**: Sites of Significance - Riparian; **IS**: Inanga Spawning; **AM**: Amenity; **WM**: *Whitebait*^migration; **SOS-C**: Sites of Significance - Cultural; **TF**: Trout Fishery; **TS**: Trout Spawning; **WS**: Water Supply; **DFS**: Domestic Food Supply; **FC/D**: Flood Control and Drainage.

Key for LSC Classes: **UHS:** Upland Hard Sedimentary, **UVA:** Upland Volcanic Acidic, **UVM:** Upland Volcanic Mixed, **ULi:** Upland Limestone, **HM:** Hill Mixed, **HSS:** Hill Soft Sedimentary, **LM:** Lowland Mixed, **LS:** Lowland Sand. The LSC Classes are listed as the geology of the catchment influences water quality and life-supporting capacity

Key for Fishery Classes: **I:** Outstanding, **II:** Regionally Significant, **III:** Other Trout Fishery

Middle Manawatu (Mana_10)	Middle Manawatu (Mana_10a)	Manawatu River from Teachers College at approx. NZMS 260 T24:331-892 to Upper Gorge at approx. NZMS 260 T24:494-933	HM	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓		✓	III				✓
	Upper Pohangina (Mana_10b)	Pohangina River from Totara Reserve at approx. NZMS 260 T23:534-167 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					III	✓			✓
	Middle Pohangina (Mana_10c)	Pohangina River from Mais Reach at approx. NZMS 260 T23:467-053 to Totara Reserve at approx. NZMS 260 T23:534-167	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			III	✓			✓

Schedule B

*Water Management Zone**	*Sub-zone**	*Sub-zone** Description[1]	Zone-wide Values										Site/Reach-specific Values										
			LSC	AE	CR	Mau	IA[2]	I[2]	SW	EI	CAP[3]	NS	SOS-A	SOS-R	IS	AM	WM	SOS-C	TF	TS	WS	DFS	FC/D
	Lower Pohangina (Mana_10d)	Pohangina River from Manawatu River confluence at approx. NZMS 260 T24:450-966 to Mais Reach at approx. NZMS 260 T23:467-053	HM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	III				✓
	Aokautere (Mana_10e)	Aokautere Stream from Manawatu River confluence at approx. NZMS 260 T24:349-899 to source	HM	✓	✓	✓	✓	✓	✓	✓	✓												
Lower Manawatu (Mana_11)	Lower Manawatu (Mana_11a)	Manawatu River from Oroua River confluence at approx. NZMS 260 S24:167-826 to Teachers College at approx. NZMS 260 T24:331-892	HM	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓		✓	III				✓
	Turitea (Mana_11b)	Turitea Stream from Manawatu River confluence at approx. NZMS 260 T24:304-881 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓			III	✓	✓		
	Kahuterawa (Mana_11c)	Kahuterawa Stream from Manawatu River confluence at approx. NZMS 260 S24:292-876 to source	UHS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			III	✓			
	Upper Mangaone Stream (Mana_11d)	Mangaone Stream from Milson Line at approx. NZMS 260 T24:311-953 to source	LM	✓	✓	✓	✓	✓	✓	✓	✓												✓
	Lower Mangaone Stream (Mana_11e)	Mangaone Stream from Manawatu River confluence at approx. NZMS 260 S24:283-872 to Milson Line at approx. NZMS 260 T24:311-953	LM	✓	✓	✓	✓	✓	✓	✓	✓					✓							✓
	Main Drain (Mana_11f)	Main Drain catchment (including Taonui Stream) from Manawatu River confluence at approx. NZMS 260 S24:181-836 to source	LM	✓	✓	✓	✓	✓	✓	✓	✓		✓										✓
	Upper Oroua	Oroua River from Almadale at approx.																					

Sites of Significance - Aquatic (SOS-A) Value

Figure B:3 Visual Guide to the Distribution of the Sites of Significance - Aquatic (SOS-A) Value

Table B.3: Sites of Significance - Aquatic (SOS-A) Value in the Region

*Water Management Zone**	*Sub-zone**	Site	Locality Description	Species
Middle Manawatu (Mana_10)	Middle Manawatu (Mana_10a)	Manawatu River Tributary	From the confluence with the Manawatu River at approx. NZMS 260 T24:410-937 to approx. NZMS 260 T24:444-940	Lamprey
		Manawatu River Tributary	From the confluence with the Manawatu River at approx. NZMS 260 T24:392-929 to approx. NZMS 260 T24:413-902	Lamprey
	Upper Pohangina (Mana_10b)	Pohangina Tributary	From the confluence with the Pohangina River at approx. NZMS 260 T23:652-233 to source	Koaro
		Pohangina River	From approx. NZMS 260 U23:705-256 to approx. NZMS 260 U23:708-303	Whio
		Makawakawa Stream Tributary	From approx. NZMS 260 T23:606-173 to source	Koaro
	Middle Pohangina (Mana_10c)	Pohangina River	From approx. NZMS 260 T23:468-058 to approx. NZMS 260 T23:469-086	Koaro
		Waitokanui Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:474-069 to source	Redfin bully
	Lower Pohangina (Mana_10d)	Ashhurst Domain	At approx. NZMS 260 T24:446-967 to approx. NZMS 260 T24:444-940	Brown mudfish
Lower Manawatu (Mana_11)	Turitea (Mana_11b)	Tiritea Stream	From the confluence with the Manawatu River at approx. NZMS 260 T24:302-880 to approx. NZMS 260 T24:341-866	Lamprey
	Kahuterawa (Mana_11c)	Kahuterawa Stream and tributaries	From the confluence with the Manawatu River at approx. NZMS 260 S24:293-870 to source	Banded kokopu, shortjaw kokopu koaro and redfin bully
	Main Drain (Mana_11f)	Unnamed Wetland	At approx. NZMS 260 S24:223-877	Brown mudfish

Sites of Significance - Riparian (SOS-R) Value

Figure B:4 Visual Guide to the Distribution of the Sites of Significance - Riparian (SOS-R) Value

Table B.4: Sites of Significance - Riparian (SOS-R) Value in the Region

Water Management Zone*	Sub-zone*	River^	Locality Description	Riparian Habitat Value
Middle Manawatu (Mana_10)	Middle Manawatu (Mana_10a)	Manawatu River	From Teachers College at approx. NZMS 260 T24:332-891 to the Manawatu Gorge at approx. NZMS 260 T24:495-938	Gravel and sand (dotterel)
	Upper Pohangina (Mana_10b)	Pohangina River	From approx. NZMS 260 T23:534-168 to approx. NZMS 260 T23:577-213	Gravel and sand (dotterel)
	Middle Pohangina (Mana_10c)	Pohangina River	From approx. NZMS 260 T23:464-043 to approx. NZMS 260 T23:493-113	Gravel and sand (dotterel)
	Lower Pohangina (Mana_10d)	Pohangina River	From the confluence with the Manawatu River at approx. NZMS 260 T24:448-965 to approx. NZMS 260 T23:464-043	Gravel and sand (dotterel)
Lower Manawatu (Mana_11)	Lower Manawatu (Mana_11a)	Manawatu River	From the confluence with the Oroua River at approx. NZMS 260 S24:164-825 to Teachers College at approx. NZMS 260 T24:332-891	Gravel and sand (dotterel)

Sites of Significance - Cultural (SOS-C)

Figure B:7 Visual Guide to the Distribution of the Sites of Significance - Cultural (SOS-C) Value

Table B.7: Sites of Significance - Cultural (SOS-C) Value in the Region

*Water Management Zone**	*Sub-zone**	*River**	Locality Description[1]	Reason	Iwi
Middle Manawatu (Mana_10)	Lower Pohangina (Mana_10d)	Pohangina River	Specific *sites** within the reach from the confluence with the Manawatu River at approx. NZMS 260 T24:450-966 to approx. NZMS 260 T24:450-973	Density of cultural and historical sites of significance including *wāhi tapu** and *taonga**	Rangitaane o Manawatu

Trout Fishery (TF) Value

Figure B:8 Visual Guide to the Distribution of the Trout Fishery (TF) Value

Table B.8: Trout Fishery (TF) Value in the Region

*Water Management Zone**	*Sub-zone**	*River^*	Locality Description	Classification
Middle Manawatu (Mana_10)	Middle Manawatu (Mana_10a)	Manawatu River	From approx. NZMS 260 T24:332-890 to approx. NZMS 260 T24:495-938	Other Trout Fishery
	Upper, Middle and Lower Pohangina (Mana_10b, Mana_10c and Mana_10d)	Pohangina River	From the confluence with the Manawatu River at approx. NZMS 260 T24:449-966 to source	Other Trout Fishery
	Middle Pohangina (Mana_10c)	Makiekie (Coal) Creek	From the confluence with the Pohangina River at approx. NZMS 260 T23:528-166 to source	Other Trout Fishery
Lower Manawatu (Mana_11)	Lower Manawatu (Mana_11a)	Manawatu River	From approx. NZMS 260 T24:332-890 to Oroua confluence at approx. NZMS 260 S24:164-825	Other Trout Fishery
	Turitea (Mana_11b)	Turitea Stream	From approx. 800 m downstream of the Old West Road bridge at approx. NZMS 260 T24:331-875 to approx. NZMS 260 T24:363-825	Other Trout Fishery

*Water Management Zone**	*Sub-zone**	*River^*	Locality Description	Classification
	Kahuterawa (Mana_11c)	Kahuterawa Stream	From the confluence with the Manawatu River at approx. NZMS 260 S24:293-871 to source	Other Trout Fishery

Trout Spawning (TS) Value

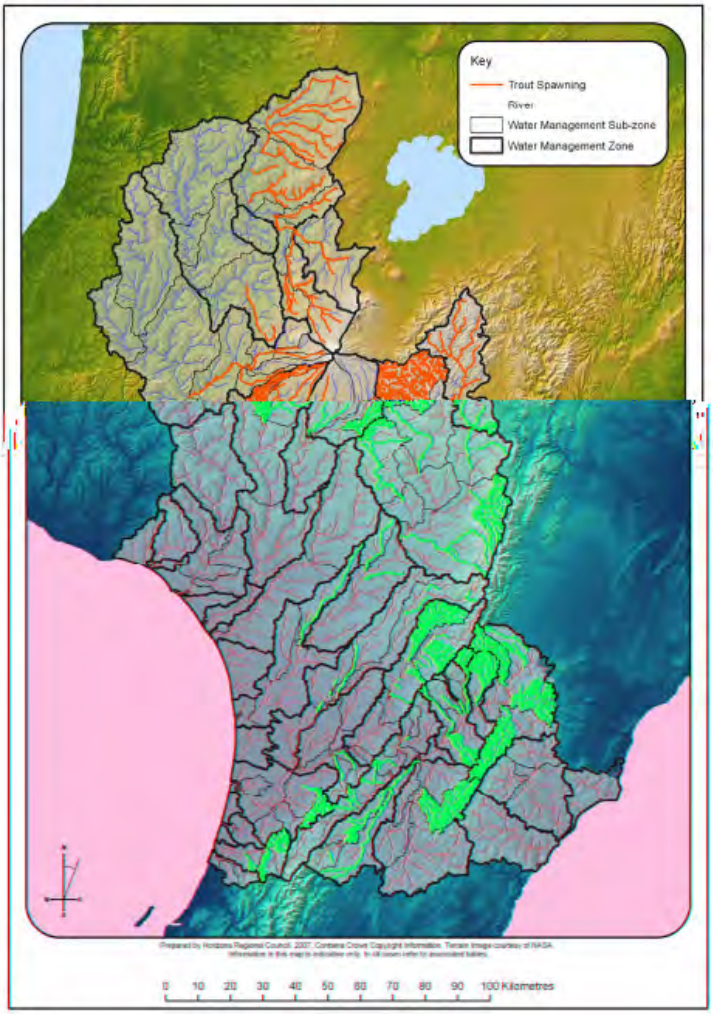


Figure B:9 Visual Guide to the distribution of the Trout Spawning (TS) Value

Table B.9 Trout Spawning (TS) Value in the Region

*Water Management Zone**	*Sub-zone**	*River**	Locality Description
Middle Manawatu (Mana_10)	Upper Pohangina (Mana_10b)	Pohangina River	From the confluence with the Whangapuna Stream at approx. NZMS 260 T23:605-240 to approx. NZMS 260 T23:647-236
		Konewa Stream and tributaries	From the confluence with the Pohangina River at approx. NZMS 260 T23:575-203 to source
		Makawakawa Stream and tributaries	From the confluence with the Pohangina River at approx. NZMS 260 T23:568-199 to source
		Te Ekaou Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:562-180 to approx. NZMS 260 T23:594-150
		Porewa Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:549-163 to approx. NZMS 260 T23:579-147
		Opawe Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:544-161 to approx. NZMS 260 T23:556-144
	Middle Pohangina (Mana_10c)	Makiekie (Coal) Creek and tributaries	From the confluence with the Pohangina River at approx. NZMS 260 T23:528-165 to source
		Ohinetapu Stream and tributaries	From the confluence with the Pohangina River at approx. NZMS 260 T23:517-131 to source
		Mi Maranganui Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:492-112 to approx. NZMS 260 T23:504-107
		Te Awaoteatua Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:480-090 to approx. NZMS 260 T23:499-077
		Makohine Stream	From the confluence with the Pohangina River at approx. NZMS 260 T23:469-058 to source
Lower Manawatu (Mana_11)	Turitea (Mana_11b)	Turitea Stream	From the confluence with the Manawatu River at approx. NZMS 260 T24:302-879 to approx. NZMS 260 T24:357-827
	Kahuterawa (Mana_11c)	Kahuterawa Stream	From the confluence with the Manawatu River at approx. NZMS 260 S24:293-870 to approx NZMS 260 T24:317-796

Table B.10: *Water^* Supply (WS) Value in the Region

*Water Management Zone^*	*Sub-zone^*	*River^*	Description	*Water^* Supply
Middle Manawatu (Mana_10)	Middle Pohangina (Mana_10c)	Highland Home Christian Camp Stream and tributaries	From a point at approx. NZMS 260 T24:564-137 to source	Highland Home Christian Camp
Lower Manawatu (Mana_11)	Turitea (Mana_11b)	Turitea Stream and tributaries	From a point at approx. NZMS 260 T25:368-827 to source	Palmerston North

Amenity (AM) Value

Figure B:12 Visual Guide to the Distribution of the Amenity (AM) Value

Middle Manawatu	Middle Manawatu	Manawatu River at Ashhurst Domain	At approx. NZMS 260 T24:445-964
		Manawatu River at Albert Street	At approx. NZMS 260 T24:342-891
	Middle Pohangina	Pohangina River at Totara Reserve	At approx. NZMS 260 T23:533-168
		Pohangina River at Raumai Reserve	At approx. NZMS 260 T23:474-072
Middle and Lower Manawatu	Middle and Lower Manawatu	Manawatu River	From approx. NZMS 260 S24:291-872 to approx. T24:353-919
Lower Manawatu	Turitea	Tiritea Stream	From approx. NZMS 260 T24:316-882 to approx. NZMS 260 T24:334-869
	Kahuterawa	Kahuterawa Stream at Reserve	At approx. NZMS 260 T24:322-810
		Kahuterawa Stream at Camp Kilsby	At approx. NZMS 260 T24:316-824
	Lower Mangaone	Mangaone Stream	From approx. NZMS 260 T24:313-954 to the point immediately upstream of the bridge at approx. NZMS 260 S24:286-877

Part B.3: Surface *Water^* Management Values Key: showing the management objectives, where the Values apply and where to find them in Schedule B

Value Group	Individual Values		Management Objective	Where it applies	Location in Schedule B
Ecosystem Values	NS	Natural State	The river^ and its *bed*^ are maintained in their natural state	Public Conservation Land	Figure B.2 page B-17 and Table B.2 page B-19
	LSC	Life-supporting Capacity	The *water body*^ and its *bed*^ support healthy aquatic life/ecosystems	All natural *water bodies*^ and their *beds*^ (8 LSC classes)	Figure B.1 page B-15
	SOS-A	Sites of Significance - Aquatic	Sites of significance for indigenous aquatic biodiversity are maintained or enhanced	Specified sites/reaches	Figure B.3 page B-21 and Table B.3 pages B-23 to B-32
	SOS-R	Sites of Significance - Riparian	Sites of significance for indigenous riparian biodiversity are maintained or enhanced	Specified sites/reaches	Figure B.4 page B-33 and Table B.4 pages B-35 to B-37
	IS	Inanga Spawning	The *water body*^ and its *bed*^ sustain healthy inanga spawning and egg development	Specified sites/reaches	Figure B.5 page B-39 and Table B.5 pages B-41 to B-42
	WM	Whitebait^ Migration	The *water body*^ and its *bed*^ are maintained or enhanced to provide safe passage of inwardly migrating juvenile native fish known collectively as whitebait^	Specified sites/reaches	Figure B.6 page B-43 and Table B.6 pages B-45 to B-46
Recreational and Cultural Values	CR	Contact Recreation	The *water body*^ and its *bed*^ are suitable for contact recreation	All natural *water bodies*^ and their *beds*^	
	AM	Amenity	The amenity values of the *water body*^ and its *bed*^ (and its margins where in public ownership) are maintained or enhanced	Specified sites/reaches	Figure B.12 page B-107 and Table B.12 pages B-109 to B-111
	Mau	Mauri^	The *mauri*^ of the *water body*^ and its *bed*^ is maintained or enhanced	All natural *water bodies*^ and their *beds*^	
	SOS-C	Sites of Significance - Cultural	Sites of significance for cultural values are maintained	Specified sites for the Manawatu River in Mana_10a, 11a, 13a and 13f	Figure B.7 page B-47 and Table B.7 page B-49
	TF	Trout Fishery	The *water body*^ and its *bed*^ sustain healthy rainbow or brown trout fisheries	Specified zones/reaches (3 categories)	Figure B.8 page B-51 and Table B.8 pages B-53 to B-59
	TS	Trout Spawning	The *water body*^ and its *bed*^ meet the requirements of rainbow and brown trout spawning and larval and fry development	Specified sites/reaches	Figure B.9 page B-61 and Table B.9 pages B-63 to B-71
	AE	Aesthetics	The aesthetic values of the *water body*^ and its *bed*^ are maintained or enhanced	All natural *water bodies*^ and their *beds*^	
Water^ Use	WS	Water^ Supply	The *water*^ is suitable, after treatment, as a drinking *water*^ source for human consumption	Catchments above surface *water*^ takes for community *water*^ supply	Figure B.10 page B-73 and Table B.10 pages B-75 to B-80
	IA	Industrial Abstraction	The *water*^ is suitable as a *water*^ source for industrial abstraction or use, excluding for hydroelectricity generation	All natural *water bodies*^ except those classified as NS and those identified as zero allocation Water Management Zones^ or Sub-zones^ (other than the Upper Mowhanga (Rang 2c) Water Management Sub-Zone) in Schedule B	
	I	Irrigation	The *water*^ is suitable as a *water*^ source for irrigation	All natural *water bodies*^ except those classified as NS and those identified as zero allocation Water Management Zones^ or Sub-zones^ in Schedule B	
	SW	Stockwater	The *water*^ is suitable as a supply of drinking *water*^ for livestock	All *water bodies*^ including artificial	
	DFS	Domestic Food Supply	The water is suitable for domestic food production	Specified water management^ sub-zones^ West_8, West_9, Hoki_1, Ohau_1, Whau_1, Whau_2, Whau_3 and Mana_12	Figure B.13 page B-113 and Table B.13 page B-115
Social Economic Values	CAP	Capacity to Assimilate Pollution	The capacity of a *water body*^ and its *bed*^ to assimilate pollution is not exceeded	All natural *water bodies*^ and their *beds*^ except NS	
	FC/D	Flood Control and Drainage	The integrity of existing flood and river^ bank erosion protection structures^ and existing drainage structures^ is not compromised and the risks associated with flooding and erosion are managed sustainably	Existing flood/ erosion control and drainage schemes	Figure B.11 page B-81 and Table B.11 pages B-83 to B-105
	EI	Existing Infrastructure^	The integrity of existing *infrastructure*^ is not compromised	This applies in the general vicinity of any existing *infrastructure*^ such as roads, culverts, bridges, *water*^ intakes, discharge^ pipes, flow recording stations and gas pipelines	

Surface *Water^* Management Values Classification Sub-code Key

Value		Classification Sub-codes
LSC	Life-supporting Capacity	**UHS:** Upland Hard Sedimentary **UVA:** Upland Volcanic Acidic **UVM:** Upland Volcanic Mixed **Uli:** Upland Limestone **HM:** Hill Mixed **HSS:** Hill Soft Sedimentary **LM:** Lowland Mixed **LS:** Lowland Sand
TF	Trout Fishery	**I:** Outstanding **II:** Regionally Significant **III:** Other Trout Fishery

**NOTE: FLOODING Maps have not been assessed, as they are assessed under a separate criterion.

Appendix 2: RULES – Horizons One Plan

17 Activities in *Artificial Watercourses**, Beds of Rivers and Lakes, and Damming

17.1 Objectives

Objective 17-1: Regulation of *structures*^ and activities in *artificial watercourses and in the *beds*^ of *rivers*^ and *lakes*^, and damming**

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
17-3 ***Structures*^ and disturbances involving a reach of *river*^ or its *bed*^ with Schedule B Values of Natural State, Sites of Significance - Aquatic and Sites of Significance - Cultural**	Except as prohibited by Rule 17-1, any of the following activities pursuant to s13(1) RMA within: (a) **a reach of *river*^ or its *bed*^ with a Schedule B Value of Natural State** (i) The erection, placement or extension of any *structure*^ in, on, under or over the *bed*^ except for lines, cables and ropeways that are suspended above the *water*^ and do not require a support *structure*^ in, on, over or under the *bed*^ of the *river*^ (ii) Any excavation, drilling, tunnelling or other disturbance of the *bed*^ including gravel extraction and any ancillary: (i) damming or diversion of *water*^ pursuant to s14(2) RMA (ii) *discharge*^ of *water*^ or sediment into *water*^ or onto or into *land*^ pursuant to ss15(1) or 15(2A) RMA (iii) deposition of substances in or on the *bed*^ pursuant to s13(1). (b) **Sites of Significance - Aquatic and Sites of Significance - Cultural** (i) The erection, placement or extension of any *structure*^ in, on, under or over the *bed*^, except for lines, cables and ropeways that are suspended above the *water*^ and do not require a support *structure*^ in, on, over or under the *bed*^ and except for those activities regulated by Rule 17-14 (ii) Any excavation, drilling, tunnelling or	**Discretionary**		

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	other disturbance of the *bed*^, except for those activities regulated by Rules 17-5 and 17-14 and any ancillary: (i) damming or diversion of *water*^ pursuant to s14(2) RMA (ii) *discharge*^ of *water*^ or sediment into *water*^ or onto or into *land*^ pursuant to ss15(1) or 15(2A) RMA (iii) deposition of substances in or on the *bed*^ pursuant to s13(1).			

17.3 General Conditions for Permitted Activities and Controlled Activities involving the Beds of Rivers and Lakes

The table below sets out general conditions for activities involving the beds of rivers and lakes. These general conditions are referred to in a number of the permitted activity and controlled activity rules in this chapter. The table sets out general conditions for all rivers and lakes under the Value of Life-supporting Capacity (this Value applies to all rivers and lakes as shown in Schedule B). It then sets out additional conditions for other Values that apply to specific reaches of rivers, as listed in Schedule B. Schedule B must be referred to in order to identify the locations of the *Water Management Sub-zones** to which these other Values apply, and whether they are therefore relevant to a particular activity.

Table 17.2 General *conditions*^ for *permitted activities*^ and *controlled activities*^ involving the *beds*^ of *rivers*^ and *lakes*^

Value	Condition
Life-supporting Capacity *conditions*^ which apply to all *water bodies*^ and their *beds*^	(a) The activity must not adversely reduce the ability of the *water body*^ or its *bed*^ to convey flood flows, floating debris or sediment, except for a period of not more than 12 consecutive hours during construction. (b) There must be no *discharge*^ of *contaminants*^, other than sediment and other *contaminants*^ inherent to the *water*^ or *bed*^, into the *river*^ or *lake*^ except where the *discharge*^ is explicitly allowed by the activity description of a *rule*^ in this chapter. (c) Any *discharge*^ of sediment into *water*^ directly caused by the activity, that causes the visual clarity standards in Schedule E to be breached, must not be undertaken for more than 24 hours in total across 5 consecutive days. There must be no more than one activity per *river*^ per *property** in any 12 month period. (d) Any *discharge*^ of sediment into *water*^ under (c) must not, after *reasonable mixing**, cause any conspicuous change in the colour of *water*^ in the receiving *water*^ or any change in horizontal visibility greater than the target set in the visual clarity % change column of Schedule E, more than 12 hours after completion of the activity. (e) Any materials used must be necessary for the activity and must not be toxic to aquatic ecosystems. (f) Any materials no longer required as part of the activity, including any temporary *structures*^, must not be stored in or on the *bed*^ of any *river*^ or *lake*^ and must be removed after completion of the activity. (g) Refuelling of machinery must not take place in any area where spills may enter surface *water*^. (h) The activity must be undertaken in a manner that provides for the safe passage of fish both upstream and downstream, including past any *structure*^. (i) Any diversion of *water*^ required for works ancillary to a *structure*^ must be temporary, must be within the *bed*^ of the *river*^, must not exceed 100 m in length, must not be between catchments, must not involve a *lake*^, and the diversion channel must have sufficient capacity to carry the same flow as the original channel. (j) Upon completion of any channel bank works, the banks must be reinstated to a natural contour and revegetated. (k) Any straightening or channelling of a *river*^ must not exceed a length equal to two times the *bed*^ width of the *river*^ in any 2 km length of *river*^ in any 12 month period. (l) There must be no removal of instream woody debris less than 2 m^3 in size unless this is required to reduce the risk of flooding or erosion.
Riparian (applies to all reaches in *water bodies*^ and their *beds*^ with a Schedule B Value of Sites of Significance - Riparian)	(m) For the purpose of minimising disturbance to nesting dotterels 1August to 31 December (inclusive), gravel extraction and *bed*^ disturbance on gravel beaches must only take place: (i) within 7 days following a flood of the area of beach that is the subject of the activity, or (ii) where the extraction or disturbance commenced at the same location prior to 1 August and has not been interrupted for more than 7 days.

