



# SH30 EASTERN CORRIDOR CONNECT ROTORUA - STAGE TWO

## Detailed Business Case

WAKA KOTAHI

2 DECEMBER 2020

VERSION 1

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## GLOSSARY OF TERMS

ABBREVIATION	TERM
AA	Automobile Association
AEE	Assessment of Environmental Effects
BCR	Benefit-Cost Ratio
CAPEX	Capital Expenditure
CAS	Crash Analysis System
CLoS	Customer Level of Service
DSI	Death & Serious Injury
EEM	Economic Evaluation Manual
ESR	Environmental and Social Responsibility Screen
GDP	Gross Domestic Product
GPS	Government Policy Statement (on Land Transport) 2018
HCV	Heavy Commercial Vehicle
ILM	Investment Logic Mapping
ITS	Intelligent Transport System
KPI	Key Performance Indicator
NLTP	National Land Transport Programme
NOC	Network Operating Contract
NLTF	National Land Transport Fund
P&I	Planning and Investment
PBC	Programme Business Case
PPM	Waka Kotahi's Planning Policy Manual
PV	Present Value
RAMM	Road Assessment and Maintenance Management
RMA	Resource Management Act
SH (#)	State highway (number)
SH	State Highway
TIF	Tourism Infrastructure Fund
VOC	Vehicle Operating Costs
WEBs	Wider Economic Benefits
<b>Terms</b>	
Intervention	A specific treatment or mitigation measure (e.g. banned turns at Brent Road)
Programme	A collection of separate interventions to form an overall programme of works

# EXECUTIVE SUMMARY

## Overview

This Detailed Business Case (DBC) is the investment story for the **SH30 Eastern Corridor Connect Rotorua – Stage Two** project, which is a partnership between Waka Kotahi and Rotorua Lakes District Council (RLC). The DBC sets out a plan for where, when, and how investment should be targeted.

The need for investment in the SH30 Te Ngae Road corridor, which extends between Iles Road and Rotorua Airport, stems from a need to address two fundamental issues:

- There is a **lack of transport choice**. Alternatives to using the car are unappealing to many, and historical nature of ‘development pockets’ means that even short local trips require the use of a car and SH30 Te Ngae Road. Traffic volumes on SH30 Te Ngae Road are already high and this coupled with a lack of crossing points, means that the road is already severing the community.
- There is a **serious housing supply deficit in Rotorua**. It is areas just off the eastern corridor where 2000 new homes have been earmarked for development as part of RLC’s Eastside Structure Plan, to be constructed in the next 10 years. However, these new houses cannot be introduced unless there is a transport network in place that can accommodate the additional travel demands. The local economy is highly reliant upon tourism. During the Covid-19 recovery, it is vital that barriers to job creation (e.g. via housing construction) are removed wherever possible.

## Key Principles

The DBC identifies how to address safety and connectivity issues, whilst supporting future growth and providing better travel choices. This DBC recommends a phased programme of multi-modal solutions that support the needs of all users of the corridor.

The following key principles underlined the development of this business case and design:

- We are building upon the previous work - but now thinking beyond the efficiency of SH30 Te Ngae Road, and now looking to help create a joined-up network that works for all modes.
- We are **addressing the existing level of service (LOS) gaps for all modes**, but in a manner that allows additional capacity to be added in the future to support growth.
- The focus is on **person**, not vehicle movement. Any additional capacity provided along the corridor could be allocated for special purposes – e.g. bus lanes.
- The project is about **travel choice**, and we are setting in place the infrastructure that would enable modal shift – we are not simply building our way out of congestion.
- We want to **reduce disruption** to the community as much as possible.
- We want to minimise land purchase and property impacts.

## Consultation

The recommended programme is the outcome of an extensive stakeholder engagement process. This took the form of one-on-one meetings, wider group workshops, technical challenge sessions, stakeholder open days, open online consultation, and direct consultation with landowners and local hapū leaders.

The final concept design was co-designed with partners and stakeholders, where the design was changed in response to what we heard (refer to Sections 16 and 17).

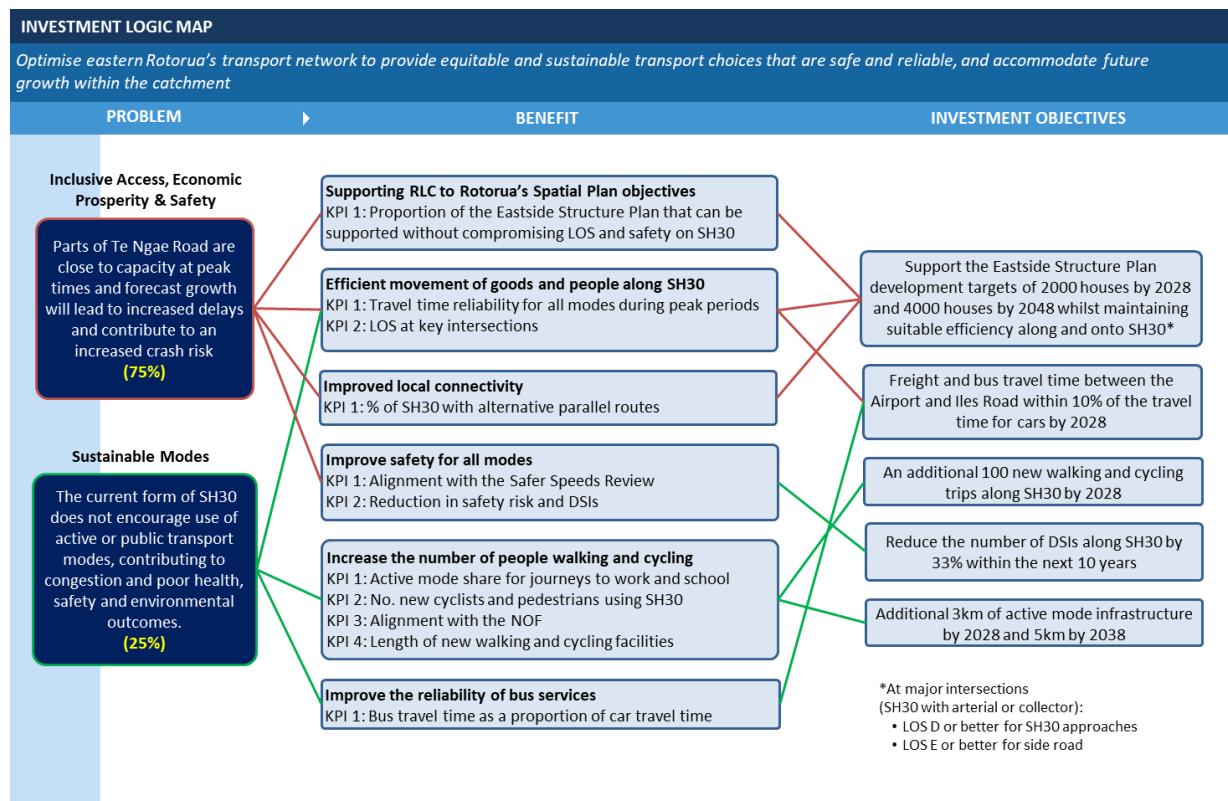


## Problems, Benefits and Investment Objectives

The agreed problem statements were:

- **Problem 1: Efficiency.** Parts of Te Ngae Road are close to capacity at peak times and forecast growth will lead to increased delays and contribute to an increased crash risk. (75%).
- **Problem 2: Travel Choice.** The current form of Te Ngae Road does not encourage use of active or public transport modes, contributing to congestion and poor health, safety, and environmental outcomes. (25%).

The Investment Logic Map for the project, which shows the link between the Problem Statements, benefits and Investment Objectives, is provided as Figure 0-1.



**Figure 0-1: Investment Logic Map**

The benefits of investment are:

- Supporting RLC to achieve Spatial Plan Objectives.
- Efficient movement of goods and people along SH30 Te Ngae Road.
- Improved local connectivity.
- Improved safety for all modes.
- Increase the number of people walking and cycling.
- Improved reliability of bus services.
- Improved mental and physical health, with better access to walking and cycling opportunities
- Reduction in greenhouse gas emissions if mode shift is achieved.
- Improved general user experience
- Improved access to employment opportunities
- Improved feeling of community cohesion (by reducing severance created by the state highway)

## Do Minimum

The Do Minimum reflects the retention of the existing corridor but adopts the recommendations of the Safer Speed Review (i.e. posted speed reduction to 50–60kph from the existing posted speeds of 60–80kph). It also captures improvements being delivered as part of the Rotorua SH30 Eastern Corridor Stage One project.

However, the traffic models developed specifically to inform this DBC identified that, if we were to adopt a 'Do Minimum' approach, by 2028:

- LOS F will be experienced during peak times at the Basley Road, Brent Road, Ōwhata Road, Wharenui Road, Pohutukawa Drive and Robinson Avenue approaches to SH30 Te Ngae Road. For people living along Pohutukawa Drive and Robinson Avenue there are no alternative routes.
- LOS E and F could also be seen between Basley Road and Wharenui Road. This is essentially because the limited capacity at the Ōwhata Road roundabout will cause long tail back queues.

If planned future development is going to be supported, then a 'Do Minimum' or a 'Do Nothing' scenario would be unacceptable. To improve corridor efficiency there needs to be some form of intervention which increases the person carrying capacity of the corridor.

## Preferred Option

### Phased approach

Extensive analysis undertaken as part of the development of the DBC established that a three-phased approach to the corridor upgrade is the optimal value for money proposition, as shown in Figure 0-2.

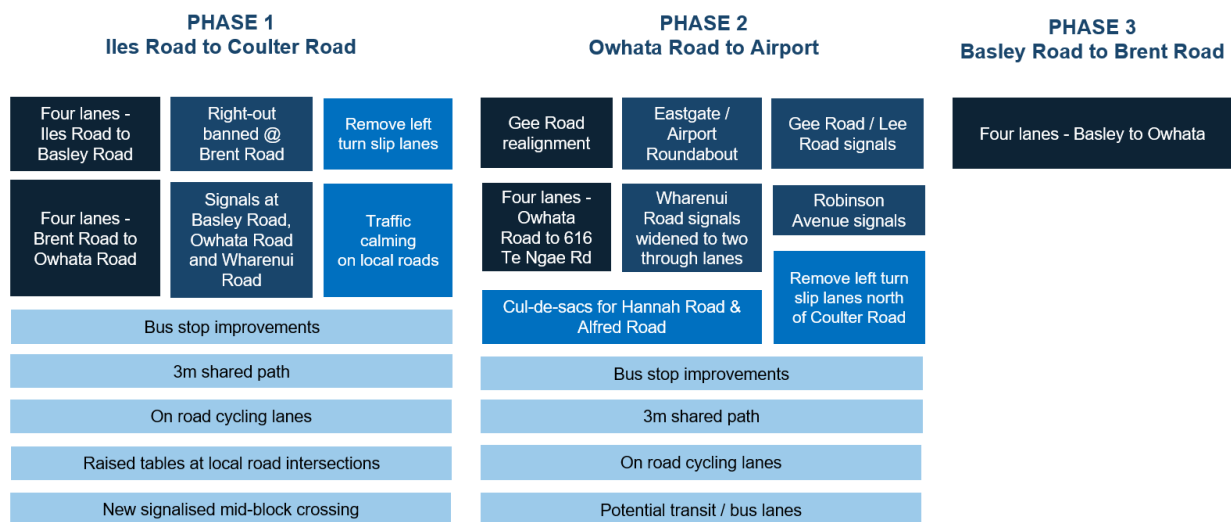


Figure 0-2: Phased approach to the corridor upgrade

The **Phase One** interventions are those which either:

- Support mode shift (addressing LOS gaps)
- Address existing safety and severance issues
- Support housing growth (i.e. 2000 new homes by 2028)

**Phase Two** has development driven, and flexible, timeframes. In this phase the focus is not just around housing growth, but also employment and economic growth.

**Phase Three** would see four laning between Basley Road and Brent Road, in response to further growth in Eastern Rotorua. However, there is some uncertainty around when, or even if, Phase Three will be required. This is because the phasing plan is such that in the first instance, we are setting in place the infrastructure that best supports a shift to active or public transport. If Phase Three is not

required in the next 30 years, this will be because either a) growth hasn't happened as quickly as we anticipated or b) we have seen good mode shift.

## Outcomes

The preferred programme will:

- Support the Eastside Structure Plan development targets of 2000 houses by 2028 and 4000 houses by 2048 whilst maintaining suitable efficiency along and onto SH30 Te Ngae Road.
- See freight and bus travel times be within 10% of the travel time for cars by 2028.
- Support modal shift towards walking, cycling and public transport.
- Reduce the number of people killed or injured on the corridor by 33% within the next 10 years.
- Provide an additional 3km of active mode infrastructure by 2028 and 5km by 2038.
- Make journeys more reliable. AM/PM peak travel times are expected to be within one minute of off-peak travel times.
- Reduce rat-running on local streets.

## Economics

The capital cost estimates for the programme are shown within Table 0-1. The table also provides the 40 year net present value (NPV) benefits and costs, and benefit-cost ratio (BCR).

**Table 0-1: Preferred Programme – Costs and Benefits**

PROGRAMME	CAPITAL COST ESTIMATE	40 YEAR NPV		BCR
		COST	BENEFIT	
Phase One	\$33m	\$28m	\$114m	4.1
Phase Two	\$74m	\$63m	\$139m	2.2
Phase Three	\$79m	\$68m	\$149m	2.2
Phased approach				
Phase upgraded (1-2-3)	\$91m*	\$63m	\$143m	2.3

\*due to cost inefficiencies of coming back and four laning

Several sensitivity tests have been undertaken to provide a likely BCR range for the preferred programme (staging upgrade), focusing on the most influential factors such as construction cost, construction duration, and the impact of slower growth (or less congestion). Under all scenarios the BCR (for the entire phased programme) remained above 1.7.

## Investment Profile

The programme obtains a Government Policy Statement (GPS) priority rating of 'High' based on the anticipated access outcomes. Based on the programme's GPS results alignment rating, and estimated BCR range, the corresponding programme priority order number is 5.

If considered separately, Phase One would have a priority of 4.

## Risk Profile

Three key risks could have a significant impact the outcomes being sought in the DBC:

- **Assumption of reduced speed along SH30 as the base case:** The proposed design has assumed that the speed of SH30 Te Ngae Road will be reduced in accordance with the SH30 Safer Speed Review recommendations. If the speed reductions are not implemented, or implemented after Phase One is delivered, there will be a higher safety risk for all users.
- **Dependency on other initiatives to reach mode shift outcomes:** The infrastructure improvements proposed in this DBC is only one element to achieving mode shift. Other critical dependencies to mode shift being achieved include car parking management and pricing strategies, school and employment travel demand planning, quality and frequency of public

transport services, local network improvements etc. These dependencies will predominantly be delivered by RLC and Bay of Plenty Regional Council (BOPRC).

- **Growth and local road network development assumptions:** The DBC assumes development will occur in line with the Eastside Structure Plan, which includes a new local road connection parallel to Te Ngae Road, from Wharenui Road to Gee Road. If this local connection is not built, development off Gee Road will result in trips of all modes being directed onto SH30 Te Ngae Road. This will result in a greater number of trips being made on the state highway than what has been allowed for in the modelling.

Section 23 provides a comprehensive Risk Review for the project.

## Next Steps

The next stage for this project is pre-implementation and implementation of Phase One.

Phase One has \$35 million funding committed from the COVID-19 Response and Recovery Fund administered by Crown Infrastructure Partners (CIP). This CIP funding was secured to support residential development in eastern Rotorua.

It is important to recognise that whilst the current Phase One cost estimates include contingency, there is no flexibility to request project price level increases from the NLTF should costs increase beyond the allocated \$35 million. If the Phase One cost estimate exceeds \$35 million (the maximum CIP funding available) following detailed design, or at any point through delivery of Phase One, the project scope will be reduced.

# **PART A: THE CASE FOR THE PROJECT**

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# 1. INTRODUCTION

## 1.1 Overview

Significant development is underway in eastern Rotorua, which means that the effects of growth across the transport network, and on SH30 Te Ngae Road in particular, need to be carefully planned for. The corridor already delivers poor experiences for pedestrians, cyclists, bus passengers, truck drivers and car users alike.

A key issue is a lack of choice. Alternatives to using the car are seen by many as unsafe or inconvenient, and the nature of adjacent development<sup>1</sup> means that even short journeys to local shops require the use of SH30 Te Ngae Road. This is creating a snowballing effect where more people drive because they feel unsafe using any other mode, and because more people are driving, roads become more dangerous. The effect is that high traffic volumes on SH30 Te Ngae Road, along with a lack of crossing points, has started to sever the community.

There is also a serious housing supply deficit in Rotorua, and it is areas just off the eastern corridor where much of the planned new housing will go. However, these new developments cannot be introduced unless there is a transport network in place that can accommodate the additional travel demands. For a city where the local economy is so reliant upon tourism, during these Covid-19 times, it is vital that barriers to job creation (e.g. via housing construction) are removed wherever possible.

For these core reasons, the time for investment is now.

### Eastern Corridor Connect Rotorua – Stage Two Detailed Business Case

This report is the investment story for the *SH30 Eastern Corridor Connect Rotorua – Stage Two Detailed Business Case (DBC)*. The project is a partnership between Waka Kotahi and Rotorua Lakes District Council (RLC) and responds to a broader partnership approach with Kāinga Ora and mana whenua.

The recommendation is a value for money proposition that has been through extensive engagement with key stakeholders (including Bay of Plenty Regional Council (BOPRC), Tatau Pounamu<sup>2</sup>, local schools, residents, and the wider community).



Figure 1-1: SH30 Te Ngae Road

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<sup>1</sup> Small, disconnected, residential areas with only access onto SH30 (with few local road connections between these suburbs).

<sup>2</sup> Tatau Pounamu is a community collective of local people and organisations with a shared vision for eastside Rotorua to be a safe place where every tamariki (child) reaches their potential.



## 1.2 Project extent

The extent of the SH30 Stage Two DBC extends along Te Ngae Road from Iles Road to the Rotorua Airport, as shown in Figure 1-2. The study area includes five schools, several retirement villages, visitor accommodation, two industrial areas and several commercial centres.



**Figure 1-2: Project extent**

Whilst this DBC is focused around interventions on SH30 Te Ngae Road itself, the DBC considers the impacts and influence of the surrounding local road network. There is an understanding between Waka Kotahi and RLC that improvements on SH30 Te Ngae Road go together with upgrades to local roads so that a 'one network approach' is taken.

## 1.3 Context

### 1.3.1 SH30 Te Ngae Road provides both access and movement functions

Around 16,000 (near the airport) to 30,000 (near Iles Road) vehicles per day travel along SH30 Te Ngae Road. It is classified as a Regional Road<sup>3</sup> and provides the only connection from the east into the CBD, with all traffic from the area (including regional traffic) eventually funnelling into the SH30 / Tarawera Road intersection (upgrade to signals currently under construction).

Given the environmental constraints (Lake Rotorua to the North, and the Redwood Forest to the south) there would be no reasonable opportunity in the future to construct another parallel road between the city centre and the eastern suburbs. Providing efficient movement of people and goods now and in the future is therefore vital from both an economic and lifestyle point of view.

SH30 Te Ngae Road doesn't just provide a movement function – it also provides an access one. Specifically, within the project extent, there are 316 properties that have driveways onto the road. Furthermore, as the road runs centrally through the eastern part of the corridor, a lot of local movements require (at least in some part) use of SH30. This is particularly true for educational trips, with all schools located on the hillside (east) of the corridor, but with many people living on the lakeside (west).

Conflict between needing to support efficient regional journeys and safe/convenient access means that the corridor has clear deficiencies, with poor provisions for walking, cycling and public transport. This has all led to car dependent communities and poor safety outcomes for vulnerable road users. Continued growth means that these deficiencies are becoming even more prevalent.

### 1.3.2 Rotorua's serious housing deficit

Over the past ten years, Rotorua has seen notable population growth. This has led to a shortage of housing at all levels of the market (including renters and owner-occupiers) and is contributing to increasing housing costs, reducing affordability and increasing homelessness<sup>4</sup>.

In late 2019, the Ministry of Housing and Urban Development (MHUD) carried out a place-based assessment. It identified serious issues relating to homelessness, increasing waiting list for social housing, unaffordable rent/property prices, poor quality homes and relatively high rates of unemployment. These factors have led to a shortfall of 1500 to 1750 homes (as at end 2019). The Covid-19 pandemic is also expected to increase unemployment, create further uncertainty for housing and increase existing inequalities in Rotorua. In particular, it is expected to compound existing issues disproportionately affecting the people of local iwi, Te Arawa.

#### Eastside Structure Plan

RLC and the MHUD have acknowledged that the time to act is now, and they are committed to meeting the objectives of the housing strategy which has been developed to address Rotorua's housing shortage<sup>4</sup>. Part of the strategy is the implementation of the Rotorua Upper Eastside Structure Plan<sup>5</sup>, which is being developed to guide the protection, use, management, and development of land near Waingaehe Stream, east of SH30 Te Ngae Road.

The area covers approximately 1500ha and aims to provide for a mixture of quality housing, recreation, heritage reserves, commercial and active travel links. The project is driven by RLC and Ngati Whakaue (a major landowner), with both parties seeking better environmental outcomes and to provide better employment and housing for the community.

Figure 1-3 provides an overview of the current proposals<sup>6</sup>.

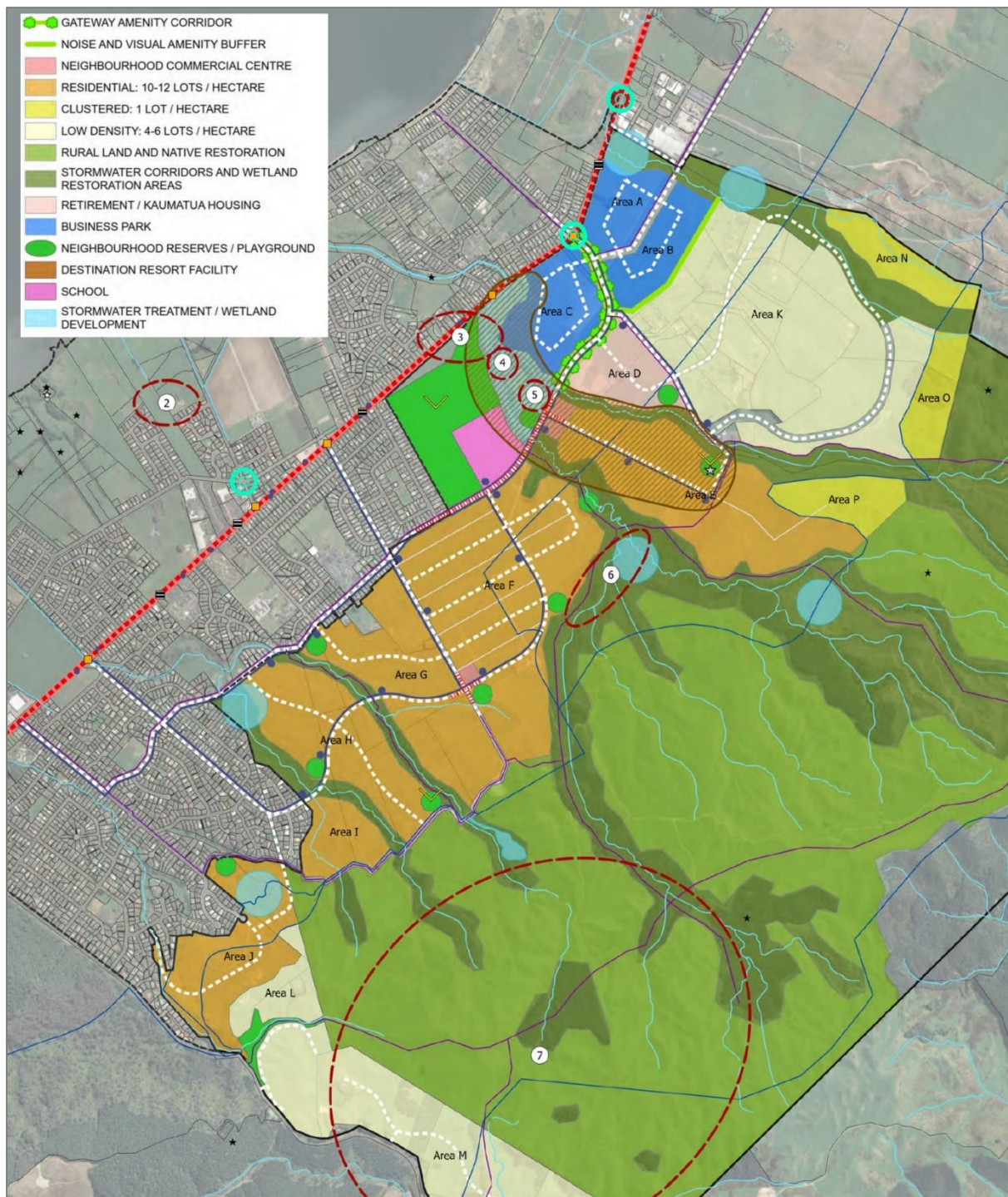
<sup>3</sup> One Network Road Classification

<sup>4</sup> He Papakāinga, He Hāpori Taurikura Te Pouou Rautaki (Homes and Thriving Communities Strategic Framework), RLC, April 2020

<sup>5</sup> <https://boffa.maps.arcgis.com/apps/MapSeries/index.html?appid=569c2e6d135b4d2f909479407c4a80b0>

<sup>6</sup> Note: these are currently in the consultation stage and are subject to some change





**Figure 1-3: Upper Eastside Structure Plan<sup>7</sup>**

The development is expected to see the following yields (low and maximum estimates provided):

- By 2028 - 1700 to 2300 houses. Generally, areas further south to be developed first. These thresholds would address the current housing shortfall in Rotorua.
- By 2048 - Approximately 3000 to 4000 houses (mix of medium and low density). Yield includes the 1700-2300 houses to be built before 2028. In addition, the plan includes more industrial development, a new school and upgraded local road network (notably, one connecting Porikapa Road through to Gee Road).

<sup>7</sup> <https://boffa.maps.arcgis.com/apps/MapSeries/index.html?appid=569c2e6d135b4d2f909479407c4a80b0>

It is important to note that the Eastside Structure Plan reflects the latest land use proposals. Previous plans outlined within the *Planning for the future of Rotorua – 2018 Spatial Plan* (discussed in Section 3), which saw a relatively even distribution of residential development either side of SH30 Te Ngae Road, have since been superseded by the *Upper Eastside Structure Plan (April 2020)*. Much of the lakeside area (west of SH30 Te Ngae Road) has now been earmarked as wetland and cultural/character areas, in line with the Eastside Wellness Plan (also detailed further in Section 3).

### 1.3.3 Economically important freight route

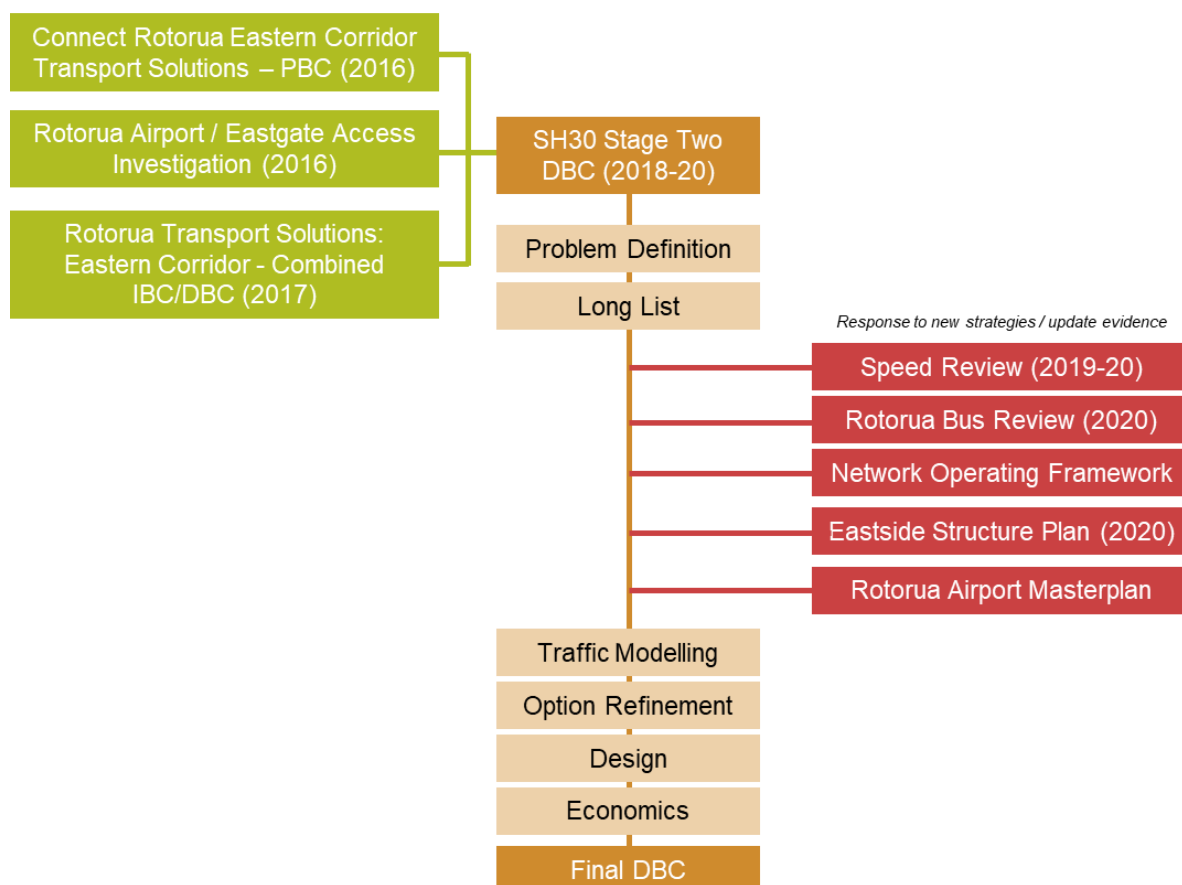
Rotorua sits just outside of New Zealand’s ‘Golden Triangle’, where much of the nation’s economic and population growth has recently occurred (and is planned).

Rotorua forms a key node in the upper North Island’s transport network, located between ports, processing centres, labour markets, and primary production areas where key freight routes cross. Rotorua also acts as an important service and freight distribution centre for the surrounding area.

SH30 Te Ngae Road is one of the primary routes within the region, linking Rotorua to Tauranga, Whakatane and the East Coast. The corridor makes a major contribution to the social and economic wellbeing of the region, connecting significant places, industries, ports, airports, and neighbouring regions. It supports regional freight journeys and provides an important tourism function.

## 1.4 Work Completed to Date

A substantial amount of work has already been completed on the Rotorua Eastern Corridor including business cases and other investigations. The key outcomes of the studies are provided below, whilst Figure 1-4 shows how the SH30 Stage Two DBC has been informed by previous (and ongoing) work.



**Figure 1-4: Project history and interactions**

The DBC began in 2018, during which time the strategic case was developed and a short list of three corridor options were established. This process involved a significant amount of consultation with a wide stakeholder group, and several technical assessments which informed the short listing process.

After this point there were several new strategies which begun; each of which would potentially influence how the preferred solution for SH30 Te Ngae Road would look. Specifically, these were:

- **Safer Speed Review (Waka Kotahi).** The outcome is likely to be the introduction of a slower posted speed limit along SH30. This influences what the 'Do Minimum' is for the business case, and several design considerations.
- **Rotorua Network Operating Framework (NOF).** The outcome of the NOF, developed by RLC, is the identification of the primary and secondary routes for each mode of travel. It is important that the outcomes of this DBC align with the NOF, and that solutions along SH30 support the direction of the NOF.
- **Rotorua Bus Review (BOPRC).** This is an ongoing review which ultimately could result in changes to future bus routes and service frequencies. This review will predominantly be informed by the recommendations of this DBC.
- **Eastside Structure Plan.** This plan, developed by RLC and Tatau Pounamu, ultimately identifies where, and when, development is being planned. This is a core input into the business case and traffic modelling that has informed design decisions and the project economics.

#### 1.4.1 Connect Rotorua Eastern Transport Solutions Programme Business Case (2016)

A key outcome of the preceding Programme Business Case (PBC) was the removal of the Rotorua Eastern Access (REA) designation in 2016. The decision to remove the REA designation was primarily due to legal and property acquisition risks.

The PBC identified SH30 Te Ngae Road as the preferred corridor for investment to address issues associated with changes to land use and anticipated traffic growth. Evidence presented in the PBC demonstrated that forecast traffic growth over the next 30 years could be accommodated by improving the existing road network, primarily through investing in SH30 Te Ngae Road.

*Note: whilst the scale of expected growth in 2016 is similar to current expectations (Figure 1-3), RLC's previous structure plan saw development split roughly evenly either side of SH30 Te Ngae Road. The focus of future housing development is now only on the hillside (east).*

The recommended programme of core activities sought to deal with existing problems and respond to future demand. Details of the recommended programme and progress to date are shown in Table 1-1.

**Table 1-1: Core activities from the Rotorua Eastern Transport Solutions PBC**

CORE ACTIVITY		PROGRESS
Existing problems	Increase capacity at the Sala Street / Te Ngae Road intersection (Reconfigure signals at Te Ngae Road / Sala Street Intersection with free left turn movements for Sala Street into Te Ngae Road.	Currently under construction as part of the Eastern Corridor Stage One project <sup>8</sup> .
	Increase capacity at Te Ngae Road/Tarawera Road/Marino Road intersection (traffic signals).	
	Four lane Te Ngae Road from Tarawera Road to Iles Road to tie in with Lynmore junction development.	
	Confirm local road connectivity – review land use and road hierarchy, ensure Vaughan Road connections fit for purpose.	NOF completed. Local road connectivity forms part of the scope of this DBC.
	Remove Rotorua Eastern Arterial (REA) designation.	Completed. REA bypass designation was removed in 2016.
Respond to future demand	Four lane Te Ngae Road from Iles Road to Basley Road in conjunction with adjacent intersections.	Requirement to be confirmed as part of this business case.
	Manage local road connectivity – review land use and road hierarchy	
	Upgrade Ōwhata Road/Te Ngae Road Intersection (likely to comprise signals).	
	Development of Spatial Plan.	Completed. Spatial Plan was adopted by Council in 2018.

<sup>8</sup> <https://www.nzta.govt.nz/projects/connect-rotorua/eastern-corridor/>



Table 1-1 demonstrates that most of the activities to address the existing problems have been completed or are currently being delivered. Many of the activities to respond to future demand on SH30 Te Ngae Road are addressed through this business case.

#### 1.4.2 Rotorua Transport Solutions: Eastern Corridor - Combined IBC/DBC (2017)

The Eastern Corridor combined IBC/DBC was an outcome of the Eastern Transport Solutions PBC, branded as the 'Connect Rotorua Programme' and was completed in 2017. The IBC/DBC identified short to medium term investment priorities for SH30 Te Ngae Road aimed at addressing existing problems. The IBC focused on corridor improvements between Sala Street and Ōwhata Road, whereas the DBC focused on upgrades between Sala Street and Iles Road (Tarawera Road and Sala Street intersections, and mid-block improvements between Tarawera Road and Iles Road).

A summary of the IBC/DBC recommended package is provided in Figure 1-5. The scope of the DBC was extended to include the airport, based on planned growth in operations at the airport.

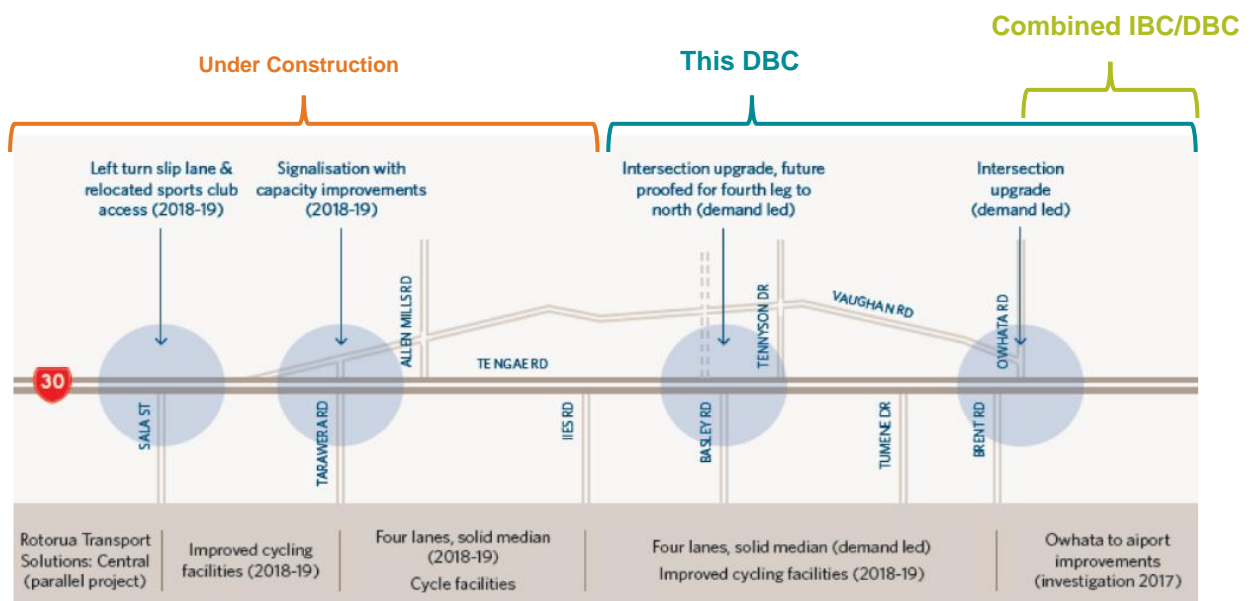


Figure 1-5: Recommended Package from Combined IBC/DBC

#### 1.4.3 Airport/Eastgate Access Investigation (RLC 2016)

This study investigated the optimum access arrangements onto Te Ngae Road for Rotorua Airport and the Eastgate Business Park in response to expected growth.