Value	Condition
Inanga Spawning (applies to all reaches in *water bodies*^ and their *beds*^ with a Schedule B Value of Inanga Spawning)	(n) The use of mobile machinery in or on the *bed*^ of a *river*^ or *lake*^ in a manner that disturbs the *bed*^ must not take place 1 February to 1 May (inclusive).
*Whitebait** Migration (applies to all reaches in *water bodies*^ and their *beds*^ with a Schedule B Value of *Whitebait** Migration)	(o) The use of mobile machinery in or on the *bed*^ of a *river*^ or *lake*^ in a manner that disturbs the *bed*^ of the active flowing channel must not take place 15 August to 30 November (inclusive).
Trout Spawning (applies to all surface water management zones and their *beds*^ with a Schedule B reach Value of Trout Spawning for this provision)	(p) The use of mobile machinery in or on the *bed*^ of a *river*^ or *lake*^ in a manner that disturbs the *bed*^ of the active flowing channel must not take place 1 May to 30 September (inclusive).
Trout Fishery (applies to all reaches in *water bodies*^ and their *beds*^ with a Schedule B Value of Trout Fishery)	(q) Activities must not result in suspended sediment that causes the visual clarity standards in Schedule E to breached during Saturdays, Sundays and public holidays 1 December to 28 February (inclusive).
Contact Recreation (applies to all reaches in *water bodies*^ and their *beds*^ with a Schedule B Value of Contact Recreation)	(r) Existing public access to or along a *river*^ or *lake*^ must not be rendered unsafe by the activity. (s) Existing public access to or along a *river*^ or *lake*^ may be rendered unavailable where this is necessary for public safety or for the purpose of undertaking the activity, provided the public access is re-opened as soon as practicable. (t) Activities must not result in suspended sediment that causes the visual clarity standards in Schedule E to be breached at reaches with a Schedule B Value of Contact Recreation, during Saturdays, Sundays and public holidays 1 December to 28 February (inclusive).
Existing *infrastructure*^	(u) Excavation, drilling, tunnelling or other disturbance of the *bed*^ of a *river*^ must not take place within 500 m upstream or downstream of any flow-recording site.[1] (v) Excavation, drilling, tunnelling or other disturbance of the *bed*^ of a *river*^ must not take place within 20 m upstream or downstream of a high pressure gas transmission pipeline identified by a *district plan*^ or *regional plan*^ or by a marker[2] on the bank of the *river*^.

1 Further information on the location of flow-recording sites can be obtained by either visiting the Regional Council's website (www.horizons.govt.nz) or by contacting the Regional Council's Hydrology Department.
2 High pressure transmission gas pipelines are normally indicated by white triangle marker posts or yellow pipeline warning signs. If you are unsure about a pipeline being present, please contact your Territorial Authority.

Appendix 3: Model Network Outputs

PNATM Outputs 2 8 2

Value	Light Vehicles			Heavy Vehicles			Total Vehicles						
	AM	IP	PM	AM	IP	PM	AM	IP	PM				
	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Daily KMs	Daily KMs	% Diff (All)	% Diff (HCV)
Base	249904	186550	286304	21668	17532	18230	271572	204082	304534	2784871	220052		
Prog 6	249093	186337	285231	21640	17562	18257	270732	203898	303488	2779628	220287	99.81%	100.11%
Prog 7	249411	186461	285458	21652	17558	18267	271063	204019	303725	2781730	220301	99.89%	100.11%
Prog 11	249580	186292	285733	21594	17501	18221	271174	203794	303954	2780604	219640	99.85%	99.81%

Difference	Light Vehicles			Heavy Vehicles			Total Vehicles						
	AM	IP	PM	AM	IP	PM	AM	IP	PM				
	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Veh-kms	Daily KMs	Daily HV KMs	% Diff (All)	% Diff (HCV)
Prog 6	-811	-214	-1074	-29	30	28	-839	-184	-1046	-5243	235	-0.19%	0.11%
Prog 7	-493	-89	-846	-16	26	37	-509	-63	-809	-3142	249	-0.11%	0.11%
Prog 11	-323	-258	-572	-74	-31	-9	-397	-289	-580	-4267	-413	-0.15%	-0.19%

MCA Workshop - PNITI

Sustainable Environment; Water Quality & CO2 Emissions

Sustainable Environment

This criterion assesses the potential impact of the options on water quality. The assessment criterion was broken down into two parts, as follows:

- Water Quality
- CO2 Emissions

Water Quality

Theme	Outcomes/Drivers	Scoring Implications
Temporary Effects	• Construction of bridges	Sites where the construction of new bridges are required score worse than those where works within or adjacent to a stream are limited
	• Construction works, including road widening and safety improvements, that extend over rivers and streams along the roading alignment	
	• Effects of instream ecology	
Permanent Effects	• Permanent discharges into stream/rivers	Sites where effects on water quality will be permanent were scored worse
	• Effects of instream ecology	

Scoring

Assessment of the options on water quality – Temporary Effects	
Area for Investigation	Overall score
Programme 6	-2
Programme 7	-2
Programme 11	-1

A score of the **temporary** effects on water quality as a result of each option is provided in the table above.

A score of the **permanent** effects on water quality as a result of each option is provided in the table below.

Assessment of the options on water quality – Permanent Effects	
Area for Investigation	Overall score
Programme 6	-1
Programme 7	-1
Programme 11	0

C.8 Archaeology

INSITE ARCHAEOLOGY LTD
ARCHAEOLOGY & HERITAGE MANAGEMENT SERVICES
Phone: 027-421-0803 Email: info@insitearchaeology.com
48 Liverpool Street, Levin (5510)

3 December 2019

Daniel John Parker

M.A. (Hons) Anthropology
NZ Archaeological Association
International Association of Landscape Archaeology

The following is a comparative assessment of the archaeological potential of short-listed Palmerston North Integrated Transport Initiative (PNITI) network programmes for the purpose of informing the Multi-Criteria Assessment (MCA) workshop. The output of this assessment is based on methods that were first developed for an MCA of the New Zealand Transport Agency's Otaki to North of Levin route options, though some minor changes and improvements have been made to the analysis and interpretation of the data.

The assessment is based on the spatial analysis of information supplied by or digitised from:

- ~100%[1] of the pre-1900 Māori Land (ML), Survey Office (SO) and Deposited Plans (DP) created by the government land survey agencies prior to the establishment of Land Information New Zealand (LINZ), the controlling agency at the present time.
- The New Zealand Archaeological Association Site Recording Scheme Database (ArchSite)
- LiDAR derived topographic data provided by Horizons Regional Council
- Land Information New Zealand's Data Service (data.linz.govt.nz)
- Heritage information supplied by the Palmerston North City Council
- Historic aerial photographs

Information was also available from a number of other sources that were not utilised for this stage of analysis. Prior knowledge or a preliminary review of these sources confirmed the presence of useful information, but it was not possible to incorporate these sources in a neutral way within the current timeframe. These sources may be of use to future stages and are:19th century cadastral parcels digitised from early survey plans

- Surveyor's field books

1 Confirmation of a full 100% coverage is not possible as some records may be indexed out of sequence; such as when a misplaced or lost plan is relocated and accessioned at a later date.

- Māori Land Court Minute Books
- Historic newspapers
- Historic rates books
- Published books and pamphlets

The main effect of excluding these sources from the analysis is that outside of central Palmerston North City 19th century sites of European/colonial association are under-represented. However, a proxy measure was developed as a coarse replacement in the absence of more specific information, as detailed below.

Criteria and Definitions

The scores assigned to each option have been assessed using the following criteria:

1. Impacts on recorded archaeological sites
2. Potential impacts on unrecorded archaeological sites

Scores provided for the network programmes that are presented at the conclusion of this assessment are based on what is known or can be reasonably estimated at the present time. Comment is provided where further research is expected to identify additional constraints, but no adjustments have been made to the assessed scores in anticipation of this. Mitigation measures are likely to be possible/appropriate for some options, but more detailed information would be required to discuss this in a meaningful manner.

The Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA) is the controlling legislation for the administration of archaeological sites and s6 of the act defines an archaeological site as:

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that -

  (i) Was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and

  (ii) Provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and

(b) Includes a site for which a declaration is made under section 43(1)

The HNZPTA definition provides a simple test to determine if a known place or location is an archaeological site, but a full assessment of archaeological potential must also incorporate an analysis of the unknown site potential. Patterns in the distribution of archaeological sites, as defined in the HNZPTA, can be used to infer the unknown potential, but a more accurate picture can be developed by studying a broader range of information, one that also includes:

any place with an historic Māori name-association and any unnamed features of

the natural or cultural landscape that are known to have been, or are generally regarded as having been, focal points for past human activity.

This enables many rivers, streams, lakes, swamps, hill and dunes etc., to be included in the analysis. Although these features of the natural landscape may not meet the HNZPTA definition of what is an archaeological site, there are a wide range of sources (Māori Land Court Minute Books, 19th century ethnographies, oral traditions etc) that indicate these places have, or are likely to have, an archaeological component that is as yet unrecognised due to issues of surface visibility or a limited history of landscape study. In some cases, the place name associated with a landscape feature indicates there is likely to be an archaeological component. The expanded definition also supports the use of roads and railways, which are in many cases archaeological sites under the strict legal definition, and other cultural landscape features as measures of the intensity of past human occupation.

There are a small number of heritage buildings and archaeological sites listed by the Manawatu District and Palmerston North City councils in the options areas. In general, these are sites or places that meet the definition used in the HNZPTA and where these sites duplicate records from the NZAA or other sources, only the original source record is kept to avoid double counting.

Because of the expanded definition of what is an 'archaeological site' that is used in this assessment, it is important to distinguish how particular terms are used throughout this briefing note. 'Known' sites are places that meet the strict definition of an archaeological site as defined in the HNZPTA, while 'unknown' or 'potential' sites are places that fall under the expanded definition outlined above. Where reference is made to 'archaeological potential', this encompasses all sites that fall under the HNZPTA and expanded definition.

Assessment of Archaeological Potential

Using the expanded definition, above, archaeological sites and landscape place names were digitised in ArcGIS. Where line or polygon data was available from the LINZ Data Service this was used – i.e., for rivers, streams, roads and railways – but in most cases sites were digitised as points at the approximate mid-point (for lines) or geometric centroid (for polygons), though polygons were traced for some classes of data. Separate classes of data were then converted to a raster format as below in Table 1.

The separate classes of raster data were combined using a raster math function in several iterations with various weightings applied. The selected model was determined to have the most balanced representation of archaeological potential for both Māori and European/colonial associations. The selected model was modified using the landscape damage layer which assigned a fixed negative value to all areas that were defined as having nil archaeological potential: this predominantly relates to the meander of the Manawatu River.

Several schemes for the thematic presentation of archaeological potential were tested using various class-sizes and mathematic models of classification, with selection finally settling on values being displayed across a single stretched gradient. While there are numeric values

Table 1: A list of inputs, including geometries, methods and values, used to produce the archaeological potential raster model.

DATA TYPE	SOURCE GEOMETRY	METHODS	VALUES
NZAA site data	Point	Point density	Classified 1 to 10
iSA site data	Point	Point density	Classified 1 to 10
Named rivers	Polyline	Euclidean distance	Classified 1-5
Named streams, creeks and drains	Polyline		Fixed value
Roads, tracks, rail and tramways	Polyline		Fixed value
Forest clearings	Polygon		Fixed value
Lagoons, lakes and swamps	Polygon		Fixed value
Lagoons, lakes and swamps (buffer)	Polygon		Fixed value
Nineteenth century cadastral parcels	Polygon	Fishnet, Count	Classified 1 to 10
Landscape damage	Polygon		Fixed value

underlying the model of archaeological potential, short-list programme scores cannot be assigned as a sum of all values or by other mathematic methods: the model and input data are not yet sufficient for this to be appropriate. In place of the numeric values, the scale has been converted to three ordinal values – Low, Medium and High – and scores were assessed on the basis of my interpretation of the distribution of archaeological potential that is presented, the extent and degree of adverse impact that could be expected and the statutory processes that would need to be addressed.

Assumptions

As previously discussed, 19th century sites of European/colonial association are known to the be under-represented outside of the Palmerston North city centre. However, inclusion of the 19th century road, rail and cadastral parcel network in the analysis acted as a general proxy in the absence of more detailed information. Historic newspaper articles and published works have stated that the road and rail network was an important factor in the economic development of the Manawatu and it is reasonable to expect that European/colonial sites will be clustered in relative proximity to the road or rail network. Additionally, the variance in the distribution and density of cadastral parcels is a useful proxy for the potential intensity of European/colonial occupation.

Overall, the model that has been produced is assumed to be a reasonable representation of not just the known, but also the unknown archaeological potential. The basis for this understanding is that the model, for the most part, conforms with independent data that was not used in its construction: this being environmental data indicating that away from the major rivers the landscape was covered in a dense podocarp forest for most of its occupied history until the last decades of the 19th century. While the entire landscape has been occupied for many centuries,

the archaeological potential is greatest near open land alongside the major rivers and streams or near late-19th century urban centres, roads and railways.

Scoring

Scoring of the short-listed options was complicated by definitions that combined the need to evaluate the potential adverse impact and the scope for mitigation or management. In particular, the potential adverse impacts of Programmes 6 and 7 could have been scored at a lower level (i.e. worse), but in both of these instances scoring priority was given to the scope for management and mitigation. While there are a number of interventions associated with all programmes, scoring has been determined with regards to the works that are mostly likely to have substantive effects on archaeological sites: that is, the proposed bridge crossings and the Bunnythorpe and Ashhurst bypasses.

Programme 6 includes scope for a new bridge crossing south of the current city and bypasses of Bunnythorpe and Ashhurst. Both of the potential bridge locations are in areas of high archaeological potential and will either directly affect or be in close proximity to historically occupied clearings, hunting and fishing grounds along the banks of the Manawatu River. Connections to SH56 will directly affect or be in close proximity to European sites adjacent to the former railway. Additional constraints are likely to be identified in these areas as the programme develops. The Ashhurst and Bunnythorpe bypasses have the potential to affect sites predominantly relating to European/colonial occupation. The Bunnythorpe bypass has a higher potential for adverse impacts as it is likely to affect a large number of former urban or suburban land parcels, while the Ashhurst bypass covers predominantly rural land. However, further research is required at Bunnythorpe to determine the extent of 19th century occupation as the archaeological potential may be overstated at this location. Overall, there is the potential for significant adverse impacts at these locations, but it is expected that these impacts may be adequately managed under the HNZTPA archaeological authority process.

Programme 7 includes scope for two new bridge crossings to the north and south of the current city and bypass of Bunnythorpe. All of the potential bridge locations are in areas of high archaeological potential and will either directly affect or be in close proximity to historically occupied clearings, hunting and fishing grounds along the banks of the Manawatu River. Connections to SH56 and SH3 will directly affect or be in close proximity to European sites adjacent to the former railway. Additional constraints are likely to be identified in these areas as the programme develops. Potential impacts of the Bunnythorpe bypass are the same as above. Overall, there is the potential for significant adverse impacts at these locations, but it is expected that these impacts may be adequately managed under the HNZTPA archaeological authority process.

There are no new bridge crossings included in Programme 11 and the major works are restricted to a bypass of Bunnythorpe. As above, the Bunnythorpe bypass has the potential to affect sites predominantly relating to European/colonial occupation but further research is required at to determine the extent of 19th century occupation as the archaeological potential may be

overstated at this location. In balancing the uncertainty of the level of effect at Bunnythorpe, overall there is the potential for moderate adverse impacts at this location, but these impacts can be adequately managed under the HNZTPA archaeological authority process.

While there is some variation in the level of potential adverse impacts it is expected that this could be adequately managed for all options under the archaeological authority process provided under the HNZPTA, though Programmes 6 and 7 are likely to require a greater effort in this regard. No fatal flaws have been identified at this point in time, though further research and engagement with iwi partners would be needed to confirm this.

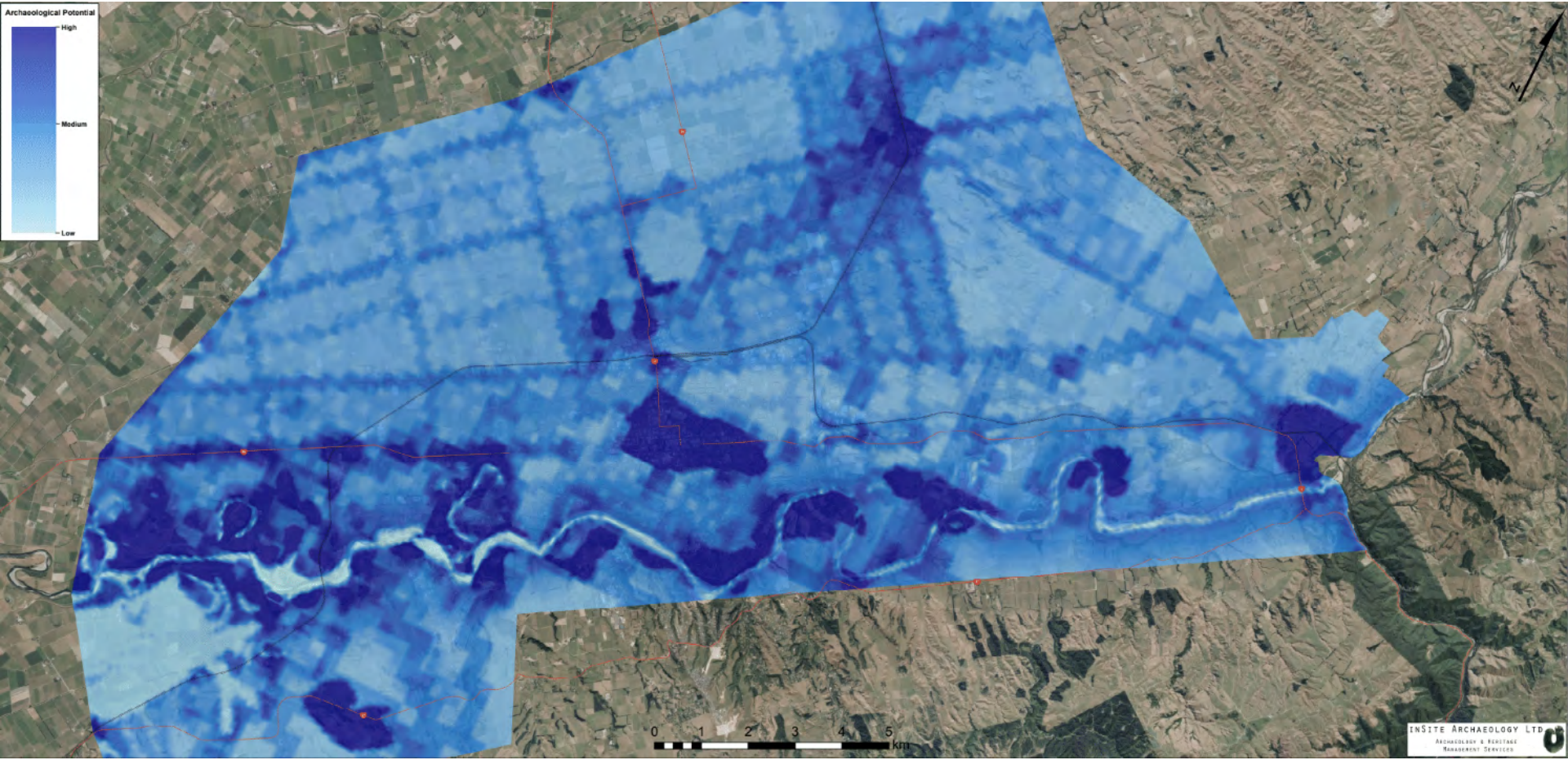
Table 2: Scoring and assessment of short list options.

PROGRAMME	ASSESSMENT	SCORE
6	• Potential substantial adverse impacts to historic sites at bridge crossing and bypasses o The Manawatu River and its environs have been a focal point for Māori occupation for many centuries • Impacts may be managed under the HNZTPA archaeological authority process	-2
7	• Potential substantial adverse impacts to historic sites at two bridge crossings and the Bunnythorpe bypass o The Manawatu River and its environs have been a focal point for Māori occupation for many centuries • Impacts may be managed under the HNZTPA archaeological authority process	-2
11	• Uncertain, but estimated to be moderate, adverse impacts at Bunnythorpe • Impacts can be managed under the HNZTPA archaeological authority process	-1

Archaeology

Risk Map created by compiling:

- Pre-1900 Māori Land (ML), Survey Office (SO) and Deposited Plans (DP)
- ArchSite
- LiDAR derived topographic data
- Land Information New Zealand’s Data Service
- Heritage information supplied by the Palmerston North City Council
- Historic aerial photographs


Archaeological Potential
High
Medium
Low
N
0 1 2 3 4 5 km
InSite Archaeology Ltd
Archaeology & Heritage Management Services

Archaeology

	Programme 6	Programme 7	Programme 11
Assessment	Potential substantial adverse impacts to historic sites at bridge crossing and bypasses	Potential substantial adverse impacts to historic sites at two bridge crossings and the Bunnythorpe bypass	Uncertain, but estimated to be moderate, adverse impacts at Bunnythorpe
Score	**-2**	**-2**	**-1**

Impacts should be managed under the HNZTPA archaeological authority process.

C.9 Engineering Degree of Difficulty and Cost

Palmerston North Integrated Transport Initiative Engineering Degree of Difficulty & Cost Multi Criteria Analysis

Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
1	6/12/2019	1st Draft	M Skelton		P Peet	P Peet

1 Purpose.

This report outlines and documents the evaluation process and considerations for the Engineering Dgree of Difficulty (EDoD) criteria for the Multi-Criteria Asessment workshop for the three shortlisted programmes.

In parrallel, programme estimates were developed and these have been used to assign a score for Cost.

2 Considerations.

2.1 Overview

The assessment looks at a number of aspects related to the engineering complexity of the three programmes under the following criteria:

- Bridge Structures. This criterion assesses the number of bridge structure required to complete the programme. The elements under this criterion are weighted 1 for a significant structure, 0.5 for a moderate structure and 0.25 for a minor structure
- Complexity of the Programme. In general terms, this criterion looks to assess the time differentials to complete a given programme in its entirety. All programmes will be impacted by resource and material availability.
- Temporary works. Temporary works are defined as specific additional works required to allow a road or structure to function while its being upgraded or replaced. It also includes the need for additional works to facilitate construction. It does not include temporary traffic management as this is considered to be a minor or moderate impact that is routinely managed or mitigated.
- Access Management. This criterion considers the impact the programme has on access to other facilities.
- Unknown Risks. This criterion looks at the components of the programme and cost schedule and considered the likelihood of unknowns affecting the programme.
- Construction Difficulty: All programmes will have some construction challenges and this criterion considers how this compares across the three programmes.
- Natural Hazards: This criterion considers the impact natural hazards could have on the Programme, during and post construction. Flood risk is a particular consideration during construction, which is obviously a high impact for the river bridges and approaches and low for road reconstruction works.

3 Weightings and Scoring Treatment.

3.1 EDoD

As required, a -3 to +3 evaluation was to be applied where -3 represents a significant adverse impact with serious long-term effects compared to the do minimum. A neutral score represents a similar impact to the do minimum and a score of +3 represents a significant positive impact likely resulting in long term improvements.

By its very nature EDoD infers a negative leaning assessment. However, it is important to note that these effects are likely to be temporary and are also likely to be managed or mitigated. meaning the scoring range will be from 0 to -2.
To provide further differentiation a 0.5 point score has been used for the sub-criteria.

3.2 Cost Estimate

The cost score is determined by the relative value of a programme over the lowest estimated programme which would have a value of -1.

4 Evaluation

4.1 EDoD

Table 4.1 summaries scored attributes

Attribute	Programme 6	Programme 7	Programme 11
Bridge Structure	**-1.5**	**-2.5**	**-1**
Commentary	1 significant river bridges , rail underpass, 4 rail over passes (Waughs, Stoney Creek, Ashhurst, Rongotea) SH57 road bridge	2 significant river bridges, rail underpass, 3 rail over passes (Waughs, Stoney Creek, Rongotea). 3 SH57 road bridges	No river crossing, rail underpass, 3 Rail overpasses (Waughs Stoney Creek, Ashhurst). SH57 road bridge
Programme Complexity	**-1.5**	**-2**	**-1**
Commentary	Large programme of works spread over a large geographic urban and rural area. Plus significant projects including bypasses and 1 bridge.	Large programme of works spread over a large geographic urban and rural area. Plus significant projects including bypasses and 2 bridges.	Large programme of works spread over a large geographic urban and rural area. Plus significant projects including bypasses.
Temp Works	**-1**	**-2**	**-0.5**
Commentary	As per 11 plus temp works required in river to build river bridge	As per 11 plus temp works in river to build two river bridges	No significant temp work required for bridges, but some for Ashhurst and Bunnythope particularly when affecting rail
Access Management	**-1**	**-1.5**	**-1**
Commentary		Higher on this programme due to additional length of upgrades to access roads required.	
Unknown Risks	**-1.5**	**-2**	**-1**
Commentary	Sub options works being included $25m. Accidental discovery greatest on river.	Sub options works being included $49m. Accidental discovery greatest on river and this programme as two locations.	Sub options works being included $36m
Natural Hazards	**-1.5**	**-2.5**	**-0.5**
Commentary	Construction in floodplain.	Construction in floodplain for two river bridges	Floods works on existing roads same across all programmes
Composite Score Total	**-8**	**-12.5**	**-5**
Score	**-1**	**-2**	**-1**

4.2 Cost estimate.

Table below has been extracted from the high level estimates for each of the thee programmes with and without the sub options adjustments to the programme.

Table 4.2

	Programme 6	Programme 7	Programme 11
COST SUMMARY (excludes sub options)	**~$330m**	**~$400m**	**~$250m**
% increase over lowest	**31%**	**57%**	
assigned score	**-2**	**-3**	**-1**
COST SUMMARY (includes sub options)	**~$370m**	**~$470m**	**~$310m**
% increase over lowest	**17%**	**51%**	
assigned score	**-2**	**-3**	**-1**

The inclusion of the sub options treatments adds more to programme 11 about 25% and the least to programme 6 about 10%., with Programme 7 coming in at 18%. This means that % increases reduce accordingly but still retain a point difference between each of the programmes.

5 Conclusion

The inclusion of river crossing(s) under programmes 6 and 7 are the principal difference between these and programme 11. Many other aspects of the works are similar across the 3 programmes - Bunnythorpe bypass, treatments on KB road for transmission lines and flood risk are examples.
Programme 7 requires more new road construction due to the upstream bridge crossing and has an additional 10Km of existing road upgrading to be completed. As a result this ranks Programme 7 with highest number of (mitigatable) impacts ahead, of programme 6 and 11 which are assessed to be similar, based on the scoring system.

Engineering Degree of Difficulty

Attribute	Programme 6	Programme 7	Programme 11
Bridge Structure	-1.5	-2.5	-1
Programme Complexity	-1.5	-2	-1
Temp Works	-1	-2	-0.5
Access Management	-1	-1.5	-1
Unknown Risks	-1.5	-2	-1
Natural Hazards	-1.5	-2.5	-0.5
Score	**-1**	**-2**	**-1**

Cost

	Programme 6	Programme 7	Programme 11
Cost Differential over Prog 11	+20-30%	+50-60%	0%
Score	**-2**	**-3**	**-1**

C.10 Value For Money

Stantec

Memo

File: MCA – Access and Amenity Date: 10 December 2019

PNITI MULTI-CRITERIA ASSESSMENT: VALUE FOR MONEY

This brief memo outlines the approach to, and scores for, the 'value for money' criteria of the multi-criteria assessment of short-listed PNITI options.

OPTIONS BEING ASSESSED

PROGRAMME 6 (FULL RING ROAD – ONE BRIDGE)

- Full ring road that connects Longburn, SH3, Bunnythorpe, Ashhurst and SH57 via a downstream bridge
- Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant aspects of amenity, land use, safer speeds, and safety programmes

PROGRAMME 7 (FULL RING ROAD - TWO BRIDGES)

- Includes online and offline upgrades to complete a full ring road around Palmerston North. It will include the provision of two new bridges, one north and one south of the city
- Online upgrades to Kairanga Bunnythorpe Road and Stoney Creek Roads. Major intersection upgrades on Kairanga Bunnythorpe Road.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety programme components.

PROGRAMME 11 (PROGRAMME 6 WITHOUT BRIDGE + KEY FREIGHT INTERSECTION UPGRADES)

- Like P6 but with additional treatments at key freight intersections, and no new major bridge.
- Programme includes Do-Min elements. Includes relevant land use, amenity, safer speeds, and safety components.

"B" PROGRAMMES

Programmes 6B, 7B and 11B are the same as their corresponding base options, but do not include speed reductions.

SCORING SCALE

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

INDICATIVE COSTS

The indicative programme costs are:

- Programme 6 = $330m
- Programme 7 = $400m
- Programme 11 = $260m

BENEFIT STREAMS

The key benefits of the project have been considered in terms of those which can be assessed using standard Economic Evaluation Manual (EEM) procedures and those which would be considered as a 'wider economic benefit (WEB)'. The main EEM-type benefits would be:

- Travel time
- Travel distance and VOC
- Safety (reducing the number of death and serious injury crashes)
- Walking and cycling (i.e. through new connections)

An indicative $ benefit for travel time and travel distance benefits has been derived through network wide outputs from the traffic modelling. Whilst at this stage it is difficult to quantify the potential safety and walking and cycling benefits, an initial qualitative review of the relative benefits of the various programmes has been undertaken (see below).

Safety, Walking and Cycling

Figure 1 provides a map which identifies (based on Waka Kotahi's Megamaps) the high risk roads and intersections within the project area.

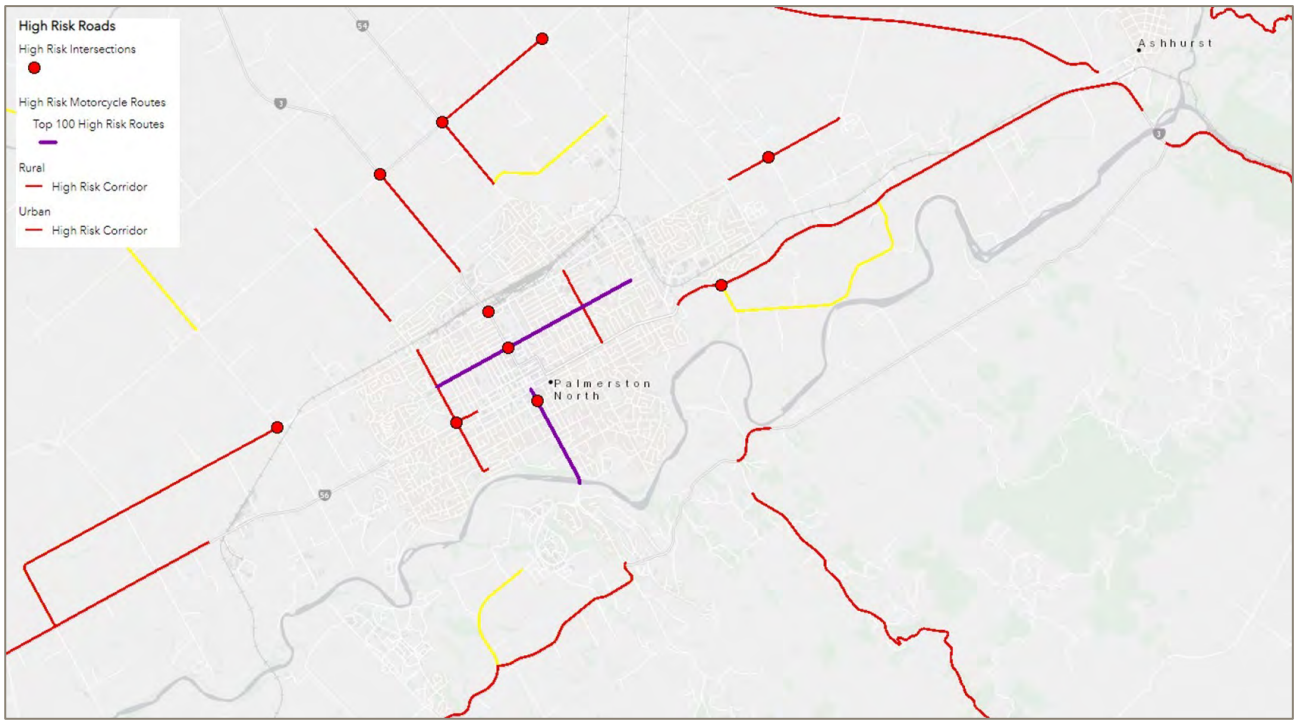


Figure 1: High Risk Roads and Intersections

In terms of safety improvements, the various programmes are relatively similar – with the main differentiating element being whether the programme includes zero, one or two bridges. Depending upon how these new bridges influence the diversion of traffic away from higher risk roads would influence the relative safety benefits of each programme.

Through improved connectivity, the bridges would likely create additional walking and cycling trips, particularly if a new connection could be made with the Manawatu River Pathway. On this basis, the programmes which provide more river crossings (i.e. Programme 6 and Programme 7) would likely provide higher proportional walking and cycling benefits. The northernmost river crossing, which is removed from a sizeable urban area, is likely to have lower walking/cycling benefits than compared with the potential southern bridge.

Wider Economic Benefits

The wider economic benefits have been considered in two categories, those which would be represented by quantified agglomeration benefits for which guidelines are set out in the EEM and more speculative new employment opportunities for which the commitment to an improved road network could provide an impetus, especially for firms looking for a regionally strategic location.

The agglomeration benefits have been broadly estimated by assuming that these are equivalent to the EEM type benefits for Programmes 6 and 7, which include the improved accessibility offered by new river crossings. 50% of the EEM benefits have been assumed for Programme 11, as this programme does not provide the same level of accessibility benefits. It should be noted that these assessments may be optimistic with WEBs typically amounting to 20-40% of conventional economic benefits.

In addition to these formal WEBs, which mainly relate to existing firms operating more productively there are believed to be opportunities for new activities to locate to the area to take advantage of the enhanced accessibility. To some extent these are covered in the Economic Development criteria but some allowance for these is probably appropriate to include in the Value for Money criteria.

Overall Value for Money

On the basis of an assessment of the quantified economic benefits and the less tangible impacts likely to arise, for which quantification is not possible at present the scores for the scenarios without and with speed changes in the base network are set out in below, It should be noted that the these are intended to reflect the relativities between the Programme options rather than exact quantified measures.

SCORING – VALUE FOR MONEY

Programme	Score
Programme 6	0
Programme 7	-1
Programme 11	-1

Programme 6B	1
Programme 7B	0
Programme 11B	0

No Speed Reductions

Rationale for Scoring

- For the purpose of the MCA, the important aspect is the relative scoring between the options, rather than whether a neutral score would represent a BCR of 0 or 1. The score for Programme 6 has been increased to a limited extent because of the potential walking/cycling benefits the southern bridge might bring although further work on this is needed as the project progresses. The incremental BCR for the northern bridge may still however be relatively low because it does not directly connect to notable urban areas.
- In general, there is relatively little difference between the indicative 'value for money' assessments, with Programme 6 appearing to give better results than the more expensive Option 7 or the more limited Programme 11. Once the safety, walking, cycling benefits have been quantified and a more detailed modeling assessment of the full wider economic impacts has been undertaken, a clearer differentiation between the options may be established. This may also establish a suitable phasing programme over time.
- In addition, the overall value for money is dependent on the assumptions about the management of speed within the urban area. While this is probably necessary to achieve a suitable balance between flows on the urban network and the proposed new ring road in the future so reducing the environmental impacts of heavy traffic flows within the urban area, the benefits would be sensitive to whether this is assumed to form part of the Do Minimum or is only implemented as part of one of the programme packages.

- Overall Assessment

Programme	Outcome	Score
Programme 6	Value for money is higher than the other two programmes but is relatively low given the costs of the scheme.	0 with speed management as part of Programme 1 with no speed management as part of Programme
Programme 7	Value for money lower than Programme 6 with additional costs of second river crossing not matched by benefits	-1 with speed management as part of Programme 0 with no speed management as part of Programme
Programme 11	Value for money lower than Programme 6 because of more limited impact of investments. Similar VfM results to Programme 7	-1 with speed management as part of Programme 0 with no speed management as part of Programme

Notes

- The current assessment does not include safety, walking or cycling benefits – all of which could be notable. Interventions coupled with safe and appropriate speed changes should be considered in the next stage.
- The rankings are essentially relative only at this stage rather than absolute, and the position would be refined as the project progresses.
- Speed management will be a key aspect of the programmes.

Value for Money

Richard Paling and Matt Soper

Palmerston North 11 December 2019

Stantec

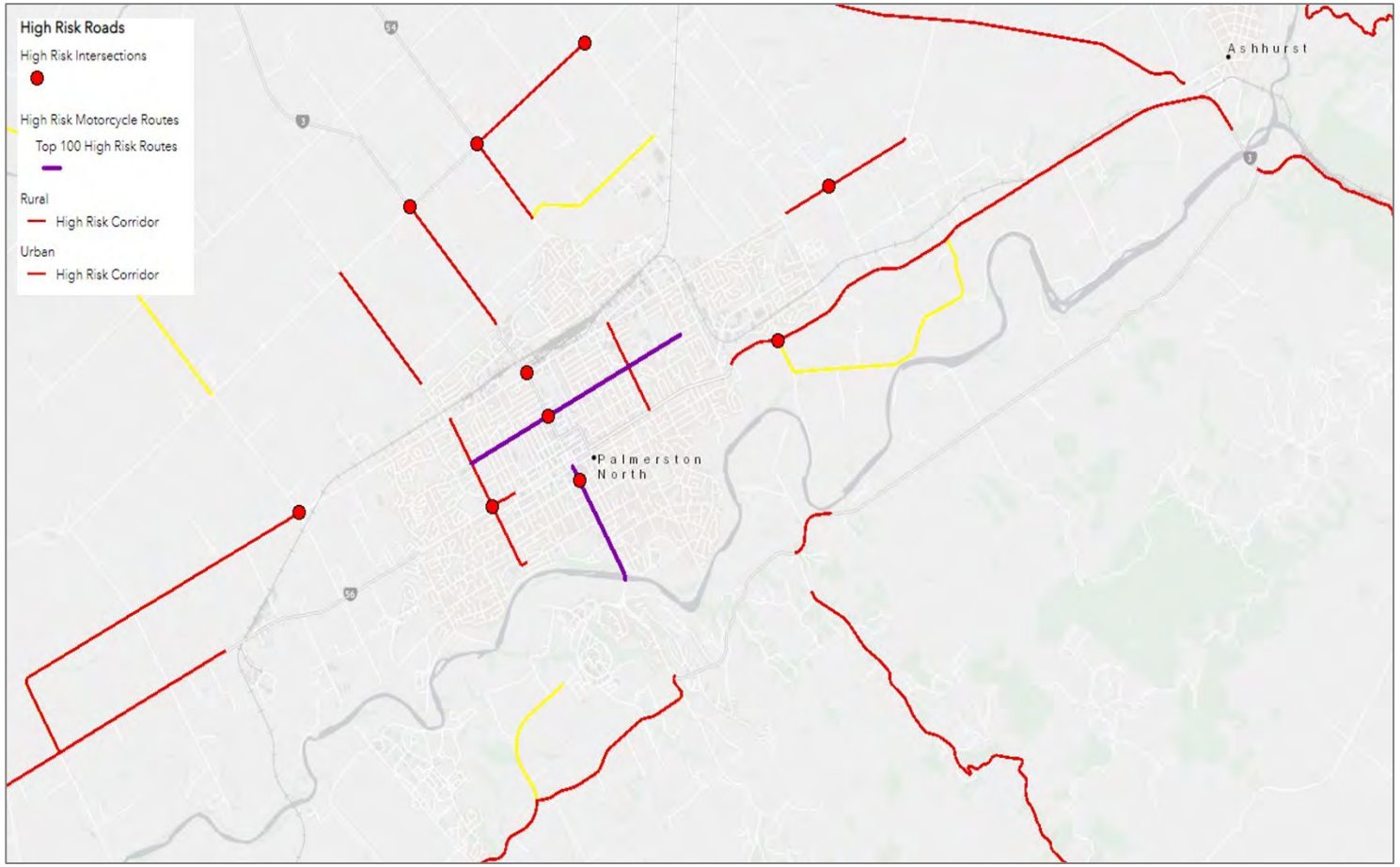
Value for Money

- Brings together the costs of the options and the benefits that are likely to be generated
- Potentially can be assessed quantitatively

Value for Money

Key considerations:

- EEM type benefits:
  - Travel time
  - Travel distance
  - Safety (reducing DSIs)
  - Walking and cycling (more trips)
- Wider Economic Benefits (WEBs)
  - New employment opportunities
  - Agglomeration benefits



High Risk Roads and Intersections

Value for Money

Indicative Cost Estimates

- Programme 6 = 25% more than P11
- Programme 7 = 50% more than P11
- Programme 11 = $$$M

Considerations

- Speed management will be a key aspect of the programmes and a key factor upon the final BCR
  - Analysis sensitive as to whether speed management included as part of the Do Minimum or as part of programmes.
  - Safety benefits of lower speeds could offset some (or all) of the disbenefit related to increased travel time
- The incremental BCR for the southern bridge likely to be better than for the northern bridge (higher demand for both traffic and active travel)
- Estimates of benefits still very preliminary, especially for wider economic benefits

Value for Money

- The current assessment does not include safety, walking or cycling benefits – all of which could be notable. Interventions coupled with safe and appropriate speed changes should be considered in the next stage.
- The rankings are essentially relative only at this stage rather than absolute, and the position would be refined as the project progresses.

Programme	Outcome	Score with speed management as part of Programme	Score no speed management as part of Programme
Programme 6	Value for money is higher than the other two programmes but is relatively low given the costs of the scheme.	0	1
Programme 7	Value for money lower than Programme 6 with additional costs of second river crossing not matched by benefits	-1	0
Programme 11	Value for money lower than Programme 6 because of more limited impact of investments. Similar VfM results to Programme 7	-1	0

C.11 Integration with Freight Hub

PN Integrated Transport Initiative

Proposed framework for evaluation for December MCA workshop

Integration with KiwiRail Freight Hub

1 Introduction

The following is a comparative assessment of the potential impacts of the three PN ITI programmes being considered on the possible KiwiRail hub locations in order to inform the workshop on 11 December 2019.

The assessment is based on two components, each of which have been scored separately

- The extent to which the different programmes would support the economic development impacts of the alternative rail hubs.
- The impacts that the programmes would have on the road traffic associated with the rail hubs.

Because no firm decision has been made on the preferred location of the rail hub, assessments have been made for each of the rail hub/programme options. In the overall assessment the impacts on each of the rail hub locations for each programme have been averaged to give a single scores for the programmes.

2 Scoring scale

The scoring scale used is that developed for the Accessing Central New Zealand PBC which is set out below:-

Description	Definition	Score
Significantly positive	Significant positive impact, likely resulting in long term improvements	+3
Moderately positive	Moderate positive impact, which may provide improvements and opportunities	+2
Slightly positive	Minor positive impact	+1
Neutral	Similar impact to the do-minimum	0
Slightly adverse	Minor adverse impact, which can be mitigated or managed	-1
Moderately adverse	Moderate adverse impact, that may be managed or mitigated	-2
Significantly adverse	Significant adverse impact with serious long term effects	-3

3 Assessment of the impacts on the economic development opportunities for each of the rail hubs - economic access

The impacts on the economic development potential of the rail hubs with the different programme options has been assessed taking into account the following more detailed criteria considering the access to the rail hubs from different directions:-

- Access from east
- Access to Tremaine Avenue
- Access to activities at Longburn
- Access to potential workforce
- Access to north
- Access to west via SH56/57

This reflect the potential responses to the increases in accessibility offered by the different programme options and is based on a qualitative analysis. To some extent, the responses have been based on the changes in traffic flows across the network as identified in the Beca presentation material with Programme 6 being assumed to be broadly represented by Beca Scenario 1, Programme 7 by Beca Scenario 1c and Programme 11 by Beca Scenario 1e

A discussion of the potential impacts is set out below in Table 3.1 and the scores that result are set out in Table 3.2.

Table 3.1 Assessment of economic access issues			
	Programme		
	6	7	11
Access from east	Via upgraded Ashhurst Road- possibility of rat-running to cut off corner with Hub Option 4 **Score 3 all options**	More indirect route via SH57 and upstream bridge **Score 1 all options**	Via upgraded Ashhurst Road **Score 3 all options**
Access to Tremaine Avenue	Basically the same as now but with limited intersection upgrades **Score 1 all options**	Basically the same as now but with limited intersection upgrades **Score 1 all options**	Intersection upgrades **Score 1 all options**
Access to activities at Longburn	Ring Road probably more important for Hub Option 2 where it would provide a direct route **Score 3** Less important for Option 4 where quickest route would be along Tremaine Avenue **Score of 1** since some reduction in traffic along Tremaine Avenue Medium importance for Option 3 where link to upgraded KB road might be important but little use of KB road in model outputs. Model suggests that main route will be via Richardsons Line and Flygers Line avoiding Tremaine Avenue but this may exclude possible RR improvements**. Score 1**		
Access to potential workforce	New river crossing providing routes for workforce from south of river plus reduced flows on existing links across river and through central area. **Score 2 all options**	New river crossing providing routes for workforce from south of river plus reduced flows on existing links across river and through central area. Better than Option 6 since 2 new river crossings **Score 3 all options**	Limited impact on central area routes. Improvements to intersections along Tremaine Avenue **Score 1 all options**
Access to north	Assumes access to Bunnythorpe bypass for Options 3 and 4 **Score 2 both options**. No impact Option 2 (**Score 0**)		
Access to west via SH56/57	Ring road connection probably attractive for Option 2 **Score 3** - less for Option 3 **(score 2**) and less so again for Option 4 **(score 1**) With river crossing would provide access to both SH56 and SH57 to south west	Ring road connection probably attractive for Option 2 **Score** 3 - less for Option 3 (**score 2**) and less so again for Option 4 (**score 1**) With river crossing would provide access to both SH56 and SH57 to south west	Ring road connection probably attractive for Option 2 but no river crossing to provide option to access SH57 **Score 2** - less for Option 3 (**score 1**) and less so again for Option 4 but still some benefit from Tremaine Avenue intersection improvements (**score 1**)

Table 3.2 Summary of economic access scores										
Criteria	Weight	Hub at location 2A			Hub at location 3C			Hub at location 4C		
		6	7	11	6	7	11	6	7	11
Access from east	0.5	3	1	3	3	1	3	3	1	3
Access to Tremaine Avenue	1	1	1	1	1	1	1	1	1	1
Access to activities at Longburn	0.5	3	3	3	1	1	1	1	1	1
Access to potential workforce	1	2	3	1	2	3	1	2	3	1
Access to north	0.5	0	0	0	2	2	2	2	2	2
Access to west via SH56/57	0.5	3	3	2	2	2	1	1	1	1
Total		**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**

4 Impact of ring road programmes on transport costs for alternative rail hub locations

An assessment had been made of the impact on road traffic costs with each of the possible rail hub options for each of the Programmes. This analysis has been carried out both on the assumption of no additional management of speeds within the urban core compared to the Do Minimum as part of the programmes and alternatively with the assumption that speeds in the urban core are reduced as part of the Programmes so reducing the transport benefits that might be achieved. The changes in the total vehicle operating costs have been scored to enable them to be compared with the assessment of the impact on economic development potential set out above.

The results of this are set out in Table 4.1.

Table 4.1 Summary

Programme and rail hub	With urban speed management as part of the Programmes	Without urban speed management as part of the Programmes
Prog6_2A	1	2
Prog6_3C	1	2
Prog6_4	1	2
Prog7_2A	2	2
Prog7_3C	2	2
Prog7_4C	2	2
Prog11_2A	0	1
Prog11_3C	0	1
Prog11_4C	0	1

In general for the position where speeds within the urban area are managed in relation to their current levels, Programme 7 would provide the largest reduction in the transport costs associated with the rail hub followed by Programme 6 and then Programme 11. When speed adjustments are not applied, benefits for all Programmes would increase. However if the same scoring framework is maintained, Programmes 6 and 7 give the highest benefits with a score of 2 in each case with lower benefits with Programme 11 but with this now having a score of 1.

5 Overall Assessment

Putting together the results for potential economic development and the impacts on road traffic gives the position set out in Table 5.1. In order to simplify the presentation of the results the scores for the three rail hub options have been averaged for each Programme option and the key results are highlighted at the foot of the table.