The investigation found that the most effective option to ensure safe access and maintain highway efficiency was for a consolidated access point at the main entrance to Eastgate in the form of a dual lane roundabout. The analysis and recommendations of this study have been reinvestigated as part of this business case.

#### 1.4.4 Rotorua Network Operating Framework

In 2019, a NOF was completed for Rotorua. A NOF uses a collaborative and integrated approach to managing the entire transport system for all users. Stakeholders agree on core modal objectives and principles then identify citywide primary and secondary networks for walking, cycling, public transport, freight and general traffic based on these principles. The NOF also identifies areas of focus with conflicting demands and constraints.

The following key objectives agreed by stakeholders as outcomes of the NOF are as follows:

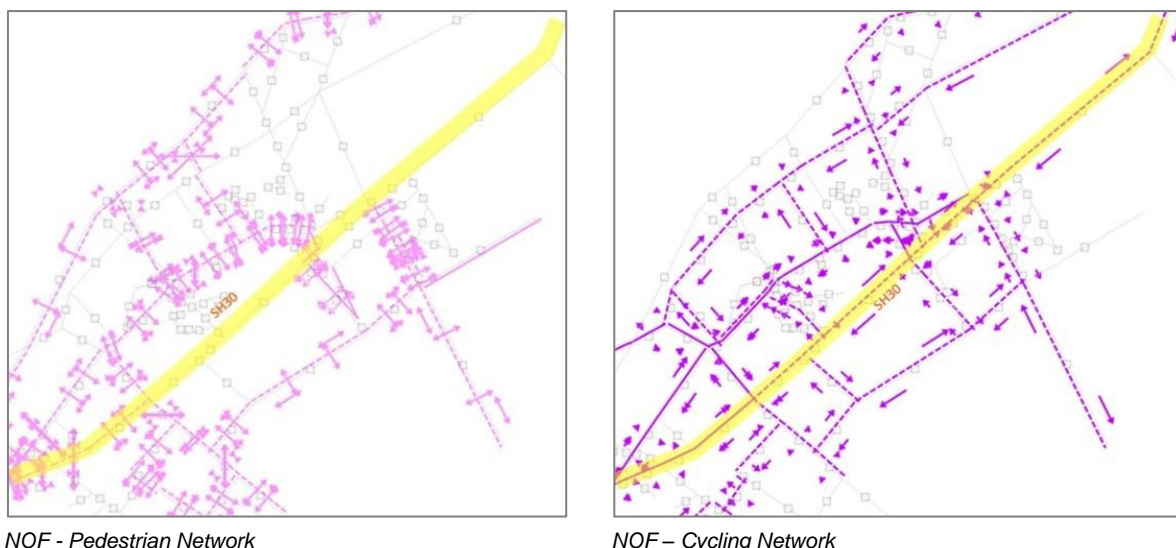
- Rotorua as a less car centric and dependant place by improving active mode and public transport attractiveness and accessibility.
- Improved perception of safety and the ability to choose alternative forms of transport.



- Improved connections between the city and recreational and tourism opportunities through active mode routes.

The outputs of the NOF are used to guide decisions on modal priority along corridors and at intersections and assist in developing solutions. The Rotorua NOF identified SH30 Te Ngae Road as a primary route for freight and public transport, a general traffic route, a secondary cycle route and features two primary pedestrian crossings at Iles Road and Brent Road.

Figure 1-6 shows the priority routes for walking and cycling across eastern Rotorua.



**Figure 1-6: NOF – Walking and Cycling Network**

The NOF also highlights the importance of local road connections for active modes – specifically Vaughan Road on the lakeside and Morey Street on the hillside. Key connections onto SH30 Te Ngae Road include Brent Road, Basley Road, Tennyson Drive and Ōwhata Road.

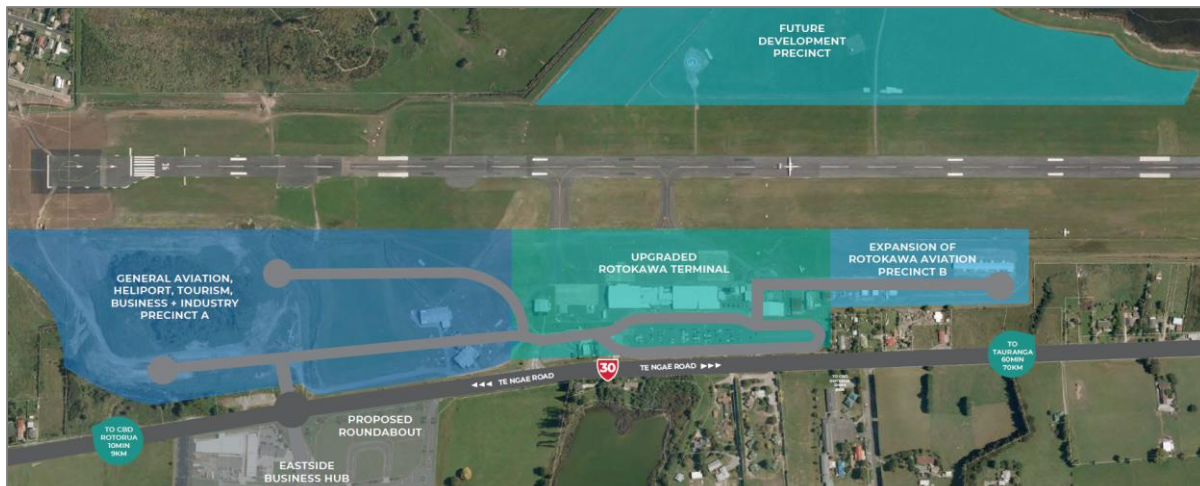
#### 1.4.5 Rotorua Airport Masterplan

As Rotorua recovers from the impacts of Covid-19, the airport will be instrumental in helping the city move forward, with aviation infrastructure and services helping to generate social and economic benefits to the wider community. The Rotorua Airport Masterplan (April 2020)<sup>9</sup> sets out the 30-year vision for the airport which includes unlocking the potential of currently unused airport land.

Figure 1-7 provides an overview of the masterplan, which would see access provided from the western approach to a new four-armed roundabout located at the main entrance to the Eastgate Business Park. The suitability of this proposal, which was identified as part of a separate study<sup>10</sup>, has been evaluated as part of this DBC.

<sup>9</sup> <https://www.rotorua-airport.co.nz/page/masterplan/>

<sup>10</sup> Airport / Eastgate Access Investigation, Greymatter Consultants, February 2016



**Figure 1-7: Rotorua Airport Masterplan**

#### 1.4.6 Rotorua Speed Review (Draft)

Waka Kotahi regularly reviews speed limits to prevent deaths and serious injuries and respond to communities seeking change. The speed limit for SH30 Te Ngae Road, along with other urban roads in Rotorua, is currently being reviewed. Consultation on this speed review finished in August 2020<sup>11</sup>.

For SH30 Te Ngae Road, Waka Kotahi assessed the safe and appropriate travels as:

- 50 kph between Sala Street and just north of Alfred Road (urban/rural boundary).
- 60 kph between Alfred Road and just north of Rotokawa Road. Current posted speed limits vary between 70-80 kph.

The current speed limits are 60 kph between Iles Road to just north of Coulter Road, 70 kph up to Alfred Road and then 80 kph north towards the Airport.

Implementation of the speed review recommendations are expected to see a reduction in the likelihood of a death or serious injury (DSI) on SH30 Te Ngae Road. This DBC has adopted these speed reductions as part of the 'Do Minimum' scenario.

#### 1.4.7 Rotorua Bus Service Review

This work has recently commenced and will identify an investment programme to increase the proportion of users on public transport. There is no timeframe yet available for the expected publication of the review.

#### 1.4.8 Rotorua Eastern Arterial (Designation Removed)

The intention of the Rotorua Eastern Arterial (REA) was to increase efficiency, reduce travel times, and improve safety for all road users travelling around and through the eastern suburbs of Rotorua. The REA was previously seen as the long-term solution to ease congestion through eastern Rotorua, but investigations identified that growth could be managed with upgrades to SH30 Te Ngae Road.

Waka Kotahi confirmed in March 2016 that the REA will not be constructed, and that the designation will no longer be required. The REA designation, which encompassed land between SH30 Te Ngae Road and the edge of Lake Rotorua has since been lifted. It had been in place since 1963 as a response to Rotorua's expected growth and potential traffic issues at that time.

A Cultural Impact Assessment<sup>12</sup> of the REA concluded that given the severity of the impacts on Ngati Hurunga Te Rangī and Ngati Te Kahu there are no measures that can mitigate the negative impacts of these potential options. The report states *"if the land is taken, the damage will be critical and would harm the health and survival of the hapū. There will be a loss of land, loss of mana and loss of*

<sup>11</sup> <https://www.nzta.govt.nz/projects/connect-rotorua/sh5-and-sh30-rotorua-urban-speed-review/>

<sup>12</sup> Prepared by Hurunga Te Rangī Marae Trust and Ngapuna A 2nd Residue Trust - 22 July 2011

*mauri*<sup>13</sup>. The option that was supported by Ngati Hurunga Te Rangi and Ngati Te Kahu was to upgrade and widen SH30 Te Ngae Road<sup>14</sup>.

## 1.5 Key Principles

The following key principles have underlined the development of this business case:

- We are building upon the previous work - but now thinking beyond the efficiency of SH30 Te Ngae Road, and now looking to help create a joined-up network that works for all modes.
- We are **addressing the existing level of service (LOS) gaps for all modes**, but in a manner that allows additional capacity to be added in the future to support growth.
- The focus is on **person**, not vehicle movement. Any additional capacity provided along the corridor could be allocated for special purposes – e.g. bus lanes.
- The project is about **travel choice**, and we are setting in place the infrastructure that would enable modal shift – we are not simply building our way out of congestion.
- We want to **reduce disruption** to the community as much as possible
- We want to minimise land purchase and property impacts

The outcome statement, as agreed with stakeholders, is:

*“Optimising Eastern Rotorua’s transport network to provide equitable and sustainable transport choices that are safe and reliable and accommodate future growth within the catchment.”*

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<sup>13</sup> Paragraph 15.1

<sup>14</sup> Paragraphs 13.1 and 13.2

## 2. STAKEHOLDER ENGAGEMENT

### 2.1 Key Stakeholders

Table 2-1 provides a summary of the investment partners, Treaty Partners and key stakeholders who have a vested interest in the outcomes of this business case.

**Table 2-1: Project Partners**

PARTNER	ROLE
<b>INVESTMENT PARTNERS</b>	
Waka Kotahi	Waka Kotahi is the road controlling authority for the state highway network, are a funder of land transport activities and provide access to and regulation of land transport.
Rotorua Lakes District Council (RLC)	<p>RLC is the local road controlling authority responsible for fully managing the local transport network. Alongside Waka Kotahi, RLC is a project partner. RLC has provided key input into the optioneering and design as the DBC progressed – with internal specialists from the road infrastructure, environment and land development planning teams providing key insights along the way.</p> <p>For the project to respond effectively to the housing crisis and partners under the Treaty of Waitangi there has been a focus on:</p> <ul style="list-style-type: none"> <li>• Alignment with the NOF to develop an integrated local road and state highway network</li> <li>• Staging works in response to, and to support, future housing development</li> <li>• Alignment with RLC's land-use review which is being undertaken in partnership with the local community</li> <li>• Development of a cohesive network of state highway and local roads that responds to mana whenua and community aspirations.</li> </ul> <p>RLC has developed a complimentary local roads investment plan (the Eastside Structure Plan) that has been developed in parallel to the business case. This is provided as Figure 1-3.</p>
<b>PARTNERS</b>	
Bay of Plenty Regional Council (BOPRC)	<p>In the context of this corridor, BOPRC is responsible for transport planning and public transport in the region. They are also the overarching consenting authority for the region's water, soil, air, geothermal areas, and coastlines.</p> <p>BOPRC has provided input for the development of bus stop facilities. BOPRC has also supported improved active transport connections within the local road network to reduce the number of short trips that are made by vehicles. A programme business case to improve public transport outcomes is currently being delivered by BOPRC.</p>
Kāinga Ora	Kāinga Ora are responsible for providing state housing to address homelessness and making homes more affordable for New Zealanders. In addition to managing existing homes, they also partner with other stakeholders to facilitate and deliver urban development projects.
Ministry of Education	The Ministry of Education do not have any significant investment plans or new education facilities in Rotorua East in relation to the anticipated growth in population. The ministry's interests have revolved around the safety of their communities. Schools in and nearby the community include: Ōwhata Primary School, Mokoia Intermediate, Rotorua Lakes High School, Rotokawa Primary School, Lynmore Primary School, Te Wharekura o Ngati Rongomai, Te Kura Kaupapa Māori o Ruamata and Te Kohangareo ki Rotokawa.
<b>TREATY PARTNERS</b>	
Local hapū	<p>Waka Kotahi has duties and obligations to hapū of Te Arawa as parties to the Treaty of Waitangi. Waka Kotahi has a memorandum of understanding with Ngati Uenukukopako, Ngāti Roro o Te Rangi and Ngati Hurunga Te Rangi that has been developed for Stage One of the <i>Eastern Corridor Connect Rotorua</i> project. This will be expanded to include Stage Two as part of this business case.</p> <p>Two hui were held, initially undertaken via Zoom during the Covid-19 Alert Level 4 period (May 2020), and then face to face in Rotorua once the country had achieved Alert Level 1 status (in June 2020). Through this engagement the project team understood the expectations of hapū regarding land requirements and received strong support regarding the strategic case for change.</p> <p>Engagement with Ngati Whakaue through their development arm Ngati Whakaue Tribal Lands was also a key aspect of the project's commitment to partnership under the Treaty of Waitangi. This is discussed further throughout the business case. During the pre-implementation phase the memorandum of understanding between Waka Kotahi and hapū will be updated.</p>
Tatau Pounamu	Tatau Pounamu is a community advocacy group and local hapū collective. The role of the group is to support sustained physical, cultural and spiritual wellbeing of the people of eastern Rotorua through Te Ao Māori. In particular, this relates to the protection of land, water, and resources as they relate to the origin, history and tribal affiliations and are a statement of identity.

PARTNER	ROLE
	<p>The project team gave two project updates to Tatau Pounamu. This group has a partnership agreement in place with RLC to implement a community-driven wellness plan, which the council has plans to support through the District Plan by way of a structure plan.</p> <p>A key objective of engagement with Tatau Pounamu is to develop the relationship and align the project with mana whenua aspirations so that the memorandum of understanding developed for the Stage One Eastern Corridor project can be updated and continued through the implementation phase of Stage Two.</p>
Owhatiura South 5 Incorporation	<p>The Owhatiura South Trust owns 15 hectares of undeveloped land at 362-408 Te Ngae Road. The incorporation has plans to develop the site and has been seeking favourable access on to Te Ngae Road for some time. The site is zoned under the district plan as a mix of residential, light industry and commercial land.</p> <p>The project team met with the incorporation and their consultants on 24 June 2020. During the meeting a range of future activities were proposed for the site and Waka Kotahi undertook to determine what access was suitable, given that a new signalised intersection was proposed at Basley Road and a shared path along the length of the site. A follow up meeting was held on the 3<sup>rd</sup> September 2020 where Stantec provided feedback on the Owhatiura South Trust's traffic modelling and presented the most recent intersection designs relating to the block. An overview of the process for land acquisition was also provided.</p>
Ōwhata Marae Committee	<p>The Ōwhata Marae Committee are the decision making body responsible for decisions relating to Māori Roads in the area. There is one road that connects to the state highway network: Te Roro o Te Rangi Road near the Wharenui Road intersection that will be the subject of further investigation during the detailed design phase, in consultation with adjoining land-owners.</p>

Table 2-2 outlines the key project stakeholders, and their role in the project.

**Table 2-2: Key Stakeholders**

ORGANISATION	ROLE
Rotorua Airport	<p>Rotorua Airport is a roading and aviation authority and is owned by RLC. The airport has a memorandum of understanding with Ngati Whakaue and Ngati Uenukukopako.</p> <p>The airport currently have a long-term masterplan in place. To aid the development of the business case, they provided valuable input into better understanding potential stormwater and drainage design issues. They have also supported efforts to be responsive to the needs and aspirations of mana whenua under the Treaty of Waitangi.</p>
Ngati Whakaue Tribal Lands Trust	<p>Ngati Whakaue are the largest landowner in east Rotorua with plans for greenfield development to start in 2020 in partnership with Kāinga Ora</p>
Ministry of Education (MOE)	<p>Ōwhata Primary, Mokoia Intermediate and Rotorua Lakes High School were initially engaged during the development of the Strategic Case. This engagement identified the potential scope and scale of improvements from reducing the severance caused by SH30 Te Ngae Road on the community.</p> <p>During the consultation phase the project team met with:</p> <ul style="list-style-type: none"> <li>• Ōwhata Primary School, Mokoia Intermediate and Rotorua Lakes High School were engaged from an early stage working on mode shift and safety elements of the design before public consultation</li> <li>• Rotokawa School and the adjoining Kohanga Reo ki Rotokawa to identify ways these school communities can benefit from local road and state highway enhancements</li> <li>• Lynmore Primary School to understand how the improvements on SH30 Te Ngae Road up to Iles Road (being delivered under Stage One) are impacting travel choices and what Stage Two may mean for the school community.</li> </ul> <p>Other schools in the area that we informed about the project include Te Wharekura o Ngati Rongomai, Te Kura Kaupapa Māori o Ruamata and Te Kohangareo ki Rotokawa.</p> <p>There are also several early years education facilities in the area.</p>
Ministry of Housing and Urban Development (HUD)	<p>HUD leads New Zealand's housing and urban development work programme and are responsible for strategy, policy, funding, monitoring and regulation of New Zealand's housing and urban development system. They are interested in supporting urban development in Rotorua and are working with RLC to support their spatial plan aspirations.</p>
Individual landowners along the corridor	<p>A letter was sent to all properties adjacent to the corridor (between Iles Road and Basley Road) advising of the planned public engagement. A follow-up letter was sent advising when engagement was open for public feedback.</p> <p>A separate letter was sent to the owners and tenants of 347 properties (including 98 owner/occupiers) who were expected to have their existing access impacted. In summary:</p> <ul style="list-style-type: none"> <li>• 28 properties were identified as potentially being directly impacted, that is potential for land acquisition or tailored design activity to mitigate new safety risks (such as access controls for properties impacted by new traffic lights). After the safety review and redefined staging plan this number reduced to 24 properties. At the time of writing, successful contact was made with all</li> </ul>



ORGANISATION	ROLE
	<p>impacted landowners directly impacted by the proposal, most of them before public consultation commenced</p> <ul style="list-style-type: none"> <li>• There was widespread agreement regarding the problems that the business case identified and strong support for interventions proposed to address these problems</li> <li>• 24 landowners, including four businesses and three Māori organisations will be engaged as part of the pre-implementation stage. This is discussed further in <i>Part C Readiness and Assurance</i>.</li> </ul>
NZ Police	The NZ Police have a strong interest in safe use of roads and vehicles through enforcing speed limits, checking vehicle compliance, managing traffic /congestion associated with accidents and other unplanned stoppages.
NZ Emergency Services	<p>The Emergency Services have a strong interest in any changes to the road network and the impacts this can have on their emergency response. A fire truck has more demanding access requirements than other emergency response vehicles.</p> <p>A Zoom meeting was held in late August with Police and emergency services. They were given an overview of the proposed improvements and provided their feedback on the design.</p>
St John New Zealand	St John are contracted by the Lakes District Health Board to respond to medical emergencies. They have a strong interest in safe roads to prevent accidents and also with a roading network that supports the rapid deployment of emergency response assets to all areas.
Holmes Group	Holmes Group has land holdings at Lynmore Junction and Eastgate Business Park. Holmes Group represents the commercial and retail tenants/ business owners at the Lynmore Junction. Engagement with Holmes Group to resolve concerns with the central median on the section of SH30 Te Ngae Road between Allan Mills Road and Iles Road (Part of the Stage One project) is ongoing.
R&B Property Group Limited	<p>In person engagement on 23 July 2020. R&amp;B Property Group has land holdings at 340 Te Ngae Road. R&amp;B represents the commercial and retail tenants/ business owners at that site.</p> <p>Feedback received focused predominantly on the impacts of Stage One works. These have been shared with the relevant team at Waka Kotahi for consideration.</p>
Damar Industries Limited	Damar Industries developed the Eastgate Business Park (in partnership with Holmes Group). They undertake industrial activities at the site currently. At the time of development, contributions were paid to RLC for enhanced access to SH30 Te Ngae Road. There was an agreement between Damar and the council to upgrade the intersection when traffic volumes rose above 2,000 vehicles per day and whilst Damar have been patient, the delayed development of the intersection is having an impact on business park tenants.
Rosedale Superette	The owner and operator of the Rosedale Superette also owns the site of the adjoining Makar Indian Restaurant. This site is currently adjoining, and also impacted by public transport facilities on Basley Road. Urban design input will be required during the detailed design phase due to the changes to this corner, including changes to the existing car parking on both private and public property.
Regency Park Estate Lifestyle Retirement Village	This retirement village on the corner of Te Ngae Road and Brent Road is one of three along the corridor and recently obtained consent to increase the scale of their operation. Pedestrian safety improvements proposed by Regency were incorporated into the proposed concept plans that went out for public consultation.
Rotorua Forest Haulage	Rotorua Forest Haulage are part of the large industrial site in Ngapuna which enjoys a private through-road connecting Te Ngae and Vaughan Roads.
New Zealand Heavy Haulage Association	This section of State Highway is on the main oversize route for over-dimension and overweight freight loads travelling between the Bay of Plenty and Rotorua. It is the main route for freight and oversize items that are travelling to/from the Port of Tauranga.
Rotorua Cycle Action Network	Rotorua Cycle Action Network is a local cycling advocacy group. They were engaged before the proposal went public and will be engaged in the detailed design phase.
Automobile Association	Automobile Association has over 1.7 million members nationally, with over 80,000 of these being in the Bay of Plenty region. The AA recognises the challenges for the project and the importance of log freight on this road, bringing significant economic benefits to the region. The AA advocate for greater priority on through traffic levels of performance and enhanced safety for cyclists by having cycle lanes off grade from the road.

Other stakeholders were updated at various stages throughout development of the DBC via emails, newsletters and detail on the Waka Kotahi website. including a technical advisory group set up during the programme business case.

Other stakeholders not listed above (but were consulted through the programme business case newsletter) include: Freight industry advocacy groups; Positive Ageing Rotorua; Rotorua Principal's Association; Rotorua Sustainable Living and the Rotorua Chamber of Commerce.



## 2.2 Meetings and workshops

Engagement with local authorities, local hapū, developers, residents, schools, and the wider community was undertaken at strategic points during the development of this DBC. As such, we consider that the preferred programme was co-designed with stakeholders and partners.

An extensive list of the meetings and workshops that have informed the development of this DBC are provided within **Appendix A**.

Minutes from these meetings are provided as **Appendix B**.

## 2.3 Stakeholder engagement plan

A **Stakeholder Engagement Plan** has been developed for this project (see **Appendix C**), which outlines the purpose and objectives of engagement, the engagement methods and programme. The plan also defines the roles and responsibilities of key stakeholders.

The engagement objectives and outcomes for the project are outlined in Table 2-3.

**Table 2-3: Engagement Outcomes and Objectives**

OBJECTIVE	OUTCOME
Awareness	Ensure key stakeholders, partners, and communities are aware of the key messages and the timeframes for inputs and outcomes.
Understanding	Key stakeholders and hapū partners understand the business case process, including programme deliverables and decision making.
Behaviour	Key stakeholders and partners team up with the Waka Kotahi to deliver the programme in a cohesive and collaborative way.
Participation	Stakeholders, partners, and communities are provided with opportunities to participate in decision making processes, where applicable, to inform business case development.
Reputation	Waka Kotahi delivers robust business cases, engages genuinely and effectively with stakeholders and is working on behalf of the Government to give effect to transport priorities.

Key messages were developed for the project to support engagement with stakeholders and the community, according to the following themes:

- SH30 Te Ngae Road is a key gateway and an important part of the local road network.
- Stakeholder and community engagement are critical to the business case process.
- We want to support growth by working with our partners.
- We are working in partnerships to enable sustainable housing development.
- The state highway and local roads form part of one cohesive network.
- We are developing a cost-effective approach that delivers benefits over many years.

Outcomes from public consultation are discussed throughout the report.

## 3. STRATEGIC CONTEXT

This section provides the strategic context for the project. Consideration of the main objectives from each strategy has helped to shape the DBC. **Appendix D** describes how the preferred programme aligns strongly with each of the key national, regional, and local strategies.

### 3.1 Key strategies

#### 3.1.1 Eastside Wellness Plan (2020)

The Eastside Wellness Plan was developed in a collaborative partnership between Ngāti Uenukukōpako, Ngāti Te Roro o te Rangi, Ngāti Hurungaterangi, Tatau Pounamu and RLC. The Plan identifies the key features of eastern Rotorua and the known challenges in the area. It also provides a framework for future development, guiding and coordinating growth to ensure that key values of the area are maintained<sup>15</sup>.

Key aspects of the Eastside Wellness Plan that have informed the development of the DBC are:

- A desire to make Vaughan Road a community friendly corridor.
- Safe crossings to connect to the schools on the eastern side of SH30 Te Ngae Road.
- Traffic calming along Pohutukawa Drive and Lee Road to reduce traffic speeds.
- Create a sense of arrival through a well-designed gateway entrance (on Ōwhata Road).

Figure 3-1 and Figure 3-2 show the areas which have been identified for cultural and environmental protection (i.e. wetlands) respectively.

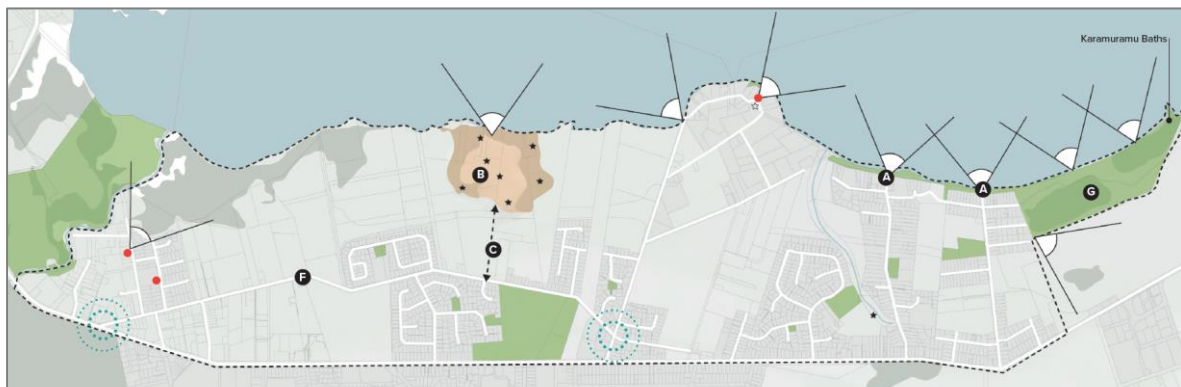


Figure 3-1: Eastside Wellness Plan – protection of cultural sites



Figure 3-2: Eastside Wellness Plan – protection of the natural environment

<sup>15</sup> Public engagement on the wellness plan was coordinated with the business case and feedback between the two projects was shared.

### **3.1.2 Rotorua Spatial Plan (2018)**

Rotorua's Spatial Plan provides a blueprint for the district to plan how the city and district will grow, develop, and change over a time horizon of 30+ years. The aim of the Spatial Plan is to create a more inclusive, equitable and sustainable community and economy. It highlights key areas for growth and change, identifies issues and priorities to address these and provides a guide for investment decisions at all levels of government.

The Spatial Plan show the Eastside area as a priority for development in the short term, incorporating a new collector road and 'green' active transport links to the CBD.

This plan has been developed to respond to population changes and global and national trends that will influence growth and development. The aim is to balance the environmental, social, economic, and quality of life factors affecting the community. It also guides allocation of resources such as land use and construction of capital works, such as roads. The Spatial Plan confirms the location and intensity of future land use development, and aspirations for liveability, such as enhancing recreation opportunities.

### **3.1.3 Rotorua Housing Accord (2017)**

In August 2017 RLC and the Government signed a Rotorua Housing Accord, agreeing to work together to address housing supply and affordability issues. The accord enables collaboration with government agencies and allows RLC to recommend areas to be established as Special Housing Areas. This can trigger special legislation enabling fast-tracked consenting for new homes.

Additional residential and industrial development is proposed adjacent to the Eastern Corridor, and this will increase travel demand on Te Ngae Road. Investment in improvements on SH30 Te Ngae Road is closely aligned to the Housing Accord, and will support access to the proposed new developments, population growth and housing affordability.

### **3.1.4 Rotorua Urban Cycling Plan and Framework (2015-18)**

The vision of the Urban Cycling Strategic Plan is for *"a district in which people from all sectors of the community can and do cycle safely for transport and enjoyment"*. The aims of the plan are:

- To increase participation.
- Make urban cycling a safer and more attractive transport choice.
- Support economic growth through cycling.
- Socialise cycling.

A cycle network plan is provided within the Framework, with SH30 Te Ngae Road identified as a major commuter (primary) route requiring separated cycleways. The recent NOF however only identifies SH30 Te Ngae Road as a secondary cycling route, with a greater focus on alternative parallel routes (e.g. Vaughan Road).

Nonetheless, there is consistency between both frameworks that SH30 Te Ngae Road serves an important function as a cycle corridor and provides a different function for commuters (faster and more confident) and less confident or slower riders.

### **3.1.5 Rotorua District Plan (2016)**

The Rotorua District Plan provides guidance and rules about new developments and the use of land and buildings across Rotorua. Of specific interest to this project is information and rules which relate to the Wharenui Road development area<sup>16</sup>.

Rule A5.3.2 (2g) outlines that staged residential development shall not exceed the following rules unless the mitigation measures outlined within Table 4-1 are implemented. To date, the trigger for left-in/left-out turning restrictions at Coulter Road and Brent Road (151 lots) has not been triggered.

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<sup>16</sup> Appendix 5.1 – Development Plans

**Table 3-1: Wharenui Road development triggers**

Trigger Level (new lots created)	Mitigation Required
51	Brent Road Traffic Calming
151	Left In/Left Out turning restrictions at Coulter Road and Brent Road
301	Traffic signals at Wharenui Road, Basley Road and Iles Road Wharenui Road Traffic Calming

Should this business case confirm the need for any of these restrictions to be implemented to address existing issues (i.e. not in direct response to the Wharenui Road development), these triggers would then effectively become redundant.

### 3.1.6 RLC Road Safety Campaign

RLC also have a road safety promotion programme<sup>17</sup> in place that includes walking and cycling education, advertising, and travel demand management. The SH30 Te Ngae Road improvements are already listed in upcoming works on council advertising and maps<sup>18</sup>.

## 3.2 Other national, regional and local policies

**Appendix D** provide summaries of other relevant national, regional, and local documents and strategies that have helped shape this DBC. This also includes a review of how the how the desired outcomes of the DBC align with the 2021 GPS.

Commentary has been provided around how the desired key principles influenced the outcomes of the DBC. Generally, the principles relate to *providing equitable and sustainable transport choices that are safe and reliable and accommodate future growth*.

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<sup>17</sup> [www.rotorualakescouncil.nz/our-services/SafeandSustainableJourneys/RoadSafety/Pages/default.aspx#:~:text=Road%20Safety%20Rotorua,travel%20around%20safely%20and%20freely.&text=07%20348%204199%20or%20roadsafety.rotorua%40rotorualc.nz](http://www.rotorualakescouncil.nz/our-services/SafeandSustainableJourneys/RoadSafety/Pages/default.aspx#:~:text=Road%20Safety%20Rotorua,travel%20around%20safely%20and%20freely.&text=07%20348%204199%20or%20roadsafety.rotorua%40rotorualc.nz)

<sup>18</sup> Confirmed during the 17 August 2020 meeting with RLC

## 4. CONTEXT

### 4.1 Economic

In recent years there has been positive economic progress in Rotorua. The local economy has performed above the national average, unemployment has been dropping and the tourism, agriculture/horticulture, forestry, retail, and hospitality sectors have thrived<sup>19</sup>. Described below is an overview of how SH30 Te Ngae Road plays a role in supporting each of these key industries.

#### 4.1.1 Tourism

Rotorua is world-renowned for its geothermal activity that include geysers, thermal springs and hot mud pools which make it a major destination for both domestic and international tourists. In recent years, Rotorua has diversified its tourism offerings, promoting adventure activities, and has become one of New Zealand's premier mountain biking destinations. Rotorua also hosts many large corporate and sporting events throughout the year. Puketawhero Park, within the study area, is also the host of the annual rugby league nationals.

Tourism is a vital part of the local economy, and prior to the Covid-19 pandemic, visitors were spending \$717 million annually on goods and services in Rotorua<sup>20</sup>. This contributed to 17.2% of the district's GDP<sup>21</sup> which made tourism the district's largest employment sector<sup>22</sup>.

The Rotorua airport masterplan recognises this growth with a plan to accommodate more private charters and a greater volume of helicopter flights (see 1.4.5 for more information).

Over the next 1-2 years, the local economy is expected to see a short-term hit because of Rotorua's exposure to international tourism. However, there is hope that this will, at least in part, be offset through an increase in domestic travel. As shown in Figure 4-1, *Rotorua Economic Development Ltd* still maintains a goal of growing the industry to \$1 billion by 2030.

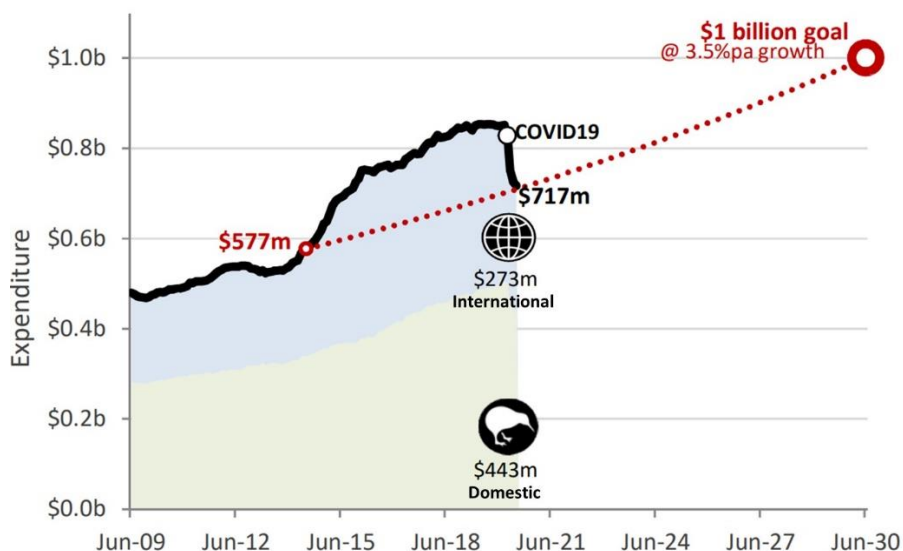


Figure 4-1: Rotorua – Visitor Expenditure<sup>20</sup>

Rotorua is a hot spot for domestic and international tourists alike, and for many visitors, a journey along SH30 Te Ngae is their first experience. Given that such a high proportion (70%) of visitors are domestic (i.e. people more likely to revisit), it is vital that their entire trip, which includes the journey to/from home, is as enjoyable and stress-free as possible.

<sup>19</sup> Rotorua Draft Spatial Plan 2017.