Table 5.1 Impact of PN ITI programmes on the proposed rail hub Proposed MCA Scores						
Rail hub location	PN ITI Pro-gramme	Economic Development impacts	Impact on road traffic costs- With speed adjustments	Combined - with speed adjustments	Impact on road traffic costs - No speed adjustments	Combined - no speed adjustments
location 2A	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	2	0	1	1	1
location 3C	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1
location 4C	**6**	2	1	1	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1
Average all hub locations	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1

The assessment by programme is set out below

Table 5.2 Impact on rail hubs - Summary assessment		
Programme	**Assessment**	**Average Score**
Programme 6	Provides reasonable economic development impacts, although in the scenario with urban speed adjustments, the impact on the flows to and from the rail hub is more limited, reflecting the focus on movements to and from the main urban core. The provision of the additional river bridge improves accessibility for cross river traffic to and from the hub, both by providing a new route and reducing the traffic flows and congestion on traffic continuing to use the existing route.	2 for both speed scenarios
Programme 7	Provides reasonable economic development impacts although the benefits of the construction of the additional upstream bridge are offset by the more limited improvements to the direct route to the east. The impact on the forecast traffic flows is higher than for Programme 6 reflecting the additional infrastructure provided.	2 for both scenarios
Programme 1	The more limited network improvements and in particular the absence of a new river crossing results in a lower impact on economic development opportunities for the hubs and also lower traffic benefits	1 for both speed scenarios

Impact on alternative rail hub locations

Richard Paling

Palmerston North 11 December 2019

Scope of Rail Hub Assessment

- Economic development impacts of programmes for the alternative rail hubs.
- Road traffic impacts for the rail hubs
- Assessment has been undertaken for each of the rail hub options 2,3 and 4.
- Not assessing rail hubs

Economic development/access impacts

- Criteria assessed
  - Access from east
  - Access to Tremaine Avenue
  - Access to activities at Longburn
  - Access to potential workforce
  - Access to north
  - Access to west via SH56/57

Road traffic impacts

- Looking at how quantified travel costs would change with alternative Programmes
- Based on output of traffic model.
- Although assessed separately results for all programmes similar for each hub option
- Sensitive to assumptions about speed management

Summary assessment

Table 5.2 Impact on rail hubs - Summary assessment		
Programme	**Assessment**	**Average Score**
Programme 6	• Provides reasonable economic development impacts, • The provision of the additional river bridge improves accessibility for cross river traffic to and from the hub, both by providing a new route and reducing the traffic flows and congestion on traffic continuing to use the existing route.	2 for both speed scenarios
Programme 7	• Provides reasonable economic development impacts • Benefits of the construction of the additional upstream bridge are offset by the more limited improvements to the direct route to the east. • The impact on the forecast traffic flows is higher than for Programme 6 reflecting the additional infrastructure provided.	2 for both scenarios
Programme 1	The more limited network improvements and in particular the absence of a new river crossing results in a lower impact on economic development opportunities for the hubs and also lower traffic benefits	1 for both speed scenarios

Supplementary material

Table 5.1 Impact of PN ITI programmes on the proposed rail hub Proposed MCA Scores						
Rail hub location	PN ITI Pro-gramme	Economic Development impacts	Impact on road traffic costs- With speed adjustments	Combined - with speed adjustments	Impact on road traffic costs - No speed adjustments	Combined - no speed adjustments
location 2A	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	2	0	1	1	1
location 3C	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1
location 4C	**6**	2	1	1	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1
Average all hub locations	**6**	2	1	2	2	2
	7	2	2	2	2	2
	11	1	0	1	1	1

Detailed economic access scores

Table 3.2
Summary of economic access scores

Criteria	Weight	Hub at location 2A			Hub at location 3C			Hub at location 4C		
		6	7	11	6	7	11	6	7	11
Access from east	0.5	3	1	3	3	1	3	3	1	3
Access to Tremaine Avenue	1	1	1	1	1	1	1	1	1	1
Access to activities at Longburn	0.5	3	3	3	1	1	1	1	1	1
Access to potential workforce	1	2	3	1	2	3	1	2	3	1
Access to north	0.5	0	0	0	2	2	2	2	2	2
Access to west via SH56/57	0.5	3	3	2	2	2	1	1	1	1
Total		**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**1**

Summary of traffic impacts

Table 4.1 Summary		
Programme and rail hub	With urban speed management as part of the Programmes	Without urban speed management as part of the Programmes
Prog6_2A	1	2
Prog6_3C	1	2
Prog6_4	1	2
Prog7_2A	2	2
Prog7_3C	2	2
Prog7_4C	2	2
Prog11_2A	0	1
Prog11_3C	0	1
Prog11_4C	0	1

Wellington
Level 13, 80 The Terrace
Wellington 6011
PO Box 13-052, Armagh
Christchurch 8141
Tel +64 4 381 6700
Fax +64 4 473 1982

Please visit www.stantec.com to learn more about how Stantec design with community in mind.

Stantec

Manawatū Gorge Alternatives

Assessment of the Wider Economic Benefits of the Shortlisted Options

16 March 2018

Building a better working world

Table of contents

1. Executive summary

1.1 Background and purpose

State Highway 3 (SH3) through the Manawatū Gorge has been closed due to major damage caused by large slips since April 2017. As part of reinstating the route, the New Zealand Transport Agency (NZTA) developed four short list options for an alternative route. To support the selection of a preferred route NZTA engaged EY on behalf of the Joint Working Group (JWG) to develop a more robust understanding of the economic structure of Palmerston North, its role within the regional and national economy, and the effect that to changes in transport accessibility have on economic performance.

As agreed with the JWG, the scope of this report includes, in summary:

- An analysis of the economy of Palmerston North and the surrounding region, including an examination of key trends, and a discussion of the regions' competitive advantages.
- An assessment of how different Gorge replacement options affect the future growth of the region's economy – in particular whether any of the options has a materially different impact on the area's economy or land use.

1.2 Regional economic assessment

The regional economic assessment found that the Horizons South East economy has competitive advantages in:

- Transport and distribution with strong and consolidating growth in the North East Industrial Zone in Palmerston North. This is supporting the growth of a regional logistics hub, and could respond strongly to future decisions about the location of rail infrastructure
- Food product manufacturing, particularly value added manufacturing, supported by processing red meat and dairy from the Rangitikei, Manawatū, and Tararua Districts; and
- Palmerston North also has a strong agricultural and scientific research focus, supported by Massey University. Food HQ has been identified as a major opportunity for the region, and attracting outsourced food science research and development work for international companies provides opportunities to support productivity in agriculture and food manufacturing across the region.

Palmerston North also supports a strong public sector and health workforce. The NZDF also has a strong presence in Linton, which helps to support economic activity in the region.

As in many regions, there are also some significant challenges, such as the aging population and relatively slower population which are driving lower overall economic growth. However, the specialisation of the region is driving increases in productivity and incomes, and GDP will increase faster than population.

The continued growth of the region is strongly dependent on maintaining high quality and efficient transport links. The nature and timing of the Gorge replacement and associated roading upgrades – including upgrades to the ring road around Palmerston North and a second Manawatū river crossing – are important determinants of the Region's future economic growth, in part by improving the efficiency of firms operation and the productivity of workers, particularly in the transport, logistics, and distribution sectors.

1.3 Industry engagement

In order to strengthen our understanding of the regional economy and the potential impact of the options we engaged with a range of industry stakeholders, including: CODA Group; Fonterra; Foodstuffs; Higgins Holdings; Kiwirail; Massey University; Palmerston North Airport; Road Transport Association of NZ; NZDF; NZ Heavy Haulage Association and Progressive Enterprises.

From these stakeholders we heard four themes that are particularly relevant to our analysis. Our discussions revealed that:

- Continued delays in reopening or replacing the Manawatū Gorge has led to significant increases in freight costs that will begin to affect input and consumer prices throughout the region.
- Delayed commitment to a replacement Gorge route is impeding investment, with some $20-40m of investment currently awaiting an announcement on the Gorge.
- Most parties see the value in a second Manawatū river crossing in addition to the Gorge replacement, but realising the potential of these investments is dependent on upgrades to the regional ring road.
- The preference expressed by some parties for Option 4, is largely (although not completely) driven by the fact that Option 4 assures a second bridge across the Manawatū. There is concern that unless this bridge is delivered as part of the Gorge replacement, it may be indefinitely delayed. One party expressed a strong preference for Option 4, and it was premised on a belief that the southern part of the 'ring road' would provide better access between points south of Palmerston North (e.g. Levin) to the East.

1.4 Wider economic benefits

Following any unplanned outage, recovery proceeds in a typical pattern. There is some initial investment after a commitment to 'rebuild' or 'restore' that which was lost. Once the 'rebuild' is complete, some of the costs imposed by the outage reduce as the economy returns to its pre-disruption state. There can then be a level of additional growth (exceeding previous trends) if opportunities to build back better have been exploited.

In assessing different network options, we examined the three key benefits that are likely to result from the restoration of the Gorge as well as other supporting improvements. They are:

- Benefits of certainty – committing to a clear plan will release industry investment
- Productivity benefits of reduced transport costs – decreasing transport costs will free up money for more productive uses
- Agglomeration benefits – improving travel times essentially brings firms closer together, making them more productive.

This analysis explicitly excludes direct transport costs, including travel time and vehicle operating costs, and vehicle kilometres travelled. These benefits are captured in separate work conducted by GHD.

The analysis also necessarily excludes the impact of 'transformative' but unknown future events. We have been told that the economy is at a 'tipping point', and that the choice of the appropriate Gorge option could drive transformational change. While this cannot be discounted completely, we did not encounter this sentiment through our stakeholder engagement, nor is the historical data suggestive of imminent broad-based and transformative growth.

Economics simplifies complex systems and relies on historical data and relationships between key parameters to provide forecasts of future scenarios. In the absence of such data, forecast growth relies on historical relationships between population, economic structure, and output. Even if Palmerston North is primed for change and restoring the Gorge acts as the catalyst for new investment, it is unlikely that the growth and investment futures experienced with different the options would be significantly different.

1.5 Summary of Key Findings

To better understand the wider economic benefits of each option, eight scenarios were developed that included variations to the road network and the addition of an upstream or downstream bridge

(or both) which are described in Table 1. Table 2 shows the wider economic benefits associated with each scenario.

Table 1: Option 3 and 4 Scenarios

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Summary	Upgrades+ down-stream bridge	No upgrades + no bridge	Upgrades + double bridge	Upgrades + upstream bridge	Upgrades+ no bridge	Upgrades + upstream bridge	Upgrades + double bridge	Limited upgrades + upstream bridge
Construction time	6 years	6 years	6 years	6 years	6 years	7 years	7 years	7 years
Ring route improvements	✓		✓	✓	✓	✓	✓	
Improvements to KB Rd and intersection	✓		✓	✓	✓	✓	✓	
Upgrades to Stoney Creek Rd to rural high standard	SH3 to Kelvin Grove Rd		SH3 to KB Rd	SH3 to KB Rd	SH3 to Kelvin Grove Rd	SH57 to KB Rd	SH57 to KB Rd	SH57 to KB Rd
Upgrade Kelvin Grove from Stoney Creek Rd to Tremaine Ave to arterial high standard	✓		✓	✓	✓	✓	✓	
Upgrade Roberts Line from KB Rd to Railway Rd to rural high standard	✓		✓	✓	✓	✓	✓	
Build upstream bridge			✓	✓		✓	✓	✓
Build downstream bridge	✓		✓				✓	

There are significant costs to delay. If nothing was done to restore the Gorge, the economy would lose $279m of output over the next 40 years. This is due to the:

- GDP effects of lost investment on GDP of $82m or $7m per annum
- Impact of increased freight costs on output of $130m or $9m per annum
- Agglomeration efficiencies forgone relative to a Gorge open scenario of $67m or $5m per annum.

A 1-year delay to restoration of the Gorge in nominal terms costs the economy $21m in addition to the transport benefits forgone.

Table 2: Total wider economic benefits (40-year present value, $m) – excluding transport benefits

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Description	Downstream Bridge + Improvements	No Bridge, No Improvements	Double Bridge + Improvements	Upstream Bridge & Improvements	Improvements & No Bridge	Improvements + Upstream Bridge	Improvements + Double Bridge	Limited Improvement + Upstream Bridge
Benefits of certainty (starting 2021)	82.3	82.3	82.3	82.3	82.3	82.3	82.3	82.3
Productivity benefits of reduced transport costs	87.9	87.9	87.9	87.9	87.9	82.2	82.2	82.2
Agglomeration benefits	92.8	13.0	97.0	73.0	60.0	69.2	91.5	21.8
Total wider economic benefits	**263.0**	**183.2**	**267.2**	**243.2**	**230.2**	**233.6**	**256.4**	**186.3**

These results show that reinstating the Gorge is the first priority and is important, but it is not sufficient to unlock the total potential economic benefits of the Region. Improvements to the regional ring road and the addition of a second bridge enhance the economic productivity of the Region. The exact location of the bridge changes the benefits realised, and further investigations should be undertaken to understand the location that best supports transport and economic outcomes.

Value of Reinstatement

Economic modelling estimates that restoring the network and Gorge to its pre-closure status would result in $40m of benefits relative to continued closure of the Gorge, but the Gorge closure presents an opportunity to consider how the network in and around Palmerston North functions, including how a second Manawatū River crossing near Palmerston North and the completion of regional ring road impacts economic performance.

Additional Value of the Ring Road and Bridge

Completing the ring road without a second bridge provides $20m of additional benefits over 40-years relative to reinstatement of the Gorge alone. Adding a second river crossing near Palmerston North along with the ring road improvements adds $32-53m of additional benefits depending on the location of the bridge.

It is worth noting the choice of bridge and network improvements have a greater relative impact on realised agglomeration benefits than the choice of the replacement Manawatū Gorge route. Comparing scenarios that are identical but for the Gorge route (Scenario 2A compared with Scenario 1D) shows that the selection of the route on agglomeration benefits is very small ($73m versus $69m). Option 4 relies on a bridge to link into the wider road network, so like for like comparisons between the options 'without a bridge' is not possible, but for the purposes of comparison, if a bridge is excluded in Option 3 the agglomeration benefits fall by 17% to $60m. If ring road improvements and a bridge are excluded the agglomeration benefits drop by 82% to $13m.

Implications

With a single bridge and network improvements, Option 3 has similar agglomeration benefits to Option 4 ($73m versus $69m), but it is delivered at significantly lower cost. Option 3 also aligns best with short term land use trends and economic recovery due to the location of the route and how quickly it can be constructed. Achieving the medium to long-term economic benefits of this

option depends on upgrades to the wider transport network – not just which upgrades are made, but when and in what order. When combined with network improvements, Option 3 has greater overall benefits than Option 4.

The timing and sequence of transport network upgrades and the placement of the second bridge are critical decisions to optimise the functioning of the network. Not just which upgrades are made, but when, where, and in what order, can make an important difference to the economic impact of a new route.

2. Context & Purpose

2.1 Scope and Purpose

The closure of Manawatū Gorge in July 2017 has increased transport costs, travel time, and reduced accessibility of traffic moving between the Manawatū-Whanganui and Hawke's Bay regions. This has reduced investment, slowed growth, and adversely affected productivity throughout the region.

Central and local government are about to make a significant investment in the region to restore the connectivity and economic benefits that were lost. In making this investment, decision-makers also seek to exploit opportunities to build back a network that is more efficient than before, enhance regional and national connectivity, support economic growth, and promote resilience.

To ensure that the option selected supports the growth of the regional economy, enhances its competitive advantages, and serves the needs of the national and regional economy, NZTA – at the behest of the Joint Working Group (JWG) – engaged EY to develop a more robust understanding of the economic structure of the regional economy and its role within the national economic context, and most critically, how the different Gorge replacement options may influence future economic growth.

The scope of this report as agreed by the Joint Working Group (JWG) includes:

- An empirical analysis of the economy of Palmerston North and the surrounding region, an examination of key economic trends, and the regions' competitive advantages.
- An assessment of how different Gorge replacement options affect the future growth of the region's economy – in particular, whether any of the options has a materially different impact on the area's economy or land use. This benefits analysis focusses on those economic changes that will be influenced by the choice of route – that is, how the economic future of the Region unfolds differently if Option 3 is selected instead of Option 4.

In developing this report and the scope of work we engaged with Horizons District Council, Palmerston North City Council, Tararua District Council, and Spearhead. These Councils' interests were aligned with that of NZTA and the JWG in that they wished to understand which road network option generated the best economic performance for the region in a manner consistent with planned land use intentions.

Exclusions and Limitations

This analysis explicitly excludes direct transport costs, including travel time and vehicle operating costs, and vehicle kilometres travelled. These benefits are captured in separate work conducted by GHD.

The agglomeration modelling is partly based on the outcomes of the traffic modelling, so many of the same limitations that apply to the traffic work, as identified in the GHD report, also apply to this component of the economic modelling.

The analysis also necessarily excludes the impact of 'transformative' but unknown future events. We have been told that the economy is a 'tipping point', and that the choice of the appropriate Gorge option could drive transformational change. While this cannot be discounted completely, we did not encounter this sentiment through our stakeholder engagement, nor is the historical data suggestive of imminent broad-based and transformative growth.

Economics simplifies complex systems and relies on historical data and relationships between key parameters to provide forecasts of future scenarios. In the absence of such data, forecast growth relies on historical relationships between population, economic structure, and output. Even if Palmerston North is primed for change and restoring the Gorge acts as the catalyst for new

investment, it is unlikely that the growth and investment futures experienced with different the options would be significantly different.

2.2 Context

On 24 April 2017, SH3 through the Manawatū Gorge was closed due to major damage caused by a large slip. A significant amount of work was done to clear the slip, but due to subsequent slips and increased safety risks, the road was closed indefinitely in July 2017. NZTA have made investments in Saddle Road, a detour route north of the Gorge, to allow it to cope with increased traffic volumes.

NZTA established the SH3 Manawatū Gorge alternative route project to identify a long term, sustainable route through the Tararua and Ruahine ranges. An initial long list of 13 options was identified. Based on feedback the community and other stakeholders, NZTA released four shortlisted options in October 2017. Table 3 and Figure 1 provide an overview of the four options.

Table 3: Manawatū Gorge options summary[1]

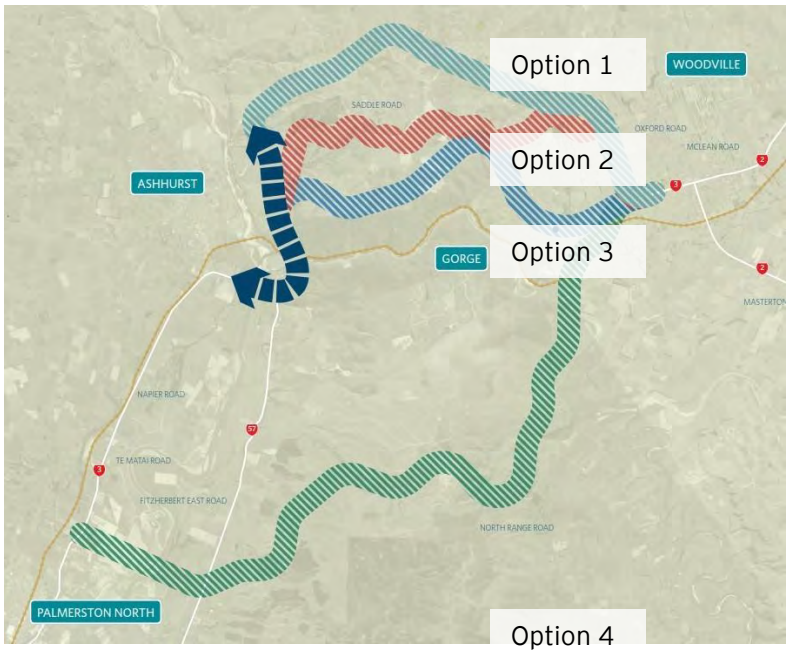
	Option 1	Option 2	Option 3	Option 4
Name	North of Saddle Road	Saddle Road upgrade	South of Saddle Road	South of the Gorge
Description	Provides a new road corridor across the Ruahine Range north of Saddle Road	A major upgrade of the existing Saddle Road corridor	A new road corridor across the Ruahine Range south of Saddle Road	A new route south of the Manawatū Gorge providing a new road corridor
Total Delivery Cost[2]	$417-537m	$408-534m	$392-561m	$603-801m
Length	15.7km	13.8km	12.4km	19.2km
Time to complete	5-6 years	5-6 years	5-6 years	6-7 years
Max. gradient	8%	8%	6%	6%
Approx. travel distance[3]	25km	23km	22km	21km
Travel time	15-18	14-17	13-16	13-16

[1] GHD Advisory. Draft Manawatu Gorge Short List Options Assessment p.30.

[2] The cost ranges reported in this table are indicative only and are subject to change. The costs are as developed in the Detailed Business Case for the purpose of informing a relative assessment between the short-listed options. For more information on the costs, including any changes to costs made subsequent to the issuance of this report, please refer to the SH3 Manawatu Gorge Alternatives Detailed Business Case.

[3] Travel distances and times are estimated based on the journey from the State Highway 3 (Napier Road) and Stoney Creek Road intersection to the State Highway 2 / State Highway 3 intersection at Woodville.

Figure 1: Manawatū Gorge options map



During the development and assessment of the short-listed options, early feedback was received from the local and regional councils identifying an early preference for Option 4 on the basis that it would provide greater value in terms of supporting and stimulating regional growth. Of particular interest was the inclusion of a second bridge across the Manawatū River and the ability of this option to better integrate with the current and planned transport network and associated land use patterns. It was acknowledged that this was an area that was less developed in terms of the Agency's understanding of the manner in which each of the options integrated with the wider transport network and supported the desired land use patterns.

In response, the NZTA established a Joint Working Group (JWG) in December 2017 to support the evaluation of the four shortlisted options. The purpose of the JWG is "to objectively consider the future development of a regional freight network and how the shortlisted options for the Manawatū Gorge Alternatives project can support, enable and/or complement the desired investment in the regional freight network". [4] The JWG includes representatives from NZTA, Accelerate 25, Palmerston North City Council, Horizons Regional Council, Tararua District Council, Road Transport Association NZ (RTANZ), the NZ Automobile Association (AA), the New Zealand Defence Force, and the NZ Heavy Haulage Association (NZHA).

To support a robust analysis, subsets of Options 3 and Option 4 were further developed to a form a set of eight scenarios, described in Table 4.[5] The purpose of the scenarios was to allow for a high-level assessment of the programme of work associated with the Gorge replacement, including ring road upgrades and the provision of a second bridge. These are not formal options, but rather allow for each component of the network to be considered separately, in order to develop a better understanding of which improvements are most important to the economic performance of the region.

These are the options for which wider economic benefits are assessed in Section 6.

[4] "SH3 Manawatu Gorge: Joint Working Group: Terms of Reference", NZTA, December 2017.

[5] Options 3 could be essentially interchanged with Options 1-2 as both result in similar connectivity to the overall network, although Option 3 is somewhat shorter in terms of distance and travel time. All options remained under consideration at the time of this report.

Table 4: Options 3 and 4, Scenarios for Further Analysis

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Summary	Upgrades+ down-stream bridge	No upgrades + no bridge	Upgrades + double bridge	Upgrades + upstream bridge	Upgrades+ no bridge	Upgrades + upstream bridge	Upgrades + double bridge	Limited upgrades + upstream bridge
Construction time	6 years	6 years	6 years	6 years	6 years	7 years	7 years	7 years
Ring route improvements	✓		✓	✓	✓	✓	✓	
Improvements to KB Rd and intersection	✓		✓	✓	✓	✓	✓	
Upgrades to Stoney Creek Rd to rural high standard	SH3 to Kelvin Grove Rd		SH3 to KB Rd	SH3 to KB Rd	SH3 to Kelvin Grove Rd	SH57 to KB Rd	SH57 to KB Rd	SH57 to KB Rd
Upgrade Kelvin Grove from Stoney Creek Rd to Tremaine Ave to arterial high standard	✓		✓	✓	✓	✓	✓	
Upgrade Roberts Line from KB Rd to Railway Rd to rural high standard	✓		✓	✓	✓	✓	✓	
Build upstream bridge			✓	✓		✓	✓	✓
Build downstream bridge	✓		✓				✓	

Note: KB Rd refers to Kairanga Bunnythorpe Rd.

3. Regional economic assessment

Transport accessibility affects the economic sustainability and growth of different industries, differently. In considering the effect of different Gorge replacements on economic performance, this analysis focusses on how accessibility between jobs and areas supports the areas of economic competitive advantage of the Horizons (Manawatū-Whanganui) region.

In considering the regional economy, we focussed on Palmerston North in the context of the Horizons South-East economy, defined as the south-east part of the Manawatū-Whanaganui region, (consisting of Palmerston North and the Manawatū, Tararua and Horowhenua districts) as the largest generator of GDP within the region, and the area most directly affected by the Gorge options. The more distant and northern areas of the Horizons district are less directly affected by the Gorge replacement. Those areas are less directly dependent on the direct traffic flows enabled by that route for their economic activity and the time 'penalty' of the current Saddle Rd route is less as a proportion of total trip time.

Unless stated otherwise, base population data in this section are sourced from Statistics NZ medium-growth projection.[6]

3.1 Population, Employment, and Earnings

Demographic shifts in the region are likely to place downward pressure on economic growth. Currently, 1.8% of the New Zealand population lives in Palmerston North and 3.5% lives in the Horizons South-East. Between 2013 and 2043, the population of New Zealand is expected to grow by an average of 1.0% per year. Palmerston North, however, will grow by 0.6% and the Horizons South-East region by just 0.4%.

Palmerston North City Council and Accelerate25 use Sense Partners forecasts of population, which suggest a faster rate of population growth in Palmerston North than Statistics NZ. According to Sense Partners' projections, population growth will average 1.0% per year over the next 30 years.[7] The assumptions underpinning these projections are driven by a higher national growth rate, so the proportional difference between Palmerston North and national growth is approximately the same.

GDP will grow more quickly than population, due to relatively high labour productivity offsetting less than favourable demographic changes. This means that:

- Real GDP growth is forecast to grow by 1% per annum over the next 30-years and
- In real terms the GDP for the region will grow from $6,300m per annum today to $10,300m over the next 40 years.[8]

Even as the growth in working age population levels off, the economy overall will grow and residents will take home higher incomes. Table 5 and Figure 2 show how the population is expect to grow.

[6] The Statistics NZ medium scenario is used by NZ Government agencies to inform their decision-making. As a result, analysis supporting option evaluation must also use this scenario.

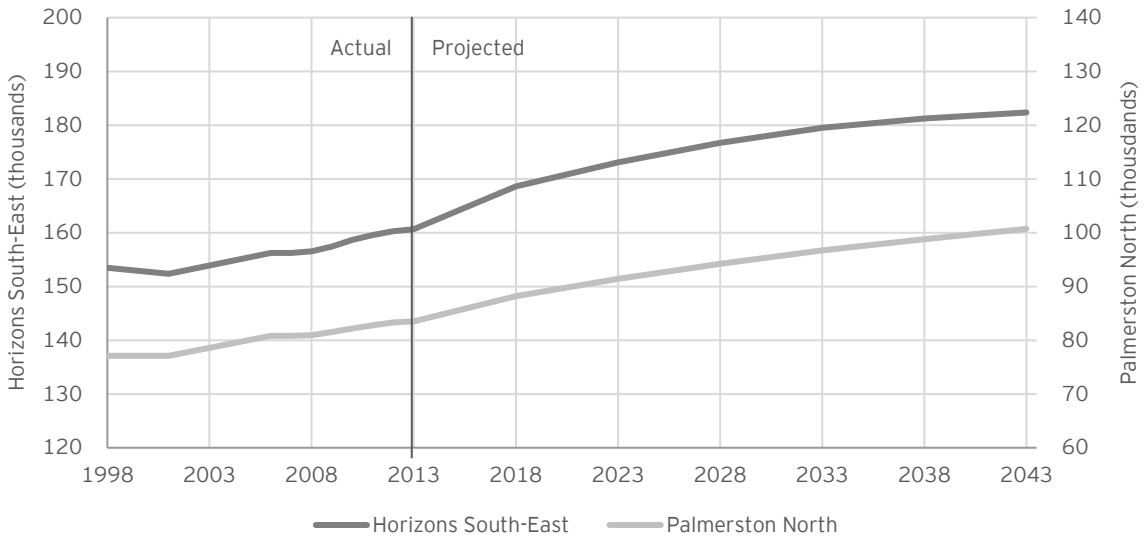
[7] "Palmerston North City demographic projections", Sense Partners, 14 September 2017.

[8] Unless otherwise specified GDP is presented in 2012($) – the reference year for MBIE and StatsNZ's regional datasets.

Table 5: Projected population growth (000s)

Area	Population in 2017	Population in 2023	Population in 2043	Average annual growth rate 2013-2043	Percentage increase 2013-2043
New Zealand	4,794	5,158	5,923	1.0%	33.3%
Horizons South-East	168	173	182	0.4%	13.5%
Palmerston North	87	91	101	0.6%	20.6%

Figure 2: Actual and projected population growth

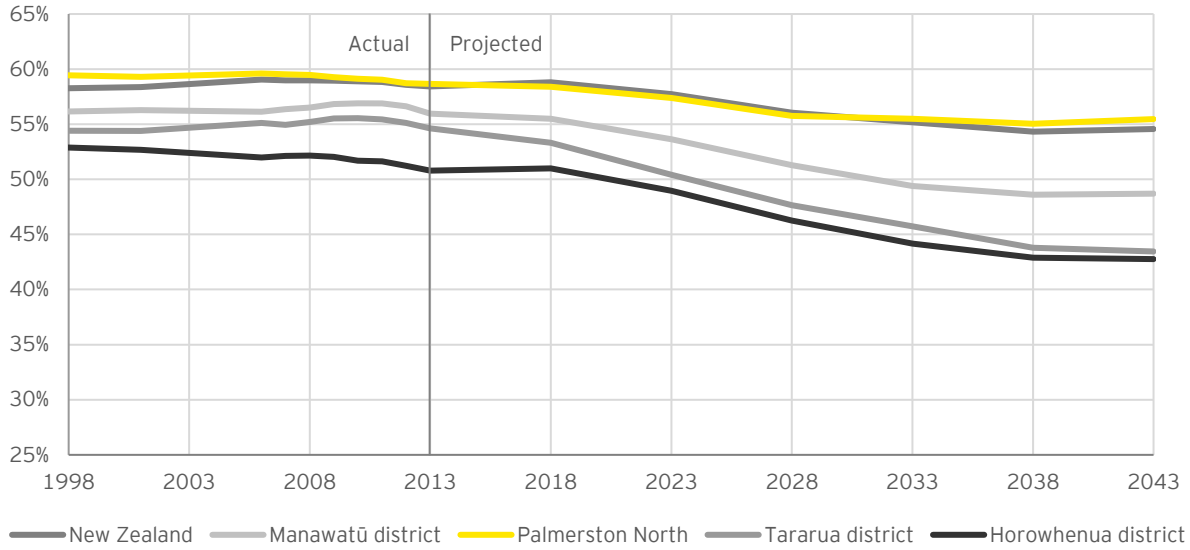


The working age population is also under pressure. Like many other parts of the Western world, the Horizons South East area struggles with an aging and declining working age population, with 14.3% more people aged over 65 and 4.9% fewer people aged 15-39 years than in the rest of New Zealand. In the Horowhenua district, more than a quarter of people are 65 or over.

Palmerston North itself remains relatively young and will remain the engine of growth for the regional economy. The continued presence of Massey University and NZDF are important to countering natural demographic shifts. Figure 3 shows how the working age population in these districts is expected to change over time.

These features suggest that increasingly the region's economic activity will consolidate toward its urban core. Strong transport links will become increasingly important to support the movement of primary goods to the distribution and value-add industries in the industrial centre of the region.

Figure 3: Actual and projected percentage of population at working age (20-64 years)



3.1.1 Incomes and GDP per capita

The proportion of the employed population earning more than $50,000 is 7.3% lower in Palmerston North and 14.8% lower in the wider Horizons South-East region than in New Zealand as a whole. This is due to a higher proportion of people employed part-time and a high concentration of industries that historically pay lower salaries.

Figure 4 shows how incomes in the area compare with the rest of the country, and Figure 5 shows how incomes have changed since 1999. Consistent with a transforming economy, the labour force demonstrates high output in spite of its relatively low wage structure. GDP per capita – conceptually, the amount of activity the economy produces divided by the population – in Palmerston North is higher than the national average.

Figure 6 shows that some parts of the region have experienced strong economic growth over the past decade and a half. Consistent with strong and differentiating labour markets and industrial growth, regional per-capita GDP outpaced national growth with per capita rose at an annual rate of 3.75% in Palmerston North, and 4.12% in Tararua, compared to 3.66% in the country as a whole. Palmerston North per-capital GDP is higher than the national average, and as industrial consolidation continues this is likely to transfer into wage growth.

Not all areas have or will benefit from this growth, however. Over the same period, nominal GDP per capita in the Manawatū and Horowhenua districts grew by 2.88% and 2.79% respectively, which is likely to be reflective of further industrial and employment consolidation toward urban areas. GDP per capita in these districts is now less than half the GDP per capita for the country as a whole.

Figure 4: Breakdown of employed population by income, 2013

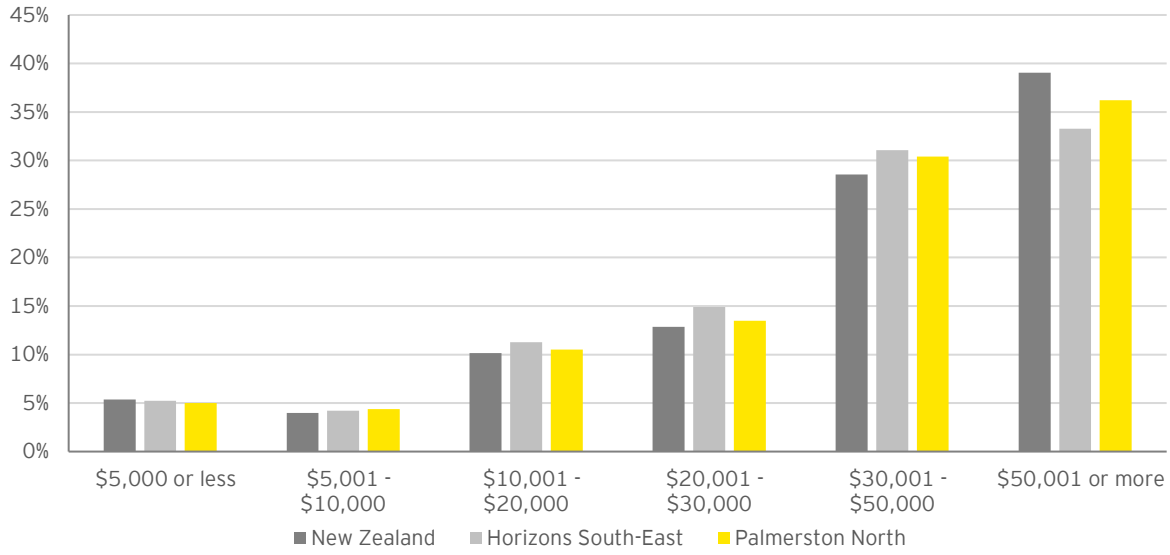


Figure 5: Median earnings in third quarter over time

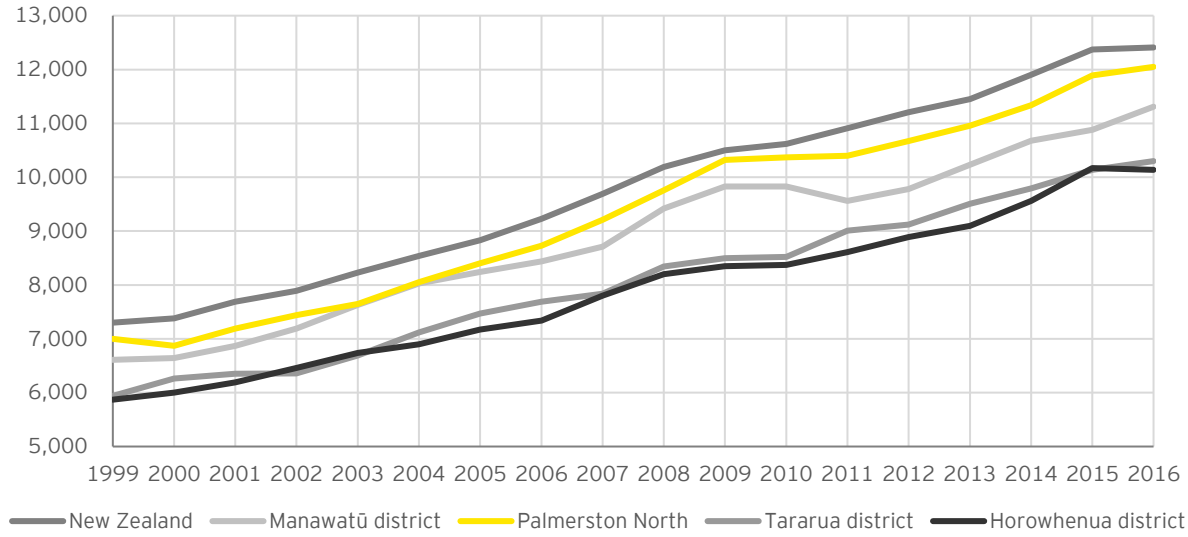
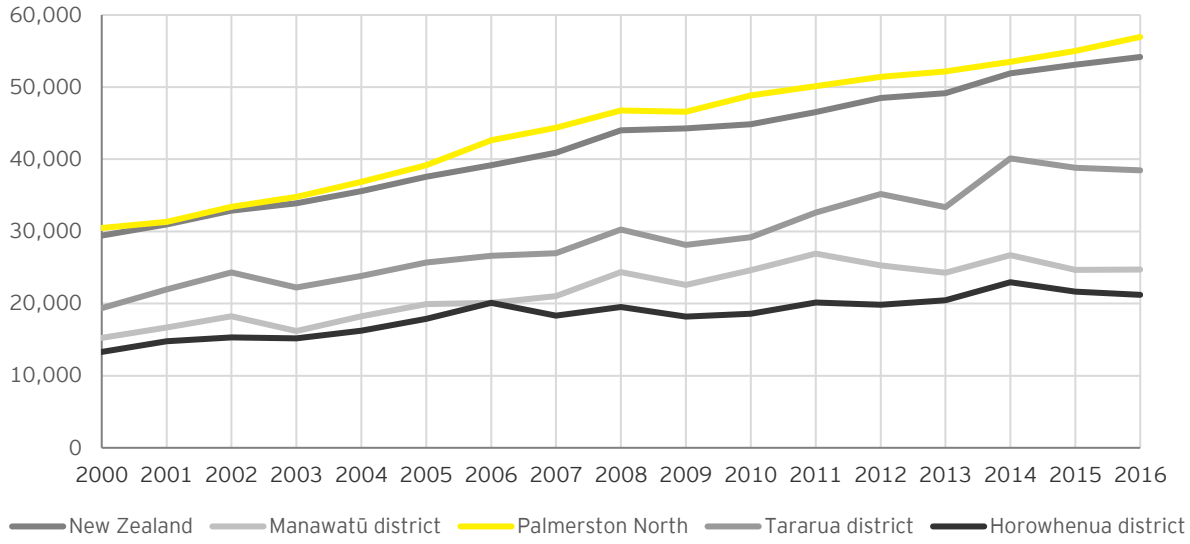


Figure 6: Nominal GDP per capita over time



3.1.2 Implications for Gorge Options

As economic activity continues to centralise in Palmerston North, greater access to primary industries, transport, and labour markets will become more important to the sustainability of the region.

Access to and from suburban and rural areas surrounding Palmerston North will become more important. As labour specialises and demands higher returns (wages), industries will expand their search for highly skilled employment and to introduce competition into the regional labour market. Remaining competitive will require access to jobs from a wider population area.

Continued consolidation will also paradoxically make better transport critical to the survival of smaller towns, particularly those serving the primary industry sectors. As the majority of employment consolidates, continuing to provide services in rural areas will come under pressure. The ability to access these smaller centres will allow for the continued provision of services (e.g. police, fire, medical, education), meaning that they can continue to serve workers and their families.

3.2 Industry composition: areas of competitive advantage and opportunity

This section looks more closely at industries that have the potential to drive growth in the Horizons South-East in the future, and that need to be supported by transport investment. These include industries of explicit regional comparative advantage as well as industries that have been identified as potential future opportunities for economic specialisation.

- **Transport & Wholesale Trade:** The transport industry has been identified as a key growth area for Palmerston North by the Regional Technical Team and is an important enabler for the Accelerate25 Economic Action Plan. The wholesale trade industry is also an area of comparative advantage and recent growth, reflecting the strength of Palmerston North as a transport and distribution hub.

- **Food product manufacturing:** Value-added food product manufacturing is amongst the region's largest industries. The food product manufacturing industry is strongly tied to the agriculture industry, and the proximity of productive land, agricultural expertise, and research will continue to be an important driver for growth in this area. Agriculture is strategically important for the Manawatū-Whanganui region: four of the nine opportunities in the Accelerate25 Economic Action Plan apply to this sector.

- **Scientific Research:** Scientific research at Food HQ has been identified as a major opportunity for the region. By attracting outsourced food science research and development work for international companies, Food HQ can grow Palmerston North's training and research industries and provide innovations that improve productivity in in agriculture and food manufacturing across the region.

- **Health care and social assistance: This** is one of the area's largest industries and aged care presents an important opportunity for the Horowhenua.

The largest industries in Palmerston North are health care and social assistance, public administration, and education and training. These industries are all significantly larger here than in the rest of the country, reflecting the presence of Massey University's main campus and several government agencies in the city. In the districts surrounding the city these industries provide for the greatest level of employment. Figure 7 shows the relative size of each industry in Palmerston North, the Horizons South East, and the country as a whole.

Figure 7: Percentage of employees working in each industry, 2017

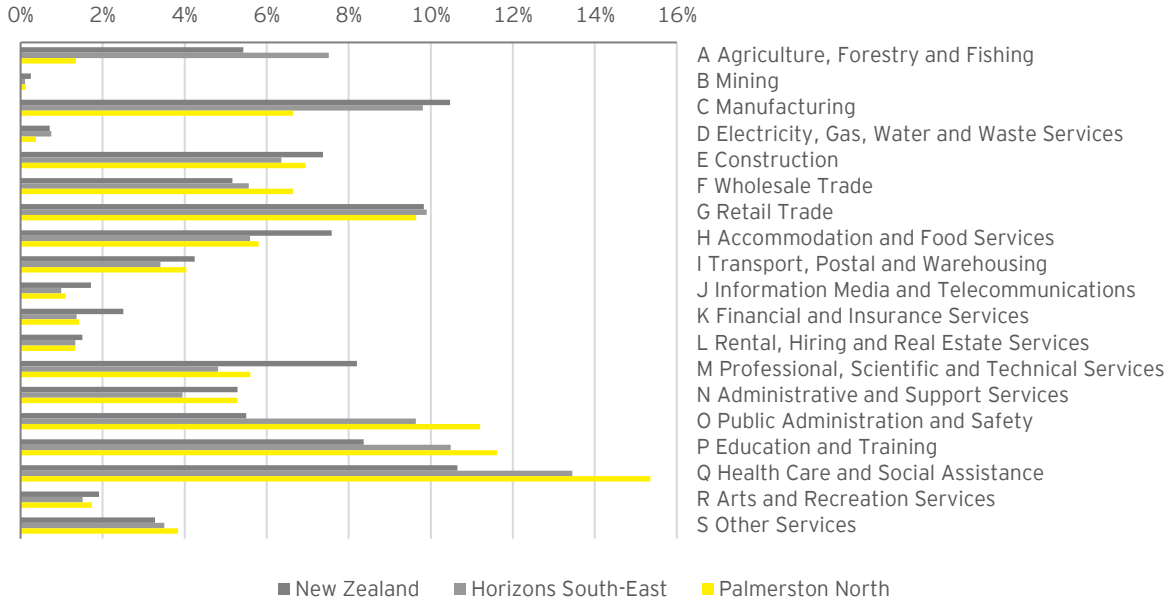


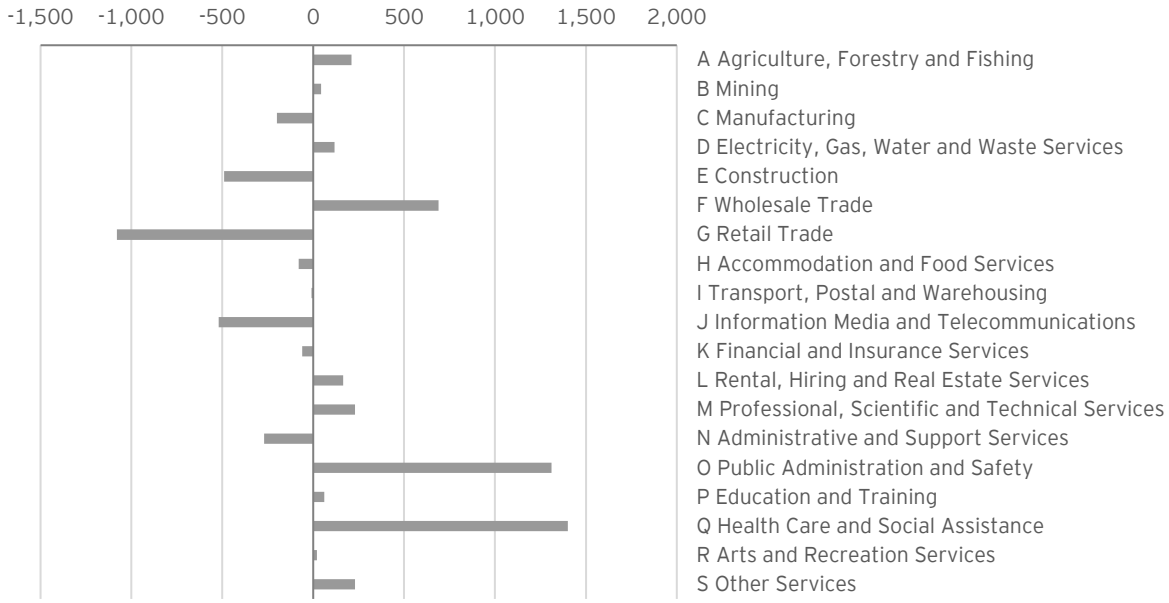
Table 6 lists the five largest industries in the Horizons-South East, as well as industries that either are areas of significant comparative advantage or have been identified as areas of opportunity for the region.

Table 6: Key industries in the Horizons South-East

Largest industries	Areas of comparative advantage or identified opportunity
► Health care and social assistance ► Education and training ► Retail trade ► Manufacturing ► Public administration and safety	Comparative advantage: ► Transport and distribution ► Food product manufacturing Identified opportunity: ► Scientific research ► Health care and social assistance

Over the past 10 years, the industries (outside of the public sector) that had the strongest population growth were: health care, wholesale trade, and agriculture with retail, construction, and telecommunications industries experience significantly employment declines over this period.

Figure 8: Increase (decrease) in number of employees in Horizons South-East for the period 2007-2017



The nominal growth (or decline) of an industry is not in and of itself a strong indicator of a region's competitive advantage. Examining which industries perform more strongly in the region relative to the rest of the country provides a better indication of areas of competitive advantage.

Using shift-share analysis, industries of competitive advantage have been identified. A shift-share analysis shows how much better (or worse) different industries perform over a period relative to the national (or regional) average. They show what share of the growth is due to growth in the national economy as a whole (national shift), what share is due to national growth in that industry (industry shift), and what share is due to local influences (regional shift).

Regional shift can be used to help identify industries where the region has a comparative advantage over the national economy, particularly when there are other reasons (e.g. labour productivity growth, infrastructure advantage, emergence of industrial clustering, etc.) to expect that the region is differentiating itself in particular industries.

Figure 9 shows regional shift in employment in the Horizons South-East over the past five years. This indicates that Horizons South-East has a comparative advantage in manufacturing (specifically food product manufacturing), wholesale trade, and health care and social assistance. Although there has been large regional shift in employment in public administration, this industry is driven by public spending and cannot be considered an area of comparative advantage.

Figure 9: Regional shift in employment in the Horizons South-East region for the period 2012-2017.

3.2.1 Transport and distribution

Palmerston North is further differentiating itself as an important national distribution hub.[9] This is reflected in the size of the transport and wholesale trade sectors.

An inland port and inter-modal freight hub have been established at Longburn, south of the city, and Toyota, EziBuy and Foodstuffs also have distribution centres in the North East Industrial Zone. The two Foodstuffs distribution centres in Palmerston North meet the dry good and chilled and frozen food distribution needs of the Lower North Island.[10]

As shown by Figure 10, a disproportionate share of wholesale trade employment in Palmerston North is in grocery and motor vehicle wholesaling, which is likely due to the presence of the Toyota and Foodstuffs distribution centres.

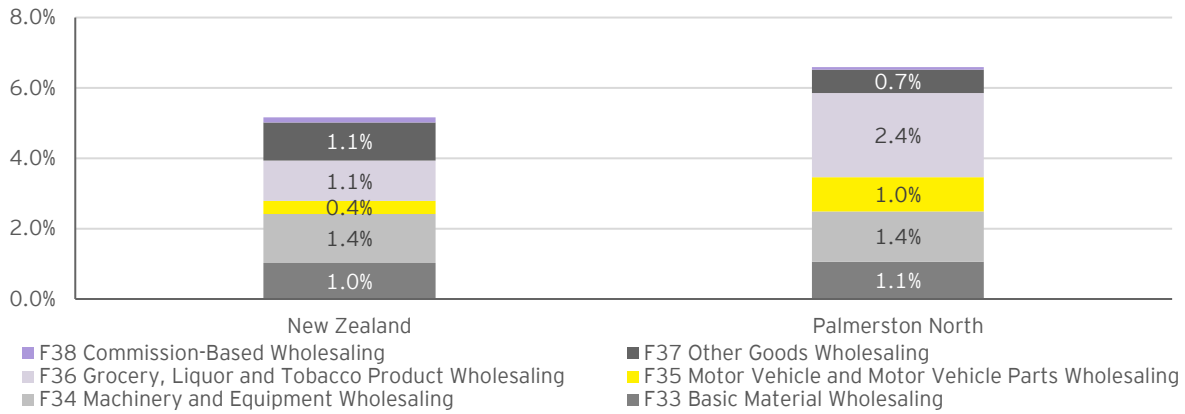
The size and continued growth of the transport and distribution sector in Palmerston North is due to its strategic location and transport connections. Major highways pass through Palmerston North, and the city has the main airport and railway station in the area. Palmerston North is well connected with major centres and ports.

Planning decisions by PNCC, and natural consolidation of the industry are likely to concentrate transport and distribution growth toward the North East Industrial Zone; this consolidation could be potentiated by investment decisions that are pending final decisions on the Gorge replacement.

[9] "Growth Centre: Palmerston North", *NZTA website*, www.nzta.govt.nz.

[10] "Our Operations", *Foodstuffs website*, www.foodstuffs.co.nz.

Figure 10: Breakdown of wholesale trade employment, 2017



Road transport

Road transport is particularly significant in the region, comprising half the transport industry in Palmerston North and almost the entire transport industry in the Tararua district (see Figure 11). This is likely due to the fact that State Highways 1, 2 and 3 pass through the Horizons South-East region and provide important connections with the rest of the North Island, including the ports of Wellington, Tauranga, and the Hawke's Bay.

Figure 12 shows that Palmerston North has recently lost its comparative advantage in road transport. Analysis of employment and output trends suggest that Palmerston North had a comparative advantage in road transport up until the series of Gorge closures in 2017, and it can be reasonably anticipated that Palmerston North will regain that advantage once the Gorge replacement is confirmed.

The ability to commute between districts is an enabler for growth across the region. Improved transport connections could bring Palmerston North 'closer' to the districts around it, making it easier for goods to be transported, but also providing labour access to the city from the regions and vice versa. In concert with major upgrades to State Highway 1 between Wellington and Levin these upgrades will improve the accessibility of the Horizons South-East region and the Horowhenua district in particular which will further support the accessibility of the region to the central and lower North Island.