<sup>20</sup> <https://www.rotoruanz.com/RNZ/media/Media-Library/Business/Do%20Business/Research%20and%20Statistics/RotoruaTourismFactsheet.pdf>

<sup>21</sup> <https://www.rotoruanz.com/RNZ/media/Media-Library/Business/Media/Resources/Rotorua-Economic-Development-Annual-Report-2019-FINAL.pdf>

<sup>22</sup> Employment across several sectors including accommodation, tourist attractions, retail, food services, performing arts and event companies.

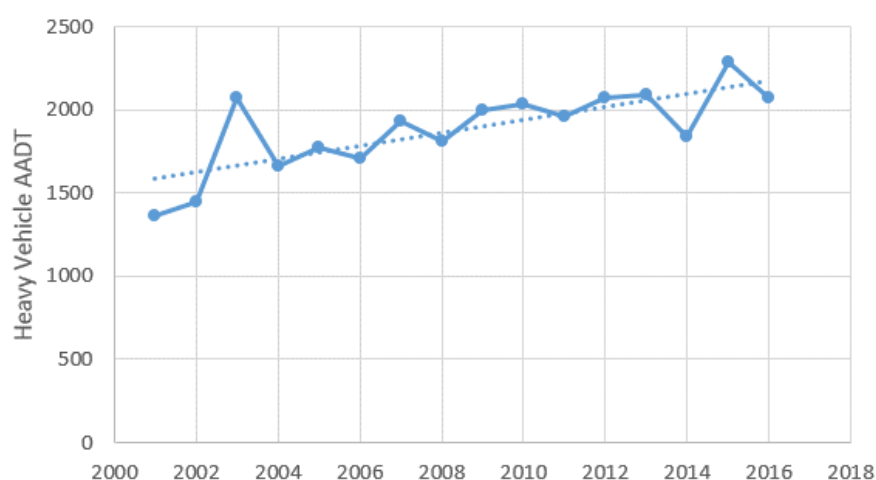
### 4.1.2 Primary Industries

The main primary industries for Rotorua are forestry and wood processing, agriculture and horticulture, and the geothermal/power industries.

The forestry industry is Rotorua's second largest employer (after tourism), with forestry and wood processing accounting for about 15% of Rotorua's GDP. Indeed, around 40% percent of New Zealand's total wood production comes from within 100km of Rotorua<sup>23</sup>. The surrounding regions are also highly fertile, which helps create a high amount of agricultural produce that contributes 5.7% to the local economy.

For these primary industries, safe and efficient transport connections are needed. SH30 Te Ngae Road provides the strategic connection between the Rotorua District and the Port of Tauranga (the largest export port (by volume) in New Zealand). There is also strong focus on facilitating economic growth through transport infrastructure within national, regional, and local strategies. Therefore, SH30 Te Ngae Road must continue to support these industries.

Figure 4-2 shows how freight volumes have steadily grown over the last 20 years<sup>24</sup>.



**Figure 4-2: Annual Freight Volumes at Puarenga Stream**

There is a balance to be struck. Growing industries means more trucks on the road, which could conflict with the role SH30 Te Ngae also needs to play in facilitating safe local movements and access into properties off the state highway.

### 4.1.3 Impacts of Covid-19

The COVID-19 pandemic and the resulting government containment measures to reduce the spread of infection, including the mandatory Alert Level 4 lockdown and closing New Zealand's borders, represents the greatest economic shock in living memory. The knock-on effects of the initial wave of the pandemic in New Zealand and continuing crisis overseas will continue to constrain economic activity and result in substantial job losses. An initial report<sup>25</sup> on the economic impacts of COVID 19 outlined that the worst hit areas in New Zealand are those that are heavily exposed to international tourism, including Rotorua.

In addition, Rotorua also has one of the largest international student populations outside of the main centres, with 17% of Toi Ohomai Institute of Technology's income coming from international students. Rotorua's forest industry has also been hard hit due to a steep decline in demand for logs due to closure of key export markets. However, the reopening of the Chinese economy means that demand for logs is anticipated to grow once more.

<sup>23</sup> <https://www.rotorualakescouncil.nz/our-council/news/Pages/default.aspx?newsItem=6113>

<sup>24</sup> Puarenga Stream Telemetry Data 2016

<sup>25</sup> Infometrics (2020). Economic Impacts of COVID-19 on the Rotorua Economy – Early Estimates <https://www.rotorualakescouncil.nz/our-council/council-publications/surveysandReports/Documents/Infometrics-impact-of-COVID19-on-Rotorua-economy-April-2020.pdf>



Other key findings from the report were:

- Rotorua's unemployment rate is expected to increase to 10.7% by March 2021
- An estimated 3,700 jobs are expected to be lost
- Increase in under-employment and fall in labour force participation
- Māori, Pasifika, and youth are likely to be disproportionately impacted
- Domestic tourism may increase, particularly in the short-term, due to Rotorua's proximity to the three largest upper North Island population centres.
- An increase in youth not in employment, education, or training (NEETs) is expected.
- Population growth expected to slow, at least in the short to medium-term

Investment in upgrading SH30 Te Ngae Road will play a part in how strong, and how fast, the local economy will recover. This will come via employment generated by a) construction activities on the state highway itself; and b) in the building the new houses an upgraded corridor would help facilitate.

## 4.2 Land Use

### 4.2.1 Existing land use

There are currently distinct areas of residential, commercial, and industrial development adjacent to SH30 Te Ngae Road. There is also an industrial park at Eastgate close to the airport, and numerous commercial activities off the road, including light industrial shopping centres and convenience stores.

Directly off SH30 Te Ngae Road (between Iles Road and the airport) there are around 200 residential properties which have unrestricted access. These residents are more susceptible to negative effects of rising traffic volumes which includes social issues (such as community severance) and health issues such as the effects of noise, vibration, pollution, and increased safety risk. All of this reduces the quality of life for people living off the road<sup>26</sup>.

### 4.2.2 Under Construction

There are two significant developments currently under construction whose influence has been carefully considered as part of this business case. These are described below.

#### Lynmore Rise

The Lynmore Rise Retirement Village, located at 40 Owhatiura Drive, comprises of 63 single level villas and is due for completion in 2021<sup>27</sup>. The development is also bound by SH30 Te Ngae Road and Basley Road, fully utilising the extent of the property boundary. A noise bund has already been constructed alongside SH30 Te Ngae Road.

Figure 4-3 shows the development proposals.

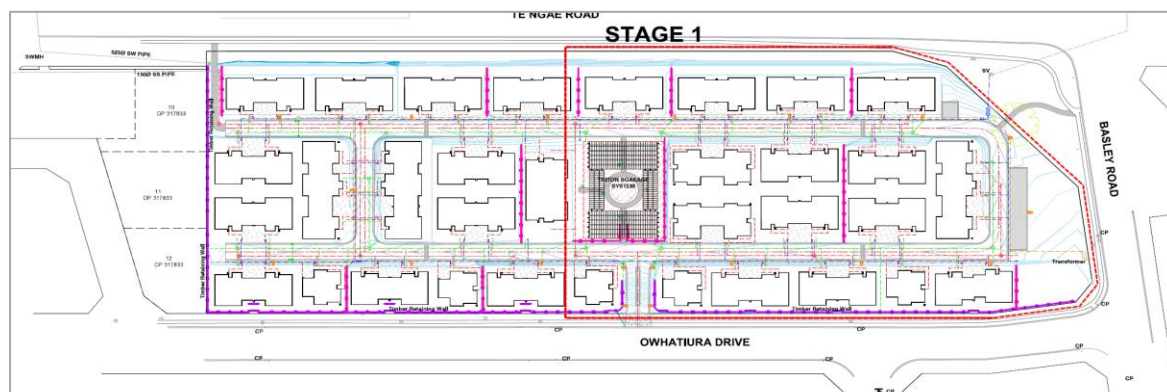


Figure 4-3: Lynmore Rise Retirement Village - plans

<sup>26</sup> Transport sources accounted for 17% of PM10 emissions in Rotorua, concentrated around the major road corridors (BOPRC (2005) Rotorua Air Emissions Inventory).

<sup>27</sup> <https://discover.classicbuilders.co.nz/lynmorerise/>

As part of the option development process, the DBC has taken into consideration that:

- It is not possible to acquire any part of this property to facilitate the upgrade of SH30 Te Ngae Road. As such, any widening of the road would be constrained by the extent of the existing road reserve on the eastern side.
- The development would generate an increase in pedestrian activity along Basley Road and SH30 Te Ngae Road. Many of these people would be elderly people and some may:
  - Be less confident walking and cycling along a busy road
  - Need a little more time to cross the road
  - Need to access public transport services to get to and from the city centre

### Wharenui Road residential development

The Wharenui Road area is located on the western side of Wharenui Road and bound by Porikapa and Morey Street to the north, McKenzie Road, Hayward Rise, Basley Road, Devoy Drive, and Stafford Rise to the west; and the extension of Link Road (paper road) to the south.

The staging of the development includes provision for infrastructure upgrades throughout development of the site (see

Table 3-1). Figure 4-4 shows the plan for the first stage of the Wharenui Road development<sup>28</sup>, which includes 179 residential lots.



Figure 4-4: Wharenui Road development

#### 4.2.3 Future land use

As described in Section 1.3, large scale (predominately housing) development is planned on the hillside (east) of SH30 Te Ngae Road over the next 10 years. Rotorua Airport also have large scale development plans that would generate more local employment.

The Ministry of Education confirmed that they are not building any new schools, nor classrooms in response to anticipated demand from new housing. Currently, Rotorua is outside of their strategic

<sup>28</sup> [www.rotorualakescouncil.nz/our-services/planningservices/districtplan/DistrictPlan/Documents/Proposed-district-plan/Proposed%20District%20Plan%20Text/Proposed%20District%20Plan%20-%20Appendix%205%20-%20Approved%20Development%20Plans%20-%20Sep%202012.pdf](http://www.rotorualakescouncil.nz/our-services/planningservices/districtplan/DistrictPlan/Documents/Proposed-district-plan/Proposed%20District%20Plan%20Text/Proposed%20District%20Plan%20-%20Appendix%205%20-%20Approved%20Development%20Plans%20-%20Sep%202012.pdf)

focus areas (namely Auckland and Tauranga)<sup>29</sup>. However, this differs to the aspirations of the Eastside Structure Plan.

## 4.3 Social

### 4.3.1 High number of schools

There are five public schools located on or near SH30 Te Ngae Road:

- Lynmore Primary School (roll: 660)
- Rotorua Lakes High School (roll: 622)
- Mokoia Intermediate School (roll: 300)
- Ōwhata Primary School (roll: 193)
- Rotokawa Primary School (roll: 198)

All schools are located on the eastern side of the corridor. This means that access to these schools by active modes for those living to the west of Te Ngae Road is inhibited as high traffic volumes and speeds deter families from walking or cycling to school. The Ministry of Education expects that existing schools have capacity to grow to meet future planned housing growth, without a new school being built.

On the other side of the road are two Kaupapa Māori schools, one within the study area and the other between the airport and Tikiteri to the east where SH30 and SH33 meet.

Any solution that seeks to improve access to schools would also need to consider the trip end facilities (e.g. bike lockers) and other non-infrastructure measures to promote sustainable travel.

### 4.3.2 Increasing Population

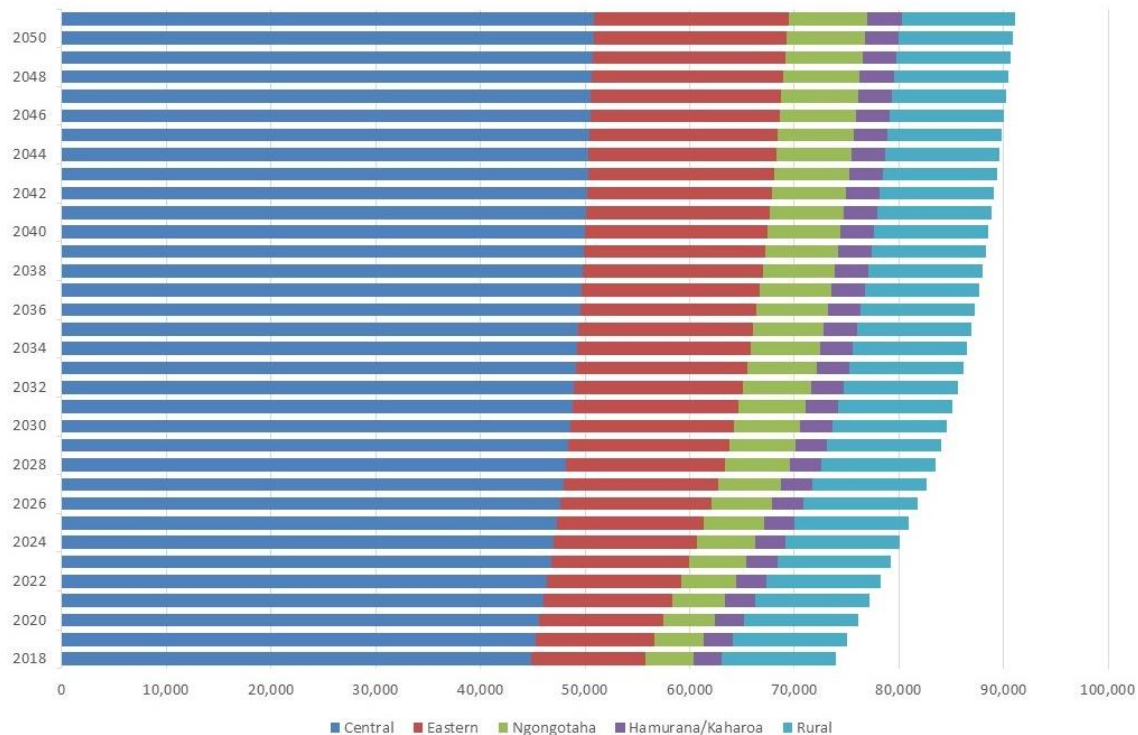
The census identifies that between 2013 and 2018 Rotorua's population increased by 10.1% to 71,877 residents, which exceeded RLC's (2015) highest growth scenario population forecasts<sup>30</sup>.

RLC have since developed more recent projections (March 2020) which have directly informed the development of the Eastside Structure Plan. These are shown graphically as Figure 4-5, broken down by the 'central Rotorua', 'eastern Rotorua', 'Ngongotaha', 'Hamurana/Kaharoa' and 'rural' areas.

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<sup>29</sup> Email from the MOE (16 March 2020)

<sup>30</sup> Rotorua Lakes District Population Projections Draft report (February 2015) <http://www.rotorualakescouncil.nz/our-council/news/Documents/BERL.pdf>



**Figure 4-5: Rotorua population projections**

The projections show residential growth is focused on the eastern side of Rotorua, with an average rise of 2.2% per annum over the next 30 years. In absolute terms this will see the population east of SH30 Te Ngae Road increase from 10,800 to 18,600 people.

#### 4.3.3 An aging population

Currently the average age of a resident in Rotorua is 36 years old (compared to 38 years old nationally). However, by 2043 this is expected to increase to around 42-46 years old<sup>31</sup>.

As with much of New Zealand, Rotorua is expecting to have an aging population. This will increase demand for social services, public transport, access to local goods and services, improved pedestrian infrastructure and mobility parking spaces. It will also influence household composition, with a substantial growth in one-person households and demand for retirement villages and rest homes.

Given that SH30 Te Ngae Road forms part of the only route to the main hospital in the CBD for people living in the eastern suburbs (and wider rural areas), significant delays encountered by emergency services could cost lives.

#### 4.3.4 Social disadvantaged areas

The Social Deprivation Index (SDI)<sup>32</sup> is a measure of socio-economic status based on a range of variables derived from census data. Variables used to calculate socio-economic disadvantage include income, employment, home ownership, housing quality and qualifications.

The SDI ranges from Decile 1, representing areas with the least deprivation through to Decile 10, areas with the highest levels of deprivation. Levels of deprivation for areas around the SH30 Te Ngae Road corridor (north of Iles Road) are largely Decile 9 and 10, representing some of the most socially deprived communities in New Zealand.

<sup>31</sup> Stats NZ. <https://www.stats.govt.nz/tools/2018-census-place-summaries/rotorua-district>

<sup>32</sup> Ehinz. Socioeconomic deprivation profile - <https://ehinz.ac.nz/indicators/population-vulnerability/socioeconomic-deprivation-profile/>

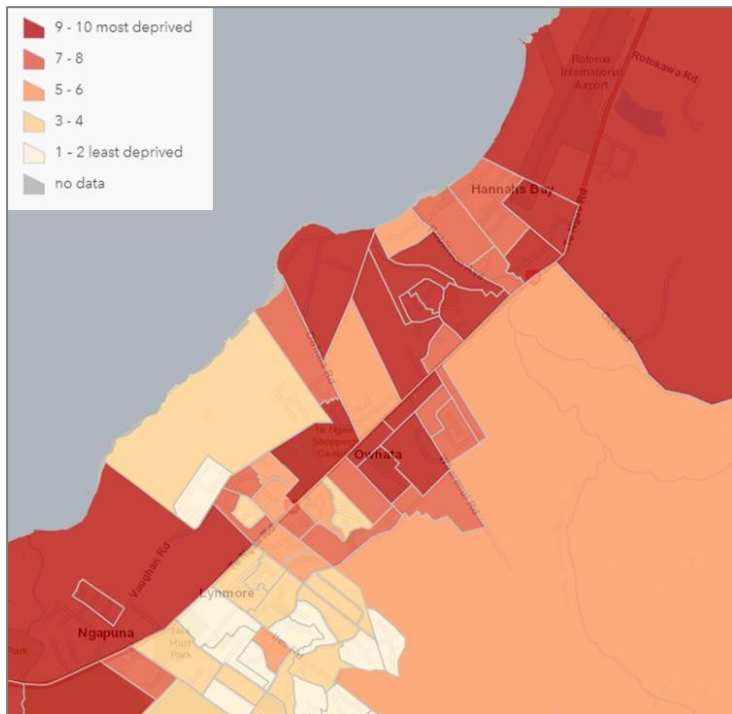


Figure 4-6: Social Deprivation Index – Eastern Rotorua

## 4.4 Transport context

### 4.4.1 Overview of the current corridor

SH30 Te Ngae Road is a two-lane regional state highway, with a posted speed limit of 60 kph from Iles Road to Coulter Road, 70 kph from Coulter Road to Alfred Road and 80 kph northeast of Alfred Road. There are three signalised pedestrian crossings, and a central flush median provided on the section through the urban area.

The Ōwhata Road intersection features a roundabout which was upgraded in 2019 to include a 'bypass' lane for southbound traffic<sup>33</sup>. The remaining intersections are priority controlled.

There is no on-street parking along the route. The corridor features footpaths on both sides between Iles Road and Coulter Road, and on the northern side of Te Ngae Road from Coulter Road to Alfred Street. Cyclists are provided with on-road cycle lanes for the full extent of the corridor in addition to a shared path on one side, between Iles Road and Coulter Road.

Within the project area the RLC's District Plan<sup>34</sup> considers the following roads as being urban collectors<sup>35</sup> – Basley Road, Brent Road, Lee Road, Ōwhata Road, Pohutukawa Drive, Robinson Avenue, Tennyson Drive and Wharenui Road. On these roads there is a need to balance between land use and movement needs.

### 4.4.2 Increasing traffic volumes

Traffic volumes along Te Ngae Road range from 16,000 vehicles per day (vpd) at Rotorua Airport to 30,000 vpd at Iles Road<sup>36</sup>. Further to the south (within the Stage One project area), volumes can exceed 40,000 vpd.

Over the last 10 years, general traffic along the corridor has increased by over 20%, with much of this growth occurring in the last five years. Heavy vehicle volumes increased by 35% over this same 10-year period, with a notable increase in freight volumes over the past two years.

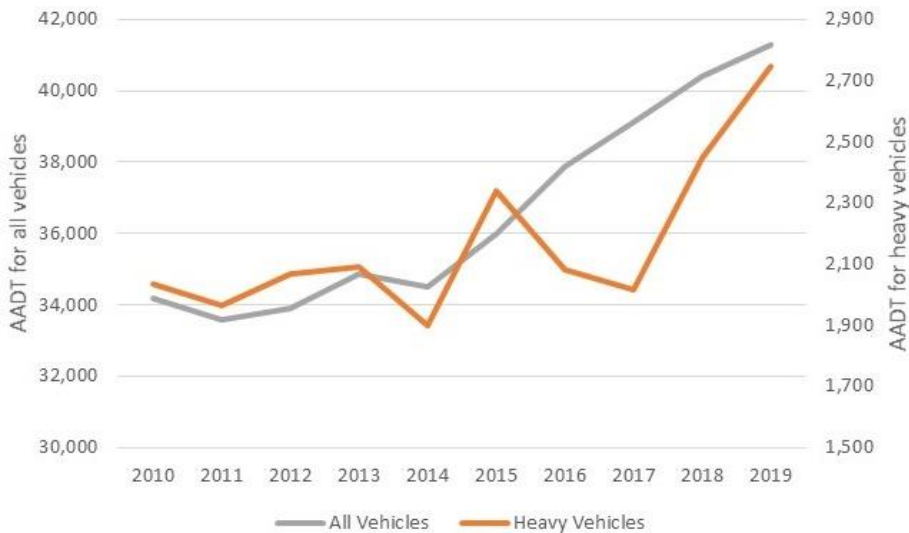
<sup>33</sup> [www.nzta.govt.nz/projects/connect-rotorua/sh30-Ōwhata-roundabout-improvements/](http://www.nzta.govt.nz/projects/connect-rotorua/sh30-Ōwhata-roundabout-improvements/)

<sup>34</sup> [www.rotorualakescouncil.nz/our-services/planningservices/districtplan/Documents/District\\_Plan\\_2016/Appendices\\_1\\_to\\_11/23-Appendix%203%20-%20Road%20Hierarchy%20-%20PDP%20Final%20Post%20Appeal%20version%20-%20cleanskin.pdf](http://www.rotorualakescouncil.nz/our-services/planningservices/districtplan/Documents/District_Plan_2016/Appendices_1_to_11/23-Appendix%203%20-%20Road%20Hierarchy%20-%20PDP%20Final%20Post%20Appeal%20version%20-%20cleanskin.pdf)

<sup>35</sup> This is relevant to the project Investment Objectives

<sup>36</sup> Data based on Waka Kotahi telemetry sites, with traffic volumes at intermediate points derived from the RAMM database





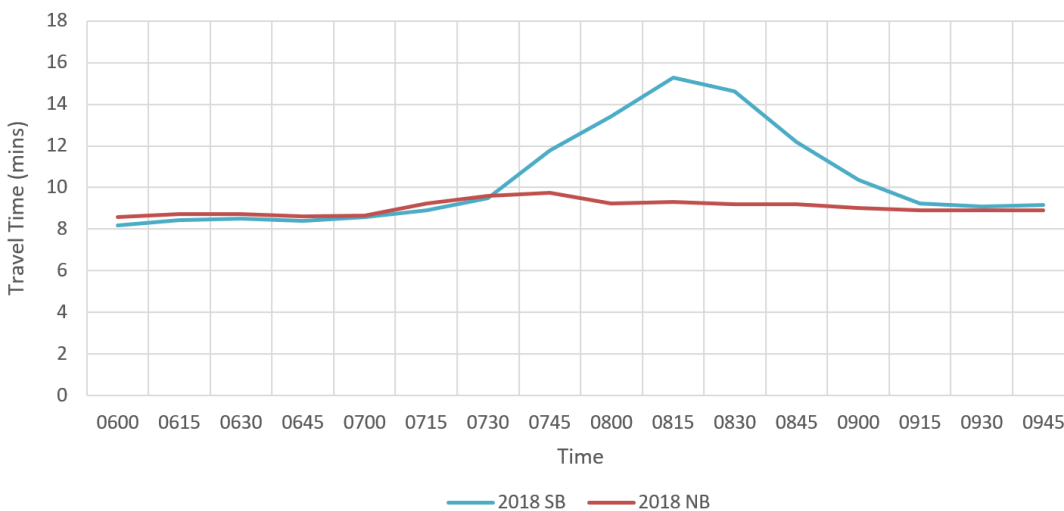
**Figure 4-7: Traffic growth on the SH30 Te Ngae Road corridor (2010 and 2019)<sup>37</sup>**

The SH30/33/2 corridor to Tauranga carries most of the freight from and passing through Rotorua to the Port of Tauranga. While SH36 offers a shorter route around the western side of Lake Rotorua (by both distance and time), the link around the eastern side of the lake provides a safer and more comfortable journey, and in part due to the Tauranga Eastern Link. There has been significant and steady growth in freight volumes as shown in Figure 4-7 and this growth is expected to continue.

#### 4.4.3 Unreliable travel times

Travel time variability was determined by interrogating the TomTom database for traffic travelling in both directions through the study corridor in March and April (years 2017, 2018 and 2019) in the AM peak (the busiest period).

Figure 4-8 shows there are notable travel time variations for southbound traffic during the AM peak. Generally, travel times start increasing from around 07:30, peaking at 08:15 and slowly recover to the general off-peak conditions at around 09:15. Travel time variations in the northbound direction during the AM peak are not significant.



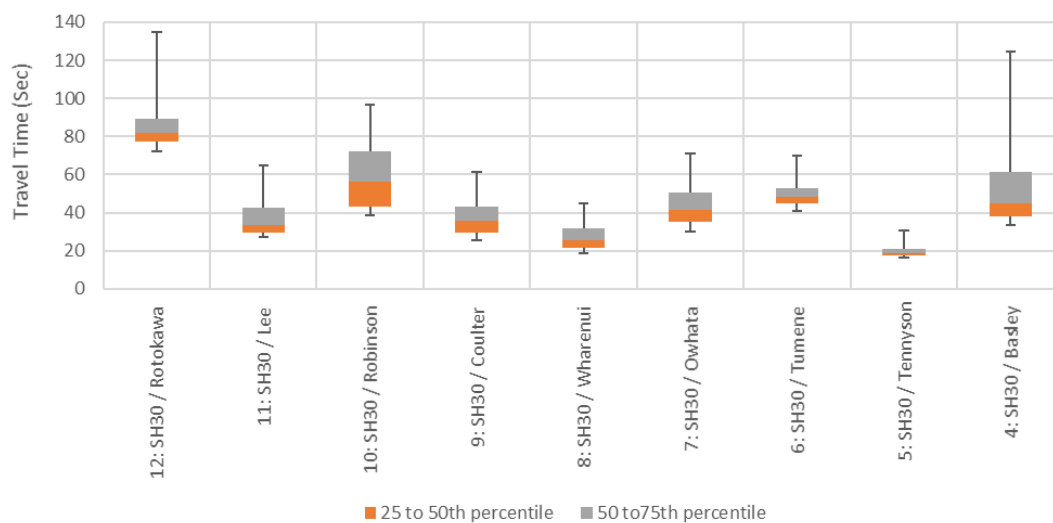
**Figure 4-8: Travel Time Variation by Direction**

To identify any possible existing pinch points, the SH30 Te Ngae Road corridor was divided into 13 sections based on homogeneity of traffic flow and land use. Analysis of the travel times for each

<sup>37</sup> <https://nzta.govt.nz/resources/state-highway-traffic-volumes/>



section was undertaken. Figure 4-9 provides a representation of the southbound travel time reliability (worst performing direction).



**Figure 4-9: Southbound travel time distribution (2018)**

The travel variability statistics outline the following:

- There is no notable delay / travel time variation observed for northbound traffic.
- Travel time for southbound traffics are broken down by sections as below:
  - Iles to Basley: least reliable section from travel time perspective, travel time varies from 40 seconds to more than two minutes during the AM peak.
  - Basley to Coulter: no notable variation is observed, typical travel times are within 40 seconds to approximately one minute.
  - Coulter to Rotokawa: less reliable travel time on these sections given the typical variations are more than one minute (from 25<sup>th</sup> to 95<sup>th</sup> percentile).

#### 4.4.4 Seasonal variability

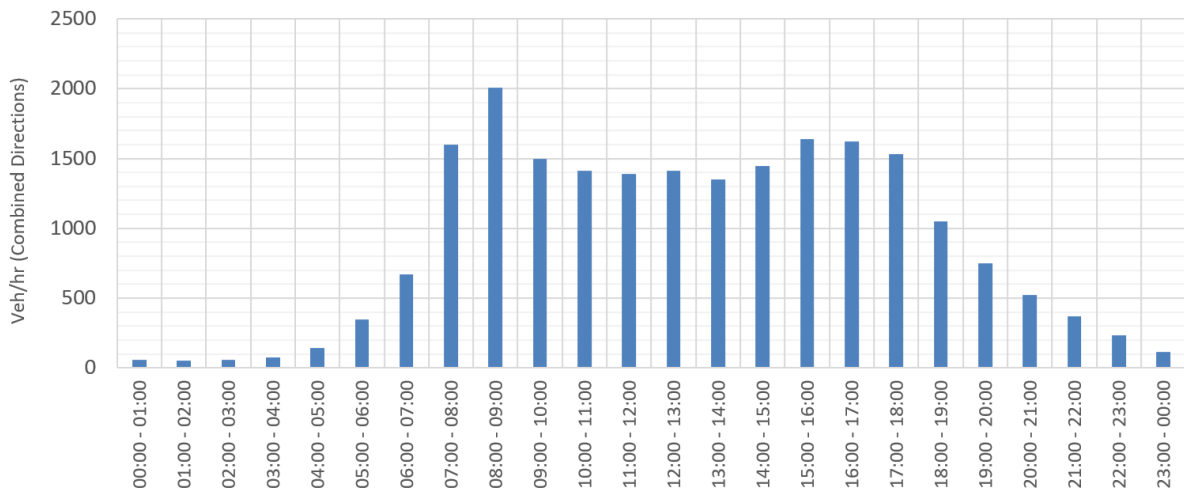
A review of seasonal variability (using TomTom data) revealed that:

- Traffic volumes are higher over summer, reflecting the influx of tourists and visitors. During these months, the total journey (Airport to Tarawera Road) takes around 6 minutes longer during the AM peak than it does during the off-peak.
  - Whilst the impacts of COVID-19 are likely to reduce traffic volumes in the region, the data and recent observations have shown that there is a high underlying baseline of demand. Furthermore, the effects of the loss of international visitors to the region may be offset by an increase in domestic travel while New Zealand's borders remain closed.
- Freight traffic volumes show similar seasonal variation due to agricultural and horticultural influences; they reflect a drop in volume over December and January, aligning with the summer school holiday period.

#### 4.4.5 Defined but spreading peak periods

The typical traffic demand profile for the corridor<sup>38</sup> is provided as Figure 4-10.

<sup>38</sup> TMS count data



**Figure 4-10: Traffic Profiles (Average Weekday from 2017 to 2019)**

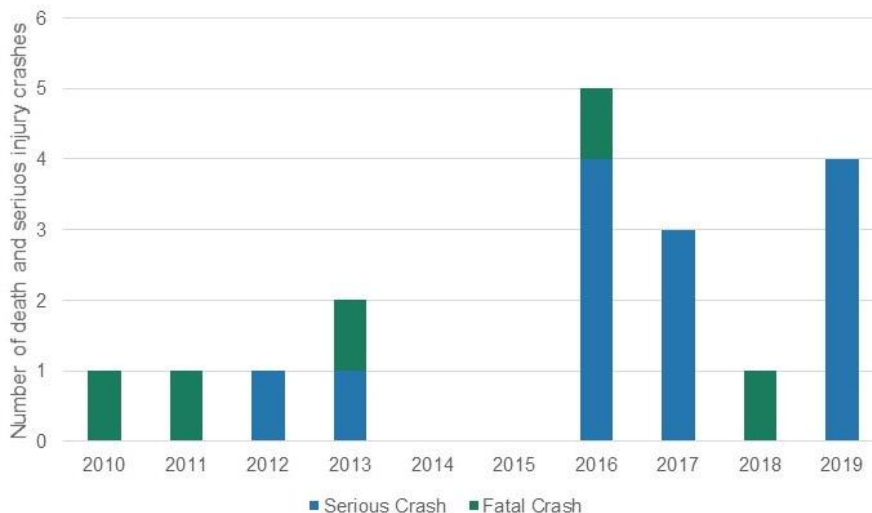
The graph identifies two clear peak periods for an average weekday:

- AM (07:00 – 9:00). This is the busiest period when traffic can be 25% higher than the off-peak.
- PM peak is less pronounced and spread between 15:00 – 17:00.

## 4.5 Crash history

An analysis of crash data between 2015 and 2019 identified that there were 13 death and serious injury (DSI) crashes on the corridor. Two of these were fatal crashes resulting in the deaths of two pedestrians, while five of the DSI crashes involved alcohol impaired road users.

Of concern is that there is an increasing number of DSIs along SH30 Te Ngae Road. From 2010 to 2014 there were five DSI crashes, however between 2015 and 2019 there were 13 DSI crashes on the corridor (Figure 4-11).



**Figure 4-11: DSIs on SH30 Te Ngae Road (2010-2019)**

The locations of the DSI crashes are shown in Figure 4-12.



**Figure 4-12: Locations of DSI crashes**

**Crash Types**

Assessment of the DSI crashes over the past five year period found that the high-risk crash types were intersection crashes (29%) and head on crashes (14%), while key factors attributed to crashes were alcohol (29%) and speed (21%). The most frequent crash type (all crashes) was rear end crashes, accounting for 47% of all crashes. These crashes frequently occurred because of drivers slowing or stopping at signalised pedestrian crossings on SH30 Te Ngae Road.

The proposed reduction in speeds (as part of Waka Kotahi’s Safer Speed Review) would help to reduce the likeliness of a DSI, but not significantly the likeliness of a crash occurring.

**4.6 What our customers need**

The previous information has highlighted that the corridor provides a variety of needs for a variety of different road users. Table 4-1 provides a summary of these customer needs.

**Table 4-1: Customer Needs**

CUSTOMER	NEED
Locals	A local is likely to make a lot of short journeys, with occasional longer ones. Two important needs are the safe and reliable access to a sufficient selection of modes to be able to make the desired movement.
Residents on Te Ngae Road	Residents on Te Ngae Road access their properties via a painted median. Public utilities, such as powerpoles make access to properties difficult for larger vehicles and residents. In addition to managing access for these properties with the addition of additional signalised intersections the noise and vibration of trucks has been a significant issue for residents, particularly at night when trucks are travelling at higher velocities.
Commuters	One of the key commuting movements will be into Rotorua from the northeast along SH30 Te Ngae Road in the morning, and back out on the same route in the afternoon/evening. Two of the important needs for these movements is that they can be undertaken safely, and reliably. In addition to this access to and from SH30 Te Ngae Road can also be important depending on the origin and destination.
Truck drivers	Truck drivers often have a schedule to closely follow. They also operate generally slower moving, less manoeuvrable vehicles. They also require safe and reliable movement along SH30 Te Ngae Road, and intersections with sufficient gap selection available.

CUSTOMER	NEED
Tourists	A key tourist movement in this area is that to get to and from the airport. Therefore, one of the key needs for tourists is that this route is safe and reliable.
Cyclists	One need is that conflicts between vehicles, pedestrians, and other cyclists managed. In addition to this the ability to have access across the highway in places. Facilities for a range of abilities is also a consideration.
Pedestrians	Te Ngae Road forms the primary continuous southwest to northeast connection for pedestrians. This means pedestrians need this route to be high quality, with good crossings. Facilities for a range of abilities is also a consideration.
School kids	There are four schools located on the eastern side of Te Ngae Road (two primary, one intermediate, and one secondary), with none on the western side. This means that children residing on the western side of the highway require safe and accessible crossing provisions.
Elderly and mobility impaired	There are two retirement villages and another currently under construction on the eastern side of SH30 Te Ngae Road. These customers will need safe access with good sight lines, and flat non-abrupt grades.

## 5. DEFINING THE PROBLEMS

The precursor to this DBC was the *combined IBC/DBC for the Eastern Corridor*, which encompassed both Stages One and Two. The Problem Statements that were developed as part of that project were:

1. The current form of Te Ngae Road does not adequately support its primary function, causing peak period network inefficiencies. **60% corridor; 70% other areas.**
2. The current form of Te Ngae Road infrastructure encourages reliance on car use with other modes being less attractive. This will contribute to reduced levels of service along the corridor in the future. **40% corridor; 30% other areas.**

### Update in response to GPS

The release of a new draft Government Policy Statement in early 2018 changed the focus of the Government's investment priorities. The new strategic direction focused on two key priorities: *safety* and *access*, and two supporting priorities - *environment* and *value for money*.

The change in focus resulted in the need to reconsider key aspects relating to the problems and benefits of this project. Economic growth and productivity are no longer cornerstones for investment in the new GPS, meaning the focus on efficiency of both the previous problem statements were unlikely to demonstrate a strong alignment for funding.