Figure 11: Percentage of employed people working in transport industries, 2017

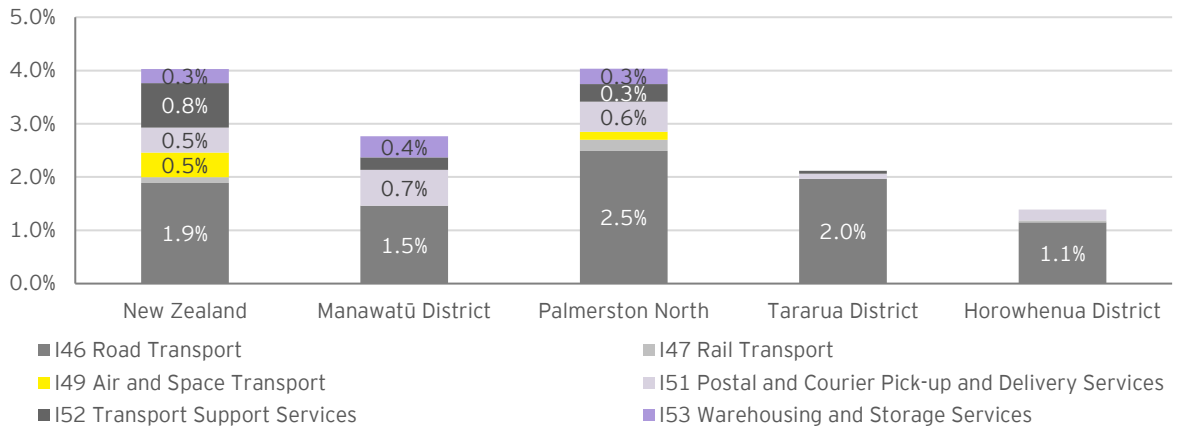
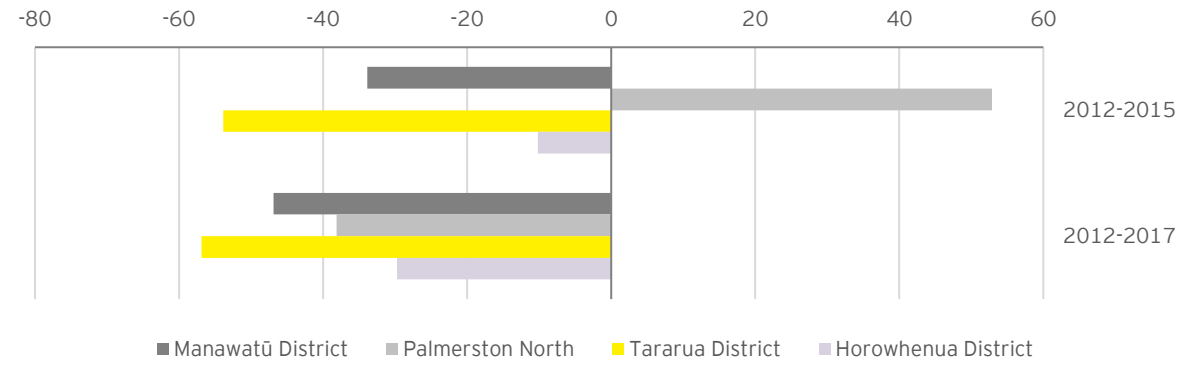


Figure 12: Regional shift in road transport employment for the period 2012-2015 compared to 2012-2017



Air and rail transport

The region's air and rail industries are concentrated in Palmerston North, which has the main airport and railway node in the region. The city has rail links to Wellington, Taranaki, Hawkes Bay and Waikato.

The Palmerston North Airport is a significant domestic airport, with direct freight links to Auckland International Airport. Transport volumes through this airport are increasing. Passenger volumes for the year ending June 2017 were 22% larger than the previous year.[11] This increase was due to Jetstar's continued operation of flights to and from Auckland, as well as increased capacity on Air New Zealand flights to and from Hamilton and Wellington. In addition, a new Boeing 737-400 freighter service operated by Freightways and New Zealand Post began in 2016.[12]

The airport will remain a regional provider, however. FreedomAir's service to Australia was lost in 2008, and international service is not anticipated in the future. International air passenger transport is increasingly moving toward a hubbing model, with fewer airports providing longer distance flights and regional airports playing a critical role in hubbing passengers and freight to these larger nodes.

3.2.2 Agriculture and food product manufacturing

The Horizons South-East is a fertile area with rich farmland and it is natural that agriculture and food product manufacturing play a central role in the local economy. Agriculture and food product manufacturing are major industries in the Horizons South-East. The main types of food that are farmed and processed in the region are red meat and dairy. Figure 13 shows the size of dairy and red meat food product manufacturing and farming industries in each district.

Although the Manawatū has the region's largest dairy farming industry, the main dairy processing plant in the area is in the Tararua district. Similarly, although Tararua has the largest red meat farming industry, there are significant beef processing plants located in the Manawatū and Horowhenua (see Table 7). This indicates that large volumes of raw material and manufactured products are being transported between districts to make the most of inter-regional specialisation, and need to be supported by strong and efficient transport links.

[11] "Annual Report 2017", Palmerston North Airport Limited, 2017.

[12] "Annual Report 2017", Palmerston North Airport Limited, 2017.

Figure 13: Number of employees working in selected food product manufacturing and agriculture industries, 2017

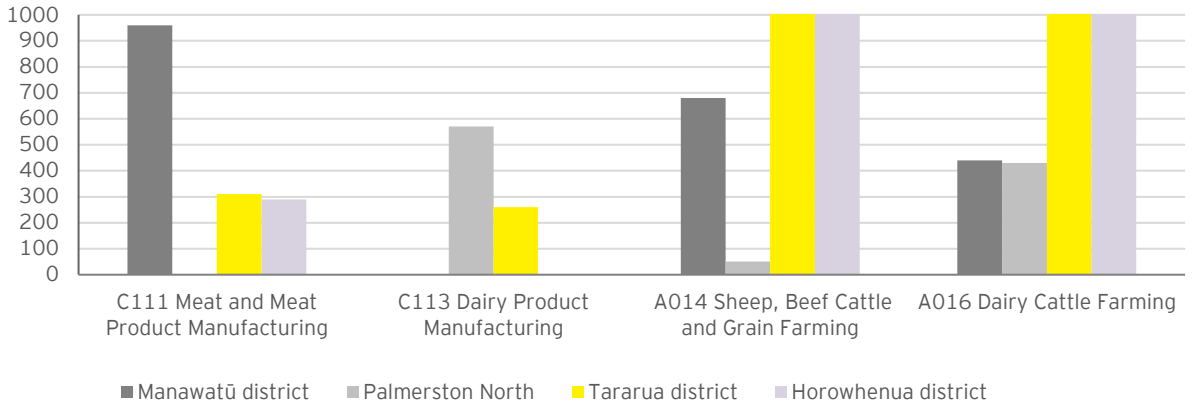


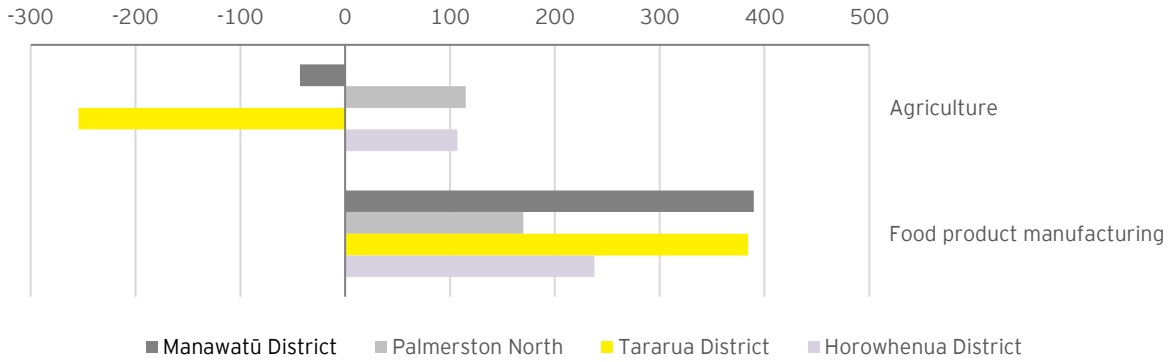
Table 7: Key red meat and dairy processing plants in the Horizons South-East

Processor	Type	District
AFFCO Manawatū	Beef	Manawatū
Alliance Dannevirke	Sheep, Bobby calves	Tararua
Alliance Levin	Sheep, Beef	Horowhenua
Fonterra Longburn	Dairy	Palmerston North
Meadow Fresh Longburn	Dairy	Palmerston North
Fonterra Pahiatua	Dairy	Tararua

In addition to the processing plants listed in the table above, there are two ANZCO Foods processing plants near Manawatū in the Rangitīkei that process beef and sheep.

Not only are agriculture and food product manufacturing major industries in the area, they are also industries where the area shows strong regional comparative advantage. Regional shift in employment over the past five years (Figure 14) reveals that the Palmerston North and the Horowhenua district have a comparative advantage in agriculture, and all districts in the Horizons South-East have a comparative advantage in food product manufacturing.

Figure 14: Regional shift in employment for the period 2012-2017 – agriculture and food product manufacturing



Growing the agriculture sector is a priority of Accelerate25, and the Manawatū-Whanganui Economic Action Plan describes opportunities both for improving the productivity of red meat and dairy farms, and diversifying the agriculture industry by supporting Manūka honey, poultry meat, and fresh vegetable production.[13]

[13] "Manawatū-Whanganui Economic Action Plan", Horizons Regional Council, August 2016.

3.2.3 Scientific research

The food and agricultural sciences industry is an important area of opportunity for the Horizons South-East region. This is due to the presence of Palmerston North's food science research hub, Food HQ. Food HQ is a collaborative innovation cluster made up of a range of research organisations, including Massey University, Fonterra, and AgResearch, Bio Commerce Centre, Plant & Food Research and the Riddet Institute.

In the medium term, Food HQ aims to become one of the top five food innovation centres in the world in terms of economic and social impact.[14] It plans to develop an integrated super campus with 4000 public and private researchers, students and educators.

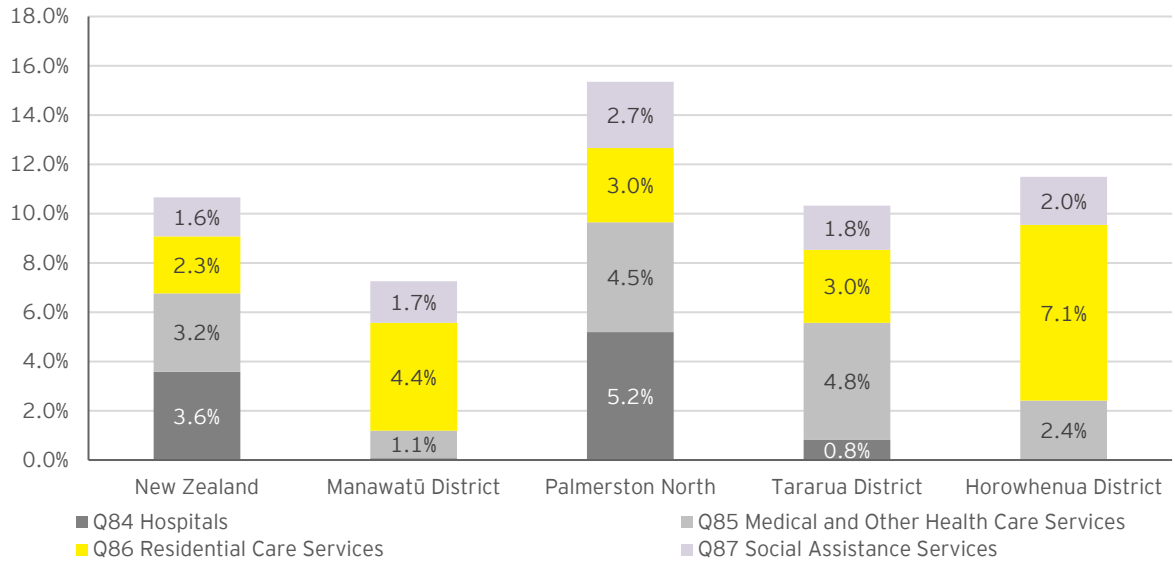
A large volume of traffic currently passes past Food HQ along Tennent Drive, which separates the Fitzherbert science centre from Massey University. Removing traffic from this route would allow the Food HQ campus to be improved, assisting the development of the food science cluster.

As the 2015 Growth Study notes, the strength of Food HQ lies in its potential.[15] It has produced few innovations that have led to business success, and it is not yet clear how well the organisations that make it up can collaborate and operate as a single entity.

3.2.4 Health care and social assistance

Health care and social assistance is the largest and fastest growing industry in the Horizons South-East region. Currently, 9670 people work in the health care industry (13.4% of the employed workforce). This number has increased by 1.6% per since 2007, slightly above the national growth rate of 1.4% per year. Figure 15 shows the size and composition of the health care and social assistance industry in each district.

Figure 15: Percentage of employed people working in key health industries



The Accelerate25 Economic Action Plan describes a key opportunity relating to the health care and social assistance industry: community-based care for older people.[16] This opportunity involves responding to the increasing aged population by pioneering new approaches to delivering services to this group. These approaches focus on integrating older people with their communities, improving their quality of life and reducing the public cost of care. A prototype could be introduced

[14] "Vision 2025", Food HQ, 2013.

[15] "Manawatū-Whanganui Growth Study: Opportunities Report", Ministry for Primary Industries and Ministry of Business, Innovation and Employment, July 2015.

[16] "Manawatū-Whanganui Economic Action Plan", Horizons Regional Council, August 2016.

to Levin (a town in Horowhenua) with the aim of transforming the area into a centre of lifestyle innovation. The concept could then be rolled out to other parts of the region, including Palmerston North.

Horowhenua already has a significant residential care services industry. 25.2% of people in Horowhenua are aged 65 or over compared to 15.1% in the general population, and the proportion of employed people who work in the residential care services industry is more than three times as large (7.1% compared to 2.3%). This shows that the district has a strong foundation which it can build on by developing innovative models of care.

3.3 Implications for the options

With respect to the Gorge restoration options, the key findings from the regional economic assessment are that:

- Palmerston north is developing as a distribution hub, with significant growth in the transport and distribution sectors over the past ten years
- The Horizons South-East has large dairy and red meat industries and strong comparative advantage in food product manufacturing
- The agriculture, food product manufacturing, and transport and logistics sectors will be positively affected by the restoration of the Gorge, leading to stronger economic growth than would have occurred otherwise.
- Food and agricultural sciences industry are important areas of opportunity for Palmerston North and the Horizons South-East, and greater integration of FoodHQ with Massey could unlock some additional growth potential.

These findings indicate that strategic infrastructure investment can have important benefits to the local economy. Improved infrastructure can help the city develop as a distribution hub by improving the efficiency of logistics activities. In particular, reopening the Manawatū Gorge would restore Palmerston North's comparative advantage in road transport. Improved infrastructure can also help maintain and strengthen the area's comparative advantage in food product manufacturing by improving the connections between farms and food processing plants.

The magnitude of these impacts are examined in Section 6.

4. Land use planning trends

In order to understand how the different route options affect economic growth, it's important to consider how they relate to land use trends. This section summarises Palmerston North City Council's (PNCC's) land use plans.

The overall land use intentions for Palmerston North are shown by the Palmerston City Council's planning map (Figure 16). For the purposes of this analysis, the most critical aspect is the intention to focus warehousing and distribution in the North East Industrial Zone, with limited further growth at Longburn.

All of the growth scenarios in Section 6 that are used to determine the impact of the Gorge replacement on economic growth are conceptually consistent with the planning intentions of PNCC.[17] Forecast growth is necessarily based on historical trends in each area, but to understand the effect of growth in different zoned locations, scenarios were developed that accelerate growth in (for example) the North East Industrial Zone. In addition, employment locations and population growth have been allocated to the residential areas in a manner consistent with regional growth ambitions in transport modelling performed by BECA that underpins the scenario modelling on the economic benefits of the different scenarios.

Figure 16: PNCC City planning map

The balance of this section summarises the current and future land use intentions for Palmerston North, and the implications for modelling.

4.1 Industrial land use

Scenario modelling has focussed on ensuring that industrial growth continues to be allocated primarily to the North East Industrial Zone. A key land use consideration for the Manawatū Gorge route is how well it improves access to Palmerston North's major industrial areas and thereby supports the growth of the transport and distribution industries.

[17] Growth was allocated to the appropriate growth areas, but to make modelling tractable they are not allocated to particular 'meshblocks'. In this sense, the growth is placed as 'close' to the growth area as the modelling will allow. The size of the zones used for modelling and the efficiency of the transport network means that this will not make any appreciable difference to the results.

There are currently two main industrial areas in Palmerston North:

- The North East Industrial Zone, situated close to the airport at Milson.
- Longburn Industrial Zone, located next to State Highway 56 and the North Island Main trunk Railway line just south of Palmerston North.

4.1.1 The North East Industrial Zone (86 hectares) and the Extension Area (126 Hectares)

PNCC is prioritising industrial growth at the North East Industrial Zone (NEIZ) and the Extension are for large floor plate transport, warehousing and logistics activities.[18] Toyota, Ezibuy and Foodstuffs currently have distribution centres in the NEIZ, although it does not have direct connection to the rail network.

The NEIZ is well separated from established residential areas and easily accessible by road and rail. Since it was rezoned in 2004, approximately 3.5 hectares of land has been taken up per year and 4 hectares is now in use. The rate of land uptake is expected to increase.

To meet the growth of large floor plate industrial activity over the next 2-30 years, PNCC has recently rezoned the NEIZ Extension Area. Road connections are planned to connect the Extension Area with the existing NEIZ.

4.1.2 Longburn

Because it is located close to the local wastewater treatment plant, Longburn is PNCC's preferred location for wet industry development.[19] The plants at Longburn include a Fonterra dairy manufacturing plant. Longburn has an inland port and inter-modal freight hub.

PNCC is under pressure to rezone additional land in Longburn, but is unwilling to do so because the area is currently serviced by private infrastructure that does not meet PNCC's standards. PNCC is prioritising infrastructure for industrial growth at the NEIZ.

4.2 Commercial land use

PNCC's commercial land use strategy is to keep commercial activity concentrated in the city centre, and avoid it moving to the edge of the urban area or the industrial zones.[20] The district plan establishes a hierarchy of four business zones:

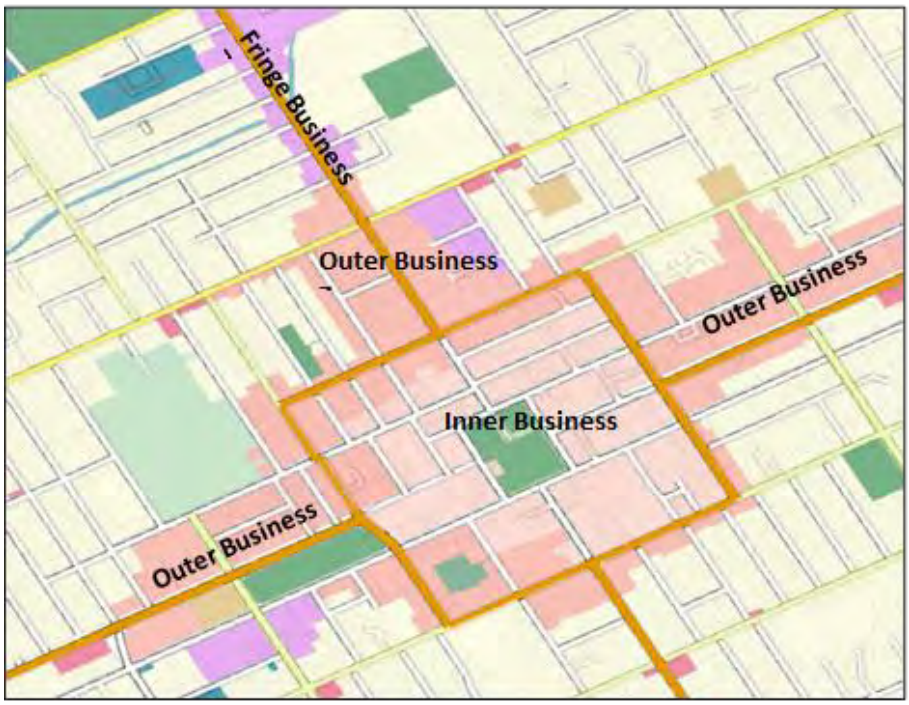
- The inner business zone, which consists of convenient retailing to create pedestrian oriented city centre.
- The outer business zone, which consists of self-sufficient development with on-site parking.
- The fringe business zone, which consists of large format retailing.
- The local business zone, which provides local amenities outside of the city centre.

[18] "Growth Narrative for 2017 AMPS", PNCC City Future Planning Team, 23 May 2017.

[19] "Growth Narrative for 2017 AMPS", PNCC City Future Planning Team, 23 May 2017.

[20] "Growth Narrative for 2017 AMPS", PNCC City Future Planning Team, 23 May 2017.

Figure 17: Map showing district plan business zones



4.3 Residential land use

PNCC projects 9440 new households over the next 30 years, including 4950 greenfield developments.[21] Development is expected to be fastest over the next 10 years (at a rate of 460 households per year) and slow over the subsequent two decades.

Only 1611 lots of zoned land are currently available (in Aokautere, Ashhurst, Kelvin Grove, and Whakarongo), however an additional 2000 lots has been identified for rezoning in the short to medium term, and 1680 lots have been identified for rezoning in the medium to long term.

[21] "Residential Growth Strategy", PNCC, 2017.

5. Industry engagement

In order to strengthen our understanding of the regional economy and the potential impact of the four options, we held in-depth discussions with transport and logistics stakeholders, industry players and representatives from the following organisations:

- Coda Group
- Fonterra
- Foodstuffs
- Horizon's Regional Council
- Higgins Holdings
- KiwiRail
- Massey University
- New Zealand Defence Force (NZDF)
- New Zealand Heavy Haulage Association (NZHHA)
- Palmerston North Airport
- Palmerston North City Council
- Road Transport Association New Zealand (RTA NZ)
- Progressive Enterprises
- Tararua District Council

Four key themes emerged from this engagement, which have informed the modelling undertaken. We were particularly cognisant of the increased freight costs that have been incurred as a result of the longer, steeper route being taken across the Gorge, and the investment that has been delayed due to a lack of commitment to a solution.

The key themes are as follows:

1) **Providing a new route through the Manawatū Gorge is the first priority.**

The closure of the Manawatū Gorge has imposed significant costs to industry, particularly to the freight industry. Some carriers are experiencing increases in net time, labour, and operating costs of 20-30%, while other investors and operators note that returns to earlier investments have been adversely impacted. These costs will soon be passed on to consumers, raising prices and reducing the productivity and output of the region overall. This will perpetuate for the duration of the closure.

2) **Commitment to a certain future has significant value *regardless of the route chosen*.**

There is significant value in providing certainty by committing to a particular route. Industry stakeholders estimate that between $20-40m of business investment – particularly in the transport and logistics industry – is being delayed due to the uncertainty around the Gorge replacement route. These investments will take place regardless of which route is chosen, but they will be delayed until such a decision is made.

3) **A second bridge and regional ring road improvements are seen as important transport features.**

All parties want a commitment to a second bridge crossing the Manawatū River in or near to Palmerston North City to supplement the existing Fitzherbert Bridge. This would support the resilience of the road network surrounding Palmerston North, which is a key concern for freight operators. Freight operators are also seeking better access to the regional ring road, particularly to points south of the city.

A second bridge is required by Option 4, but not for Options 1-3. Some stakeholders are concerned that, without a commitment to a new bridge now, the bridge and other enabling sections of the network may never be delivered.

In addition, to optimise the network for freight, bridge upgrades are required along the ring road – notably at Bunnythorpe to cater for high performance vehicles. Without these upgrades, the value of the ring road will significantly decrease.

4) **The enhanced operation of Massey & FoodHQ would be facilitated by changing the environment on Tennent Drive.**

Massey University is aiming to integrate its campus with FoodHQ to provide a more attractive cluster of research, teaching, and commercialisation opportunities. Tennent Drive currently separates these two campuses. Reducing traffic on this road would support the vision of an integrated campus, although it is unclear that the selection of either Option 3 or 4 has a significant impact on this traffic flow.

FoodHQ also qualitatively perceives value in an upstream bridge for better access to the North East Industrial Zone.

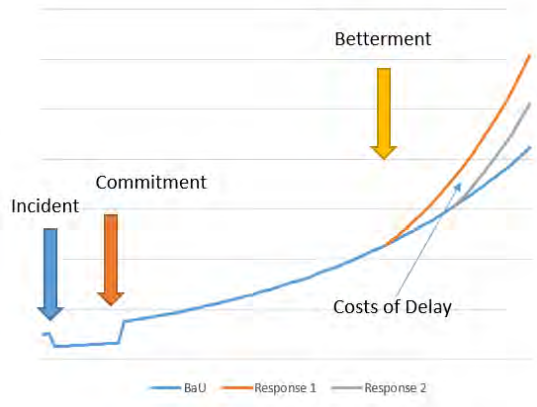
6. Wider Economic Benefits Calculations

The structure of the economy suggests that it is strongly reliant on strong and reliable transport connections. Stakeholder engagement reveals that industry is experiencing increased costs due to the Gorge closure, and investment is being delayed due to uncertainty over the timing of the Gorge replacement. This analysis considers the wider economic benefits attributable to increased business confidence (certainty), the economy wide (indirect) impacts of reduced transport costs, and increased productivity. These benefits are all *additional* to the direct transport benefits including vehicle operating costs and reduced travel time.

Following any unplanned interruption or disaster what matters to the economic operation and decision-making of businesses and the public change across each stage of recovery:

- **Immediate:** act quickly to restore some operations and restore the basic economic function of the centre.
- **Short term:** provide confidence by committing to restoring the network. This can unlock investment that is awaiting firm commitment / signals prior to committing to a programme of works.
- **Medium Term:** as a permanent solution is sought, determine if there is a way to 'build back better'. In this case, it could mean building a network with better access and/or one that is more resilient.

Figure 18: Benefits of commitment, costs of delay



In performing our analysis we have considered the impact on the economy of each stage along the recovery pathway. That means that the following benefits were selected as part of the Wider Economic Benefit assessment:

- **Benefits of certainty:** the investment released by providing a clear and certain view of the future environment.
- **Impact of reduced transport costs:** Reducing the costs of goods to households, businesses, and the sector itself means there is more money to spend on other productive uses, increasing potential GDP. This is *in addition* to direct transport benefits.
- **Enhanced access and productivity:** more efficient access between employment areas means that workers and businesses become more productive in the short and long term (agglomeration benefits).

Costs of Delay

When considering reinstatement of connectivity, the costs of delay are high. These costs are incurred as delay persists, but they also affect future output potential. The economy grows more slowly prior to the restoration of a network, and even more slowly prior to commitments being made. That means that the level from which the economy begins its new growth path is lower if decisions are delayed, and the impact of delay persists into the future. Figure 18 shows a stylised representation of the costs of delay between two projects with similar economic effects.