During a workshop on the 18 February 2018 the problem statements from the combined IBC/DBC were revisited to ensure that they were still relevant, reflected the specific issues for Stage Two and the strategic direction of the most recent GPS (2018). There was agreement that the general problem themes were represented, but that the wording should be revised slightly to better reflect the desired outcomes of the Stage Two DBC. The weightings were also reviewed.

### Final Problem Statements

The final Problem Statements are:

1. **Efficiency.** Parts of Te Ngae Road are close to capacity at peak times and forecast growth will lead to increased delays and contribute to an increased crash risk. **75%.**
2. **Travel Choice.** The current form of Te Ngae Road does not encourage use of active or public transport modes, contributing to congestion and poor health, safety, and environmental outcomes. **25%.**

The wording of these revised Problem Statements was agreed by stakeholders during a second workshop on the 26 June 2018. Figure 5-1 shows the levels of support for the aligned project objectives during public consultation on the proposed concept design.

Problem Statement No.1 generally relates to route efficiency and links neatly with the current Ministry of Transport's *Enduring Outcomes* of 'Inclusive Access', 'Economic Prosperity' & 'Safety'. Problem Statement No.2 relates to travel choice, and links to the 'sustainable modes' enduring outcome.

### SUPPORT FOR PROJECT OBJECTIVES

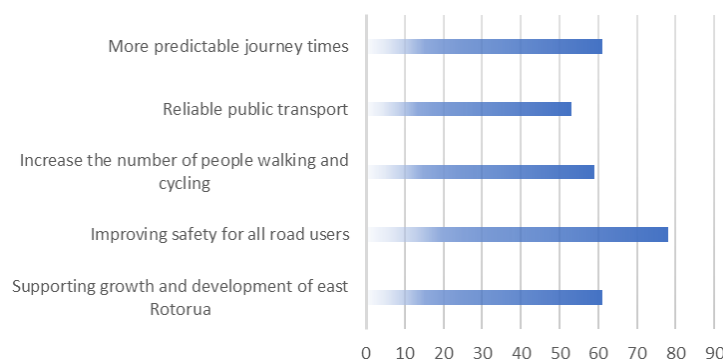


Figure 5-1: Support for project objectives during public consultation

## 6. PROBLEM 1 – EFFICIENCY

*Parts of Te Ngae Road are close to capacity at peak times and forecast growth will lead to increased delays and contribute to an increased crash risk*

### 6.1 Overview

This section provides the evidence base which substantiates the ‘efficiency’ problem (75% weighting), with information structured in the following manner:

- The **cause** of the problem – what contributes most strongly to the problem
- The **effect** of the problem – to road users, ease of access, commercial activity etc.
- The **consequence** of the problem – e.g. health or economic effects created by the problem

Table 6-1 summarises the key causes, consequences, and effects of the efficiency problem.

**Table 6-1: Efficiency problem – causes, consequences and effects**

PARTS OF TE NGAE ROAD ARE CLOSE TO CAPACITY AT PEAK TIMES AND FORECAST GROWTH WILL LEAD TO INCREASED DELAYS AND CONTRIBUTE TO AN INCREASED CRASH RISK	
Causes	<ul style="list-style-type: none"> <li>• Planned growth – residential, employment and industrial</li> <li>• Capacity of the transport network</li> </ul>
Consequences	<ul style="list-style-type: none"> <li>• Increasing demand on SH30 Te Ngae Road and side roads</li> </ul>
Effects	<ul style="list-style-type: none"> <li>• Congestion</li> <li>• Rat-running through local streets</li> <li>• Increasing travel times for freight</li> <li>• Increased crash risk and DSIs</li> <li>• Worsening community severance</li> </ul>

### 6.2 Causes

#### 6.2.1 High levels of planned growth

The primary causes for the efficiency problem (i.e. growth) have been discussed in Section 4.4.

#### 6.2.2 Capacity of the transport network

In the morning peak, there are over 1200 vehicles travelling southbound through the Basley Road intersection with a similar number travelling northbound during the PM peak.

Austrroads<sup>39</sup> estimates that the typical peak period mid-block capacity for urban roads at around 1200 vehicles per lane per hour. This provides an indication that the road is already operating close to theoretical capacity.

### 6.3 Consequences

#### 6.3.1 Increasing demand on SH30 Te Ngae Road and side roads

The consequence of introducing a significant amount of new housing into an area with limited public transport and active mode infrastructure would be the creation of a high number of new car-based trips. Most of these trips would be making journeys that would require, in part, the use of SH30 Te Ngae Road.

Table 6-2 provides a summary of the side road demands in 2018, 2028 and 2048. These volumes are based on a ‘Do Minimum’ scenario where the only change to SH30 Te Ngae Road are lower posted

<sup>39</sup> Austrroads (2009). Guide to Traffic Management Part 3: Traffic studies and analysis



speeds (in line with the Safer Speed Review recommendations)<sup>40</sup>. Note that these values represent one-way demands onto SH30 Te Ngae Road; so, the two-way AADTs would be roughly double.

**Table 6-2: Side road demands onto 'side road (peak hour)**

SIDE ROAD	AADT			2018-2028	2018-2048
	2018	2028	2048		
Gee Road	600	1000	4900	400	4300
Robinson Avenue	2000	2000	1500	0	-500
Pohutukawa Drive	1400	1300	1100	-100	-300
Coulter Road	1000	1500	2600	500	1600
Sunrise Avenue	900	1000	1400	100	500
Wharenui Road	1000	2100	2100	1100	1100
Ōwhata Road	3900	4200	4600	300	700
Brent Road	1400	2100	2300	700	900
Tennyson Road	1400	1400	1200	0	-200
Basley Road	1400	1900	2000	500	600

Transport modelling identified that:

- In the short-term (before 2028) the most notable increases to side road demand onto SH30 Te Ngae Road will be at Wharenui Road, Brent Road and Basley Road. This is reasonable considering that most of the short-term residential development is focussed around the Wharenui Block.
- By 2048, Gee Road will carry a far higher volume of traffic, with two-way AADT at almost 9000 vpd. Again, this reflects where much of the mid-to-long term development is proposed.
- The AADT for Robinson Avenue, Pohutukawa Drive and Tennyson Drive is expected to decrease. This is because a) there is little to no planned land use development off these roads; and b) side road delays increase to the point whereby people do not take trips during peak periods, sometimes referred to as unmet demand.

## 6.4 Effects

### 6.4.1 Congestion

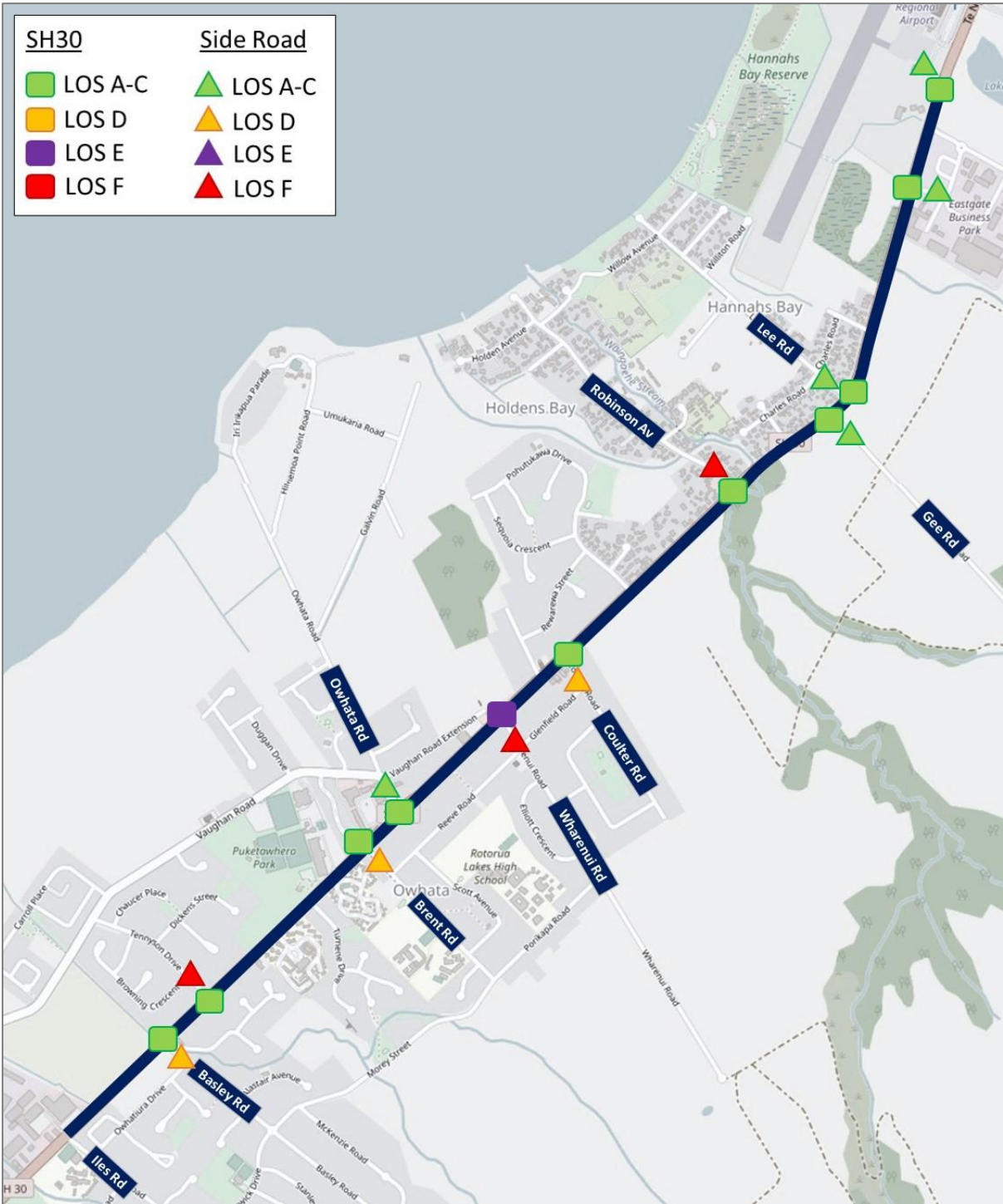
A bespoke (Paramics) microsimulation model has been developed specifically for this DBC. It has been used to better understand the nature of existing network efficiency issues, evaluate the benefits of potential options, assist with design refinements, investigate the impacts from land use development, and ultimately provide critical inputs to the economic assessment.

The model covers morning (0630-0930), interpeak (1200-1400) and evening (PM) time periods, and the 2018 base model has been accepted by an independent peer reviewer as being robust and fit for purpose. The model also provides forecasts for years 2028 and 2028. The *SH30 Te Ngae Road Model Development Report* is provided as **Appendix E**.

The 2018 base model has been validated against observed data (volumes and travel times) and by nature provides an accurate representation of the current levels of delay and performance.

Figure 6-1 provides an overview of the existing (2018) levels of service (delay based). Shown are the 'worst peak' LOS's – which means in some cases they represent the performance of the AM peak, and in others, the PM peak. A full breakdown of the results is provided within **Appendix F**.

<sup>40</sup> The AADTs were determined using forecast hourly traffic volumes and an AADT conversion factor determined using recent (2018) traffic counts.



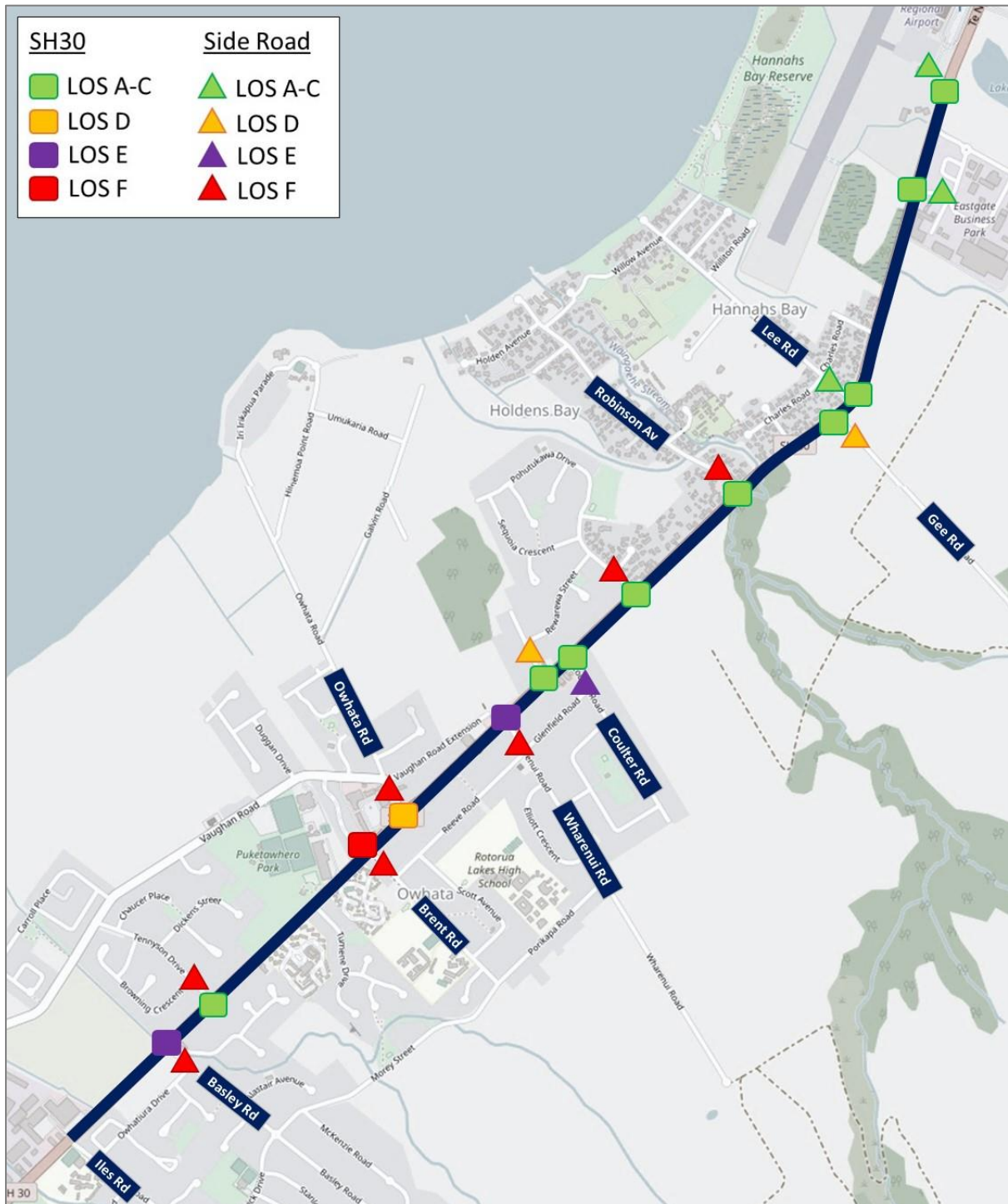
**Figure 6-1: Peak LOS (2018 Do Minimum)**

The results of the 2018 base model show that:

- LOS F (delays > 50 seconds for give-way controlled intersections) is already being experienced on the Tennyson Drive, Wharenui Road and Robinson Avenue approaches.
  - This means that drivers looking to enter SH30 Te Ngae Road from these side roads will be experiencing a high level of frustration.
  - LOS F is characterised by stop-and-go waves, poor travel times, low comfort and convenience, and increased accident exposure.
- Traffic approaching from Basley Road, Brent Road, Coulter Road are already experiencing LOS D conditions during peak times.

- The Ōwhata Road roundabout is currently working well, in large part because the capacity has been recently increased through the introduction of a southbound bypass lane.

Figure 6-2 shows the forecast LOS for the 2028 'Do Minimum' scenario.



**Figure 6-2: Peak LOS (2028 Do Minimum)**

The results of the 2028 Do Minimum models show that, without mitigation, by 2028:

- LOS F will be experienced during peak times at the Basley Road, Brent Road, Ōwhata Road, Wharenui Road, Pohutukawa Drive and Robinson Avenue approaches to SH30 Te Ngae Road. For people living along Pohutukawa Drive and Robinson Avenue there are no alternative routes.
- LOS E and F could also be seen between Basley Road and Wharenui Road. This is essentially because the limited capacity at the Ōwhata Road roundabout will cause long tail back queues.



The modelling results show clearly that if planned future development is going to be supported, then a 'Do Minimum' (which includes reduced speed limits) or a 'Do Nothing' scenario would be unacceptable. To improve corridor efficiency there needs to be some form of intervention which increases the person carrying capacity of the corridor.

#### 6.4.2 Travel time reliability

The traffic modelling has identified that by 2028, if a Do Minimum approach is adopted:

- AM peak travel times (southbound) around 1.3 minutes longer than off-peak travel times
- PM peak travel times (northbound) around 2.5 minutes longer than off-peak travel times

#### 6.4.3 Increased risk of crashes

The collective risk<sup>41</sup> for the corridor is predominantly medium, however the northern extent of the corridor has a low medium risk (Figure 6-3). The existing personal risk<sup>42</sup> for the corridor is evenly split between low to the south and low medium to the north (Figure 6-4).

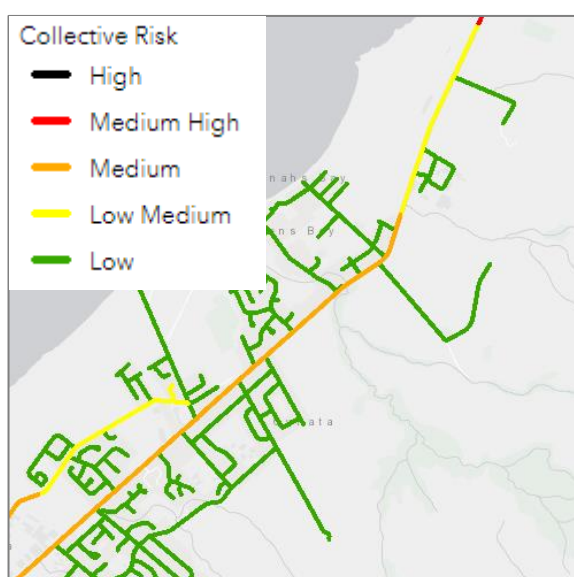


Figure 6-3: Collective risk on Te Ngae Road<sup>43</sup>

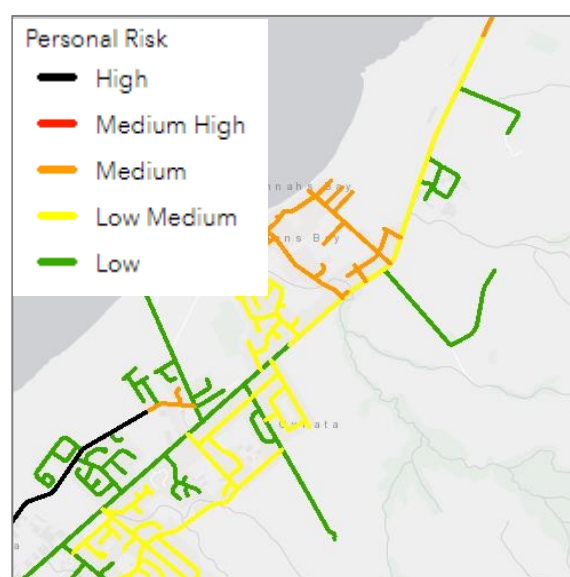


Figure 6-4: Personal risk on Te Ngae Road<sup>44</sup>

Given the anticipated growth for the area it is not unreasonable to expect the collective risk on Te Ngae Road to increase as the traffic volumes increase.

The traffic congestion issues highlighted above means that there will be ever reducing gaps in traffic that will allow drivers to safely turn onto the highway from side roads or private accesses.

Increasing delays means that drivers are more tempted (or feel pressured) to accept smaller gaps, which increases the likeliness of an injury crash risk. Between 2015 and 2019, 16% of all reported crashes on Te Ngae Road within the study area were a result of vehicles crossing, turning, or merging to and from side roads and accesses<sup>45</sup>. The frequency of these types of crashes will increase as traffic volumes rise.

#### 6.4.4 Rat-running through local roads

High delays on side roads means that a significant amount of traffic on the eastern side of the state highway (where there are alternative routes) will look to access at other locations – i.e. at Iles Road

<sup>41</sup> Collective Risk can be thought of as 'crash density' and is related to the crash history of the section of road. It is a measure of the number of DSIs per km that can be expected on a road segment over the next five years.

<sup>42</sup> Personal Risk can be thought of as 'crash rate' and is related to the crash history of the section of road. It is a measure of the risk of an individual dying or being seriously injured on a road corridor. It is calculated by dividing the Collective Risk by traffic volume exposure.

<sup>43</sup> "Road Safety Metric," Safer Journeys Risk Assessment Tool, Waka Kotahi Waka Kotahi, accessed 4 August 2020, <https://megamaps.abley.com/Maps/>

<sup>44</sup> Waka Kotahi Waka Kotahi, "Road Safety Metric."

<sup>45</sup> Movement code groups H to M

signals. This will mean that people will travel further to ultimately reduce their journey time. This rat-running effect then has knock-on impacts to amenity values, air quality and safety on local roads.

To gain an appreciation of the potential level of rat-running if a 'Do Minimum' was adopted a review of the traffic modelling for the Iles Road / SH30 Te Ngae Road intersection was undertaken. For the 2048 future year:

- Adopting a 'Do Minimum' approach (i.e. which would see LOS F on side roads):
  - 380 vehicles forecast to use the eastern approach to the Iles Road signals (AM peak).
- Adopting a 'Do Something' approach – i.e. increasing capacity at key intersections along Stage Two of the Eastern Corridor to achieve LOS E or better:
  - 200 vehicles forecast to use the eastern approach to the Iles Road signals (AM peak).

Adopting a 'Do Something' approach would reduce demand onto SH30 Te Ngae Road from Iles Road by almost 50% in 2048, as traffic would be able to gain access to the state highway from earlier points. This would help to reduce rat-running.

#### **6.4.5 Worsening community severance**

Social (or community) severance can be created when a road acts as, or feels like, a barrier to movement. This tends to be because people feel unsafe crossing the road (which could be on foot, on bike or even in a car) which means people tend not to make a trip they would otherwise want to.

Severance is more marked when:

- Traffic volumes are high, and flow is continuous
- Speeds are higher
- There are a high proportion of heavy vehicles
- The road in question has priority over other roads
- Facilities for crossing the road using any mode offer a poor level of service either due to long wait times or lack of protection when crossing

Effects such as noise and air pollution created from traffic can also create a psychological barrier.

The connection between the volume of traffic and community cohesion has been recognised, with the impacts of high volumes of traffic found to reduce community liveability and wellbeing (Appleyard, 1980)<sup>46</sup>. In 2018, Wiki et al<sup>47</sup> found that residents living on streets with lower traffic volumes in Christchurch had a more positive perception of their street environment, more connections and interactions within their neighbourhood and a general improved sense of wellbeing and belonging than those living on streets with heavy traffic volumes.

The volume of traffic has also been found to have a significant impact on children's freedom. Heavy traffic on roads such as SH30 Te Ngae Road severs communities and limits the area children can safely navigate on their own due to parental fears of traffic danger (Tranter and Pawson, 2001)<sup>48</sup>. Safety is also seen as a problem on local roads, as evidenced by how only 50% of people who live in Ōwhata East (around Brent Road)<sup>49</sup> walking or cycling to school.

With increasing car dependency, streets are increasingly being dominated and prioritised for vehicle movement, rather than spaces that previously provided a space for social interaction. Achieving a better balance between the movement and place function of our city streets is being recognised in New Zealand. Waka Kotahi has recently adopted the One Network Framework (ONF), which considers and values the place function of city streets.

<sup>46</sup> Appleyard, D (1980). 'Liveable streets: Protected neighbourhoods?' *Annals of the American Academy of Political and Social Science*, 451 (1), 106-117.

<sup>47</sup> Wiki J, Kingham S & Banwell K (2018) Re-working Appleyard in a low-density environment: An exploration of the impacts of motorised traffic volume on street liveability in Christchurch, New Zealand. *World Transport Policy and Practice*, 24(1):60-68.

<sup>48</sup> Tranter, P., and Pawson, E (2001). 'Children's access to local environments: A case-study of Christchurch, New Zealand'. *Local Environment*, 6 (1), 27-48.

<sup>49</sup> i.e. children living Ōwhata East and going to school in Ōwhata East

## 7. PROBLEM 2 – TRAVEL CHOICE

*The current form of Te Ngae Road does not encourage use of active or public transport modes, contributing to congestion and poor health, safety, and environmental outcomes*

### 7.1 Overview

Table 7-1 provides a summary of the key causes, consequences, and effects of the travel choice problem, as identified by the wider stakeholder group.

**Table 7-1: Travel choice problem – causes, consequences and effects**

THE CURRENT FORM OF TE NGAE ROAD DOES NOT ENCOURAGE USE OF ACTIVE OR PUBLIC TRANSPORT MODES, CONTRIBUTING TO CONGESTION AND POOR HEALTH, SAFETY, AND ENVIRONMENTAL OUTCOMES	
Causes	<ul style="list-style-type: none"><li>• SH30 Te Ngae Road street typology</li><li>• Lack of local connectivity</li><li>• Poor quality and limited provision of walking and cycling infrastructure</li><li>• Limited and unreliable public transport services</li><li>• Infrequent and unreliable public transport services</li></ul>
Consequences	<ul style="list-style-type: none"><li>• Low active mode share for journeys to work and education</li><li>• Walking, cycling, and public transport option are unattractive</li></ul>
Effects	<ul style="list-style-type: none"><li>• LOS gaps for all modes</li><li>• Poor health and environmental outcomes</li></ul>

### 7.2 Causes

#### 7.2.1 Te Ngae Road street typology

The current typology of SH30 Te Ngae Road is one which presents a message that cars are the priority. The road reserve is wide, most intersections have generous turning bays for left turn movements, there are narrow footpaths on both sides of the road and the on-road cycle lanes are unappealing for most people.

There are numerous intersections along the corridor, which have historically risen from sporadic residential developments which are not directly connected. This means that in some instances there are three intersections onto SH30 Te Ngae Road<sup>50</sup>, when potentially just one could serve several neighbouring residential areas.

#### 7.2.2 Lack of local connectivity

Whilst there are numerous local road connections onto SH30 Te Ngae Road, the connections between the local areas is poor. The local roads are mostly no exit cul-de-sacs with little or no connection (for vehicles, pedestrians, or cyclists) to other local roads, particularly at the northern end of the corridor (e.g. Gee Road, Lee Road, Robinson Avenue, Pohutukawa Drive).

Limited connections between the local roads at the northern end means that people must use their car (even for short trips) and doing so requires the use of Te Ngae Road as there is no alternative.

While the local roads at the southern end of Te Ngae Road are slightly better connected, the curved nature of the roads and the way the subdivisions are laid out means routes are often long and meandering. The lack of direct connectivity also means that walking, cycling, and public transport are not realistic options and people are once again forced into their cars.

Looking to the future, the Eastside Structure Plan provides a grid-based road network that includes a parallel connector road between Gee Road and Wharenui Road. This means that an alternative route (essentially an extension of Moray Street), running parallel to SH30 Te Ngae Road would be created.

<sup>50</sup> E.g. Lee Road, Hannah Road, Alfred Road



### 7.2.3 Poor quality and limited provision of walking and cycling infrastructure

An assessment of the current infrastructure provisions for each mode was assessed against minimum standards to determine whether there were gaps in the levels of service. A summary of the assessment is provided in Table 7-2, with the complete assessment provided in **Appendix G**.

**Table 7-2: Level of Service assessment for key transport infrastructure**

	CURRENT LOS	DESIRED LOS	LOS GAP
<b>WALKING</b>			
Footpath provision and width	Footpath on both sides of corridor in urban area, but <1m wide in some locations	Footpath on both sides, min width of 1.8m on a collector road	Moderate
Pedestrian crossings - spacing	4 signalised pedestrian crossings within 2.3 km urban section	≤3 minute walk between facilities ≈ 11 crossing facilities in urban portion of corridor	Significant
Pedestrian crossings - treatments	Main intersections – LOS ranges from D to E	Main intersections – LOS ranges from B to C	Significant
Pedestrian environment <sup>51</sup>	Corridor LOS ranges from C to E	Corridor LOS ranges from B to D	Moderate
<b>CYCLING</b>			
On-road cycle lanes	Shoulder cycle lanes between 1-2 metres wide	Minimum 2.0 metres desirable based on form and function of Te Ngae Road	Significant
Shared walking/cycling path	Varies, but <1m wide in some locations	Minimum of 2.5m (recreational and regional commuter path)	Significant
<b>PUBLIC TRANSPORT</b>			
Service	Service every 30 minutes between 7am and 6pm Monday to Saturday.	Service every 15 minutes between 6am and 10pm weekdays and every 30 minutes on weekends	Significant
Bus stops	Ranges from LOS C to F	LOS B or C	Significant
Travel time	18 minutes from Airport to CBD	Competitive with car travel ~ 12 minutes	Moderate
<b>MOTOR VEHICLES / FREIGHT</b>			
Travel time delays – side roads	Five intersections perform at LOS E or F during AM and/or PM peak	LOS E or better on side roads	Moderate for Pohutukawa Dr Wharenui Rd & Brent Rd
Travel time delays – Te Ngae Road	Worst performing sections perform at LOS D	LOS D or better on Te Ngae Road	Achieved

The LOS assessment highlights that there are significant LOS gaps on Te Ngae Road in the provision for walking, cycling and public transport.

These gaps in infrastructure and service provision are barriers to increasing active and public transport mode share and demonstrates why the community is largely car dependent for most journeys. With forecast growth on the corridor, new residents will be locked into car travel as the current network does not encourage or enable active or public transport. Access for vehicles will subsequently deteriorate as LOS gaps on SH30 Te Ngae Road and side roads will increase.

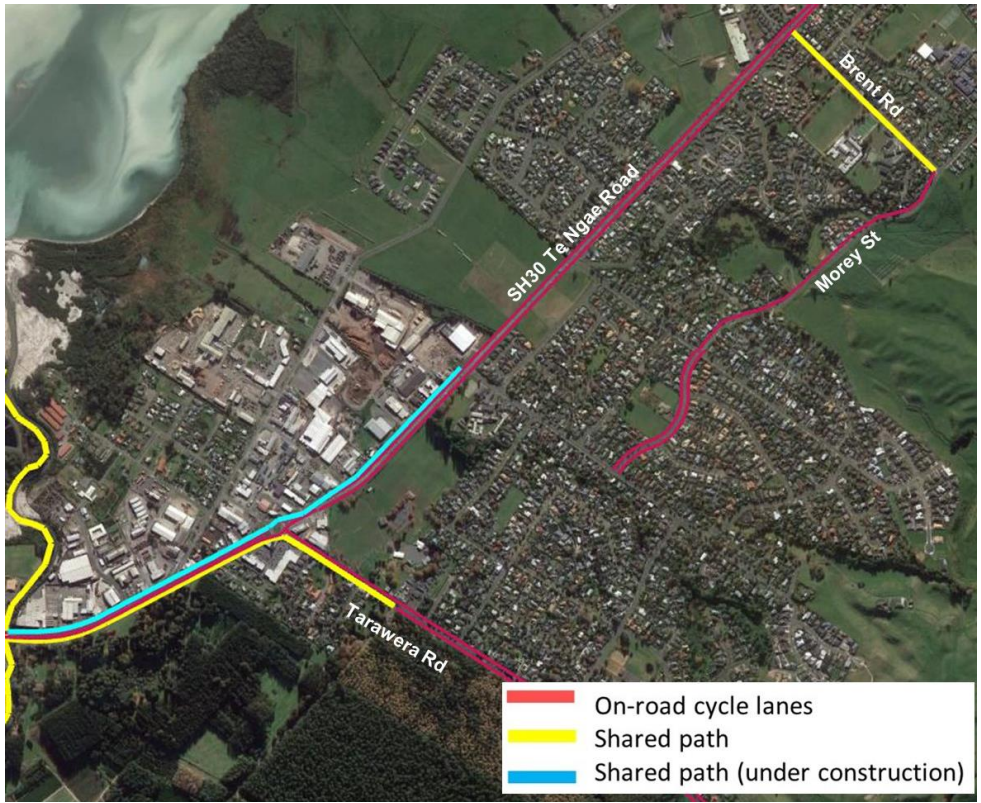
#### Extent of current cycling network

The extent of the current cycling network in eastern Rotorua is limited and consist of:

- 3.7 km of shared path.
- 7.5 km of cycle lanes (excluding those on Tarawera Road).

The extent of the current cycle network is shown as Figure 7-1.

<sup>51</sup> Roads and Maritime Services (2018) – NSW Road Planning Framework - Performance Indicator Guidelines

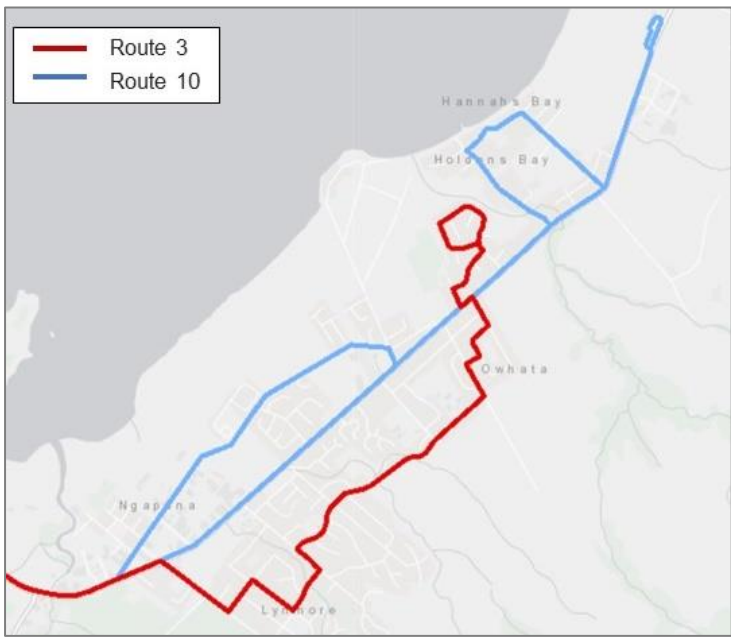


**Figure 7-1: Existing cycle network**

In addition, RLC is currently planning for additional cycleways along Vaughan Road and to connect the existing Moray Street path to Tarawera Road. These projects have recently received Crown Infrastructure Partners (CIP) funding.

**7.2.4 Limited and unreliable public transport services**

Two bus routes serve the area; Route 3 (Ōwhata via Lynmore and Redwoods) and Route 10 (Rotorua Airport via Ngapuna and Ōwhata), as shown in Figure 7-2.



**Figure 7-2: Bus routes serving Rotorua's eastern corridor**

Both services operate every 30 minutes between 0700 and 1800, however the airport is only serviced by every second bus on Route 10. Some sections of the bus routes operate as loops (e.g. Route 10 travels northbound along Vaughan Road and southbound along Te Ngae Road). Bus stops are frequent along each route, and some stops feature bus shelters and seating.

There are no bus priority measures along SH30 Te Ngae Road, and with buses sharing the general traffic lane, bus reliability is directly related to the level of congestion.

## 7.3 Consequences

### 7.3.1 Low active mode share for journeys to work and education

New Zealand is one of the most car dependant countries in the world, with 792 cars per 1,000 people.<sup>52</sup> Since 2011, the number of vehicles on our roads has recorded year on year growth, with 4.3 million vehicles registered in 2018. This growth is attributed to a stronger economy and increased net migration and has resulted in subsequent growth in vehicle kilometres travelled. The overwhelming dependence on cars is particularly evident in the travel to work, travel to education, and motor vehicle ownership data collected by the Census and discussed below.

Figure 7-3 and Figure 7-4 (2018 Census data) show that the reliance on private vehicles is very high for residents living in the vicinity of the Eastern Corridor<sup>53</sup> when compared to the wider Rotorua District or New Zealand. In 2018, 93% of residents used a private vehicle to get to work (up from 88% in 2013), and 63% of students either drove or were driven to school or study.

Public transport use for residents living along the corridor is very low at around 1% for travel to work and 13% for travel to education. This aligns with the rest of district however Rotorua’s bus mode share is substantially less than the New Zealand average. While the rate of cycling on the eastern corridor is marginally higher than the Rotorua District or New Zealand, the mode share for walking to work or school is substantially lower.

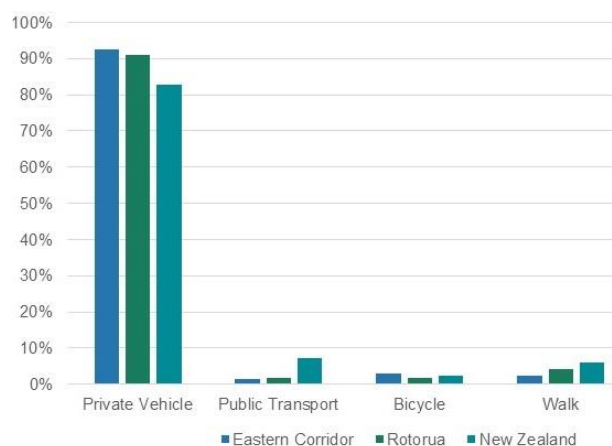


Figure 7-3: Travel to work (2018 Census)

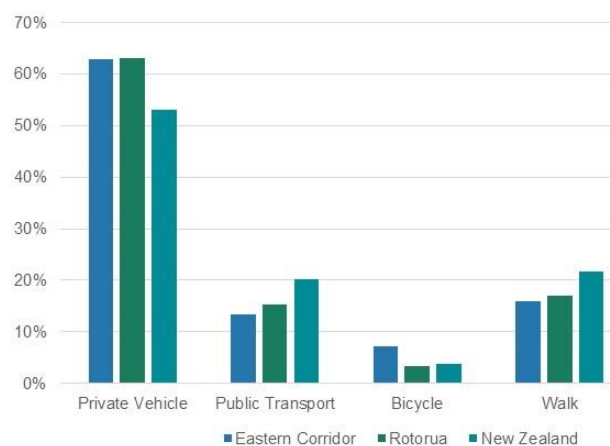


Figure 7-4: Travel to education (2018 Census)

Figure 7-5 provides a representation of the origin and destination of education related trips for eastern Rotorua based on Census 2018 data. The map identifies a high amount of flow across the state highway between Ōwhata West and Ōwhata East (177 education trips).

<sup>52</sup> Ministry of Transport, “We are driving further and more than ever before,” 12 October 2018

<sup>53</sup> The following Statistical Areas (level 2) were used: Ngapuna, Lynmore, Ōwhata East, Ōwhata West, Holdens Bay-Rotokawa and Waiohewa

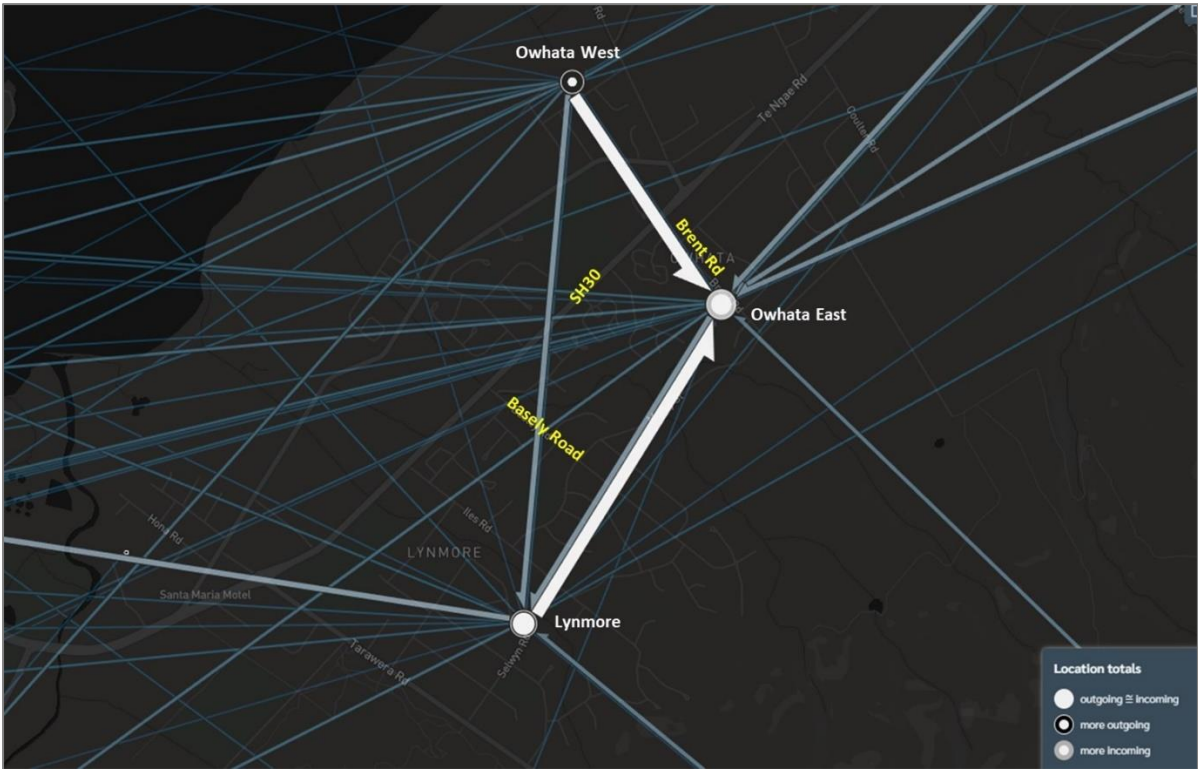


Figure 7-5: Education Trips<sup>54</sup>

### 7.3.2 Car dependency

Car dependency along the corridor is further validated by motor vehicle ownership data. Census data shows that the proportion of households along the corridor with no access to a motor vehicle is less than across the Rotorua District and the New Zealand average (Figure 7-6). Similarly, the proportion of households with two motor vehicles is highest along the Eastern Corridor.

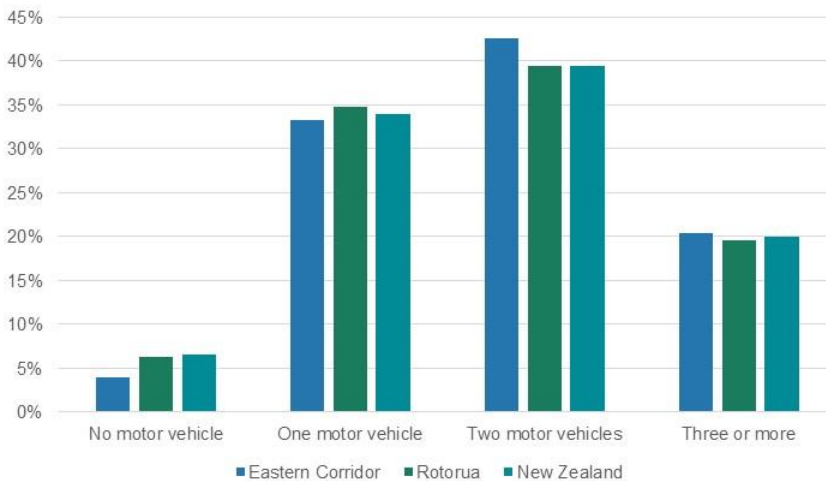


Figure 7-6: Comparison of motor vehicle ownership data (2018 Census)

The evidence shows that the number of people using active and public transport is low, with vehicles being the primary mode choice for journey to work and education. This adds to the congestion and delays discussed under Problem 1. It also adds to parking pressure at destinations.

<sup>54</sup> [lowmap.blue/1ySZqe2onnkehmflyxc4o3UqbyZq4RCk9AYcaAC-kWzA/80023e4?v=-38.136734,176.287337,13.91,0,0&a=0&as=1&b=1&bo=75&c=0&ca=1&d=1&fe=1&lt=1&lft=1&lftm=ALL&col=Default&f=50](https://www.google.com/maps/@38.136734,176.287337,13.91,0,0&a=0&as=1&b=1&bo=75&c=0&ca=1&d=1&fe=1&lt=1&lft=1&lftm=ALL&col=Default&f=50)



### 7.3.3 Walking, cycling, and public transport are unattractive options

The attractiveness and uptake of walking, cycling and public transport is largely correlated to the provision of appropriate infrastructure, as well as safety (real and perceived). Other factors that influence mode choice include adjacent land use, amenity, cost, distance, topography, and weather.

Provisions for each of these modes on Te Ngae Road is detailed below.

#### Walking

A narrow footpath (only 1m in parts) is provided on both sides of the corridor between Iles Road and Coulter Road, and on the northern side of Te Ngae Road from Coulter Road to just north of Alfred Street. Three sets of pedestrian operated traffic signals are available on Te Ngae Road within the study area, near Brent Road, Coulter Road and Tennyson Drive. The traffic signals at Iles Road also provide for pedestrians. However, there are no other pedestrian crossing facilities along the 6.7 km stretch of corridor within the study area.

The pedestrian environment along the corridor is mostly stark and oppressive. There is little landscaping or shade along the corridor, and multiple driveways and side streets interrupt pedestrian flow and priority. Crossing is also difficult given there are few formal crossing points, footpaths are narrow and uneven, and in parts the path must be shared with cyclists. Land use zoning and density is inconsistent and the subsequent 'ribbon development' that has spread out along the corridor results in long walking distances between key destinations. The high volume and speed of vehicles and trucks create issues such as noise, vibration, pollution, and increases the real and perceived safety risk of the corridor. All these factors contribute to making the area less attractive for walking, which reflects in a low pedestrian mode share.

Figure 7-7 and Figure 7-8 highlight some of the deficiencies in the pedestrian network.



**Figure 7-7: Poor pedestrian connectivity**



**Figure 7-8: Ponding at the Coulter Road pedestrian crossing**

#### Cycling

On-road cycle lanes (ranging from 1m to 2m wide) are available for the full extent of the corridor, and advance stop boxes are provided at the Iles Road traffic signals. Between Iles Road and Coulter Road, the footpath on the east side of the road is designated as a shared path (including sections of approximately one metre in width). At the Ōwhata Road roundabout, a shared path is provided on the periphery of the roundabout.

The existing on-road cycle lanes on Te Ngae Road are accommodated within the road shoulder. They provide no separation from traffic and the space is shared with the bus stops. Given the high-speed limit, freight demand and traffic volumes along this route, these cycle lanes are likely to be used only by very confident cyclists.

The parallel shared path on the eastern side of Te Ngae Road offers a safer environment for less experienced cyclists however the path is narrow in parts, crosses many driveways and cyclists must



give way to traffic at side roads. Limited connectivity to other parts of the off-road cycle network make it challenging for less confident cyclists to undertake journeys by bicycle.

Figure 7-9 and Figure 7-10 highlight some of the deficiencies of the local cycle network.



**Figure 7-9: Shared path crosses numerous driveways close to property boundaries**



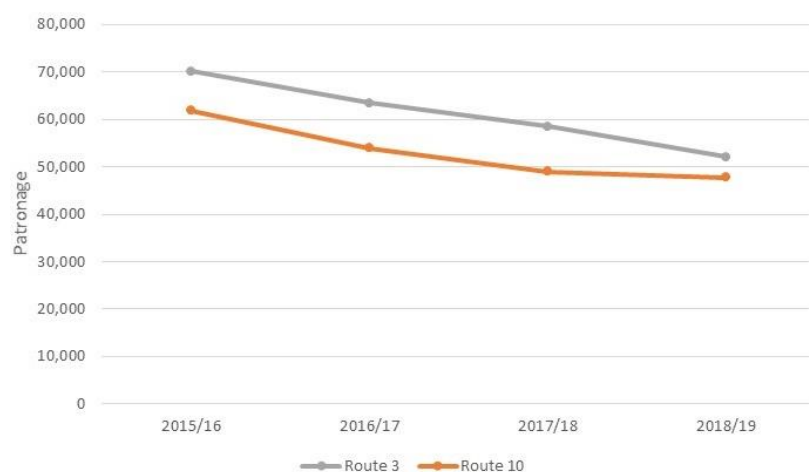
**Figure 7-10: Narrow shared path**

While the travel to work mode share for cycling is marginally higher for the eastern corridor than the Rotorua and New Zealand average there are substantial opportunities for growth - particularly given that Rotorua's climate, topography and size provide ideal conditions for commuter cycling.

### Public Transport

The attraction of public transport is generally related to service frequency, hours of operation, relative cost, and travel time. The bus routes that service this corridor offer only moderate frequency (every 30 minutes including at peak times), limited hours of operation (0700 – 1800), and inconsistent loop routes, particularly on Route 10. While bus fares are relatively affordable, there is no differentiation in fares for short trips and free parking is available on the periphery of the town centre. Furthermore, any travel time reliability issues faced on the road network will be experienced by bus users, making bus travel less affordable and convenient than driving for some journeys.

Bus patronage data for both routes that service the area is shown in Figure 7-11.



**Figure 7-11: Annual patronage data for bus routes servicing the Eastern Corridor**

The data demonstrates that patronage has decreased over the past three years. The BOPRC have identified that unreliable services are one of the key factors contributing to declining patronage in both Tauranga and Rotorua. The Regional Council also identified that low-cost or free parking relative to bus fares in Rotorua also contributes to declining patronage.

## 7.4 Effects

### 7.4.1 Health, safety, and environmental outcomes

The health, safety, and environmental benefits of providing for active and public transport modes are well understood and there is increasing support and investment in the development of infrastructure to support these modes. Providing feasible transport choices also supports social and community benefits and contributes to reducing congestion and optimising existing infrastructure. These outcomes are the focus of key national, regional, and local strategies, including the Draft GPS that seeks to achieve mode neutrality and reduce the adverse effects of transport on the local environment and public health.

#### Health and environment

In recent times our cities and towns have been designed around the underlying assumption of providing for vehicle access, resulting in barriers and limited opportunities for walking and cycling. Car dependency has contributed to sedentary lifestyles that result in multiple poor physical and mental health outcomes. The Bay of Plenty region has statistically significant higher rates of people being overweight or obese (70%) when compared to the rest of New Zealand (66%).<sup>55</sup>

Increasing car use and growth in freight demand is leading to increases in greenhouse gas emissions. Road transport accounts for 19.7% of New Zealand's gross national greenhouse gas emissions<sup>56</sup> and is one of the only sectors recording an increase in emissions. Vehicle exhaust emissions release other toxic pollutants such as nitrogen dioxide and particulate matter into the air and waterways. These pollutants mainly affect the respiratory system of people that live near busy roads and can lead to long term illnesses and premature death.

#### Safety

Actual and perceived safety influence people's decision to use active modes. Crash data between 2015 and 2019 reveals there were 146 recorded crashes on Te Ngae Road within the study area.

Six of the 13 DSI crashes recorded involved active road users (five pedestrians and one cyclist). Both fatal crashes were the result of pedestrians being struck by vehicles. One fatality occurred when a pedestrian was crossing the highway adjacent to the airport, and the other occurred when a pedestrian ran into the carriageway after her dog and was struck by a bus. This is disproportionate to mode share, and reaffirms the need for safety improvements for pedestrian infrastructure.

## 7.5 Summary

The evidence confirms that the current form of SH30 Te Ngae Road has below the minimum standard provisions for walking, cycling, and public transport. Poor service provision and infrastructure for these modes has contributed to sedentary lifestyles and poor health and environmental outcomes for residents in the area.

The evidence highlights that there is an immediate need for investment to enhance active and public transport modes. Planned changes in adjacent land use provides a catalyst for developing integrated solutions that improve multi-modal access.

Addressing these issues may require an acceptance of a lower LOS for vehicle access to close the current LOS gaps for walking, cycling and public transport. It may also require support for issues outside of the study area such as a review of parking management in Rotorua town centre, which can contribute to reducing car travel and increasing the use of active and public transport modes. Without short-term investment, new residents will be locked into car travel that will subsequently lead to deterioration of the LOS for vehicles on SH30 Te Ngae Road and local side roads.

<sup>55</sup> "Indicator: Overweight or obese: BMI of 25.0 or greater" Regional Data Explorer Results 2014-2017, Ministry of Health, published March 2018, [https://minhealthnz.shinyapps.io/nz-health-survey-2014-17-regional-update/\\_w\\_99fc3a05/\\_w\\_97dcde04/#/compare-regions](https://minhealthnz.shinyapps.io/nz-health-survey-2014-17-regional-update/_w_99fc3a05/_w_97dcde04/#/compare-regions)

<sup>56</sup> Ministry for the Environment (2019). New Zealand's Greenhouse Gas Inventory <https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/nz-greenhouse-gas-inventory-2019.pdf>

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## 8. INVESTMENT OBJECTIVES

### 8.1 Benefits of Investment

The benefits of investment were identified during Workshop No.2 and further developed by the project team after consideration of the problem statements and benefits:

- **Supporting RLC to achieve Spatial Plan Objectives.** RLC's Spatial Plan identifies areas for new development and highlights the Eastside area as a priority for residential and commercial growth in the short term. Investing in intersection and corridor improvements on Te Ngae Road and enhancing walking, cycling and public transport infrastructure will enable additional journeys generated from growth to be accommodated within the catchment without significantly impacting on the function of Te Ngae Road. Improvements to the corridor will also provide certainty for residential and commercial developers and provide them with confidence on the future form of the corridor.
- **Efficient movement of goods and people along SH30 Te Ngae Road.** Investment in corridor upgrades to enhance access to side roads and improve walking and cycling infrastructure will optimise the transport network and support efficient movement of people and goods on SH30 Te Ngae Road.
- **Improved local connectivity.** Intersection upgrades will improve local connectivity throughout the catchment for residents. Future land use plans, including the Eastside Structure Plan, incorporate local collector roads that enable residents to access local destinations that reduces the demand on Te Ngae Road.
- **Improve safety for all modes.** Upgrades at key intersections will improve safety for residents accessing major side roads and will also enhance access to minor side roads and driveways by providing gaps in the traffic flow. Investment in walking and cycling along and across Te Ngae Road will address the safety deficiencies for vulnerable road users who are currently over-represented in crashes.
- **Increase the number of people walking and cycling.** Investment to provide safe, separated, and connected facilities for walking and cycling networks will address network deficiencies on Te Ngae Road. Improvements will encourage more people to walk and cycle for key journeys who may not currently feel confident doing so.
- **Improve the reliability of bus services.** Corridor upgrades will improve travel times for all vehicles including buses, while intersection improvements will enable buses to safely enter and exit from side roads. Future phases could incorporate investment in bus priority measures (such as bus lanes) that will further contribute to improving bus service reliability.

Further benefits that could be delivered through the project are:

- **Improved mental health**, with better access to walking and cycling opportunities
- **Reduction in greenhouse gas emissions** if mode shift is achieved.
- Improved general **user experience**
- Improved access to **employment opportunities**
- Improved feeling of on **community cohesion** (reduce severance)

### 8.2 Investment Logic Map

An Investment Logic Map (ILM) was developed to identify and clarify the links between problems and benefits. Benefits were developed to demonstrate the links between the benefits and key performance measures that can be used to measure success.

The investment objectives are:

1. Support the Eastside Structure Plan development targets of 2,000 houses by 2028 and 4000 houses by 2048 whilst maintaining suitable efficiency along and onto SH30 Te Ngae Road.

2. Freight and bus travel time between the Airport and Iles Road within 10% of the travel time for cars by 2028.
3. An additional 100 new walking and cycling trips per day along SH30 Te Ngae Road by 2028.
4. Reducing the number of DSIs along SH30 Te Ngae Road by 33% within the next 10 years.
5. An additional 3km of active mode infrastructure by 2028 and 5km by 2038.

Figure 8-1 provides an ILM which shows the development of the Investment Objectives.

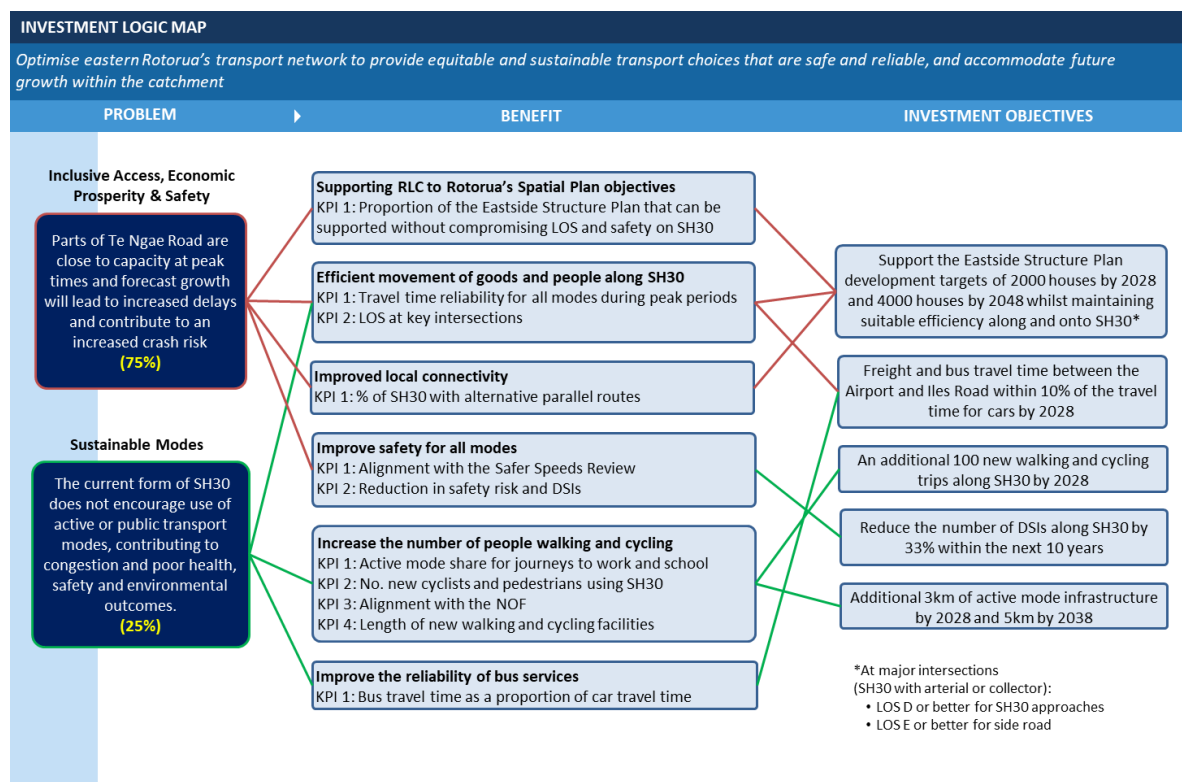


Figure 8-1: Investment Logic Map

### 8.3 Key Performance Indicators

The Key Performance Indicators (KPIs), as identified by the project team, are outlined in Table 8-1. The purpose is to provide clarity around what benefits investment would provide, and how, in real-terms, these benefits could be identified.

Table 8-1: Benefits, associated key performance indicators, baselines, and targets

BENEFIT	KPI	BASELINE	TARGET
Supporting RLC to achieve Spatial Plan objectives	Proportion of new dwellings within the Eastside Structure Plan that can be supported without reduction in efficiency and safety on SH30 Te Ngae Road	0%	100% support - i.e. 2,000 new houses by 2028 and 4,000 houses by 2048.
Efficient movement of goods and people along SH30 Te Ngae Road	Travel time reliability for all modes during peak periods	By 2028 – peak travel time expected to be up to 2.5 mins longer than the off-peak times.	AM/PM peak travel times within 1 minute of off-peak travel times
	LOS at key intersections	By 2028 - LOS F conditions expected to be experienced on the Basley Road, Brent Road, Ōwhata Road, Wharenui Road, Pohutukawa Drive and Robinson Avenue approaches to SH30 Te Ngae Road.	LOS E or better on side roads to major intersections and LOS D or better for the SH30 Te Ngae Road approaches – for all years up to 2048

BENEFIT	KPI	BASELINE	TARGET
Improved local connectivity	Percentage of SH30 Te Ngae Road with alternative parallel routes	<ul style="list-style-type: none"> <li>40% on the eastern side (Moray Street).</li> <li>30% on the western side (Vaughan Road).</li> </ul>	<ul style="list-style-type: none"> <li>75% on the eastern side – in line with where housing development is.</li> <li>30% on the western side (as no additional housing proposed)</li> </ul>
Improve safety for all modes	Alignment with the Safer Speeds Review	<ul style="list-style-type: none"> <li>60km/h - Iles Rd to Coulter Rd</li> <li>70km/h - Coulter Rd to Alfred Rd</li> <li>80km/h - Alfred Rd to Airport</li> </ul>	<ul style="list-style-type: none"> <li>50 kph between Sala Street and just north of Alfred Road.</li> <li>60 kph between Alfred Road and just north of Rotokawa Road.</li> </ul>
	Reduction in safety risk and DSIs	13 DSIs (2015-2019)	33% reduction in DSIs in the next 10 years
Increase the number of people walking and cycling	Active mode share for journeys to work and school <sup>57</sup>	<ul style="list-style-type: none"> <li>5% active mode share for journeys to work</li> <li>23% active mode share for journeys to school</li> </ul>	<ul style="list-style-type: none"> <li>8% active mode share for journeys to work</li> <li>40% active mode share for journeys to school</li> </ul>
	Number of new cyclists and pedestrians using SH30 Te Ngae Road	n/a	100 additional pedestrians and cyclists using SH30 Te Ngae Road each day
	Length of new walking and cycling facilities	<ul style="list-style-type: none"> <li>Shared path: 3.7 km</li> <li>Cycle lanes: 7.5 km</li> </ul>	Additional 5km of shared paths
	Alignment with the NOF	n/a	Full alignment with desired outcomes of the NOF
Improve the reliability of buses	Difference in peak vs off-peak bus travel times	By 2028 – peak travel time expected to be 1.3-2.5 mins longer than the off-peak times.	AM/PM peak travel times within 1 minute of off-peak travel times

## 8.4 Opportunities

### 8.4.1 Economic Growth and Tourism

Improving multi-modal access on SH30 Te Ngae Road will accommodate future forecast growth by unlocking the potential for new residential and commercial developments along the corridor that may otherwise be constrained by growing pressure on the transport network. Improving access to the local road network will provide safety benefits, while investing in walking and cycling facilities will provide locals with transport choice and reduce the demand on the road corridor. Some capacity improvements will ensure that constrained segments of the corridor are addressed, providing for efficient journeys to support the movement of people and goods for local and regional journeys.

Tourist journeys will be enhanced by more efficient and safer journeys to Rotorua Airport. Improvements to cycle facilities on Te Ngae Road will provide the opportunity for cycle tourists to ride between the airport and key destinations in Rotorua including the town centre and mountain biking trails in Whakarewarewa Forest Park.

### 8.4.2 Amenity Improvements

There is the opportunity to bring in urban and landscape design features into the corridor upgrade. The look and feel of the corridor are unappealing and has very limited place value. Improving amenity through landscaping and urban design can rejuvenate the streetscape and attract new investment to the area. Upgrades to walking and cycling infrastructure can incorporate amenity upgrades that will attract new users and contribute to enhancing the look and feel of the corridor.

RLC also aspire to create an iconic gateway at the eastern entrance to the town providing a more positive welcome to visitors.

<sup>57</sup> Ngapuna, Lynmore, Ōwhata East, Ōwhata West, Holdens Bay-Rotokawa and Waiohewa



# **PART B(I): PROGRAMME DEVELOPMENT**

## 9. OPTIONEERING PROCESS

### 9.1 Terminology

This section describes the process taken to determine a short list of programmes for the corridor, which then led onto the development of a preferred programme.

### 9.2 Process

Optioneering was essentially a three step process:

1. Long list to short list
2. Reviewing the alignment of short list against the wider transport strategies
3. Developing an emerging preferred programme.

Outlined below are the steps taken during each step of the optioneering process.

#### 9.2.1 Long list to short list

The long list to short list process is shown as Figure 9-1.

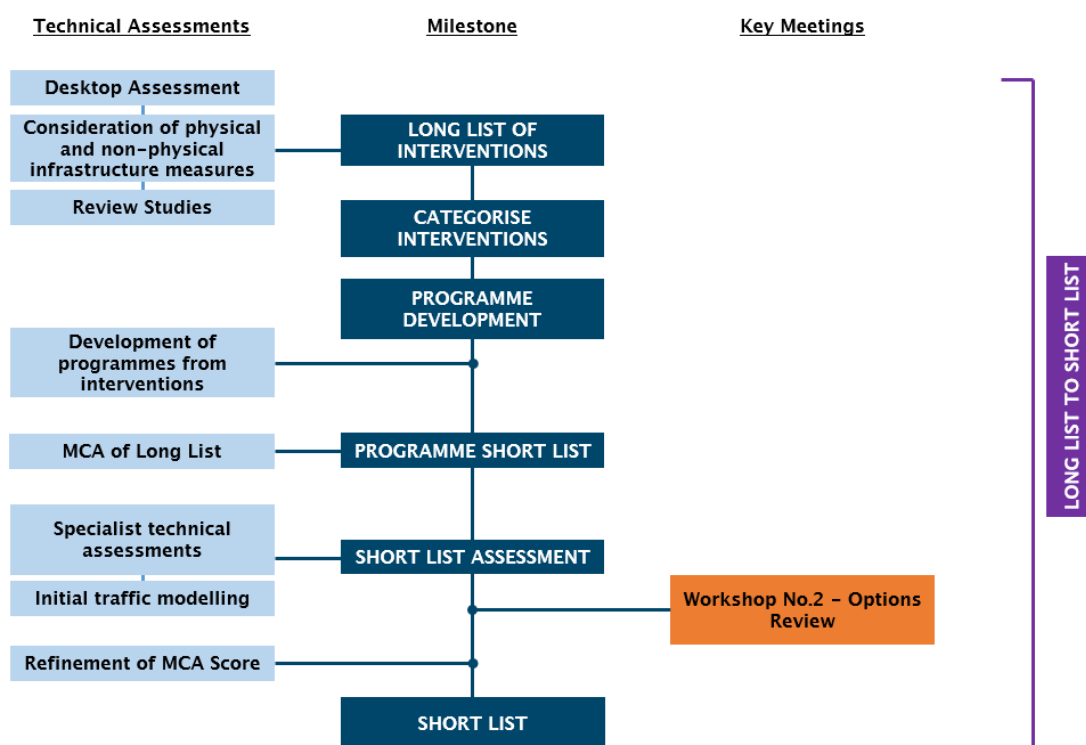


Figure 9-1: Long list to short list process

During this initial phase we:

- Developed a comprehensive long list of interventions (see **Appendix H**) which was derived from an original long list developed as part of the combined IBC/DBC. These interventions were then categorised into key themes (e.g. intersection upgrades, active modes etc.).
- Undertook an initial screening of the long list by evaluating the strength of each intervention against the investment objectives.
- Developed a range of potential programmes using the filtered long list. These programmes comprised of various combinations of corridor and intersection interventions.

- Assessed the long list of programmes using a multi-criteria assessment (MCA) process against the key project risks<sup>58</sup>. This allowed us to identify an initial short list of programmes.
- Received initial feedback from project partners and agreed a short list.
- Undertook desktop technical assessments for drainage, ecology, geotechnics, archaeology, stormwater, and structures. The specialists then provided inputs into an updated MCA. The assessments are provided as **Appendix I**.

### 9.2.2 Aligning with the wider transport strategies

The DBC process was then paused to allow for the completion of several wider area strategies; namely – the Safer Speed Review, NOF, Eastside Structure Plan and Rotorua Airport Masterplan. Without first completing these strategies there would have been a risk that the proposed changes for SH30 Te Ngae Road would not have aligned with the wider strategies and land use plans.

This ‘hold point’ turned out to be essential, as some key things did change:

- As part of the **Safer Speed Review**, the proposed speed of the SH30 Te Ngae Road reduced (down to 50-60kph). This influenced what our ‘Do Minimum’ for the corridor was. The change in speed environment also meant it was appropriate to challenge the decision around whether a solid median was a necessary intervention.
- The **NOF** identified Vaughan Road, Ōwhata Road and Tennyson Road as future primary cycling corridors. SH30 Te Ngae Road was identified as a primary cycling corridor in the short term, and then as a secondary cycling corridor in the long term (after local road improvements has been made). Brent Road was identified as a primary pedestrian route (due to its connections to local schools). SH30 Te Ngae Road was also a primary public transport route.
- The **Eastside Structure Plan** identifies approximately 3000 to 4000 houses to be constructed on the eastern (hill) side of SH30 Te Ngae Road. This is a significant change to what was previously assumed as part of the Rotorua Spatial Plan. Although 4000 houses were previously proposed, these were planned to be distributed evenly on either side of SH30 Te Ngae Road. The Eastside Wellness Plan was a key driver for this change, as now much of the lakeside area is earmarked as wetland and cultural/character areas.

The Eastside Structure Plan also provides for commercial development off Gee Road, rather than expansion of the Eastgate Industrial Park. This then influences the amount of future traffic that would be added to the Eastgate Industrial Park access from SH30 Te Ngae Road.

### 9.2.3 Short List to Preferred programme

With the wider area strategies in place, we were able to revisit the previously identified short list and progress with the completion of the business case.

To get from a short list of three programmes to a preferred (and phased) programme we:

- Reviewed the short listed programmes against the NOF and Safer Speed Review. The purpose was to determine whether the outputs were aligned, and to identify any service gaps.
- Updated the evidence base (inc. site visit, traffic counts, travel time data, review of crash data and an infrastructure deficiency assessment). The purpose was to better understand the current LOS gaps for each transport mode.
- Combined elements of three short listed programmes into a single, phased, programme that was based on the new evidence and aligned with the wider strategies. This was presented to RLC for feedback.
- Undertook MCAs for each major intersection to ensure that a) we had the right solution in place for each location; and b) to ensure that all potential alternatives had been considered.
- Undertook traffic modelling (using the microsimulation model) to understand the impact of the emerging recommended programme. The results were reported back, and revisions to the design were made as a means of optimising the solution.

<sup>58</sup> 1) Alignment with the local road network; 2) Future growth; 3) Property; 4) Tangata whenua values; 5) Natural environment; 6) Impact on adjacent land uses; 7) Engineering degree of difficulty; 8) Visual and landscape impacts; and 9) Urban design opportunities

- Refinement of the programme following a review of the modelling results, a value-engineering exercise and incorporating feedback from the stakeholder group and public.

Figure 9-2 outlines the process taken to get from an agreed short list to a preferred programme.

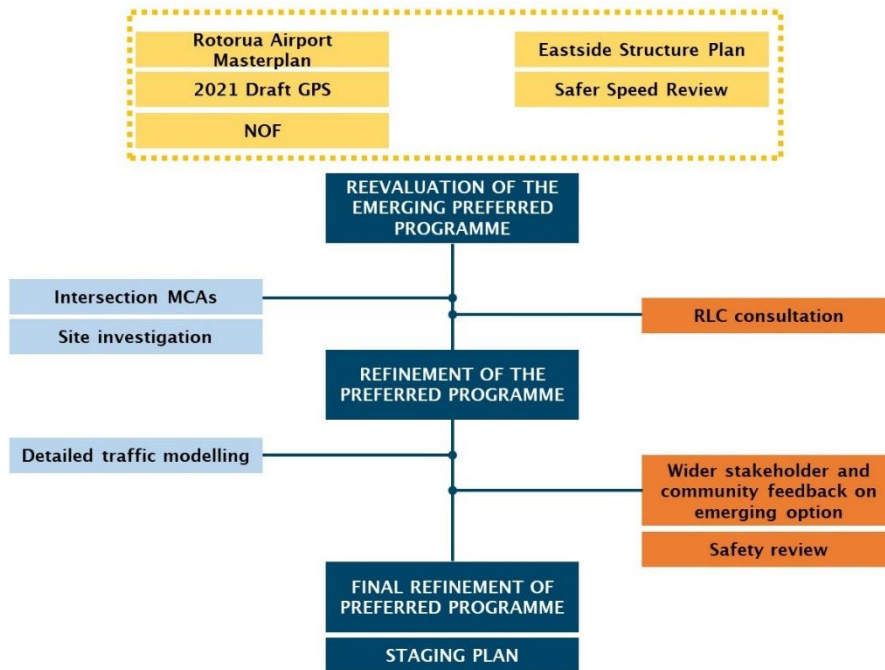


Figure 9-2: Developing and refining the preferred programme

## 10. LONG LIST TO SHORT LIST

### 10.1 Potential interventions

At the long list stage only high-level, generic interventions were considered. Then, during the short list stage, the nature and extent of the interventions were better defined.

The initial long list (provided as **Appendix H**) includes over 130 individual interventions. These range from intersection treatments, landscape and streetscape improvements, stormwater management, public transport upgrades and active travel improvements. Each of the interventions were grouped into one of four categories:

- Corridor treatments and streetscape improvements
- Intersection upgrades for major intersections
- Intersection strategies for the remaining intersections
- Active modes, public transport, and land use management

Table 10-1 provides a list of the high-level interventions.