The cost of a 1-year delay to realising the benefits of the Gorge replacement $21m in nominal dollars, *excluding* the direct transport benefits. This is lost economic activity in the region that reduces today's potential income, and also reduces the base from which the regional economy recovers.

6.1 Confidence and transport cost benefits

The first benefit to be 'felt' from recovery is a commitment benefit. This is the investment that is released as a result of a strong commitment to restoring the Gorge being made by central and local government.

Investment Confidence / Commitment Benefits

Based on our discussions with regional stakeholders, we estimate that some $20-40M of investment in transport and logistics is on-hold due to uncertainty over the timing of the Gorge replacement. This investment is anticipated in the transport and logistics industries, particularly focussed in the North East Industrial Zone. This is consistent with the lower end of the estimated investment anticipated by Sense Partners using a different methodology in their report.[22]

We expect this estimate is conservative as there are likely to be other investments that have not been identified through our stakeholder engagements, and given Palmerston North's unique geographic location we expect that there may be significant response to any decisions made with respect to the current rail yard. On this basis, we utilise the upper end of the conservative investment range.

This investment appears to be 'primed' and is likely to be released almost immediately following a commitment to the Gorge replacement. We have examined relationships between capital stock investment and output, and find that total capital stock supports approximately 17.5% of its value in output in the transport and logistics industry. Based on these relationships we estimate that $40m of investment would support approximately $7m of GDP output per annum.[23]

There is no difference in the level of investment between the options, as stakeholders indicate that the exact location or route of the Gorge replacement is relatively unimportant to investment intentions.

Reduced Freight Costs

The Gorge closure has also resulted in higher freight costs – some 10-30% higher across the regional road freight industry. Higher cost inputs lead to lower productivity and higher costs outputs *inter alia*. As real costs increase, they create a 'budget constraint' over the entire economy – there is simply less money to spend on alternative consumption, and this can lead to a decrease in overall activity. The magnitude and duration of this decrease is strongly dependent on how the economy adjusts to higher prices. Road transport is difficult to substitute away from in the short-medium term (goods need to move, and the origins and destinations of those goods are fixed by sunk capital investment), so it is reasonable to assume that the impact of higher prices in this sector are passed on to producers and consumers.

Using conservative estimates for the impact of increased road transport costs on output across different sectors we estimate that the impact of reinstating the Gorge would be an increase of $9m in GDP per annum.[24]

Differences between options

Based on our consultation with stakeholders, the two suites of options under consideration are broadly similar with respect to investment and freight operations. Relative to a do-nothing scenario,

[22] 2017. Economic Benefits of Manawatu Gorge Alternative Route Option 4. Sense Partners. pp. 7.

[23] The average ratio and trend of gross capital stock to GDP by industry was utilised to calculate a relationship between new investment and output, this assumes static return to labour. Estimation methods using returns on capital yield broadly similar results.

[24] These estimates are based on inter-industry relationships between road transport services and industry outputs. The calculations assume a relatively inelastic price elasticity of demand for freight transport services -0.1 to -0.5, and arbitrarily halve the result to account for other medium-term market adjustments. Using these parameters, the impact could credibly range from $7 – 18m per annum.

both options provide an improved investment environment and reduce transport costs by virtually the same amount.

In this sense, while there are significant benefits to restoring a Gorge crossing, there are limited differences between the options with respect to investment confidence, and only minor differences (due to the year difference between delivery timing) in terms of freight costs.

Table 8 shows the benefits of certainty and impact of reduced transport for each of the eight scenarios over 40 years relative to a 'do nothing' scenario.

Table 8: Wider economic benefits excluding agglomeration benefits (40 Year PV, 2012$m)

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Benefits of certainty (starting 2021)	82	82	82	82	82	82	82	82
Productivity benefits of reduced freight costs	88	88	88	88	88	82	82	82
Total Wider Economic Benefits from Certainty and Reduced Freight Costs	170	170	170	170	170	164	164	164

6.2 Enhanced Access – Agglomeration benefits

Enhancements to accessibility (or restoring lost accessibility) have well documented impacts on economic productivity and growth. Intuitively this makes sense – easier access makes shipping goods cheaper and more productive, and enables better access to jobs and housing. Economists call the productivity benefits that accrue from enhanced access agglomeration benefits.

Agglomeration benefits (or agglomeration economies) are productivity benefits that arise when firms become more productive because they are located more closely to other firms. This can occur because of increased physical density (jobs per square kilometre) or faster travel times (jobs per travel-minute).

Greater effective job density benefits firms and workers because it:

- Decreases the business costs of delivery operations
- Increases the effective market size
- Increases opportunities for economies of scale
- Makes it easier to share knowledge between firms and workers
- Deepens labour markets by providing access to a wider range of skills.

Providing an alternative route through the Manawatū Gorge will improve travel times across the Tararua Ranges and also in some parts of Palmerston North. Each option provides different levels of accessibility to different areas of the region. These options restore accessibility to the region and can lead to greater productivity through a process called 'agglomeration'.

Some options – particularly those that provide an extra bridge or ring route improvements – provide the opportunity to 'build back better'. By decreasing the travel times between key locations, transport infrastructure effectively brings firms closer together and helps form clusters of economic activity. This brings down the costs of production for firms in the cluster because it reduces transport costs, makes it easier to access skilled workers, and improves flows of knowledge and information.

To understand the agglomeration benefits of each of the options, it is important to compare the options with the current situation, in which no alternative route has been chosen and the Manawatū

Gorge route remains closed.[25] Due to data limitations, the total agglomeration benefits have been calculated in two stages:

- **Stage 1:** Calculate the agglomeration benefits of the Gorge route being open relative to the Gorge route being closed, then
- **Stage 2:** Calculate the agglomeration benefits of each of the scenarios 1A-C compared to a reference case of the Gorge route being open.

Table 9 shows the total agglomeration benefits associated with each Scenario.

Table 9: Total agglomeration benefits (PV, 2012$m)

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Benefits of Reopening the Gorge	40.1	40.1	40.1	40.1	40.1	37.3	37.3	37.3
Additional benefits relative to a Gorge open scenario	52.7	(27.2)	56.8	32.9	19.9	31.9	54.3	(15.5)
Total agglomeration benefits	**92.8**	**13.0**	**97.0**	**73.0**	**60.0**	**69.2**	**91.5**	**21.8**

Note: the present value of the agglomeration benefits of the Gorge route being open relative to the Gorge route being closed is greater for scenarios 1A-1E compared to 2A-2C because construction is completed one year earlier.

Reinstating the Gorge is the first priority and it is important, but it is not sufficient to unlock the total potential economic benefits of the Region. Improvements to the regional ring road and the addition of a second bridge enhance the economic productivity of the Region. The exact location of the bridge changes the benefits realised, and further investigations should be undertaken to understand the location that best supports transport and economic outcomes.

Value of Reinstatement

Economic modelling estimates that restoring the network and Gorge to its pre-closure status would result in $40m of benefits relative to continued closure of the Gorge, but the Gorge closure presents an opportunity to consider how the network in and around Palmerston North functions, including how a second Manawatū River crossing near Palmerston North and the completion of regional ring road affect economic performance.

Additional Value of the Ring Road and Bridge

Completing the ring road without a second bridge provides $20m of additional benefits over 40-years relative to reinstatement of the Gorge alone. Adding a second river crossing near Palmerston North along with the ring road improvements adds $32-53m of additional benefits depending on the location of the bridge.

Comparisons between Scenarios

Compared with a 'Gorge closed' scenario all options provide benefits. Some options, notably 1B and 2C do not perform as well as the previous Gorge crossing however. This means that implementing these solutions would not provide the same level of benefit that existed prior to the Gorge closure. This is due to the higher travel times and lowered accessibility relative to the previous Gorge option.

[25] For a detailed overview of our agglomeration model approach and methodology, see Appendix A.

In practice, this means that while some of the benefits of restoring the Gorge crossing are achieved, the 'replacement' option provides *less* benefit than the 'old Gorge'.

All of the other options, provide somewhat greater benefits than opening the now defunct Gorge. Those with a bridge (1A, 1C, 1D, 2A-C) all perform significantly better than if no bridge is provided. There are also benefits associated with ring-road improvements.

There are relatively large differences in benefits that can be attributed to the location of the bridge ($92.8m for a downstream bridge relative to $73m for an upstream bridge on Option 3). This implies that further analysis should be conducted to understand the relative impacts of different bridge locations on economic performance.

The benefit of a second additional bridge – a third river crossing – is minimal. This is because the network becomes much more efficient with a single additional bridge, and there is little marginal benefit to further improvement in terms of overall access.

6.3 Summary of Results and Implications

These results show that restoring a new route through the Gorge is critical, but that introducing improvements to the regional ring road network are important to realising the full economic benefits of the transport network. The results are summarised in Figure 19 below.

Figure 19: Wider Economic Benefits Summary Table

Option	Option 3					Option 4		
Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Description	Downstream Bridge + Improvements	No Bridge, No Improvements	Double Bridge + Improvements	Upstream Bridge & Improvements	Improvements & No Bridge	Improvements + Upstream Bridge	Improvements + Double Bridge	Limited Improvement + Upstream Bridge
Benefits of certainty (starting 2021)	82.3	82.3	82.3	82.3	82.3	82.3	82.3	82.3
Productivity benefits of reduced transport costs	87.9	87.9	87.9	87.9	87.9	82.2	82.2	82.2
Agglomeration benefits	92.8	13.0	97.0	73.0	60.0	69.2	91.5	21.8
Total wider economic benefits	**263.0**	**183.2**	**267.2**	**243.2**	**230.2**	**233.6**	**256.0**	**186.3**

The key results are that:

- **The benefits of any Gorge restoration option are significant** – close to $200m even for the worst performing option *in addition* to the significant transport benefits modelled by GHD.
- **The benefits of committing to a known future are significant.** Just the commitment to a known and certain future will release immediate investment supporting $82m of GDP growth over 40 years.
- **Reducing transport costs by restoring the Gorge will bring relief to businesses and households.** This is worth some $88m over 40 year with a 6 year project timeframe and $82m with a 7 year project horizon.

- **Improvements to the transport network are critical to realising the benefits of a new route.** The scenarios with the greatest agglomeration benefits are 1A, 1C and 2B. All of these scenarios involve upgrades to the transport network and a new downstream bridge crossing the Manawatū River. The agglomeration benefits of 1B, which includes no network upgrades and no bridge, and 2C, which includes minimal network upgrades and a new upstream bridge, are lower than the agglomeration benefits of the other scenarios.

- **When combined with network improvements, Option 3 has greater agglomeration benefits than Option 4.** For example, both 1C and 2B involve similar network upgrades and two new bridges, but 1C has greater agglomeration benefits than 2B. In addition, both 1D and 2A involve similar network upgrades and one new bridge, but 1D has greater agglomeration benefits than 2A. This indicates that the agglomeration benefits associated with opening the new route a year earlier exceed any agglomeration benefits associated with the location or length of the Option 4 route.

- **The ring road and bridge are important components to realising the economic potential of the network:** Reinstating the Gorge is the first priority and is important, but it is not sufficient to unlock the total potential economic benefits of the Region. Improvements to the regional ring road and the addition of a second bridge enhance the economic productivity of the Region.

- **Completing the ring road without a second bridge provides $20m of additional benefits over 40-years relative to reinstatement of the Gorge alone.** Adding a second river crossing near Palmerston North along with the ring road improvements adds $32-53m of additional benefits depending on the location of the bridge.

- **The preferred options are robust to different growth scenarios futures:** The spatial allocation of growth (within the bounds of the planning framework) does not affect the overall result of the modelling. This is due to the efficiency of the overall network with the Gorge replacement.

These results show that restoring a new route through the Gorge is critical, but that introducing improvements to the regional ring road network are needed to realise the full economic benefits of a new route.

It is worth noting the choice of bridge and network improvements have a greater relative impact on realised agglomeration benefits than the choice of the replacement Manawatū Gorge route. Comparing scenarios that are identical but for the Gorge route (Scenario 2A compared with Scenario 1D) shows that the selection of the route on agglomeration benefits is very small ($73m versus $69m). Option 4 relies on a bridge to link into the wider road network, so like for like comparisons between the options 'without a bridge' is not possible, but for the purposes of comparison, if a bridge is excluded in Option 3 the agglomeration benefits fall by 17% to $60m. If ring road improvements and a bridge are excluded the agglomeration benefits drop by 82% to $13m.

With a single bridge and network improvements, Option 3 has similar agglomeration benefits to Option 4 ($73m versus $69m), but it is delivered at significantly lower cost. Option 3 also aligns best with short term land use trends and cost recovery due to the location of the route and how quickly it can be constructed. However, achieving the medium to long-term economic benefits of this option depends on upgrades to the wider transport network – not just which upgrades are made, but when and in what order. When combined with network improvements, Option 3 has greater overall benefits than Option 4.

The timing and sequence of transport network upgrades and the placement of the second bridge are critical decisions to optimise the functioning of the network. Not just which upgrades are made, but when, where, and in what order, can make a difference to the economic impact of a new route.

6.4 Scenario Testing

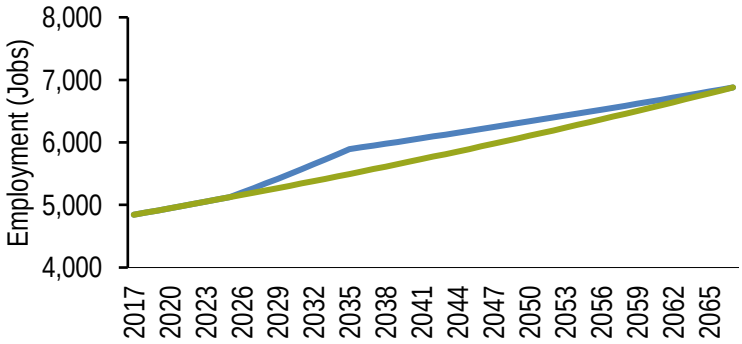
Discussions with industry stakeholders indicate that significant investments are being delayed due to uncertainty around the Gorge replacement route, particularly in the NEIZ. This means that jobs creation may have also been suppressed.

As well as improving productivity, committing to a preferred route could release pent up demand for jobs in some part of the city. While we don't anticipate that releasing this demand will change the total employment growth of Palmerston North in the long term, it could change when and where that growth happens. In particular, the nature of the economy and the location of *any* option would be likely to enable faster growth in the NEIZ and could shift some growth from Longburn toward the North East Industrial Zone, particularly if there are investment in logistics infrastructure in the area.

In order to understand the impact of these changed growth patterns, we considered five growth scenarios alongside the base case growth scenario:

- **Scenario 1:** Employment in the Rural North Zone, which contains the NEIZ, grows twice as rapidly in the short term (for 10 years after construction has finished) but more slowly in the long term (the rest of the forecast period, i.e. 10-40 years after construction has finished), as shown in Figure 20.

Figure 20: Accelerated NE Growth – Scenario Example Relative to BAU



- **Scenario 2:** Employment in the South West City Zone – particularly around Longburn – grows half as rapidly during in the short term, as some growth consolidates toward the North East.
- **Scenario 3:** A combination of Scenario 1 and 2 (the decline in employment growth in South-West City Zone is transferred to the Rural North Zone)
- **Scenario 4:** Employment in the Rural West Zone grows twice as rapidly in the short term but more slowly in the long term
- **Scenario 5:** Employment in the Rural South Zone grows half as rapidly in the short term but more rapidly in the long term.

In all scenarios, final employment numbers at the end of the forecast period (40 years after construction has finished) are the same as in the base case. Employee growth rates and projections used for each zone and scenario are shown in Appendix B.

Table 10 shows the additional agglomeration benefits (losses) of each growth scenario compared to the base case growth scenario.

Table 10: Additional agglomeration benefits for each growth scenario compared to the linear growth scenario (present value, $000)

Scenario	1A	1B	1C	1D	1E	2A	2B	2C
Scenario 1	513	(856)	681	755	572	683	644	(591)
Scenario 2	6	25	(41)	(13)	83	11	(1)	29
Scenario 3	582	(921)	710	828	751	780	720	(618)
Scenario 4	15	1	14	10	12	9	13	(2)
Scenario 5	1,581	(33)	1,581	276	113	270	1,583	165

The results show that the spatial location of growth (within Palmerston North) makes very little difference over the 40-year horizon. This is due to the relatively small size of the area, ease of accessibility within the city, and enhanced connectedness provided by the options.

This also means that the base case agglomeration results are robust to different growth scenarios, and it is unlikely that different growth futures would change the option selected, as changes to the scale of the benefits would occur approximately proportionally across options.

Appendix A Agglomeration model approach and methodology

Approach

Our approach to calculating agglomeration benefits was as follows:

1. Divided the area surrounding Palmerston North into 8 zones and assigned a centre point for each zone for the purposes of estimating travel times between zones.

2. Expanded Options 3 and Option 4 to a set of eight scenarios that take into the account the effect of network upgrades and the addition of a new bridge (or two) over the Manawatū River.

3. Requested the current travel times and travel times under each Scenario from the Beca transport model.

4. Defined five growth scenarios in order to understand the impact of releasing suppressed job demand.

5. Calculated agglomeration benefits of each Scenario under each growth scenario.

The transport model is not able to forecast traffic volumes and travel times for the current situation, in which no alternative route has been chosen and the Manawatū Gorge route remains closed. In order to overcome this limitation and compare our results to the current situation, the total agglomeration benefits have been calculated in two stages:

   a. Calculated the agglomeration benefits of each of the scenarios 1A-C compared to a reference case of the Gorge route being open (using forecast travel times)

   b. Calculated the agglomeration benefits of the Gorge route being open relative to the Gorge route being closed (using current travel times) and added these benefits to the results of step 5a.

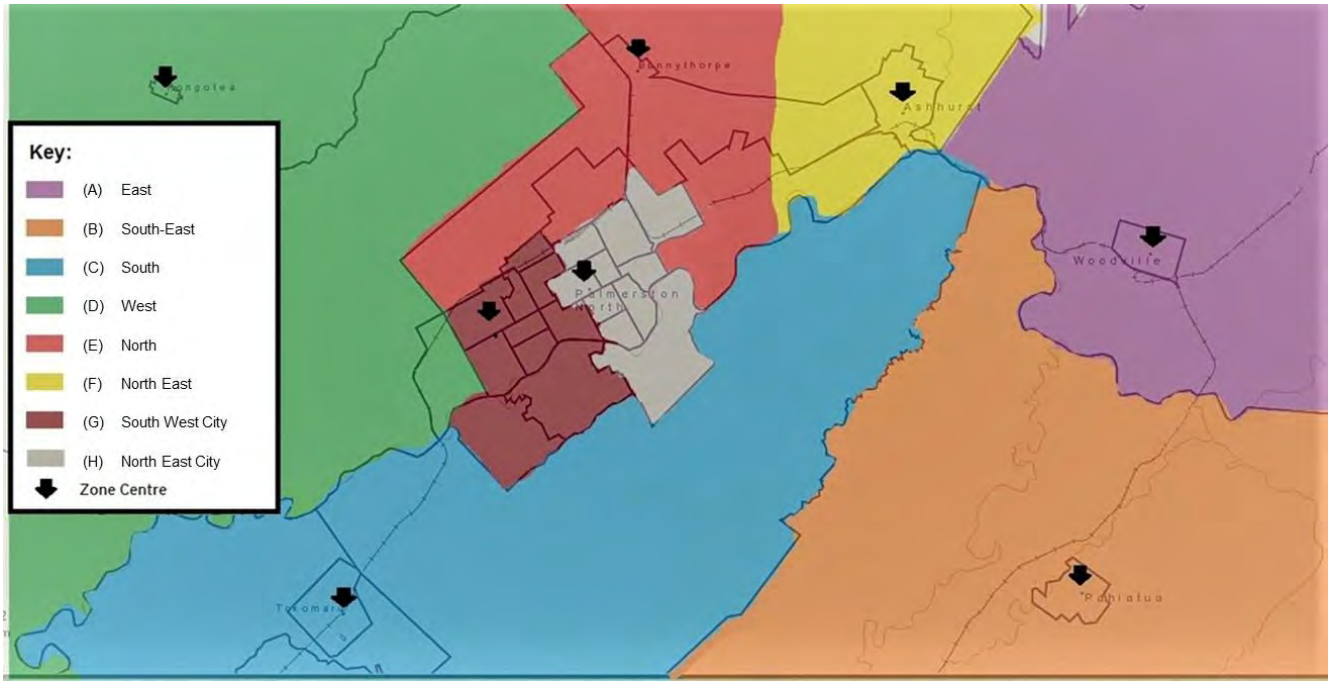
Zones

For the purposes of estimating the increased effective job density due to faster travel times, we divided the area surrounding Palmerston North into 8 zones and assigned a centre point for each zone. These are zones used for the purposes of establishing transport accessibility only. The region's land use zoning underpins the location of growth within these areas.

Table 11: Zones and centres

Zone	Name	Centre points
A	East	Woodville
B	South-East	Pahiatua
C	South	Tokomaru
D	West	Rongotea
E	North	Bunnythorpe
F	North-East	Ashhurst
G	South-West City	Bill Brown Park
H	North-East City	The Square

Figure 21: Map showing zones for agglomeration modelling and centre points



Inputs

The following table describes the inputs to the agglomeration model.

Table 12: Agglomeration model inputs

Input	Source
Number of jobs in each zone	Statistics NZ
Percentage of employees working in each sector in each zone	Statistics NZ
Percentage of employees in Palmerston North who work from home	Statistics NZ
Compound annual growth rate of the working age population (20-64) in each zone based on the 2013-2043 period	Statistics NZ
Real GDP per worker by industry for Palmerston North and historic compound annual growth rate based on the 2000-2015 period (allowing for a full economic cycle)	MBIE
Current travel times between each pair of centres	Beca transport model
Travel times between each pair of centres under each scenario	Beca transport model
Construction time for each option	NZTA
Agglomeration elasticity for the Manawatū-Whanganui region	Motu[26]
Discount rate	The Treasury's CBAx tool

Methodology

The following table describes the methodology we used to determine the agglomeration benefits for each scenario.

Table 13: Agglomeration model methodology

Step	Description	Method
1	Calculate forecasted GDP per worker in each industry	Multiply the real GDP per worker in that industry for Palmerston North by the historic compound annual growth rate
2	Calculate the number of workers in each zone for each year	Apply the forecast 30-year compound annual growth rate of the working age population (20-64) to the number of jobs in 2013

[26] "Agglomeration Elasticities in New Zealand", David C Maré & Daniel J Graham, Motu, June 2009.

3	Calculate the total GDP in each zone for each year	Calculate the forecast GDP for each industry in each zone by multiplying together: ► the forecasted GDP per worker in that industry ► the total number of workers in that zone ► the percentage of workers in that industry in that zone
4	Calculate the effective job density in each zone when the Gorge route is open	Calculate the number of jobs at each other zone for each minute of travel time to get to that zone
5	Calculate the effective job density in each zone under each Scenario and growth scenario	Under each Scenario and growth scenario, calculate the number of jobs at each other zone for each minute of travel time to get to that zone (using the travel times from that Scenario and the job numbers from that growth scenario)
6	Determine the agglomeration benefits for each zone	Calculate agglomeration benefits according to a variation of the Opus method[27] by multiplying together: ► The percentage change in effective job density in that zone ► The agglomeration elasticity ► GDP per worker in that zone ► The percentage of workers who do not work at home
7	Determine the total present value of the agglomeration benefits	Sum the agglomeration benefits for each zone and apply the Treasury's discount rate of 6.0% per year with a base date of 30 June 2017

[27] "Manawatu River Crossing Economic Analysis", November 2009, Opus International Consultants Ltd.

Appendix B Agglomeration model growth scenarios

Table 14 shows the compound annual employment growth rates used for each of the growth scenarios, for those regions where the growth rates were different between scenarios, and Table 15 shows the employment projections generated based on these growth rates. The base employment rates are sourced from on Statistics New Zealand's population forecasts.

Table 14: Annual employment growth rates for each growth scenario

	Zone	Time period	Linear growth	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
C	South	During construction	0.99%	0.99%	0.99%	0.99%	0.99%	0.99%
		Short term						1.98%
		Long term						0.68%
D	West	During construction	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%
		Short term					0.17%	
		Long term					0.06%	
E	North	During construction	0.70%	0.70%	0.70%	0.70%	0.70%	0.70%
		Short term		1.41%		1.41%		
		Long term		0.48%		0.48%		
F	North-East	Entire period	1.35%	1.35%	1.35%	1.35%	1.35%	1.35%
G	South-West City	During construction	0.55%	0.55%	0.55%	0.55%	0.55%	0.55%
		Short term			0.28%	0.28%		
		Long term			0.68%	0.68%		
H	North-East City	Entire period	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%

Table 15: Employee projections for each growth scenario

	Zone	Used in scenario	2017	2027	2037	2047	2057	2067
C	Rural South	Scenarios 1-4	1,126	1,243	1,371	1,513	1,670	1,842
		Scenario 5	1,126	1,267	1,503	1,608	1,722	1,843
D	Rural West	Scenarios 1-3 & 5	2,561	2,583	2,604	2,626	2,647	2,669
		Scenario 4	2,561	2,587	2,624	2,639	2,654	2,669
E	Rural North	Scenarios 2,4 & 5	4,844	5,196	5,574	5,979	6,413	6,879
		Scenarios 1 & 3	4,844	5,269	5,950	6,245	6,554	6,879
F	Rural North-East	All scenarios	813	930	1,063	1,215	1,389	1,588
G	South-West City	Scenarios 1, 4 & 5	11,001	11,626	12,286	12,983	13,720	14,499
		Scenarios 2 & 3	11,001	11,541	11,869	12,688	13,563	14,499
H	North-East City	All scenarios	22,995	23,450	23,914	24,388	24,871	25,363

Terms of Engagement and Disclaimers

Introduction

In December 2017 NZTA engaged Ernst & Young Transaction Advisory Services Limited (EY) to further evaluate several short listed options being considered to replace the Manawatū Gorge route.