**Table 10-1: Potential interventions**

TREATMENT	INTERVENTION	FURTHER COMMENT
Corridor	Flush median (where two lanes)	-
	Solid median (where four lanes)	-
	Streetscape improvements	-
Intersection upgrades	Upgrade the Basley Road intersection. Includes the potential for a fourth leg to the Owhatiura South 5 Block development and possible connection through to Vaughan Rd.	Recommendation of the Eastern Corridor Combined IBC/DBC. Accompanied by the four laning of the SH30 Te Ngae Road between Iles Road and Basley Road. This is because any upgrade of the intersection would see increased capacity, and much of the efficiency benefits gained could be lost if only two mid-block lanes are retained (due to merge/diverge issues).
	Upgrade the Ōwhata Rd intersection	Recommendation of the Eastern Corridor Combined IBC/DBC.
	Upgrade the Wharenui Road intersection	Response to the Wharenui Road development trigger in RLC's District Plan – i.e. traffic signals at Wharenui Road.
	Upgrade the Robinson Avenue intersection	Safety response
	Rationalise and upgrade Airport / Eastgate intersections	Response to the recommendation of a separate investigation undertaken by RLC.
Intersection strategies	Retain all movements to Lee Rd, Robinson Av, Pohutukawa Dr, Tennyson Dr and Gee Rd	-
	Left in/left out only with local roads	-
	Retain access to low volume roads	-
	Restrict access to low volume roads (left in/left out)	-
Active modes, public transport, and land use	Cycle lanes (both sides) and shared path on one side	The appropriateness of this treatment was later reconfirmed.
	Walking and cycling improvements	-
	Public transport improvements <sup>59</sup>	-
	Land use planning	-

The following interventions were also considered, but were agreed to be discounted at the long list stage for the following reasons:

<sup>59</sup> Service improvements are the responsibility of Bay of Plenty Regional Council



- **Fourth leg for Ōwhata Road intersection.** This option was discounted because it would push higher traffic volumes onto Reeve Road, and ultimately past the local schools.
- **Upgrade the Brent Road intersection.** This was considered as it supports access to three schools. However, it would encourage non-school traffic from the Wharenui Road development to use Brent Road (rather than collector roads<sup>60</sup> such as Wharenui Road and Basley Road) to access SH30 Te Ngae Road.

## 10.2 Programme Development

### 10.2.1 Do Minimum

Originally the 'Do Minimum' effectively reflected a 'Do Nothing' (Status Quo).

However, in response to the Safer Speed Review and NOF, the Do Minimum now reflects the retention of the existing corridor but adopts the recommendations of the Safer Speed Review (i.e. posted speed reduction to 50 – 60kph). It also captures improvements being delivered as part of the Rotorua SH30 Eastern Corridor Stage One project.

### 10.2.2 Programme development

Now we had the long list in place, the next step was to develop eight different programmes which had varying combinations of interventions, and clear distinctions. This approach meant we could easily compare the relative benefits and disbenefits of each programme.

An overview of what each programme included is provided as Table 10-2.

**Table 10-2: Long List Programmes**

TREATMENT		DM (DN)	2	3	4	5A	5B	7A	7B
Corridor	Flush median (where two lanes)	✓							
	Solid median (where four lanes)		✓	✓	✓	✓	✓	✓	✓
	Streetscape improvements			✓	✓	✓	✓	✓	✓
Intersection upgrades	Rationalise Airport/ Eastgate intersections			✓	✓	✓	✓	✓	✓
	Upgrade Ōwhata Road intersection			✓	✓	✓	✓	✓	✓
	Upgrade Basley Road intersection + fourth leg		✓	✓	✓	✓	✓	✓	✓
	Upgrade Wharenui Road intersection			✓	✓	✓	✓	✓	✓
	Upgrade Robinson Avenue intersection			✓				✓	✓
Intersection strategies	Retain all movements to Lee Rd, Robinson Av, Pohutukawa Dr, Tennyson Dr and Gee Rd	✓	✓	✓	✓		✓		✓
	Left in / left out with local roads					✓		✓	
	Retain access to low volume roads (e.g. Alfred Rd)	✓	✓	✓	✓				
	Restrict access to low volume roads (left in / left out)					✓	✓	✓	✓
Active modes, land use & public transport	Cycle lanes (both sides) + shared path on one side			✓	✓	✓	✓	✓	✓
	Walking and cycling improvements			✓	✓	✓	✓	✓	✓
	Public transport improvements			✓	✓	✓	✓	✓	✓
	Land use planning			✓	✓	✓	✓	✓	✓

Sub options were developed for the future four-laning options:

- **5A & 7A** – 'efficiency' variation. Intended to enhance person throughput and safety by restricting access to SH30 Te Ngae Road from local side roads.
- **5B & 7B** - 'growth' variation. Retaining all movements onto SH30 Te Ngae Road.

The main difference between Programmes 5 and 7 is the inclusion of a proposed treatment for the Robinson Avenue intersection.

<sup>60</sup> This is relevant to the project Investment Objectives

## 10.3 Programme assessment

### 10.3.1 Criteria

The eight options were assessed using 14 agreed criteria which reflected the themes of the investment objectives and the key project risks:

**Table 10-3: MCA Criteria**

CATEGORY		DESCRIPTION
Investment Objectives	Supporting growth	Helping deliver RLC's housing targets
	Supporting freight movements	LOS D (or better) along SH30 Te Ngae Road, for all times by 2048
	Accessibility	LOS E (or better) for access onto SH30 Te Ngae Road, for all times by 2048
	Safety	Reduction in DSIs
	Active modes	Increased number of active transport users
	Public transport	Improve the reliability of public transport services
Key risks	Access to key facilities	Support access to key local facilities (e.g. shops and schools).
	Access to new residential areas	Support access to new developments
	Property impact	The number of properties (or partial properties) that would need to be acquired or are directly impacted
	Natural environment	Impacts include water run-off and noise
	Impact to adjacent land uses	Impacts to access or residents living directly off SH30 Te Ngae Road
	Engineering degree of difficulty	Considering structural requirements, stormwater management, utilities, the number of intersections being upgraded etc.
	Visual and landscape impacts	Landscaping opportunities
	Urban design	Opportunities presented by the various alternatives.

The other key risk relates to *cultural / tangata whenua values*. However, the key issues and opportunities associated with this factor were discussed as part of separate hapū consultation (outside of the MCA process).

### 10.3.2 Scoring scale

The MCA assessment used a seven-point scoring system of +3 (significant benefit or alignment) to -3 (significant disbenefit or misalignment). A 'fatal flaw' score was also available, which if used, would discount the programme and no further scoring of any other criteria was required.

### 10.3.3 Assessment

The various programmes were initially assessed against the investment objectives. Programmes that achieved a -3 score for any of the investment objectives, or an overall negative score were excluded. Programmes were then assessed against each of the key risks. If a programme received a fatal flaw it was discounted, and remaining criteria were not assessed.

Table 10-4 provides an overview of the agreed scoring (post Workshop No.2), with the rationale provided within **Appendix I**.

**Table 10-4: Long List Programmes Assessment**

TREATMENT		DN	2	3	4	5A	5B	7A	7B
Investment Objectives	Support RLC to meet housing targets	-3	-1	1	2	2	2	3	3
	Achieve LOS D (or better) along SH30	-3	3	1	1	3	3	3	3
	Achieve LOS E (or better) for access onto SH30	3	3	3	3	1	3	3	3
	Improve safety	-2	-2	0	1	1	-3	2	-1
	Increase no. active transport users	-3	-2	1	1	0	0	1	1
	Achieve BOPRC's targets for PT	-3	-2	1	1	3	3	3	3
	Progress to key risks assessment?	N	N	Y	Y	Y	Y	Y	Y
Key Risks	Access to key facilities			1	2	-2	F	0	3
	Access to new residential areas			-2	-2	1		3	3
	Property			1	0	-1		-2	-2
	Natural environment			0	0	-1		-1	-1
	Impact on adjacent land uses			0	0	-3		-2	-1
	Engineering degree of difficulty			0	0	-2		-2	-2
	Visual and landscape impacts			0	0	0	n/a	0	0
	Urban design opportunities			1	1	2		2	2
Totals	Investment Objectives			7	9	10		15	12
	Key Risks			1	1	-6		-2	2
	Overall			8	10	4		13	14
	Progress to short list?	N	N	N	Y	N	N	Y	Y

The key outcomes of the MCA process were:

- The highest ranking programmes were:
  - **Programme 4** – two lanes, upgrade to four intersections, cycle upgrades, PT/active/streetscape enhancements. This was the highest ranking ‘two-lane’ programme.
  - **Programme 7A** - four lanes to the airport, upgrade five intersections (efficiency variation), cycle upgrades, PT/ active mode/ streetscape enhancements.
  - **Programme 7B** - four lane to airport, upgrade five intersections (growth variation), cycle upgrades, PT/ active mode/ streetscape enhancements
- Programme 2 - rejected as part of the screening against investment objectives.
- Programme 3 – provides some benefits, but achieved a lower score than Programme 4 and therefore was not shortlisted.
- Programme 5A - lack of access onto SH30 Te Ngae Road for northern residential area will require a local road connection to Ōwhata Road, and access to and from properties on the highway will require U-turns at the airport roundabout or Ōwhata Road. This is because of a lack of a signal at the Robinson Avenue intersection. The impacts on adjacent land are substantial and this option has been rejected on these grounds.
- Programme 5B – turning right into/out of access roads will require drivers to cross multiple lanes, impacting on safety. This was considered as a fatal flaw and has been rejected on this basis.

Following this process, **Programmes 4, 7A and 7B** were shortlisted.

# 11. SHORT LIST ASSESSMENT

## 11.1 Short list

The short list of options are presented as Figure 11-1 to Figure 11-3.

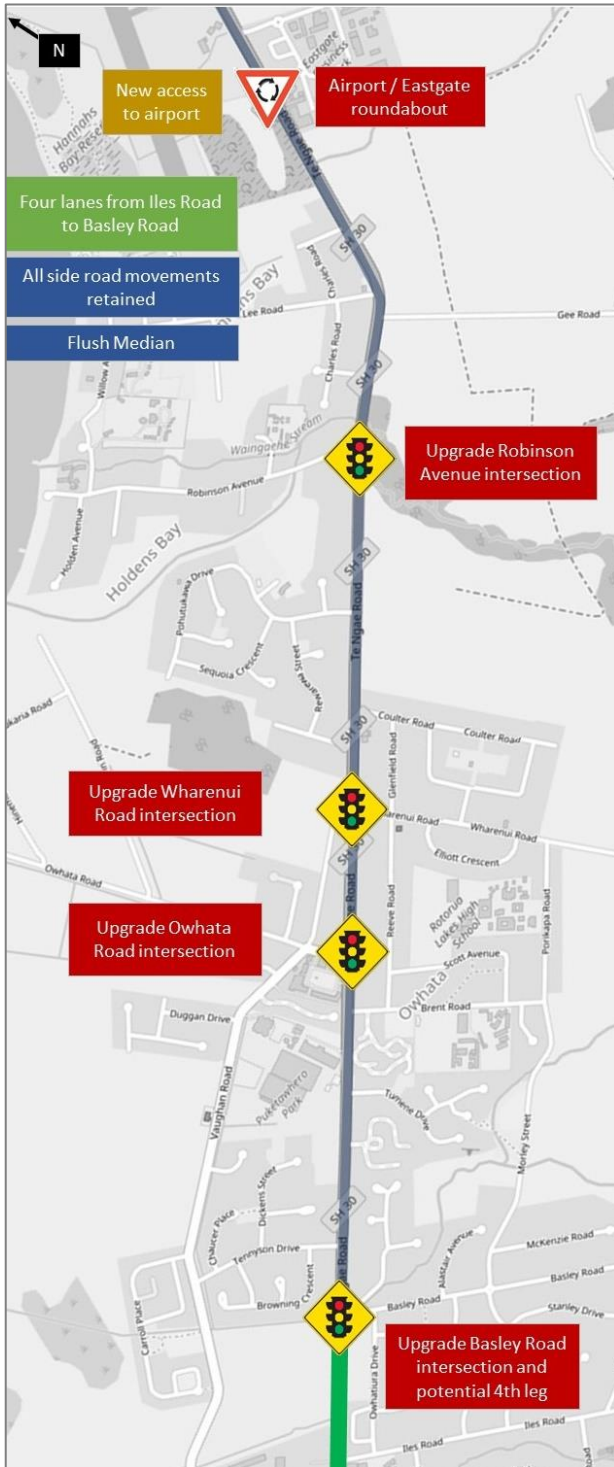


Figure 11-1: Option 4

All options include:

- On-road cycle lanes on both sides
- Shared path on one side
- Landscape and urban design improvements
- Upgrades to the major intersections

### Programme 4

Consists of four lanes between Iles Road and Basley Road, and two lanes for the remainder of the corridor. All five proposed intersection upgrades (Basley, Ōwhata, Wharenui, Robinson and Airport/ Eastgate) are included. As the two lane section retains a central flush median, movements at side streets and driveways are unrestricted.

### Programme 7a

Consists of four laning all the way to the airport, with all five intersection upgrades included. A solid central median is included, which means that there would be turning restrictions at many side roads (i.e. left in / left out only). As this option substantially restricts local road access, new local roads would need to be considered to improve connectivity – i.e.

- Ōwhata Road to Sunrise Avenue
- Galvin Road to Pohutukawa Drive
- Robinson Avenue to Lee Road
- Basley Road to Vaughan Road

### Programme 7b

This is similar to Programme 7a but allows more side road access (at Tennyson Road, Brent Road, Pohutukawa Road, Lee Road, and Gee Road). Access would be provided via openings in the central solid median.



Figure 11-2: Programme 7A



Figure 11-3: Programme 7B

## 11.2 Technical review of options

Ahead of the second workshop (26 June 2018), various technical specialists were engaged to identify potential risks and constraints for each short listed programme. The inputs provided informed updated MCA scores and general discussion during the workshop.

A summary of the specialists' inputs is provided in Table 11-1, with the technical memos provided as **Appendix J**.



**Table 11-1: Summary of specialist inputs**

DISCIPLINE	PROGRAMME 4	PROGRAMME 7A	PROGRAMME 7B
Archaeology	No known archaeological sites in area.		
Stormwater	<ul style="list-style-type: none"> <li>• Upgrade five sumps</li> <li>• Replace swales with pipes (~500m)</li> <li>• Upgrade/ widen one cross culvert</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrade 50 sumps</li> <li>• Replace swales with pipes (~500m)</li> <li>• Upgrade/ widen ten cross culverts</li> <li>• Stream erosion mitigation (1,800m)</li> </ul>	
Hydrology	<ul style="list-style-type: none"> <li>• High groundwater.</li> <li>• Capacity of Waingaehe Stream/ channel well above the 100-year ARI design levels.</li> </ul>		
Ecology	<ul style="list-style-type: none"> <li>• Culvert replacements required to maintain fish passage.</li> <li>• Construction works near streams may impact on water quality.</li> <li>• Lake Rotokawa (Protected Natural Area) close to road alignment and lake edge vegetation may be impacted by works.</li> </ul>		
Structures	<ul style="list-style-type: none"> <li>• Waingaehe Bridge – marginal deck and beam capacity for current loading.</li> <li>• Defects, six monthly inspection regimes.</li> <li>• The Waingaehe Stream bridge is over 80 years old and has been widened in the past; additional widening is required for Options 7A and 7B – but a new bridge would be preferable.</li> </ul>		
Geotechnical	<ul style="list-style-type: none"> <li>• No evidence of geothermal activity along corridor, however the southern end is near a Class IV geothermal zone.</li> <li>• Pavement support may be needed due to alluvial subgrade.</li> </ul>		
Lighting	<ul style="list-style-type: none"> <li>• Single sided lighting for most of the corridor.</li> <li>• Higher frequency of lighting columns required.</li> </ul>	<ul style="list-style-type: none"> <li>• Centrally located columns with dual mast arms.</li> <li>• Potential over dimension route constraints.</li> </ul>	
Property	<ul style="list-style-type: none"> <li>• Land acquisition required from numerous residential properties as well as newly developed commercial properties (Fresh Choice, Ōwhata Medical Centre) that may impact on parking.</li> <li>• Largest impacts at intersections (e.g. Wharenui Road and Airport/Eastgate).</li> <li>• General land owned by Māori affected.</li> </ul>		

For most disciplines, there were few differences between each of the programmes.

The two areas where differences were discernible were for stormwater and lighting. There was a ten-fold increase in the scale of stormwater upgrades required for the four lane options, as swales parallel to the corridor would need to be piped, with ten cross culverts widened or replaced (compared to one culvert for Programme 4).

For potential lighting works, Programmes 7A and 7B would likely cost less than Programme 4 as a solid median provides an opportunity to install a centrally located single column with dual mast arms, which can be placed at less frequent intervals compared to a single mast arm column.

## 11.3 Stakeholder workshop

The purpose of the second workshop was to review the short listed programmes and the MCA with the wider stakeholder group. **Appendix A** provides the minutes from the workshop.

Some key points raised by stakeholders in relation to Programme 7A and 7B were:

- Desire for a 'green wave' to optimise traffic flows through signals.
- Acceptance of the need to restrict access to Brent Road, despite the school travel demands.
- Tumene Drive would be notably impacted as the solid median would result in the requirement for U-turns at the signals and a long detour.
- There would be land requirement issues around the Wharenui Road intersection because of the development of new retail and commercial premises.
- Consideration should be given to a roundabout for Robinson Avenue to allow people to U-turn.
- Reduce the speed limit along SH30 Te Ngae Road.

- Close Lee Road at Te Ngae Road due to poor sight lines
- Connect Gee Road to Eastgate via a parallel road link
- Consider restricting access / movements to Gee Road
- Consider a fourth leg at Ōwhata Road intersection

#### **Stakeholder feedback**

Stakeholders were invited to provide feedback around the draft concept plans for each programme, and to express their view on which they preferred.

At the time, there was a clear consensus that Programme 4 (two-laning) was not supported because stakeholders considered that it would not adequately support future growth. The preference amongst the group at the time was for Programme 7A.

### **11.4 What we know now**

We now know that the assumption that Programme 4 would not deliver the capacity needed to support future growth was a misconception. This was because at the time there was not the necessary evidence available (i.e. detailed traffic modelling) to demonstrate that providing two mid-block lanes (at least in the short to medium term) could support growth.

At the time there also was a lack of discussion, or challenge, around whether four laning all the way to the Airport was required. For example, would only two lanes be appropriate through the more semi-rural areas (e.g. north of Robinson Avenue)?

The next section demonstrates how the short listed options were used as a starting point, reassessed against the latest evidence and strategies (inc. the NOF and speed review), and refined into a single phased solution.

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## 12. REVIEW OF THE SHORT LIST

### 12.1 Review against the NOF

In 2019, RLC prepared a draft NOF which is intended to be a collaborative and integrated approach to managing the entire transport system for all users. The key objectives of the NOF are:

- Rotorua to be a less car centric and dependent place by improving active and public transport attractiveness and accessibility.
- Improved perception of safety and the ability to choose alternative forms of transport.
- Improved connections between the city and the recreational and tourism opportunities through active mode routes.

All three objectives strongly support a shift away from private motor vehicle use and seek to encourage active and public transport. **Appendix K** provides a summary of how well aligned Programme 7A was against the NOF.

#### How have we responded?

Overall, the outcomes of the DBC align closely with those of the NOF.

The main difference is around the role SH30 Te Ngae Road plays for cyclists. In the NOF, the primary cycling route is along Vaughan Road – however, we understand that this was based off an assumption that much of the future land use development would be on the lakeside. This is no longer the case. If we look to align with the principle that future residential areas should connect onto primary cycling routes, then it would be more appropriate for Moray Street and SH30 Te Ngae Road to function as the primary cycling routes.

The strong message being presented via the NOF is that SH30 Te Ngae Road needs to have a greater focus around people and not just cars. In response we have revisited the preferred programme to:

- Establish whether four laning is required along the entire corridor, or whether a phased approach can be taken. Adding extra lanes creates a wider road and potentially more conflict.
- See how we can provide better provisions for cyclists – for those who are confident (i.e. on-road) and those who are less confident or more vulnerable (i.e. off-road).
- Ensure that crossings meet the desire lines for active modes and public transport users align with the NOF primary and secondary routes for pedestrians and cyclists.
- Identify how the corridor can be optimised to provide reliable journey times for freight.
- Establish a solution where we are not increasing traffic on local roads or encouraging rat-running.

### 12.2 Review against the Safer Speed Review

For SH30 Te Ngae Road, Waka Kotahi assessed the safe and appropriate travels as:

- 50 kph between Sala Street and just north of Alfred Road (urban/rural boundary).
- 60 kph between Alfred Road and just north of Rotokawa Road.

An underlying assumption of the DBC is that these speed changes will be adopted. This assumption is in part based on an independent safer speed appraisal we undertook as part of this DBC which drew the same recommendations for posted speeds.

SH30 Te Ngae Road is a long, straight, and relatively wide road. Therefore, it is essential that where possible the design seeks to help present a message that this is not a high speed environment. Simply changing the speed and signposts may not be enough.

#### How have we responded?

In response to the Safer Speed Review we have:

- Identified where and when four laning would be a requirement. A wider road can make it feel like a higher speed road, and whilst four laning in places will be a necessity for accommodating planned growth, these locations should be targeted.
- Used the design of the on-road cycle lanes to help narrow the effective cross-section for cars. This could be through added protection, or simply colouring the cycle lanes.

The introduction of signals and mid-block crossing will also help to slow down traffic. Although Programme 7A proposes 'green waves' through signal optimisation, only seldom would a car get a 'free run' along the corridor between the airport and Iles Road.

## 12.3 Review of feedback from Waka Kotahi's safety team

A review of the draft concept for Programme 7A was undertaken by Waka Kotahi's road safety team. Key feedback that has been incorporated into the refined programme was:

- Reduce the traffic lanes from 3.5m to 3.2m to present a slower speed environment.
- Questioned the need for a solid median
- Consider the interaction between alighting bus passengers and cyclists on the shared path.

### How have we responded?

The safety review brought to the forefront the question as to whether a solid or raised median were the appropriate intervention – even for sections that are proposed to be four laned.

Whilst there are some safety benefits of a solid median (removing the 'right turn against' type of crash), there are significant implications to access – as right turn bans would mean that people would either need to U-turn at signals or take alternative routes on local streets.

It is important to consider the spill on effects of changes to SH30 Te Ngae Road to the rest of the transport network – and how reducing one type of risk could inadvertently increase another. For instance, banning turns will mean that people affected would have to travel further, which in itself increases the risk of a crash. More traffic on local roads also misaligns with a desire for these streets to be low volume with a greater focus on active modes and 'place'.

### Case Study

There are arguments for and against the inclusion of a solid median in the design, especially for a road where over 300 properties have direct access. An evidence based approach, via a case study was used as a means of establishing the right approach for this corridor.

An appropriate comparison was identified as Ulster Street in Hamilton. This road has four lanes with a flush median and is similar in nature to SH30 Te Ngae Road in that it:

- Passes through a predominantly urban area
- Has a posted speed of 50kph
- Carries a similar volume of traffic (approximately 20,000 vpd)

Crash data identifies that on the 1km section between Darley Street and Storey Avenue there were 10 mid-block crashes over the last ten years (2010-2019) – i.e. typically one per year. Of these crashes, 3 resulted in minor injury (with the others non-injury).

None of the crashes would have been prevented if a solid median were in place. Indeed, there was only one crossing/turning type crash, and the primary cause was an intoxicated driver.

### Conclusion

There is not clear evidence to suggest that a raised median along SH30 Te Ngae Road would deliver any safety benefits over a flush median. However, a solid median would have notable implications to connectivity, travel distance (and CO2 emissions) and network efficiency. The programme therefore refined to adopt a flush median rather than a solid median.

This is the most notable change to the corridor strategy after the short list was reassessed against the new evidence and strategies.

It does not preclude a solid median being introduced in the future. The proposed width of the flush median is 3m, which is wide enough to construct a solid median if ever required.

## 12.4 Review against the Rotorua Airport Masterplan

The masterplan identifies a single entry at a new roundabout with the Eastgate Business Park and SH30 Te Ngae Road. This intervention is included within all short listed programmes.

### How have we responded?

Notwithstanding the above, in response to the masterplan, further investigation was undertaken to establish whether a roundabout was indeed the right solution and whether it was proposed in the right location (refer to Section 13.5).

## 12.5 Review against the Eastside Structure Plan

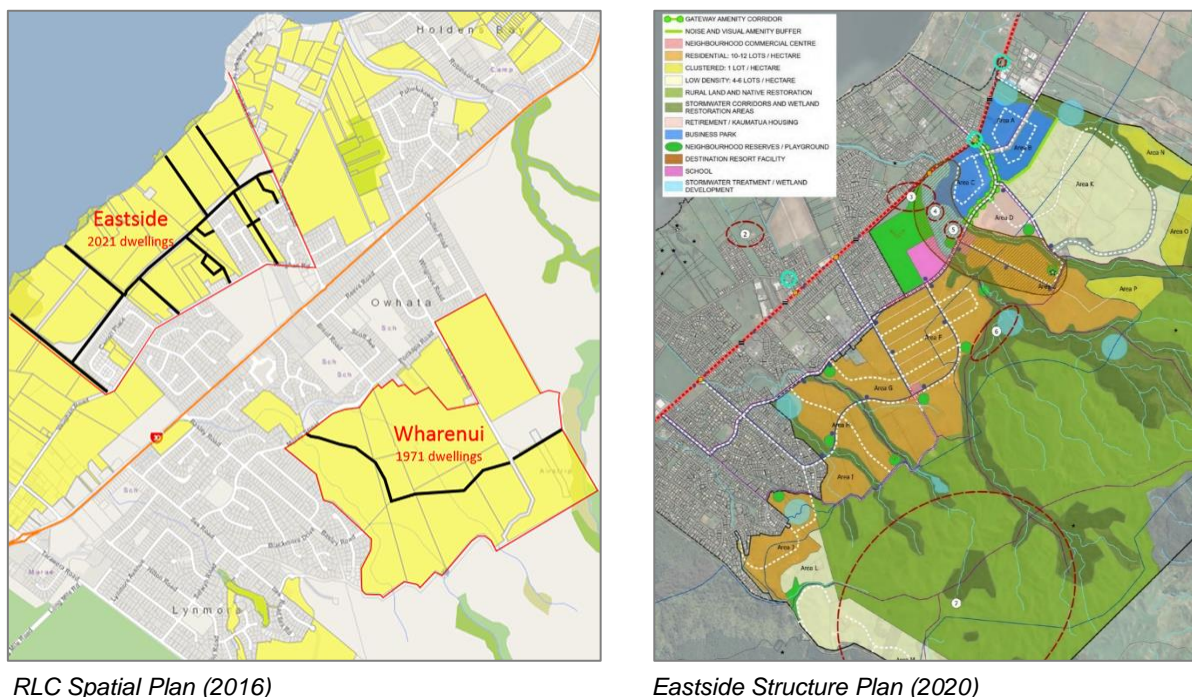
RLC's expectations for future land use development in Eastern Rotorua have now changed – both in terms of timing and location. The original short list of programmes was determined based on the notion that land use would develop in line with RLC's Spatial Plan, with similar levels of development planned for either side of Te Ngae Road. However, there is now a high degree of confidence that land use will instead develop in accordance with the Eastside Structure Plan.

A comparison of the Spatial Plan vs Eastside Structure Plan, provided as Figure 12-1, demonstrates these differences. A larger version of the Eastside Structure Plan is provided as Figure 1-3.

### How have we responded?

The planned number of new dwellings (i.e. 4000 over the next 30 years) remains relatively consistent, but RLC now expect all this new development to happen on the hillside (east of SH30 Te Ngae Road) rather than being split across the state highway. To understand the impact of this change we needed to undertake detailed traffic modelling (using microsimulation) to determine whether the short listed programmes would be able to accommodate this major change.

There was also a need to respond to how the Gee Road intersection would be treated – as there are now plans to introduce a significant amount of future development off this road (refer to Section 13.4).



RLC Spatial Plan (2016)

Eastside Structure Plan (2020)

Figure 12-1: Changes to land use plans



## 12.6 Review of plans for the Owhatiura South 5 Block

A masterplan is under development for the Owhatiura South 5 Block, which is the parcel of land bound by SH30 Te Ngae Road to the south, Vaughan Road to the north, and the new commercial area of Iles Road (Timezone Rotorua) to the west.

The masterplan proposals are currently at an initial stage of development, but are likely to include some commercial, light industrial, and a retirement village. An initial meeting was held in June 2020 with representatives of the developer and RLC to understand their proposals and general masterplanning philosophy. Minutes of the meeting are provided in **Appendix A**.

Key points raised from the meeting were:

- The internal road network for the development will be designed in such a manner that discourages potential rat-running between Vaughan Road and SH30 Te Ngae Road. The developer, RLC, and Waka Kotahi agreed that this was the desired outcome.
- Access to the site via public and active transport was important, and the developer is willing to work with Waka Kotahi to support better infrastructure and access to and in front of their site.

A letter which was intended to help inform the future development opportunities was provided on the 30<sup>th</sup> September 2020. This is provided as **Appendix L**.

### How have we responded?

The short listed programmes previously identified a potential new road connection between Vaughan Road and Basley Road through the Owhatiura South 5 Block development. This was discarded in response to feedback from RLC and the developer.

The design will however look to maximise capacity along SH30 Te Ngae Road between Iles Road and Basley Road and be future-proofed in a manner that would enable a fourth approach to the Owhatiura South 5 Block in the future. The design does not preclude another signalised intersection to be added between Iles Road and Basley Road – however it would need to be clearly demonstrated that state highway would still be able to deliver a good level of performance.

## 13. REVIEW OF INTERSECTION TREATMENTS

To ensure that all alternatives had been appropriately considered, a retrospective review of identified treatments for each major intersection was undertaken. The purpose was to challenge previous decisions and to respond to feedback received from key stakeholders and community.

For the Basley Road, Ōwhata Road, and Airport/Eastgate intersections, where there were multiple alternatives, MCAs were undertaken. Scoring was provided by technical specialists covering planning, road design, active modes, and traffic modelling.

The approach to the MCA, along with the scores, is provided as **Appendix M**.

### 13.1 Basley Road

The options considered are presented within Figure 13-1, noting that the 'Do Minimum' would be future access only provided off Vaughan Road.



**Figure 13-1: Basley Road intersection options**

The key factors which differentiated the options were:

- Adopting the *Do Minimum* does not support employment growth. Also, if access is only provided off Vaughan Road this would simply mean that most traffic will end up accessing the state highway at another (potentially busier) location. A Do Minimum would not be acceptable.
- Option A1 would reduce the efficiency of the corridor by nature of there being two, rather than one, intersection for through traffic to pass through (acknowledging that signal optimisation can reduce this effect). This misaligns with the function of the state highway as a limited access road.
- A lot of the traffic heading to/from the Owhatiura South 5 Block (if and when developed) would be local trips that would come via Basley Road. Option A does not facilitate this movement across SH30 Te Ngae Road as well as the alternatives.

- Option A1 and B would have higher costs because additional infrastructure would be required. The options might also trigger the need for a solid median between Iles Road and Basley Road.
- Option E would have significant property and stormwater challenges to overcome.
- Option A2 had a score of -3 against 'safety' and 'active modes'.

Option C (**skew the Basley Road approach**) received the highest score and was adopted as part of the design - acknowledging that there may be some stormwater challenges to overcome should a northern approach be introduced in the future. The concept design also includes a left-in only to the development (between Basley Road and Iles Road).

Options A1, B, and D all received similar scores. They are all technically feasible but would have higher construction costs. However, the design does not preclude any of these options being introduced in the future.

## 13.2 Ōwhata Road

The following options were revisited for Ōwhata Road:

- Do Minimum: Single lane roundabout with southbound bypass (status quo)
- Option A: Dual lane roundabout
- Option B1: Single lane signalised intersection
- Option B2: Signalised seagull
- Option C: Dual lane signalised intersection
- Option D: Give way (priority controlled) - single lanes
- Option E: Dual lane roundabout with fourth leg to Reeve Road
- Option F: Dual lane signalised intersection with fourth leg to Reeve Road

The key factors which differentiated the options were:

- It is undesirable to provide less capacity at the Ōwhata Road than at the Basley Road and Wharenui Road intersections, as in doing so would create a pinch point. The *Do Minimum* is therefore not suitable.
- A dual lane roundabout scored very poorly against 'active modes', 'stormwater', and 'property'.
- A signalised seagull (Option B2) scores poorly because:
  - The proposal goes against the overarching philosophy which is to try and present a slower speed environment and refocus priority towards active modes (and away from cars).
  - Increased crash risk because of weaving conflict – with two through lanes merging down to one, and then back to two south of the intersection. Pedestrians would also need to use the new 'continuous flow' southbound through lane in an uncontrolled manner.
  - It would deliver less (or similar) capacity than a standard signal with two through lanes – particularly as there is signalised pedestrian mid-block crossing south of Ōwhata Road (which otherwise could be coordinated with a standard signal at Ōwhata Road).
- Option D would fail against any safety, active modes, or network efficiency criteria.
- Option F has notable flaws which relate to high property costs and the wider network impacts (i.e. encouraging more traffic down local roads and past the Brent Road schools).

### **A dual lane signalised intersection (Option C) scored notably better than alternatives.**

This result provides validation that signalisation of the Ōwhata Road intersection is the most suitable long term option. It would also provide a level of consistency of intersection treatments along the corridor between Wharenui Road and Basley Road. This ultimately would make it easier to control the flow of traffic (via signal coordination) along the corridor.



### 13.3 Wharenui Road

There was general agreement amongst stakeholders that an upgrade to a signalised intersection was the only reasonable alternative for Wharenui Road. The key issue however was how safe access to adjacent development (i.e. the Fresh Choice supermarket and Owhata Medical Centre) could best be provided. The optioneering process was a collaborative exercise amongst the design team and affected landowners. The various access options are discussed in further detail within the Design Philosophy Statement (refer to **Appendix O**).

### 13.4 Lee Road & Gee Road

The Eastside Structure Plan earmarks a significant amount of growth off Gee Road. There is therefore a need to identify a solution which will ensure safe and efficient access from the large development area onto the state highway. In turn, it also presents an opportunity to resolve existing safety issues at several intersections in the area.

Figure 13-2 provides a graphical representation of the options considered.



**Option A – Retain current alignment**

- 1) Do nothing
- 2) Signal @ Gee Road
- 3) Signals @ Gee Road and Lee Road
- 4) Roundabout @ Gee Road
- 5) Dual roundabout for Gee Road and Lee Road



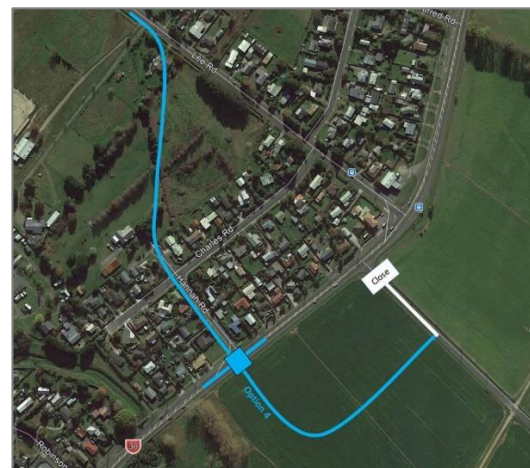
**Option B – Realign Gee Road to form one intersection at Lee Road**

- 1) Roundabout
- 2) Signal



**Option C – Realign Gee Road to form one intersection at Robinson Avenue**

- 1) Roundabout
- 2) Signal



**Option D – Realign Gee Road to form one intersection at Hannah Road**

- 1) Roundabout
- 2) Signal

**Figure 13-2: Lee Road and Gee Road intersection options**

The key scores/risks identified through the MCA process were:

- A *'Do Nothing'* approach was discounted because it goes strongly against two investment objectives – supporting future growth and safety.
- Option A5 was discounted because significant departures from design standards would be needed in order to provide two very close roundabouts, which would present notable safety risks.
- Signals at both Gee Road and Lee Road (Option A3) scored poorly against the 'network efficiency' and 'local network impacts' criteria.
- A roundabout located at Gee Road scored poorly against several criteria including 'active modes', 'stormwater', 'construction costs', 'impact to SH30 fronting property' and 'construction impact'. The key factor behind the poor scoring was that the option would trigger the need for a new service road for properties fronting the state highway.
- Both Option C1 and C2 had fatal flaws against 'stormwater', 'property', and 'construction cost'. This is because the alignment would require a bridge, stormwater discharge into the stream, and passes through potentially sensitive cultural land.
- Options D1 and D2 scored poorly for 'property', 'planning', 'environmental impact', 'construction impact', and 'construction cost' – in large part because of the new connection to Lee Road.

**The highest scoring option was for a signalised intersection at the Lee Road intersection, which would require the realignment of Gee Road.**

### 13.5 Airport / Eastgate

RLC's Airport / Eastgate Access Investigation Report (February 2016) established that the preferred long-term option was a dual lane roundabout which would serve both facilities and located at the current location of the main access to Eastgate Business Park. This recommendation was revisited by means of an engineering review and consultation with Rotorua Airport (24 June 2020) and the Eastgate Business Park (1 September 2020).

The alternatives considered are shown as Figure 13-3.