Scope of engagement

As set out in our engagement letter dated 22 December 2017, and as agreed with NZTA on behalf of the Joint Working Group (JWG) this scope of this report was to provide:

- An analysis of the economy of Palmerston North and the surrounding region, including an examination of key trends, and a discussion of the regions' competitive advantages.
- An assessment of how different Gorge replacement options affect the future growth of the region's economy – in particular whether any of the options has a materially different impact on the area's economy or land use.

As agreed in our engagement letter, we accept no responsibility whatsoever for reliance on this report other than for the purpose for which it was intended. Further, no responsibility whatsoever is accepted for persons other than those to whom this opinion is addressed, and those we have agreed in writing will be provided with the opinion.

Reliance on information

The report reflects our assessment of the material factors affecting the wider economic benefits o of the different Manawatū Gorge options. In developing our report, we have relied on information provided by third parties about the transport performance of the options, the cost of delivery, and the market's investment intentions. Assumptions may change, with potentially material effect on the opinion we have expressed.

EY takes no responsibility for the assumptions underlying our analysis and advice. Our duties, while involving an assessment of information provided and commenting as necessary, do not extend to verifying the accuracy of the information, and we have assumed its authenticity and completeness. We have not audited or reviewed the information provided, nor have we been required to do so.

Limitations to scope

Subject to our obligation to conduct our work with reasonable skill and care, we have no liability for any loss or damage, of whatsoever nature, arising from information material to our work being withheld or concealed from us or misrepresented to us by the directors, employees, or agents of NZTA or any other person of whom we make enquiries except to the extent that such loss or damage arises as a result of our bad faith or wilful default or where the withholding, concealment or misrepresentation should have been apparent to us without further enquiry from the information provided to us and required to be considered by us under the terms of our assignment.

If we become aware, in carrying out our work, of any withholding, concealment or misrepresentation, which we believe will have material implications for the performance of our work, we will inform you as soon as reasonably practicable.

Publication

This draft advice is not intended for publication. This document may not be included in any published document, circular or statement, nor otherwise published or disclosed in any way without the written approval of EY, except as required by law.

Outcome Type	Strategic Driver	Programme Outcomes					
		Key Performance Indicator	Measure	Baseline	Programme 6	Programme 7	Programme 11
Investment Objectives	Amenity	Reduce both freight and vehicles on residential and place-based streets	**Reduction in heavy vehicles through the CBD and along local streets / places**	**2031 Modelled Daily HCV** ·City Centre Access (Fitzherbert Br): 1,700vpd – proxy for city reduction ·Te Awe Awe St 800 vpd ·Albert Street 900 vpd ·Kaimanawa Street 340 vpd ·Keith Street 270 vpd ·College St 295 vpd ·Kelvin Grove Road 965 vpd ·Maxwells Line 420 vpd	·300-500 fewer heavy vehicles per day through the CBD , Bridge and Tennent Dr ·Approx. 1000 fewer HCVs heading into Bunnythorpe ·100 fewer trucks through Feilding and Ashhurst	- 300-500+ fewer heavy vehicles per day through the CBD, Bridge and Tennent Dr - Approx. 1000+ fewer HCVs heading into Bunnythorpe - <50 fewer trucks through Feilding	-Limited reductions in the CBD relating to speed measures with 200 fewer heavies on Te Awe Awe (but rat-runnning on other routes without speed changes) -Approx. 1000 fewer HCVs heading into Bunnythorpe -50 fewer trucks through Feilding
			City Centre Access (Fitzherbet Br):	1716	-380	-545	-4
			Te Awe Awe St	798	-478	-524	-204
			College St	211	2	1	6
			Keith Street	271	-35	-20	-32
			Shelley St	212	-21	-26	-22
			Kaimanawa Road	341	67	52	63
			Albert St	898	-577	-605	-559
			Maxwells Line	419	-42	-45	-34
			Kelvin Grove Road	965	-60	13	-26
			Tennent Drive (Massey)	554	-300	-308	-5
			Bunnythorpe (Western Appr.)	1325	-1098	-1183	-1192
			Feilding (to SH54)	2015	-108	-44	-59
			Ashhurst	479	-117	-9	-7
			Reduction of general traffic through townships or key places	**2031 Modelled ADT** ·City Centre Access over 30,000 vpd ·SH3 Napier Road over 12,000 vpd ·Tennent Drive 8,000 vpd ·Bunnythorpe 12,000 vpd ·Feilding up to 21,000 vpd ·Ashhurst over 7,000 vpd	·4,500 fewer vehicles per day through the CBD , Bridge and Tennent Dr - 3,000 fewer vehicles per day on SH3 Napier Road into Palmerston North ·Approx. 10,000 fewer vehicles heading through Bunnythorpe Village ·Approx 1,000-1,500 fewer vehicles through Feilding and Ashhurst	-5,500 fewer vehicles per day through the CBD, Bridge and 4,000 fewer along Tennent Dr - 2,000 fewer vehicles per day on SH3 Napier Road into Palmerston North ·Approx. 10,000 fewer vehicles heading through Bunnythorpe Village ·Approx 500-1000 fewer vehicles through Feilding and Ashhurst	-No reduction in the number of vehicles across the Fitzherbert Bridge or Tennent Dr (flow reductions on streets due to speed management) - 2,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 10,000 fewer vehicles heading through Bunnythorpe Village -Approx 500-1000 fewer vehicles through Feilding
			City Centre Access (Fitzherbet Br):	30559	-3893	-5572	118
			SH3 Napier Road	12335	-3068	-2246	-2560
			Tennent Drive	7764	-4408	-4438	66
			Bunnythorpe	11955	-9871	-10357	-10417
			Feilding	21254	-1056	-700	-793
			Ashhurst	6739	-1531	-361	-116
			Increase the number of heavy vehicles on selected freight routes	**2031 Modelled Daily HCV** ·Kairanga Bunnythorpe Road: 135 -1,000 vpd ·Longburn Rongotea Road 600 vpd ·Ashhurst Bunnythorpe Road 500vpd ·SH54 (Milsons Line to Newbury Line) 840 vpd ·SH3 North of KB Road 1000vpd ·SH57 South of PN 600vpd ·SH56 South of PN 105vpd ·Stoney Creek Road 105 vpd	- Increase in freight (approx. 300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight (approx. 200-300 vpd) using Ashhurst Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - Increase in freight along SH57 south of Linton (100-200vpd) - up to 1,000 heavy vehicles attracted to the Bunnythorpe Bypass	- Increase in freight (approx. 200-300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight (approx. 100-200 vpd) using Stoney Creek Road - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - Increase in freight along SH57 south of Linton (100-200vpd) - up to 1,100 heavy vehicles attracted to the Bunnythorpe Bypass	- Increase in freight (approx. 200-300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight along No1 Line (100-200vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (100vpd) - up to 1100 heavy vehicles attracted to the Bunnythorpe Bypass
			Kairanga Bunnythorpe Road (SH3 to SH54)	1035	284	233	250
			Kairanga Bunnythorpe Road (SH54 to	135	260	222	220
			Longburn Rongotea Road	596	522	502	-175
			Ashhurst Bunnythorpe Road	501	259	-17	26
			SH54 (Milsons Line to Newbury Line)	842	-17	-37	-16
			SH3 North of KB Road	1014	58	48	95
			SH57 South of PN	609	61	62	1
			SH56 South of PN	1051	-40	-42	-5
			Stoney Creek Road (Kelvin Grove to Ashhurst Road)	105	-21	133	-14
			Bunnythorpe Bypass (Western)	0	1016	1107	1068
			Bunnythorpe Bypass (Southern)	0	613	606	530
		Increased uptake and attractiveness of active modes	Pedestrian and cyclist measures to be considered under existing PNCC metrics in parallel project (UCMP). Baseline : ·Journey to work (cycle): 5.9% (2013 census) ·Journey to work (walk): 9% (2013 census) ·Cycling Counts (PNCC): 540 across 9 sites (2017) - a reduction from 840 in 2013		Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes	Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes	Potential to support and enables UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes. However, reductions through the city centre are dependent on speed management changes
		MCA (WS3)	An overall assessment of the programmes' impact to the local amenity both positive and negative. This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations.		Reduction of general and heavy vehicles on key routes and areas. Greater reduction of volume on Tennent Drive and town centre than Prog 11	Reduction of general and heavy vehicles on key routes and areas. Greater reduction of volume on Tennent Drive and town centre than Prog 11	Reduction of general and heavy vehicles on key routes and areas, but to a lesser extent than Prog 6 and 7. Reduction on local roads dependent on speed management.
					2	2	1
	Safety	**Reduction in Deaths and Serious Injuries (DSI)**	DSI Saved / 5 years	Wider network, excl. CBD network 2014-2018: 103 actual DSI (5yr), 100 estimated DSI (5yr)	37	33	29
		Improve safety infrastructure	Number of high risk intersections treated:	Baseline = 13 intersections identified	10	10	10
		Safe and appropriate speeds	Number of high risk speed management corridors treated:	Baseline = 27 corridors identified for treatment	18 direct, and one sub-option	18 direct, and one sub-option	15 direct
		MCA Score (WS3)	An overall assessment of the programme covering the safety impacts on state highways and local roads. This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area.		All programmes includes treatment of identified high-risk intersections and corridors.The bridge options were assessed as providing more safety benefits than P 11 as they would remove more traffic from key pedestrian and cyclist areas	All programmes includes treatment of identified high-risk intersections and corridors.The bridge options were assessed as providing more safety benefits than P 11 as they would remove more traffic from key pedestrian and cyclist areas	All programme includes treatment of identified high-risk intersections and corridors.
					3	3	3
	Access	**Intersection LoS**	Reduction in the number of key rural or freight intersections operating at capacity (LoS E/F) in the PM peak in 2031.	Baseline = 16 intersections (LoS E/F)	8	8	8
		Reduce journey time between key destinations	AM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1687 mins	46	65	7
			IP Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1624 mins	46	60	5
			PM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1804 mins	67	82	20
		MCA Score (WS3)	This criterion reflects the investment objective and relates to how well the programme improves access between key destinations and access into major areas.		Highest reduction in overall vehicle distance travelled (peak hours). Similar overall travel time benefits to Prog 7. Number of intersections with LoS issues addressed on the freight network is similar across programmes.	Highest network journey reduction time. Similar overall travel time benefits to Prog . Number of intersections with LoS issues addressed on the freight network is similar across programmes.	Some network improvements, but fewer peak period benefits than Prog 6 and 7.Number of intersections with LoS issues addressed on the freight network is similar across programmes.
					2	2	1

Outcome Type	Strategic Driver	Programme Outcomes				
		Key Performance Indicator	Measure	Baseline	Programme 6	Programme 7	Programme 11
Key Principles	Economic growth	MCA Score (WS3)	A high level assessment of each programmes' ability to facilitate economic growth. This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications.		New river crossing and minor improvements on SH57 will assist FoodHQ growth. Southern bridge will link Longburn with cross river accessibility.	Provides greatest support to existing freight generating activities. Provides direct routes for NEIZ and FoodHQ.	Marginal benefits identified. Provides well for NEIZ, and Longburn, but not as well for FoodHQ
					2	3	1
	Resilience	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.		P 6 was the second most resilient option, with a new downstream bridge outside of key flooding areas, but overall resulted in the same moderate positive score as P7. The new bridge allows a freight route south of the city to avoid the likely disrupted areas. It was considered not as resilient as P7 in an earthquake due to the unknown nature of the disruption to local road bridges on the western ring route.	P 7 was the most resilient option, scoring a moderate positive. It proposes a new road and bridge outside of the flooding area. It also seeks to improve SH57 which is more resilient than the SH56 alternative. It provides the best routes for travel in all directions in both flooding and earthquake events, including areas such as the Linton Military Camp	P 11 provided no substantial change to the current resilience of the network, with incremental improvements to the existing network and localized improvements to flooding. There were no substantial gains to resilience for both earthquakes or low impact events
					2	2	0
	Fit with strategy	MCA Score (WS3)	The alignment with strategy criterion assessed the three programmes against the relevant documents associated with the strategic direction of the city. The common themes that were identified through the analysis included efficiency, integration and connectivity.		Impact through ring road, bypasses, and new bridge results in good alignment to several strategic documents.	Significant impact through ring road, bypasses and two new bridges results in the highest alignment to strategic documents.	Lack of new bridge key difference between Prog 11 and other Progs, impacting on the blueprint outlined for the city identified in several strategic documents.
					2/3*	3	1
Impacts	Land Use	MCA Score (WS3)	This criterion covers the potential impact of the programmes on current and future land uses located on or around the sites.		Impact on current and future land use. Less than Prog 7 as only one bridge in the south.	Most impacts on current and future land uses. Impacts on existing lifestyle blocks. Highest impact of highly productive land.	Least impact on both current and future land uses. Works being undertaken on existing alignments. No bridges.
					-1	-3	0
	Environment	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces CO2 and limits the impact on water quality.		New bridge over the Manawatu River will have temporary and permanent effects. Slight reduction in total distance travelled.	New bridges over the Manawatu River will have temporary and permanent effects. Slight reduction in total distance travelled.	No new bridges over the Manawatu River. Slight reduction in total distance travelled.
					-1	-1	0
	Archaeology	MCA Score (WS3)	This criterion covers the potential impact of the programmes on known sites and/or risk areas.		New bridge in area of high archaeological potential. Bypasses have potential to affect sites predominantly relating to European/colonial occupation	New bridges in area of high archaeological potential. Bypasses have potential to affect sites predominantly relating to European/colonial occupation	Major works restricted to Bunnythorpe, with potential to affect European/colonial sites
					-2	-2	-1
Implement-ability	Engineering degree of difficulty	MCA Score (WS3)	This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.		The inclusion of river crossing(s) under Programmes 6 and 7 are the principal difference between these and Programme 11. Many other aspects of the works are similar across the 3 programmes - Bunnythorpe bypass, treatments on KB road for transmission lines and flood risk are examples.	Two new bridges, and additional 10km of existing road to be upgraded.	Difficulty relates to aspects of work common across programmes - KB Road transmission lines, Bunnythorpe Bypass etc
					-2	-3	-1
	Cost	MCA Score (WS3)	This criterion includes an indicative high-level analysis (note that MCA analysis is run with and without costs)		Cost differential from Prog 11 +20-30%	Cost differential from Prog 11 +50-60%	Lowest cost for base comparison
					-2	-3	-1
	Value for money	MCA Score (WS3)	This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.		Greater value assessed due to impact of investment, but overall rating low due to costs of scheme	More costs than Prog 6 not matched by benefits	Lower impact of investments than Prog 6
					1	0	0
	Integration with freight hub	MCA Score (WS3)	This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.		Reasonable impacts, however scenario with urban speed adjustments reduces this impact. Additional river bridge improves access.	Reasonable impact although benefits of additional upstream bridge offset by more limited improvements to the direct route to the east	Network improvements limited relative to other programmes, particularly absence of new river crossing.
					2	2	1
	IAF (Indicative)	Results Alignment (Indicative - Safety led)			High	High	High
		High Level Cost Range ($M)			335-370	400-475	255-315
		BCR Range (incl. WEBS)			1.3 - 1.5	1.1 - 1.3	1.3 - 1.6
		BCR Range (Excl. WEBS)			0.9 - 1.0	0.7 - 0.9	1.0 - 1.2

Outcome Type	Strategic Driver	Programme Outcomes				
		Key Performance Indicator	Measure	Baseline	Programme 6	Programme 6B (No Speed Reductions)
Investment Objectives	Amenity	Reduce both freight and vehicles on residential and place-based streets	**Reduction in heavy vehicles through the CBD and along local streets / places**	**2031 Modelled Daily HCV** ·City Centre Access (Fitzherbert Br): 1,700vpd – proxy for city reduction ·Te Awe Awe St 800 vpd ·Albert Street 900 vpd ·Kaimanawa Street 340 vpd ·Keith Street 270 vpd ·College St 295 vpd ·Kelvin Grove Road 965 vpd ·Maxwells Line 420 vpd	-300-500 fewer heavy vehicles per day through the CBD , Bridge and Tennent Dr -Approx. 1000 fewer HCVs heading into Bunnythorpe -100 fewer trucks through Feilding and Ashhurst	-Limited impact in the CBD without speed changes, apart from the Fitzherbert Br -Approx. 800 fewer HCVs heading into Bunnythorpe -50-100 fewer trucks through Feilding and Ashhurst
			City Centre Access (Fitzherbet Br):	1716	-380	-343
			Te Awe Awe St	798	-478	-49
			College St	211	2	1
			Keith Street	271	-35	-33
			Shelley St	212	-21	-26
			Kaimanawa Road	341	67	50
			Albert St	898	-577	-46
			Maxwells Line	419	-42	-22
			Kelvin Grove Road	965	-60	-94
			Tennent Drive (Massey)	554	-300	-176
			Bunnythorpe (Western Appr.)	1325	-1098	-774
			Feilding (to SH54)	2015	-108	-97
			Ashhurst	479	-117	-63
			Reduction of general traffic through townships or key places	**2031 Modelled ADT** ·City Centre Access over 30,000 vpd ·SH3 Napier Road over 12,000 vpd ·Tennent Drive 8,000 vpd ·Bunnythorpe 12,000 vpd ·Feilding up to 21,000 vpd ·Ashhurst over 7,000 vpd	-4,500 fewer vehicles per day through the CBD , Bridge and Tennent Dr - 3,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 10,000 fewer vehicles heading through Bunnythorpe Village -Approx 1,000-1,500 fewer vehicles through Feilding and Ashhurst	- 2,000-4,000 fewer vehicles per day through the CBD , Bridge and Tennent Dr - 2,000 fewer vehicles per day on SH3 Napier Road into Palmerston North -Approx. 7,000 fewer vehicles heading through Bunnythorpe Village -up to 1,000 fewer vehicles through Feilding and Ashhurst
			City Centre Access (Fitzherbet Br):	30559	-3893	-3893
			SH3 Napier Road	12335	-3068	-2294
			Tennent Drive	7764	-4408	-2400
			Bunnythorpe	11955	-9871	-7161
			Feilding	21254	-1056	-883
			Ashhurst	6739	-1531	-738
			Increase the number of heavy vehicles on selected freight routes	**2031 Modelled Daily HCV** ·Kairanga Bunnythorpe Road: 135 -1,000 vpd ·Longburn Rongotea Road 600 vpd ·Ashhurst Bunnythorpe Road 500vpd ·SH54 (Milsons Line to Newbury Line) 840 vpd ·SH3 North of KB Road 1000vpd ·SH57 South of PN 600vpd ·SH56 South of PN 105vpd ·Stoney Creek Road 105 vpd	- Increase in freight (approx. 300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight (approx. 200-300 vpd) using Ashhurst Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - Increase in freight along SH57 south of Linton (100-200vpd) - up to 1,000 heavy vehicles attracted to the Bunnythorpe Bypass	- Increase in freight (approx. 300 vpd) using Kairanaga Bunnythorpe Road - Increase in freight (approx. 200-300 vpd) using Ashhurst Road - Increase in freight along Longburn Rongotea Road (300-500vpd) - Increase in freight along SH3 Rangitikei Line, north of SH3/54 (50-100vpd) - up to 700 heavy vehicles attracted to the Bunnythorpe Bypass
			Kairanga Bunnythorpe Road (SH3 to SH54)	1035	284	260
			Kairanga Bunnythorpe Road (SH54 to Roberts)	135	260	245
			Longburn Rongotea Road	596	522	347
			Ashhurst Bunnyhorpe Road	501	259	135
			SH54 (Milsons Line to Newbury Line)	842	-17	-1
			SH3 North of KB Road	1014	58	57
			SH57 South of PN	609	61	80
			SH56 South of PN	1051	-40	-48
			Bunnythorpe Bypass (Western)	0	1016	699
			Bunnythorpe Bypass (Southern)	0	613	441
		Increased uptake and attractiveness of active modes	Pedestrian and cyclist measures to be considered under existing PNCC metrics in parallel project (UCMP). Baseline : ·Journey to work (cycle): 5.9% (2013 census) ·Journey to work (walk): 9% (2013 census) ·Cycling Counts (PNCC): 540 across 9 sites (2017) - a reduction from 840 in 2013		Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes	Programme 6 and 7 have the greatest potential to support and enable UCMP PNCC investment by flow reductions through the city centre, rural villages/townships and key places/routes increasing the attractivness of active modes
		MCA (WS3)	An overall assessment of the programmes' impact to the local amenity both positive and negative. This criterion reflects the investment objective and relates to how well the option reduces severance in residential areas and helps increase pedestrian and cycle trips between key destinations.		Reduction of general and heavy vehicles on key routes and areas. Greater reduction of volume on Tennent Drive and town centre than Prog 11	
					2	

Outcome Type	Strategic Driver	Programme Outcomes				
		Key Performance Indicator	Measure	Baseline	Programme 6	Programme 6B (No Speed Reductions)
	Safety	Reduction in Deaths and Serious Injuries (DSI)	DSI Saved / 5 years	Wider network, excl. CBD network 2014-2018: 103 actual DSI (5yr), 100 estimated DSI (5yr)	37	32
		Improve safety infrastructure	Number of high risk intersections treated:	Baseline = 13 intersections identified	10	
		Safe and appropriate speeds	Number of high risk speed management corridors treated:	Baseline = 27 corridors identified for treatment	18 direct, and one sub-option	
		MCA Score (WS3)	An overall assessment of the programme covering the safety impacts on state highways and local roads. This criterion reflects the investment objective and relates to how well the option will contribute to reducing deaths and serious injuries on the road network within the study area.		All programmes includes treatment of identified high-risk intersections and corridors.The bridge options were assessed as providing more safety benefits than P 11 as they would remove more traffic from key pedestrian and cyclist areas	
					3	
	Access	Intersection LoS	Reduction in the number of key rural or freight intersections operating at capacity (LoS E/F) in the PM peak in 2031.	Baseline = 16 intersections (LoS E/F)	8	
		Reduce journey time between key destinations	AM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1687 mins	46	87
			IP Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1624 mins	46	82
			PM Travel Time saved between key locations (Aggregate of 10 sites, in minutes)	1804 mins	67	104
		MCA Score (WS3)	This criterion reflects the investment objective and relates to how well the programme improves access between key destinations and access into major areas.		Highest reduction in overall vehicle distance travelled (peak hours). Similar overall travel time benefits to Prog 7. Number of intersections with LoS issues addressed on the freight network is similar across programmes.	
					2	
Key Principles	Economic growth	MCA Score (WS3)	A high level assessment of each programmes' ability to facilitate economic growth. This criterion reflects the large opportunity in the district to increase economic growth and development and relates to how well the option will increase economic activity, employment and development applications.		New river crossing and minor improvements on SH57 will assist FoodHQ growth. Southern bridge will link Longburn with cross river accessibility.	
					2	
	Resilience	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces network outages and/or the risk of network outages and/or reduces the time to recover after an event.		P 6 was the second most resilient option, with a new downstream bridge outside of key flooding areas, but overall resulted in the same moderate positive score as P7. The new bridge allows a freight route south of the city to avoid the likely disrupted areas. It was considered not as resilient as P7 in an earthquake due to the unknown nature of the disruption to local road bridges on the western ring route.	
					2	
	Fit with strategy	MCA Score (WS3)	The alignment with strategy criterion assessed the three programmes against the relevant documents associated with the strategic direction of the city. The common themes that were identified through the analysis included efficiency, integration and connectivity.		Impact through ring road, bypasses, and new bridge results in good alignment to several strategic documents.	
					2/3*	
Impacts	Land Use	MCA Score (WS3)	This criterion covers the potential impact of the programmes on current and future land uses located on or around the sites.		Impact on current and future land use. Less than Prog 7 as only one bridge in the south.	
					-1	
	Environment	MCA Score (WS3)	This criterion reflects a key principle and relates to how well the option reduces CO2 and limits the impact on water quality.		New bridge over the Manawatu River will have temporary and permanent effects. Slight reduction in total distance travelled.	
					-1	
	Archaeology	MCA Score (WS3)	This criterion covers the potential impact of the programmes on known sites and/or risk areas.		New bridge in area of high archaeological potential. Bypasses have potential to affect sites predominantly relating to European/colonial occupation	
					-2	
Implement-ability	Engineering degree of difficulty	MCA Score (WS3)	This criterion covers physical components such as, structures, complexity of programming and temporary works, access management, risks around "unknowns", any necessary additional provisions to address natural hazards, and general degree of difficulty in construction.		The inclusion of river crossing(s) under Programmes 6 and 7 are the principal difference between these and Programme 11. Many other aspects of the works are similar across the 3 programmes - Bunnythorpe bypass, treatments on KB road for transmission lines and flood risk are examples.	
					-2	
	Cost	MCA Score (WS3)	This criterion includes an indicative high-level analysis (note that MCA analysis is run with and without costs)		Cost differential from Prog 11 +20-30%	
					-2	
	Value for money	MCA Score (WS3)	This criterion covers the likely benefits that may be accrued from the option based on the Economic Evaluation Manual and Wider Economic Benefits.		Greater value assessed due to impact of investment, but overall rating low due to costs of scheme	
					1	
	Integration with freight hub	MCA Score (WS3)	This criterion covers how well the option ties in with the recommended Freight Hub option, including network modelling results and the cohesiveness of the transport network with both elements in place.		Reasonable impacts, however scenario with urban speed adjustments reduces this impact. Additional river bridge improves access.	
					2	
	IAF (Indicative)	Results Alignment (Indicative - Safety led)			High	
		High Level Cost Range ($M)			335-370	
		BCR Range (incl. WEBS)			1.3 - 1.5	1.5 - 1.6
		BCR Range (Excl. WEBS)			0.9 - 1.0	1.0 - 1.1