**Figure 13-3: Airport / Eastgate intersection options**

The key findings following a review of the options were:

- Option B does not cover off the risks of the helicopter-services adjoining that section. There are aeronautical safety issues if a roundabout were to be located at this location.
- Option C would have challenging cultural sensitivity issues to overcome.



- There is a large stormwater drain close to the current Eastgate access (Option A). However, construction of a roundabout (and retention ponds) could form part of a wider project that would help resolve stormwater catchment and flooding issues.

A review concluded that Option A (as originally earmarked) is the most suitable location. This proposal also has buy-in from both the Airport and Eastgate Business Park.

### **Roundabout vs signalised**

A roundabout is a more suitable solution than a signalised intersection because:

- A roundabout is more in keeping with the semi-rural environment
- There is a low level of pedestrian activity
- A roundabout delivers lower levels of delay for through traffic, particularly for off-peak periods.

### **One lane vs two lane roundabout**

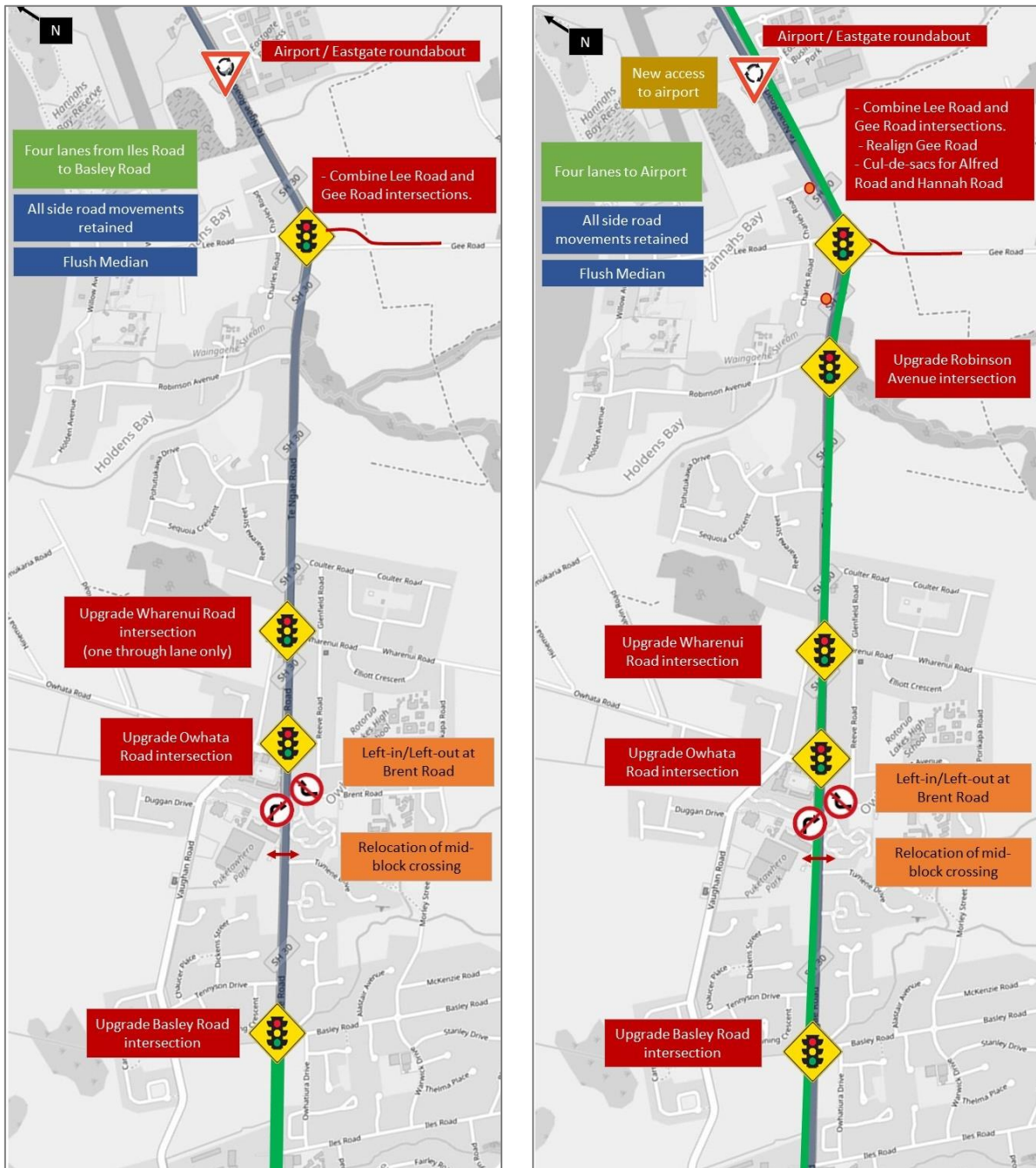
A single, rather than dual, lane roundabout is preferred because:

- Traffic modelling identified that a one lane roundabout provides sufficient capacity to meet future demand up until 2048. A two-lane roundabout is not required from a traffic efficiency perspective.
- A one-lane roundabout presents a less intimidating environment for visitors who have just at the airport, many of whom would be unfamiliar with the NZ driving conditions.
- It is safer for pedestrians and cyclists to cross one-lane approaches rather than two-lane approaches to a roundabout.

# 14. EMERGING PREFERRED PROGRAMME

The review of the short listed programmes against the new evidence and a retrospective challenge of proposed intersection treatments led to the identification of a single, but phased, corridor solution. Essentially 'Programme 4' was refined to become the 'interim' phase – where the focus is around the interventions that are essential for supporting short-term housing growth.

'Programme 7A' represents the long-term corridor solution, where various elements (such as the Gee Road/Lee Road signal) would be introduced as and when development occurs. Figure 14-1 shows the elements included in the 'interim' and 'four laning to the airport' phases.



Interim

Four laning to the Airport

Figure 14-1: Emerging preferred programme

### **Now we have an emerging programme, what next?**

The next step in the process was to gain further confidence that the emerging preferred programme would deliver strong benefits. This meant assessing the option using the microsimulation model and undertaking an initial economic appraisal.

The questions to be answered were:

- Where do most of the benefits of the programme come from?
- What are the most essential elements of the programme, and interdependencies?
- Are there opportunities for further value-engineering? For example, is four-laning all the way to the Airport a necessity in the future?
- Is the two-phase staging plan (as per Figure 14-1) appropriate?
- What are the benefits to local roads?

These questions are answered in Sections 15 to 20.

# **PART B(II): REFINING THE EMERGING PREFERRED PROGRAMME**

# 15. TRAFFIC MODELLING

## 15.1 Overview

A bespoke microsimulation (Paramics) model was developed for the project. Its application was to evaluate potential options, provide input into the design, investigating the impacts from land use development, and ultimately provide critical inputs for the economic assessment.

The model extent covers the SH30 Te Ngae Road corridor between SH30A and includes key local roads within the surrounding eastern suburbs. The model covers the AM (0630-0930), inter (1200-1400) and PM (1500-1800) peak hours, and forecasts are provided for the 2028 and 2048 future years. The base model was peer reviewed in May 2020 and was deemed as being fit for purpose.

Details of how the microsimulation base model was developed, along with the peer review feedback is provided as **Appendix N**.

Future year traffic forecasts were obtained from the Rotorua strategic traffic model (TRACKS). The latest land use information was obtained from RLC, which captured the new housing and development yields proposed as part of the Eastside Structure Plan. As such the model captures RLC’s expectations of land use growth (for all of Rotorua) as of May 2020.

## 15.2 Initial Modelling Runs

The ‘Do Minimum’, ‘Interim’ and ‘Four laning to the Airport’ options were tested for all future years and peak periods. The changes in operational performance of each of the intersections were then reviewed as a means of establishing whether the proposal would deliver the desired improvements in route efficiency.

LOS was the main indicator used to compare the performance of the scheme against the Do Minimum. A basic representation of what LOS means is provided as Figure 15-1.

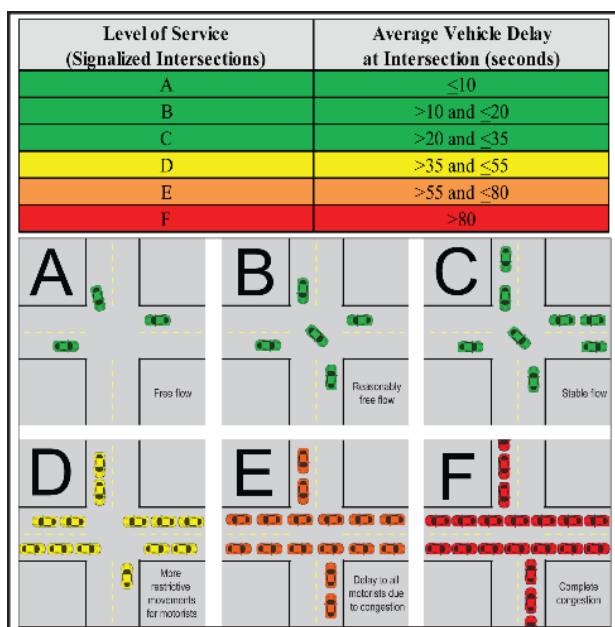


Figure 15-1: LOS definition

A comparison of the results for each of the key intersections and all scenarios is provided as Table 15-1 along with an explanation of what the results mean.

For ease, only the results for the worst performing peak have been reported.

The ‘acceptable level of performance’, as agreed by Waka Kotahi and stakeholders during the initial stage of development of this DBC, was:

- LOS D or better for SH30 Te Ngae Road approaches
- LOS E for side roads

Intersections that deliver performance worse than these thresholds could still however be considered acceptable – e.g. LOS F for a small number of vehicles or for just one short period of the day is acceptable.



**Table 15-1: Initial modelling results (worst peak)**

INTERSECTION	SCENARIO	2028		2048	
		SH30 TE NGAE ROAD	SIDE ROAD	SH30 TE NGAE ROAD	SIDE ROAD
Airport / Eastgate	Do Min	C	B	C	B
	Interim*	C	C	C	D
	Four Lane to Airport	A	A	A	A
	Commentary	<ul style="list-style-type: none"> <li>Only a moderate increase in demand through the Airport and Eastgate intersections is expected. Operationally, a Do Minimum could be considered acceptable – however, this does not reflect the safety risk of the intersection.</li> <li>A one lane roundabout (used in the 'interim scenario') performs well up until 2048. A two-lane roundabout provides only small operational benefits when compared to a one lane roundabout.</li> </ul>			
Gee Road / Lee Road	Do Min	D	C	A	F
	Interim**	C	E	C	F
	Four Lane to Airport	C	D	C	E
	Commentary	<ul style="list-style-type: none"> <li>Without intervention, both the Gee Road and Lee Road intersections would operate with LOS F in 2048.</li> <li>Two through lanes for the SH30 approaches to the Wharenui Road signals will be required post 2028 – noting these could merge back to one lane after the signals.</li> <li>The layout assumed in the 'four lanes to the airport' scenario (i.e. two through lanes) would deliver the necessary levels of capacity up until 2048.</li> </ul>			
Robinson Avenue	Do Min	A	F	A	F
	Interim***	A	F	A	F
	Four Lane to Airport	A	C	A	C
	Commentary	<ul style="list-style-type: none"> <li>Whilst the Robinson Avenue intersection operates with LOS F in 2028, this may be acceptable as the result mainly reflects the PM peak performance and only a small number of vehicles are affected.</li> <li>Soon after 2028, the intersection will likely need to be signalised.</li> </ul>			
Wharenui Road	Do Min	E	F	F	F
	Interim****	C	E	D	F
	Four Lane to Airport	C	D	C	D
	Commentary	<ul style="list-style-type: none"> <li>One through lane for SH30 Te Ngae Road approaches would deliver acceptable levels of performance up until 2028.</li> <li>Sometime between 2028 and 2048 the intersection will need to be widened to provide two through lanes on the SH30 Te Ngae Road approaches (matching the capacity provided downstream at the Ōwhata Road and Basley Road signals).</li> </ul>			
Ōwhata Road	Do Min	C	F	C	F
	Interim	C	D	D	E
	Four Lane to Airport	C	D	D	C
	Commentary	<ul style="list-style-type: none"> <li>The upgrade to a signal will deliver acceptable levels of performance up to 2048.</li> <li>Some additional benefits are gained if additional four laning is provided between Basley Road and Ōwhata Road.</li> </ul>			
Basley Road	Do Min	E	F	F	F
	Interim	B	D	C	D
	Four Lane to Airport	B	D	D	D
	Commentary	<ul style="list-style-type: none"> <li>The upgrade of Basley Road will deliver acceptable levels of performance up to 2048.</li> <li>This assumes the intersection will remain as a signalised T-intersection (no fourth leg to development in the Owhatiura South 5 Block).</li> </ul>			

\* (Airport/Eastgate) One lane roundabout in the interim, widen to a two lane roundabout in the 'four lanes to the airport' scenario

\*\* (Gee Road) One through lane for SH30 approaches in the 'interim' scenario

\*\*\* (Robinson Avenue) Status quo layout for the 'Do Min' and 'Interim' scenarios

\*\*\*\* (Wharenui Road) Only one through lane for SH30 approaches provided at the Wharenui Road intersection in the 'interim' scenario

The benefits of the 'interim' scheme are demonstrated by the model 'heat maps' which give a representation of traffic density and travel speed. These maps are provided for the 2028 PM peak as Figure 15-2, and allow for a comparison of performance against the Do Minimum scenario.



*Do Minimum – 2028 (PM Peak – 16:55)*



*'Interim' – 2028 (PM Peak – 16:55)*

**Figure 15-2: Traffic modelling 'heat maps' – Do Min vs Interim (2028 PM)**

### **So, we have a solution that will deliver good performance - what next?**

The initial round of modelling showed the emerging preferred programme would deliver the desired levels of route efficiency for vehicles. But it also revealed that there might be opportunity to deliver better value for money by potentially reducing the amount of physical infrastructure proposed or revising the phasing of the upgrade.

Specifically, the following questions were raised:

- In the next 30 years, will four laning all the way to the Airport be essential? Could four laning start/finish at a location further to the south?
- Can we phase the upgrade the corridor in an even more effective way?
- Do we need to upgrade Gee Road/Lee Road now, and how big should that intersection be?
- When do we need to upgrade Robinson Avenue?

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## 16. RESPONDING TO NEW EVIDENCE AND KEY STAKEHOLDER FEEDBACK

### 16.1 Overview

The next step was to undertake a value-engineering exercise to understand whether the emerging preferred programme could be 'scaled back' without notably reducing the benefits.

This meant bringing together all the new evidence. Running in parallel to the modelling, additional work was undertaken to better understand the design constraints (and cost implications) plus further engagement with key stakeholders to gain feedback on the first draft of the design.

The outcome was '**Preferred Programme 2.0**' - an updated concept that was co-designed with key stakeholders and later presented to the public for their feedback.

### 16.2 Setting out the design principles

The first step in the value-engineering process was to take a step back and revisit the principles behind our design philosophy. Any refinements we make should support these principles, namely:

- We are addressing the existing LOS gaps for all modes, but in a manner that allows additional capacity to be added in the future to support growth.
- The focus is on person, not vehicle movement.
- We need to provide better travel choice, and we are setting in place the infrastructure that would encourage modal shift. We are not simply building our way out of congestion.
- We want to minimise disruption to the community. This means enabling safe access to people who live directly off SH30 Te Ngae Road and reducing the effects of construction. Unless there is a robust case, we only want to upgrade intersections once.
- We want to minimise property purchase. Taking land where it is not essential disrupts the lives of landowners, increases project costs and increases the project timeframe / consenting process.
- We want to provide certainty to the community around how the state highway is going to look for the next 30 years.

The **Design Philosophy Statement (DPS)** is provided as **Appendix O**.

### 16.3 Update in response to new evidence

With these agreed principles in place, the team were able to revisit the preferred programme. Key design considerations that came through internal workshops and a review of feedback were:

- The Waingaehe Stream bridge is a major constraint in terms of complexity and potential cost. Four laning the corridor north of Robinson Avenue would mean that the bridge would need to be replaced. Otherwise, structurally it would not need to be replaced in the short to medium term<sup>61</sup>.
- A two-lane roundabout at the Airport/Eastgate intersection could effectively trigger the need to fully four lane the mid-block section between the Airport and Gee Road (to meet merge/diverge design standards).
- Land purchase can be avoided at the Wharenui Road intersection if one-through lane along SH30 Te Ngae Road is provided. However, modelling has identified that in the long-term (post 2028), two through lanes would be required from an operational perspective.
- Four-laning sections provide capacity benefits, but consequently can create effects which make it harder to align with investment objectives. A four-lane corridor is typically a less appealing

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<sup>61</sup> Beca bridge inspection report (2018)

environment for cyclists and increases the feeling of community severance. The adopted principle is that four-laning should only be proposed when:

- Demand management measures (inc. providing better active mode provisions) have been introduced in the first instance.
- There is evidence that four laning sections are essential for enabling future housing growth (a key investment objective).
- It is cost-effective. As a standalone project, would it deliver more benefit than cost?
- Only one through lane for the northbound direction should be provided at the proposed signals at Robinson Avenue. This means access (via the service lane) to properties at 648-654 Te Ngae Road can be unchanged and provides a safer transition to the one lane bridge.
- Raised tables should be provided across local roads. The purpose is to help present a slower speed environment and make motorists aware of the shared path. This also helps the project better align with the Wellness Plan, which identifies a slow speed zone between Basley Road and Wharenui Road.

## 16.4 Responding to feedback from key stakeholders

The draft plans were presented to hapū leaders, local schools<sup>62</sup>, RLC<sup>63</sup>, BOPRC and Ngati Whakaue Tribal Lands. The key feedback received, and incorporated into the updated plans were:

- The proposed new signalised mid-block crossing was moved closer to Puketawhero Park to better meet the pedestrian desire lines.
- For safety reasons, some bus stops near intersections that are being widened will need to be relocated. Where possible, 'bus stop pairs' (i.e. bus stops opposite each other) are to be provided.
- RLC suggested that the Lee Road/Gee Road upgrade could include turning Hannah Road and Alfred Road into cul-de-sacs. This eliminates rat-running, is safe for active modes, reduces connections onto the state highway and improved amenity on those local roads. This intervention would see the number of side road intersections in this area reduced from four to one.
- Incorporate a pedestrian crossing facility at Brent Road to support better connections for school and retirement village communities. This however would be captured as part of the local road improvements being undertaken by RLC.
- Incorporate urban design elements, consistent with hapū leader engagement, wherever possible. This is particularly key around Puketawhero Park, where there is an issue with people parking on the grass berm.
- Providing additional pedestrian refuges where possible.

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<sup>62</sup> Ōwhata Primary, Mokoia Intermediate and Rotorua Lakes High

<sup>63</sup> RLC were able to bring a holistic perspective, having recently reviewed the plans for the Wellness Plan

## 17. RESPONDING TO PUBLIC FEEDBACK

Preferred Programme 2.0 was presented to the public in August 2020.

We received a wide range of feedback, with generally a high degree of support for each of the proposed interventions. A summary of the key feedback and how we have responded is summarised in Table 17-1. Note that this is not an extensive list of all feedback received, but rather focuses on the substantive elements that warranted investigation. **Appendix P** provides a more detailed overview of all feedback from public engagement.

The outcome was an updated concept design, and the establishment of ‘**Preferred Programme 3.0**’.

**Table 17-1: Response to public engagement on Preferred Programme 2.0**

PROPOSAL	FEEDBACK	RESPONSE
Brent Road Left-in/Left out only	Generally, there was strong support for banning the right turn out from Brent Road.  But there was strong feedback from some residents and the Emergency Services that a right-turn in should be provided (if safe). The primary concern was around potential response times to Brent Road schools and the retirement village.	The project team reviewed the concept plan and identified a safe means of allowing right turn-in access to Brent Road. Part of the process was reviewing the balance between safety risk, reduction in accessibility and impact of emergency services. <b>The design change was incorporated in response to public feedback.</b>  The main safety issue is the ‘right turn-out’, and this is still proposed to be banned. This will be the only new banned movement in the programme.
The bus stop at the Basley Road shops	We learnt that buses do not currently use the current bus stop at the Basley Road shops. This is mainly because of difficulties drivers have in rejoining the state highway.  The Rosedale Superette was also concerned about access to parking and servicing requirements.	Revised plan sees the southbound bus stop (currently at the Basley Road shops) moved south of the Basley Road signals (opposite the northbound bus stop). The ‘spare space’ created as a consequence of skewing the Basley Road approach, will be landscaped.  The general layout of the area will be similar to the current situation, with no loss of parking for the Rosedale Superette. <b>The design change was incorporated in response to public feedback.</b>
Right turn bay at Ōwhata Road	We heard from the Rotorua Forest Haulage association that there would likely be long queues for right-turning traffic on Ōwhata Road, and that combined with the bus stop location in the left-hand lane, would result in blocked traffic.	The right turn bay length was extended in response to the feedback and the position of the left lane bus stop will be reviewed during the detailed design phase. <b>The design change was incorporated in response to public feedback.</b>
Dedicated cycling lanes physically separated from traffic	The Automobile Association and Rotorua Cycling Action Network requested that where possible physical separation of cyclists was safer.	Where possible (due to access constraints), the on-road cycle lane will be physically separated.  Physical separation also provides a means of preventing cars from parking on the grass berm alongside Puketawhero Park.
Active mode transition improvements	Pavement transitions (e.g. at kerbs) should be designed for prams and wheelchairs. Also requested was the ability for cyclists to avoid conflict with cars and pedestrians where possible	Several changes have been made to enable these elements (within the constraints of the road reserve). The detailed design phase will revisit these elements.
Safer pedestrian crossings for access to the Fresh Choice Supermarket	Pedestrian desire lines are often in conflict with vehicles turning right from the Fresh Choice. A pedestrian refuge facility, or pedestrian crossing, was considered	A signalised pedestrian crossing is incorporated as part of the Wharenui Road signals. The feasibility of an additional pedestrian refuge can be explored during the detailed design phase – noting that this section is the most constrained in terms of available road width.
Retain the left turn slip lanes and remove raised tables at crossings	The Automobile Association and several public submitters wished to see through traffic speeds maintained by retaining the status quo at intersections.	These changes were inconsistent with the design philosophy and as such <b>no change made</b> . Signposting on its own is unlikely to reduce traffic speeds to the proposed 50kph limit – and as such physical interventions to make the corridor feel slower will be essential. This approach also enables improvements for active modes crossing side streets safely.
Bring forward the development of the	The Rotorua Airport Masterplan aspirations depend on the delivery of	This would be introduced in Phase Two, as the upgrade would not be in direct response to a need to support



PROPOSAL	FEEDBACK	RESPONSE
Airport / Eastgate roundabout	the roundabout. The ability for the Eastgate Business Park to expand is constrained by the timeframes for the proposed roundabout.	housing growth, and the LOS gaps at this location are less prominent.  The timing for Phase Two is not confirmed, and there is opportunity for certain aspects to be accelerated ahead of others. Each aspect of Phase Two is dependent on the availability of funding and development timelines.
Shorter wait times for pedestrians at lights	We heard that wait times at pedestrian crossings can be up to two minutes.	The modelling assessment of the preferred programme has been based on assumption that signal phase times will be no longer than two minutes. SCATS (or equivalent) signal operation brings the opportunity to optimise timings and reduce wait times.
Provide a pedestrian overbridge	Grey Power Rotorua expressed a desire for a pedestrian overbridge rather than at-grade pedestrian crossings.	This proposal was reviewed, but not incorporated into the design because: <ul style="list-style-type: none"> <li>• This does not align with the principles of the business case – as it prioritises cars over walking/cycling.</li> <li>• It would notably increase crossing distances, as the footbridge would need to be designed to ensure that it can be used easily by mobility impaired people (hence would require a long ramp in order to provide a low gradient).</li> <li>• It would create some visual intrusions issues for several residents who live along the corridor.</li> <li>• There would be significant cost associated with a footbridge that would need to have sufficient vertical clearance to allow large trucks to pass easily below.</li> </ul>
Provide indented bus stops	We heard from several stakeholders, including emergency services and the Automobile Association that bus stops should be indented to a) reduce delays for traffic and b) reduce the likelihood of rear-end type crashes.	The proposal is for buses (which currently are relatively infrequent) to stop within the on-road cycle lanes. There is no significant evidence to suggest that the use of on-road bus stops across Rotorua is creating notable safety risks that would be solved by indented bus stops.
Extend the shared path and provide safer access to education facilities on Rotokawa Road	This is an unsafe crossing area that is heavily congested during pick-up/drop-off times. This intersection could be improved by providing better access/egress during the hour before and after normal school hours.	Rotokawa Road is adjacent to Rotorua Airport, but beyond the scope of the project. However it was considered appropriate to investigate options given the potential for high safety benefits and improved alignment of the project with feedback that we heard from hapū leaders.  Rotorua Airport agreed that extending the shared path into the airport and providing a connection to Rotokawa Road could be delivered as part of the Rotorua Airport Masterplan. This will improve active transport mode access to the schools given the lack of footpath facilities currently, although does not address the safe crossing aspirations.  At meetings with Rotokawa Primary and the Ministry of Education installing a signalised traffic light was not considered appropriate as it would require active supervision and this was considered beyond the school's capacity/capability and not desirable.  There may be an opportunity through the council's future engagement plans to develop the local road network behind Eastgate Business Park to provide an alternative access/egress option.

**Appendix P** provides an overview of the responses to other feedback received during the public consultation sessions, which the project team used to validate the assumptions and input obtained from the local community and stakeholders.

## 18. PREFERRED PROGRAMME

### 18.1 Phase One

Phase One interventions are those which either:

- A. Support mode shift (addressing LOS gaps)
- B. Address existing safety and severance issues
- C. Support housing growth (i.e. 2,000 new homes by 2028)

A summary of the Phase One interventions is provided as Table 18-1.

**Table 18-1: Phase One interventions**

MODE SHIFT	SAFETY AND SEVERANCE	SUPPORTING HOUSING GROWTH
<ul style="list-style-type: none"> <li>• Shared path - on one side of the road.</li> <li>• On road cycle lanes (on both sides). Where possible, physical separation is provided.</li> <li>• Improved bus stops.</li> </ul>	<ul style="list-style-type: none"> <li>• Signal at Basley Road</li> <li>• Signal at Ōwhata Road</li> <li>• Signal at Wharenui Road</li> <li>• Raised tables across local roads.</li> <li>• Banning right turn out of Brent Road</li> <li>• Removing left-turn slips lanes between Iles Road and Coulter Road</li> <li>• New signalised mid-block pedestrian crossings (smart signals)</li> <li>• New pedestrian refuges</li> <li>• Resolving sight-line issue at Lee Road</li> </ul>	<ul style="list-style-type: none"> <li>• Widening new signalised intersections within the constraints of the road reserve.</li> <li>• Four lanes between Iles Road and Basley Road.</li> </ul>
To be delivered by Rotorua Lakes Council		
<ul style="list-style-type: none"> <li>• Update travel wise guidance to inform the community about the new proposed pedestrian signals. These smart signals will activate only if people are waiting to cross.</li> <li>• Funding for new bike racks at Rotorua Lakes High School.</li> <li>• Wayfinding strategy.</li> </ul>	<ul style="list-style-type: none"> <li>• Traffic calming on local roads.</li> </ul>	

### 18.2 Phase Two

**Phase Two** has development driven, and flexible, timeframes. In this phase the focus is not just around housing growth, but also employment and economic growth.

A summary of the Phase Two interventions is provided as Table 18-2.

**Table 18-2: Phase Two interventions**

MODE SHIFT	SAFETY AND SEVERANCE	SUPPORTING GROWTH
<ul style="list-style-type: none"> <li>• Extending the shared path and upgrading the on-road cycle lanes all the way to the airport.</li> </ul>	<ul style="list-style-type: none"> <li>• New signal at Gee Road/Lee Road</li> <li>• New signal at Robinson Avenue.</li> <li>• Cul-de-sacs for Alfred Road and Hannah Road.</li> <li>• Removal of slip lanes north of Coulter Road.</li> </ul>	<ul style="list-style-type: none"> <li>• Widening of the Wharenui Road signals to provide two through lanes along SH30 Te Ngae Road.</li> <li>• Four-laning between Ōwhata Road and 616 Te Ngae Road.</li> <li>• A new roundabout for the Rotorua Airport and Eastgate Business Park</li> </ul>

## 18.3 Phase Three

Phase Three would see four laning of the remaining 900m section of SH30 Te Ngae Road between Basley Road and Brent Road. This intervention would purely be a response to growth.

At this stage, there is some uncertainty around when, or even if, Phase Three will be required. The analysis undertaken as part of this business case does not consider potential mode shift, and on this basis, indicatively identified an implementation date of sometime after 2035.

The phasing plan is such that in the first instance we are setting in place the infrastructure that best supports a shift to active or public transport. If Phase Three isn't required in the next 30 years, this will be because either a) growth hasn't happened as quickly as we anticipated or b) in collaboration with other strategies, the business case has been part of a success story that has strong mode shift.

## 18.4 Overview

We were able to establish our preferred programme only after we completed the value-engineering exercise and had incorporated feedback from key stakeholders and the public.

The **three phased** approach is shown as Figure 18-1.

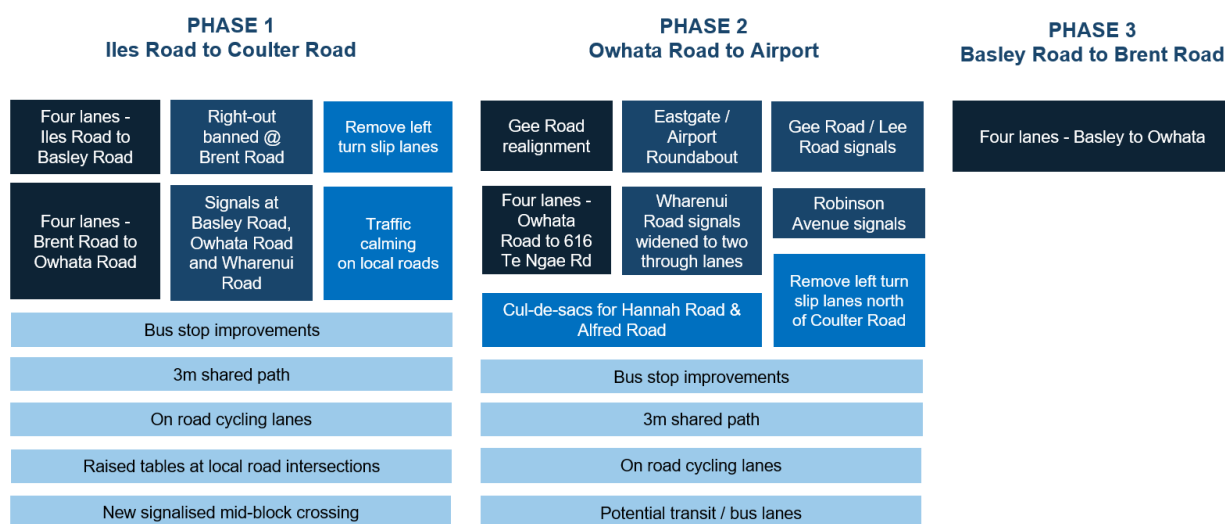


Figure 18-1: Phased approach to the corridor upgrade

Figure 18-2 on the next page presents the staging of the preferred programme in map form.

## 18.5 Trigger Points

Indicative trigger points for implementing the various interventions included as part of Phases Two and Three are outlined in Table 18-3.

Table 18-3: Trigger points

ID	TRIGGER	INTERVENTION	PHASE
1	After more than 2000 new homes constructed (as per the Eastside Structure Plan) or LOS E being experienced on the Te Ngae Road approaches to the Wharenui Road signals during both peak periods	<ul style="list-style-type: none"> <li>Widening of the Wharenui Road signals to provide two through lanes along SH30 Te Ngae Road.</li> <li>Four-laning between Ōwhata Road and 616 Te Ngae Road.</li> <li>Extending the shared path and upgrading the on-road cycle lanes all the way to the airport.</li> </ul>	Phase Two
2	"Once development has started off Gee Road <sup>64</sup> "	<ul style="list-style-type: none"> <li>New signal at Gee Road/Lee Road</li> <li>Cul-de-sacs for Alfred Road and Hannah Road.</li> </ul>	

<sup>64</sup> Areas A, B, C, D, E, K, N, O, P of the Eastside Structure Plan

ID	TRIGGER	INTERVENTION	PHASE
		<ul style="list-style-type: none"> <li>• New signal at Robinson Avenue.</li> <li>• Removal of slip lanes north of Coulter Road.</li> </ul>	
3	Implementation of the Rotorua Airport masterplan	<ul style="list-style-type: none"> <li>• A new roundabout for the Rotorua Airport and Eastgate Business Park</li> </ul>	
4	Increasing number of crashes along SH30.	<ul style="list-style-type: none"> <li>• Investigation into the benefits of a solid median, followed by implementation (if deemed to be the best solution).</li> <li>• Investigation into other safety benefits (e.g. banned turns at minor side roads)</li> </ul>	
5	LOS E or worse being experienced on any Te Ngae Road approach at any of the signalised intersections along the corridor during both peak periods or LOS F being experienced on any side road for more than one peak period	<ul style="list-style-type: none"> <li>• Four lanes between Basley Road and Brent Road</li> </ul>	Phase Three

Once Trigger No.1 and No.2 are met (i.e. >2000 houses and development starting off Gee Road), then there would be a need to extend Moray Street between Wharenui Road and Gee Road. These works would be delivered by RLC. The DBC is based on the premise that this local road improvement would be delivered at this point.

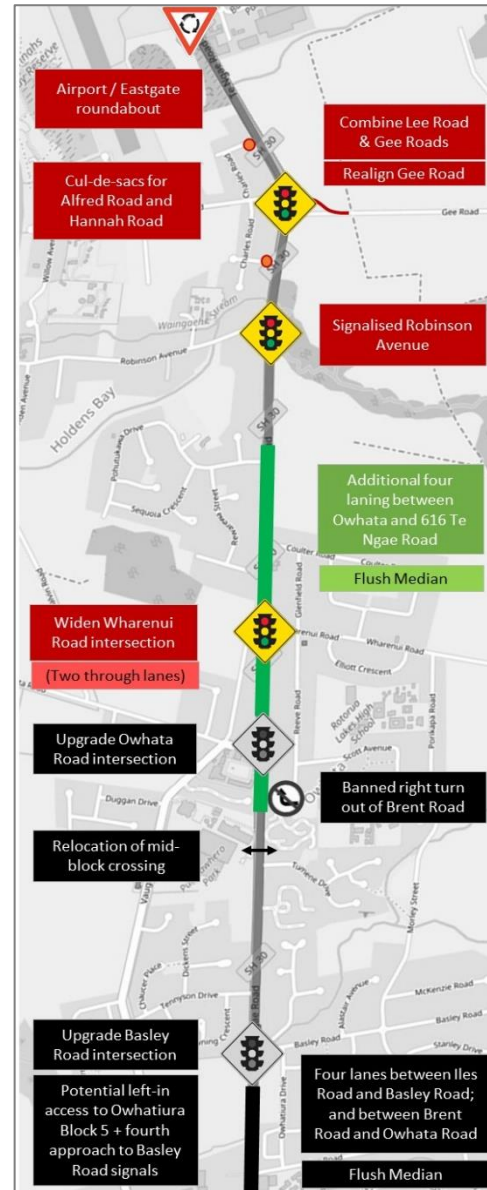
## 18.6 Concept design

The concept design for the preferred programme is provided as **Appendix Q**.

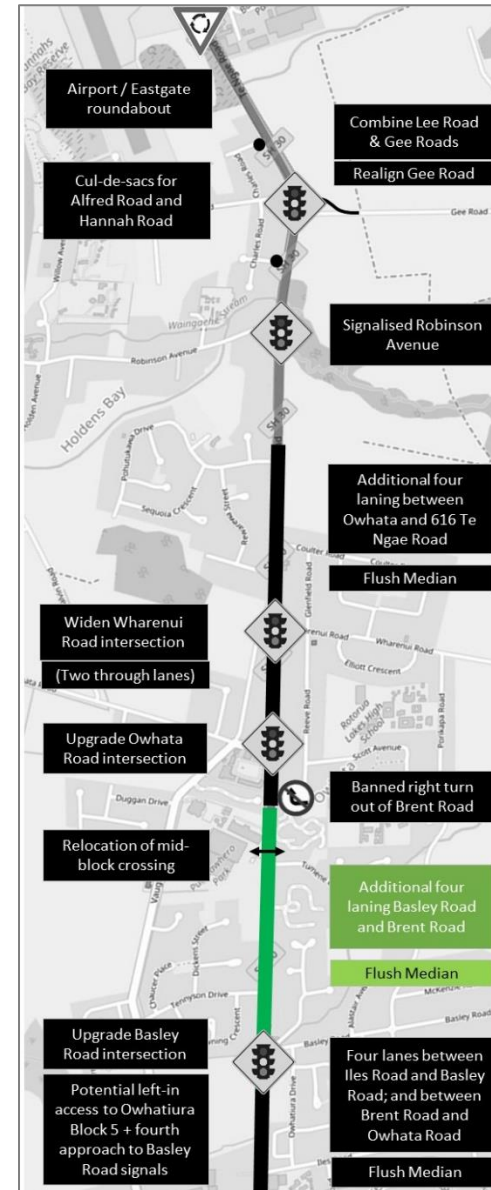
The Road Safety Audit is provided as **Appendix R**.



Phase One



Phase Two



Phase Three

Figure 18-2: Preferred programme and staging plan



# **PART B (III): RECOMMENDED PROGRAMME ASSESSMENT**

## 19. DELIVERING THE INVESTMENT OBJECTIVES

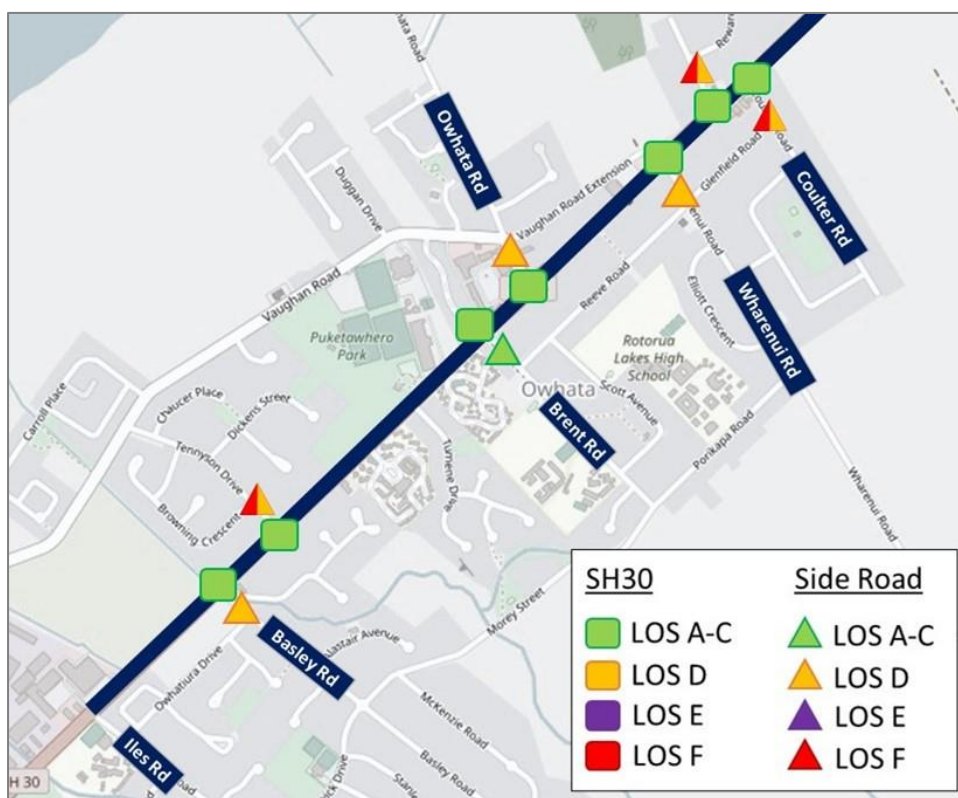
This section outlines the strength to which the preferred programme is expected to meet the Investment Objectives; namely:

1. Support the Eastside Structure Plan development targets of 2000 houses by 2028 and 4000 houses by 2048 whilst maintaining suitable efficiency along and onto SH30 Te Ngae Road.
2. Freight and bus travel time between the Airport and Iles Road within 10% of the travel time for cars by 2028.
3. An additional 100 new walking and cycling trips per day along SH30 Te Ngae Road by 2028.
4. Reducing the number of DSIs along SH30 Te Ngae Road by 33% within the next 10 years.
5. An additional 3km of active mode infrastructure by 2028 and 5km by 2038.

### 19.1 Supporting growth and delivering route efficiency

Each phase of the preferred programme was evaluated using the microsimulation traffic model to understand the quantitative route efficiency benefits that are expected to be gain. Each phase was tested for all future years (2018, 2028 & 4048) and peak hours (AM, IP & PM). The outputs were intersection LOS, network travel times and network vehicle operating costs.

Figure 19-1 provides an overview of the intersection LOS results for Phase One (2028). The results reflect the worst performing movement for any peak period.



**Figure 19-1: Preferred programme – 2028 modelling results (Phase One)**

For the 2028 future year, the preferred programme is expected to:

- Deliver LOS D or better on side roads to major intersections. This exceeds the Investment Objective target of LOS E or better.
- LOS F is expected for three minor side roads – i.e. Tennyson Drive, Sunrise Avenue and Coulter Road. However only a small number of vehicles (<100) would be subject to this LOS and occur

for one peak hour. This is likely to be considered as an acceptable result. However, following implementation, the performance of the intersections and any knock-on safety implications should be monitored.

- Deliver LOS C or better for the SH30 Te Ngae Road approaches. This exceeds the Investment Objective target of LOS D or better.
- 100% support the Eastside Structure Plan - i.e. 2000 new houses by 2028, without reducing route efficiency along (or onto) SH30 Te Ngae Road.

Figure 19-2 shows the modelled performance of the corridor for the 2048 future year (based on Phase Three interventions).

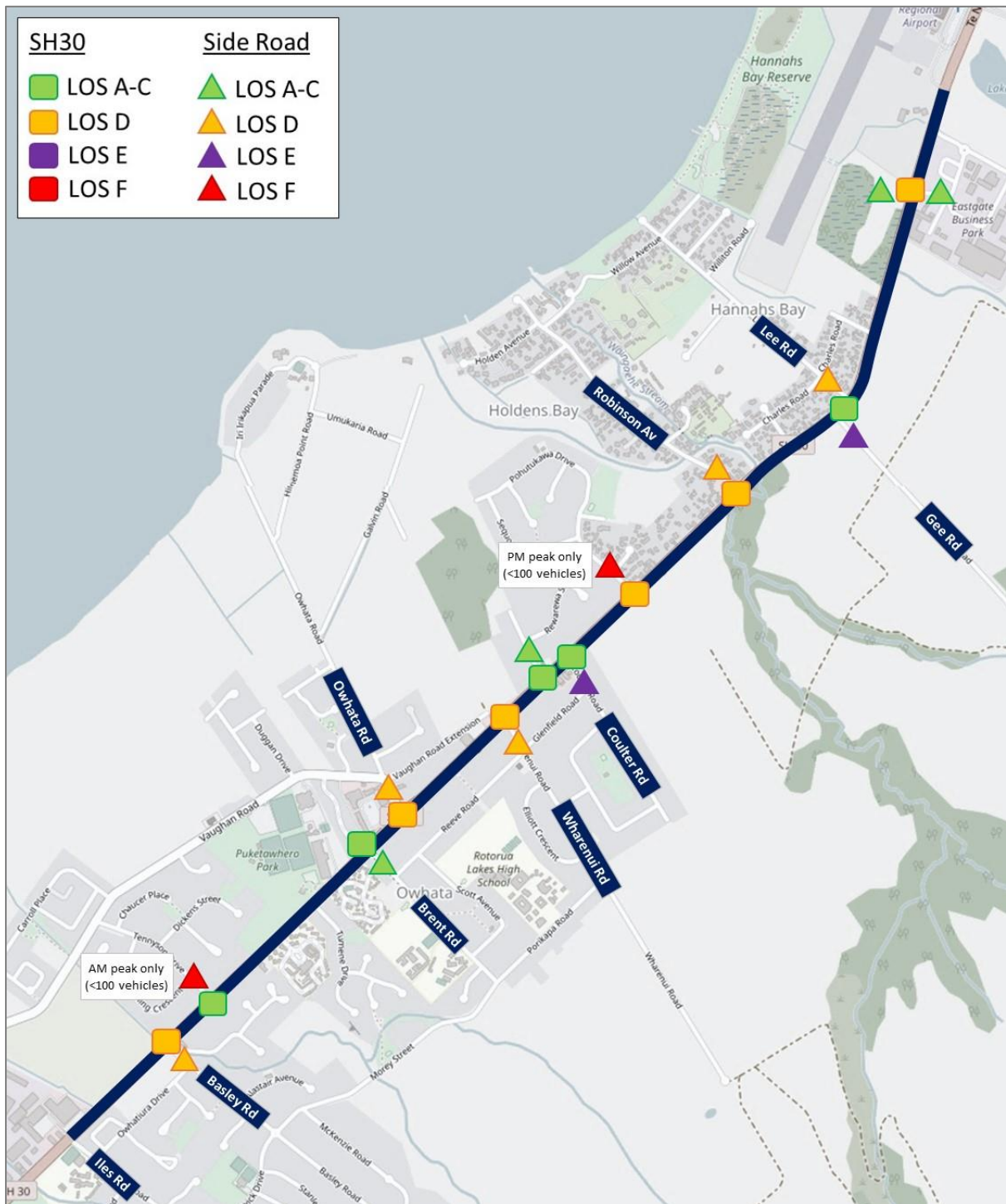


Figure 19-2: Preferred programme – 2048 modelling results (Phase Three)

For the 2048 future year, the preferred programme is expected to:

- Deliver LOS D or better for the SH30 Te Ngae Road approaches. This meets the Investment Objective target of LOS D or better.
- 100% support the Eastside Structure Plan - i.e. 4000 new houses by 4028, without reducing route efficiency along (or onto) SH30 Te Ngae Road.
- LOS F is expected for two minor side roads – i.e. Tennyson Drive and Sunrise Avenue. However, this LOS would be experienced by fewer than 100 vehicles and for one peak period only.

**The preferred programme strongly delivers upon the investment objective.**

It should also be noted that the traffic modelling does not assume any mode shift, and as such mode shift is does not need to be relied upon for this investment objective to be met. Notwithstanding, as below delivering mode shift is ultimately what we deliver. Achieving good mode shift, as we hope to do, simply pushes back the time period for when Phases 2 and 3 need to be implemented.

## 19.2 Reliable journey times for freight and bus

Table 19-1 shows how the preferred programme is expected to improve the reliability of journey times along SH30 Te Ngae Road. The table shows the difference between the travel times in the off-peak when compared to the peak hours (peak direction only).

It shows that without intervention, the northbound journey to the Airport in the PM peak is likely to take 3.7 minutes longer than the same journey would during the off-peak. The preferred programme would reduce that difference down to only 0.4 minutes, thereby making journey times far more reliable.

**Table 19-1: Changes in travel time reliability delivered by the preferred programme (2028)**

SECTION	ADDITIONAL TRAVEL TIME WHEN COMPARED TO THE INTER-PEAK (MINS)			
	SOUTHBOUND (AM PEAK)		NORTHBOUND (PM PEAK)	
	DO MIN	PHASE ONE	DO MIN	PHASE ONE
Airport to Gee Road	0.0	0.0	0.0	0.0
Gee Road to Robinson Avenue	0.0	0.0	0.0	0.0
Robinson Avenue to Wharenui Road	0.0	0.8	0.0	0.1
Wharenui Road to Ōwhata Road	0.0	0.1	0.0	0.1
Ōwhata Road to Basley Road	0.5	0.0	3.6	0.1
Basley Road to Iles Road	0.8	0.0	0.1	0.1
<b>TOTAL</b>	<b>1.3</b>	<b>0.9</b>	<b>3.7</b>	<b>0.4</b>

For journeys between Iles Road and the Airport, travel times for heavy vehicles are expected to be within 10% of those for light vehicles for all periods of the day.

**The preferred programme strongly delivers upon the investment objective.**

## 19.3 Supporting a shift to active modes

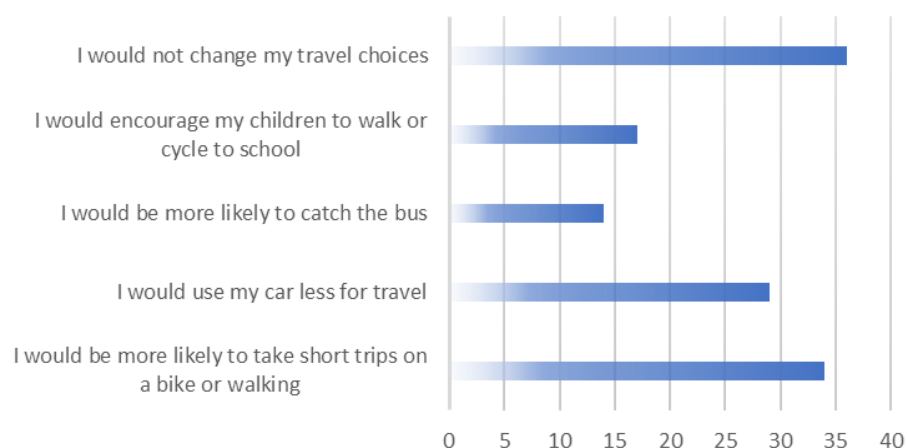
We anticipate that the provision of new and improved facilities (shared path, on-road facilities, and wayfinding) will help to remove barriers to cycling and encourage additional trips to occur. The peer-reviewed economic analysis (detailed in Section 20) estimates that the proposal will generate an additional 110 new active mode trips along SH30 Te Ngae Road.

However, it is important that improvements on SH30 Te Ngae are supported by improvements on the local road network. For mode shift to be realised, the entire journey from home to destination needs to be safe and appealing.

Generally, the proposal reasonably maximises the potential amount of new active mode infrastructure that could be introduced along the SH30 Te Ngae Road corridor. As such, **the preferred programme has a strong alignment with this investment objective.**

According to surveying undertaken during public consultation 76% of submitters who identified as local residents told us they would change their travel behaviours because of the improvements.

Figure 19-3 for results across all submitters.



**Figure 19-3: Indications of behaviour change heard during public consultation**

## 19.4 Reducing the number of DSIs

The economic analysis has identified that the preferred programme is expected to deliver a 71% reduction in injury crashes. In the next 10 years (i.e. with Phase One and Two in place) a 33% reduction is expected.

A further reduction in the number of crashes (and the severity) would be delivered through the Safer Speed proposal<sup>65</sup> that would see posted speeds reduced to:

- 50 kph between Sala Street and just north of Alfred Road.
- 60 kph between Alfred Road and just north of Rotokawa Road.

**The preferred programme strongly delivers upon the investment objective.**

## 19.5 Expanding the active travel network

Phase One will see the expansion of Eastern Rotorua's active travel network by 2.3 km, with:

- 4.6 km of new protected cycle lanes (i.e. 2.3 km x two sides)
- 2.2 km of new shared path
- 0.5 km of new footpath
- 1.47 km of upgraded footpath

Phase Two will expand the network by a further 2.5 km (total of 4.6 km for the corridor), with:

- 5.0 km new protected on-road cycle lanes
- 2.0 km new shared path
- 1.9 km upgraded footpath

**The preferred programme fully delivers upon the investment objective.**

<sup>65</sup> Not captured as part of the assessment, as the proposed speed reductions are considered as part of the 'Do Minimum' scenario.



## 20. ECONOMIC ANALYSIS

The economic evaluation has been carried out in accordance with the full procedures of the Economic Evaluation Manual (EEM), with the recommended programme against the Do Minimum using a 40-year analysis period and a 6% discount rate<sup>66</sup>.

The economics has undergone both a Waka Kotahi and external peer review. The approach to the economic assessment is detailed in **Appendix S**.

Feedback and sign-off from the peer reviewer is provided within **Appendix T**.

### 20.1 Parameters

#### 20.1.1 Do Minimum

For clarity, the 'Do Minimum' includes:

- SH30 Te Ngae Road / Tarawera Road roundabout - upgrade to signals
- Restriction to Allen Mills Road to left-out only
- Four-laning between Tarawera Road and Iles Road
- Recently installed southbound bypass lane at the Owhata Road roundabout
- Posted speed limit reduced to:
  - 50km/h between Sala Street intersection and just north of Alfred Road.
  - 60km/h between just north of Alfred Road and just north of Rotokawa Road.

#### 20.1.2 Assumed programme timeframes

The base year for the economic assessment is 2020. The assumed timeframes for each phase of the project are outlined in Table 20-1.

**Table 20-1: Assumed programme timeframes**

	DESIGN	LAND	CONSTRUCTION	FIRST YEAR OF BENEFIT
Phase One	2020	2021	2022	2023
Phase Two	2025	2026	2027	2028
Phase Three	2035	2036	2037	2038

### 20.2 Cost Estimates

The cost estimates for each phase of the preferred programme are provided within **Appendix U**, and consider pre-implementation (design and consenting), property and construction costs. The cost estimates have also been peer reviewed – refer to **Appendix T**.

The estimates reflect the cost of each phase if it were built as a single standalone package of works. We recognise that there are cost inefficiencies of undertaking a phased approach – the cost of coming back to construct Phase Two is not simply the cost of Phase Two less the cost of Phase One.

The economic analysis has therefore applied the following uplift factors to capture these inefficiencies (as agreed with the peer reviewer):

- Design – 20% uplift
- Construction (capturing traffic management) – 30% uplift

<sup>66</sup> Note that the new Monetised Benefit Manual (August 2020) was released post completion of the economic assessment.

A breakdown of the P50 capital cost estimates for the preferred programme is provided within Table 20-2. The table also includes the 40 year net present value (NPV) cost, which includes annual and periodic maintenance<sup>67</sup>.

**Table 20-2: Cost Estimates**

PROGRAMME	CAPITAL COST	40 YEAR NPV
Phase One	\$33m	\$28m
Phase Two	\$74m	\$63m
Phase Three	\$79m	\$68m
Phased approach		
Phase One + 2 + 3	\$91m*	\$63m

\*due to cost inefficiencies of coming back and four laning

## 20.3 Benefits

Table 20-3 provides an overview of the total 40-year NPV benefits (at 6% discount rate)

**Table 20-3: EEM Benefits (40-Year NPV)**

PROGRAMME	BENEFITS			
	SAFETY	TT & VOC	ACTIVE MODES	TOTAL
Phase One	\$3m	\$107m	\$4m	\$114m
Phase Two	\$15m	\$119m	\$5m	\$139m
Phase Three	\$20m	\$124m	\$5m	\$149m
Phase approach				
Phase upgraded (1-2-3)	\$13m	\$125m	\$5m	\$143m

The economic analysis has shown:

- Most of the benefits relate to vehicle operating costs (VOC) and travel time (TT) savings. Essentially these savings reflect how the proposal helps to prevent grid-lock type scenario which might otherwise be seen with the Do Minimum. The remainder of the benefits relate to safety (8-13%) and active mode benefits (3%).
- Phase One delivers a sizeable amount of the total benefits of the entire programme.
- The proposed signals and Robinson Avenue and Gee Road bring further strong benefits during Phase Two. The Airport/Eastgate roundabout also delivers new safety benefits.

## 20.4 BCR

The BCR for each phase, either as standalone programme or as part of a phased approach, are shown with Table 20-4.

**Table 20-4: Preferred Programme - BCR**

PROGRAMME	40 YEAR NPV		BCR
	COST	BENEFIT	
Phase One	\$28m	\$114m	4.1
Phase Two	\$63m	\$139m	2.2
Phase Three	\$68m	\$149m	2.2
Phased approach			
Phase upgraded (1-2-3)	\$63m	\$143m	2.3

<sup>67</sup> The maintenance costs for each phase are those over and above the Do Minimum, based on historical maintenance (RAMM) costs for SH30 Te Ngae Road.

Figure 20-1 shows how the benefits and costs are distributed across each phase.

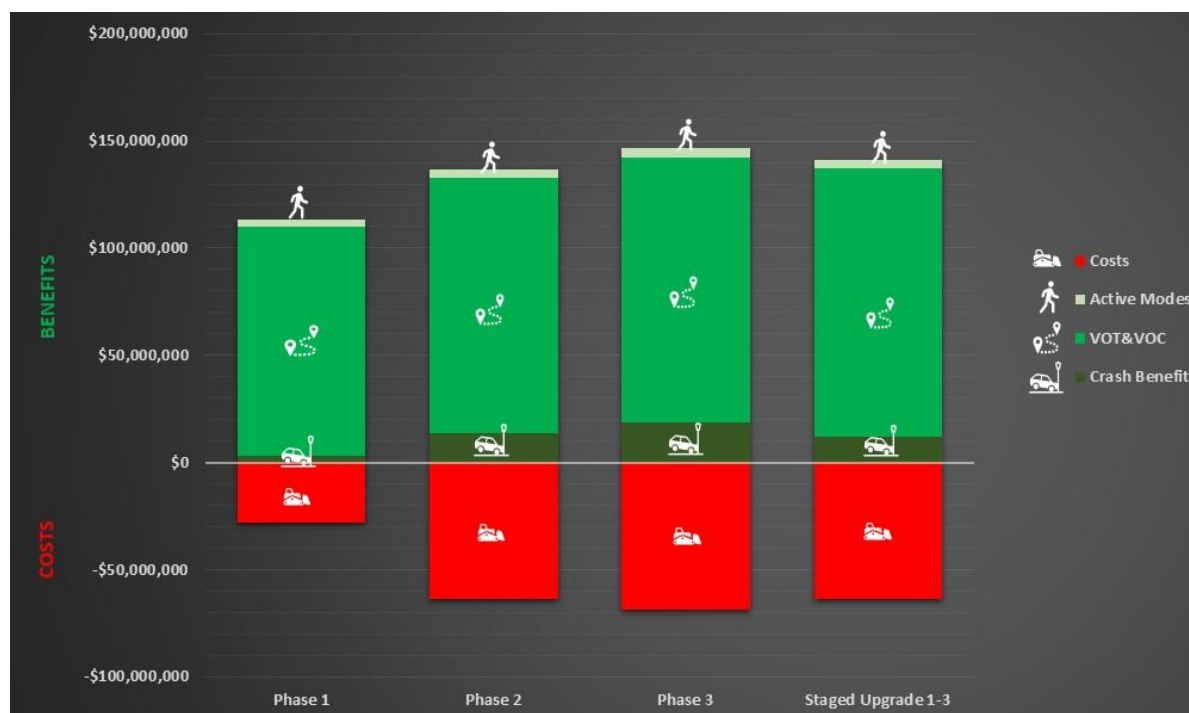


Figure 20-1: Overview of costs and benefits

## 20.5 Sensitivity Analysis

Several sensitivity tests have been undertaken to provide a likely BCR range for the preferred programme (staging upgrade), focusing on the most influential factors:

- Construction cost:
  - General increase of full scheme by 20%
  - Phase One costs = \$35m.
- Construction duration – e.g. if construction takes 3 to 6 months longer than expected
- Travel time/VOC – capping benefits earlier than 2048.
- Impact of slower growth (e.g. Covid-19 response). For this scenario, the TT/VOC benefits have been offset (e.g. forecast 2028 traffic does not appear until 2031).

Table 20-5 provides the economic sensitivity analysis for the 'Phase Upgraded'.

Table 20-5: Economics Sensitivity Analysis

PROGRAMME	VARIANCE	UPPER	BASE	LOWER	BCR RANGE
Project Costs	+20%	+20%	0%	0%	1.9
Phase One Construction Cost	\$35m	-	-	-	2.2 (Phase One only = 3.8)
Construction Duration	+6 months	-	-	-	2.3
Discount Rate	+/- 2%	8%	6%	4%	1.7 – 3.3
Capping VOT&VOC benefits at 2038	-	-	-	-	1.7
Offset the 2028 VOT&VOC benefit	+ 3 years	-	-	-	2.0

Under all scenarios, the BCR for the preferred programme (as a phased upgrade) remains above 1.7.

## 21. PROGRAMME ASSESSMENT

### 21.1 Assessment vs Key Principles

Table 21-1 shows how the programme delivers upon the key principles of the business case.

**Table 21-1: Programme alignment vs key principles**

KEY PRINCIPLE	PREFERRED PROGRAMME
Creating a joined-up network that works for all modes	<ul style="list-style-type: none"> <li>Aligns with the visions of the Eastside Structure Plan and NOF.</li> <li>Helps to reduce the amount of rat-running on local roads.</li> </ul>
We are addressing the existing LOS gaps for all modes now, but in a manner that supports future growth	<ul style="list-style-type: none"> <li>Includes a diverse suite of treatments covering improvements for all modes. The treatments address, improve, or maintain current LOS for all modes now and in the future.</li> <li>Aligns with the development phasing of the Eastside Structure Plan and in doing so will help unlock potential growth.</li> </ul>
The focus is on person, not vehicle movement	<ul style="list-style-type: none"> <li>Contains a level of flexibility – i.e. the opportunity to reallocate lanes for bus use.</li> <li>Priority is being given back to sustainable transport modes – i.e. cars will have to wait for buses and pedestrians, rather than the other way around.</li> </ul>
Setting in place the infrastructure that would enable modal shift	<ul style="list-style-type: none"> <li>Maximises the amount of active mode infrastructure than can reasonably be provided. Network optimisation is delivered in the first instance by reducing the number of cars.</li> <li>Provide a wider array of travel choices</li> <li>Does not ignore the fact some people still want, and in some cases need, to use the car. Mode shift also takes time, and new housing proposed in the short term, cannot be supported without enabling safer and more efficient access (via signals) onto the state highway. Using a phased delivery approach, we can monitor how the network performs and adds in elements of Phase Two as and when required.</li> </ul>
Reduce disruption to the community	<ul style="list-style-type: none"> <li>The phasing reflects a 'right-sized' approach. We are not proposing to build more than is needed (e.g. four laning only when essential), thus minimising disruption.</li> <li>We are providing clarity to the local community around how the corridor will look for the next 30 years. This gives certainty for people who live along SH30 Te Ngae Road.</li> <li>For all intersections, aside from Wharenui Road, construction will happen once.</li> </ul>
Minimise land purchase and property impacts	<ul style="list-style-type: none"> <li>Predominantly located within the existing road reserve boundaries. One exception to this is opposite Wharenui Road on Te Ngae Road.</li> </ul>

### 21.2 Assessment vs Strategies

Table 21-2 provides an assessment of the preferred programme against key strategies.

**Table 21-2: Programme alignment vs Key Strategies**

STRATEGY	PREFERRED PROGRAMME ALIGNMENT
<b>National strategies</b>	
Draft Government Policy Statement on Land Transport (2021)	<ul style="list-style-type: none"> <li>Improves the choices users have on SH30 Te Ngae Road. This includes the improvement of active mode infrastructure, new bus shelters, and improvements for vehicles.</li> </ul>
Arataki	<ul style="list-style-type: none"> <li>Urban mobility will be improved through the improvement of the walking and cycling networks – specifically the provision of a shared path, and the extension of facilities towards Rotorua airport.</li> </ul>
Waka Kotahi New Zealand Transport Agency Road to Zero 2020 – 2030	<ul style="list-style-type: none"> <li>Includes safety improvements for active modes and vehicles. New signalised intersections will help to separate movements and reduce conflict points.</li> <li>Improved active mode infrastructure includes the shared path, physical separation for the on-road cycle way and new signalised crossing points.</li> </ul>
Upper North Island Freight Accord	<ul style="list-style-type: none"> <li>Freight movement will become more reliable along SH30 Te Ngae Road, and access onto the corridor will be easier with the new signalised intersections.</li> </ul>
<b>Regional strategies</b>	
Bay of Plenty Regional Land Transport Plan	<ul style="list-style-type: none"> <li>Provides bus shelters and improves cycle facilities – such as the provision of a wider shared path with signalised crossings, and cycle facilities through to the southern end of Rotorua Airport.</li> </ul>

STRATEGY	PREFERRED PROGRAMME ALIGNMENT
Bay of Plenty Regional Public Transport Plan v1.1	<ul style="list-style-type: none"> <li>Includes bus shelter provisions, and there may be flexibility in the future to retrofit the design to allow for bus lanes.</li> </ul>
Bay of Connections Economic Growth Strategy	<ul style="list-style-type: none"> <li>Supports regional economic growth by supporting freight movements and access to a new housing development (Eastside Development)</li> </ul>
<b>Local strategies</b>	
Rotorua Vision 2030 – The Rotorua Way	<ul style="list-style-type: none"> <li>Helps to meet the district's growing needs by providing improved access to land for development (Eastside Development)</li> </ul>
Rotorua Long Term Plan (2018-2028)	<ul style="list-style-type: none"> <li>Seeks to promote a safe and connected network with capacity for projected growth. It also includes upgrades to bus shelters and encourages walking and cycling.</li> </ul>
Rotorua Sustainable Economic Growth Strategy	<ul style="list-style-type: none"> <li>Includes provision for capacity increase on SH30 Te Ngae Road, along with intersection improvements. It is anticipated that this will help enable greater mobility.</li> </ul>

## 21.3 Assessment vs Customer Needs

Table 21-3 shows how the preferred programme will deliver what different people need.

**Table 21-3: Programme alignment vs customer needs**

CUSTOMER	ALIGNMENT	RATIONALE
Locals	STRONG	<ul style="list-style-type: none"> <li>Locals are provided with new alternatives to the car and will benefit from safer access onto and across the state highway (for all modes).</li> </ul>
Residents living off SH30 Te Ngae Road	GOOD	<ul style="list-style-type: none"> <li>Access to properties is being maintained and new shared paths and safe crossing points will benefit those living along the SH30 Te Ngae Road.</li> </ul>
Commuters	STRONG	<ul style="list-style-type: none"> <li>Will benefit for reliable journey times between the Airport and Iles Road, and will have realistic alternative choices to the private car. The separated on-road cycle lanes are targeted directly at this user group.</li> </ul>
Truck drivers	STRONG	<ul style="list-style-type: none"> <li>Truck drivers will benefit from more reliable journey times along SH30 Te Ngae Road.</li> <li>For those delivering goods to local homes and businesses, they will be able to access the state highway more safely.</li> </ul>
Tourists	STRONG	<ul style="list-style-type: none"> <li>The speed of the corridor is going to be reduced, and the removal of powerlines will present a more welcoming environment for visitors.</li> </ul>
Cyclists	STRONG	<ul style="list-style-type: none"> <li>Provisions for cyclists will generally be very good, with facilities covering a wide range of abilities and skills. A shared path with crossing facilities will help those who are less experienced, whilst separated on-road cycle lanes will be provided for more confident users (e.g. commuters).</li> </ul>
Pedestrians	STRONG	<ul style="list-style-type: none"> <li>Pedestrian amenities will be significantly better than when compared to the existing situation – with improved footpaths, raised tables, new shared path and new signalised crossings.</li> </ul>
School kids	STRONG	<ul style="list-style-type: none"> <li>The proposed locations of crossing points were specifically identified to meet the desire lines for school children crossing SH30 Te Ngae Road to recreational or shopping areas.</li> </ul>
Elderly and mobility impaired	GOOD	<ul style="list-style-type: none"> <li>New crossings (at intersections) are being provided, which will be close to new retirement villages.</li> <li>The detailed design phase will consider how pram crossings will best support mobility impaired users.</li> <li>Pedestrian crossing times at signals should consider the user group and whether 'typical crossing times' are suitable for the likely user group.</li> </ul>



## 21.4 Assessment vs Opportunities

Table 21-4 looks back at the key opportunities identified in the Part A and assesses how well the preferred programme responds to them.

**Table 21-4: Supporting potential opportunities**

OPPORTUNITY	ASSESSMENT	COMMENTS
Economic growth and tourism	ACHIEVED	<ul style="list-style-type: none"> <li>The preferred programme will likely improve service for tourists primarily by improving access to and from the airport. At the northern end of the project area a new access to the airport will be constructed which will support the Airports Masterplan.</li> <li>Likewise, economic growth is supported by delivering more reliable freight movements.</li> <li>The design for the Basley Road intersection supports future development within the Owhatiura South Block 5 site.</li> <li>There is potential for economic growth to be stimulated by providing access to new development (such as the East Side Development), and by increasing the capacity of active mode and vehicle movements.</li> </ul>
Amenity improvements	ACHIEVABLE	The detailed design of features such as new bus stops, and lightening enhancements remain an opportunity for using urban design to add to the streetscape.

## 21.5 Summary

The preferred programme will:

- Fully deliver all the identified investment objectives.
- Achieve, or provide scope to achieve, identified opportunities.
- Address, or improve from the current baseline, the current identified customer LOS for walking, cycling, public transport and freight.
- Achieve a 'high' 2018 IAF results alignment rating.
- Deliver excellent value for money with a BCR of 2.3.

### The right solution, even if land development changes

The preferred programme does not substantially differ to the original short list of programmes. This is important, because that short list was developed based on an assumption at that time that future development would be roughly evenly distributed on either side of the SH30 Te Ngae Road corridor. But now RLC expect that all land use development (aside from potential development at the Owhatiura South Block 5) will be on the eastern (hill) side.

This provides further assurance that we have the right solution – as the same (or very similar) programme was identified for two quite different land use assumptions. If some of the land use development shifts back to the lakeside, we still have the right solution in place.

## 22. ASSESSMENT PROFILE

### 22.1 Overview

The National Land Transport Fund (NLTF) is the primary funding mechanism for Crown investment in the land transport system. The National Land Transport Programme (NLTP), reviewed and updated every three years in line with the release of the Government Policy Statement on land transport (GPS), identifies the activities likely to be funded by the NLTF.

Land transport activities which fit the criteria for funding from the NLTF, are assessed and prioritised against competing national priorities, to determine eligibility for funding. Activities with sufficiently high priority are included in the NLTP.

The framework, presented in Figure 22-1, consists of a business case review and a two-factor assessment - Results Alignment and Cost-Benefit Appraisal. The purpose of this process is to assess the significance of the problem relative to the goals and outcomes of the Government Policy Statement on Land Transport (GPS) 2018.

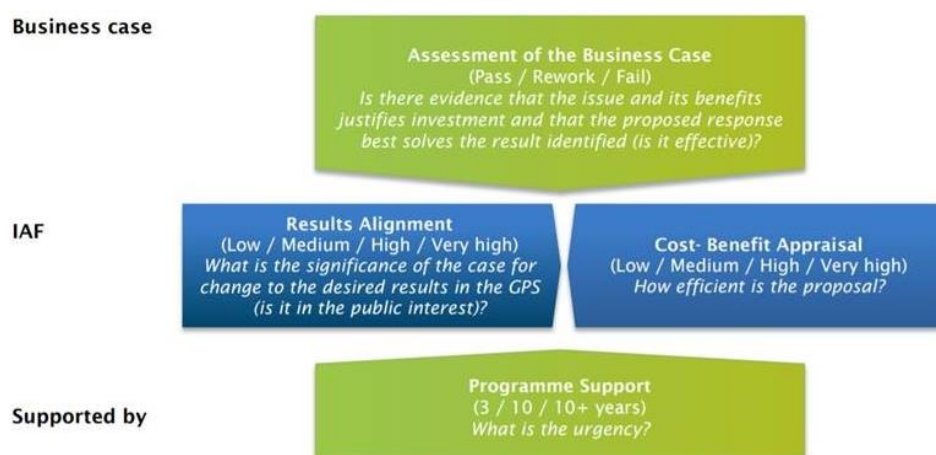


Figure 22-1: Investment Assessment Framework, 2018-21 NLTP

### 22.2 Results alignment

An assessment profile has been undertaken for the entire programme under the category of “Regional, local road and state highway improvements”. It is acknowledged that other improvements such as walking and cycling also make up the composition of the overall programme, however based on the physical size, cost, and anticipated benefits of the programmes road improvements it has been considered under this category.

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 an important consideration of the recommended programme. Table 22-1 provides an assessment of the preferred programme.

Table 22-1: Investment Assurance Framework Assessment for the Preferred Programme

GPS PRIORITY	RATING	COMMENT
Access to opportunities, enables transport choice and access, and is resilient – Liveable cities (GPS 2018)	HIGH	<p>The preferred programme will aim to address issues identified on the corridor. For example:</p> <ul style="list-style-type: none"> <li>The preferred programme will support a high priority element (transport connections) in agreed integrated land use and multi-modal plan (the East Side Development Plan). The new Gee Road will provide a signalised intersection which will connect to the proposed land development for both motor vehicles and active modes.</li> <li>Strictly speaking under the current 2018 IAF Rotorua would be considered a medium growth urban area (based on the 2013-2023 projections showing growth between 5-10%). However, as discussed in Part A, actual population</li> </ul>

GPS PRIORITY	RATING	COMMENT
		<p>growth in Rotorua between 2013 and 2018 was in excess of 10%. Therefore, while not meeting the 2018 IAF definition, in practical terms Rotorua's recent growth has been high. The IAF states that projects that address a significant gap in access to new housing in high growth areas are considered to have a high alignment with the GPS. The RLTP summarises the importance of this development with future growth:</p> <ul style="list-style-type: none"> <li>• "The Rotorua Eastern Corridor between the CBD and Rotorua Airport is one of the areas Rotorua Lakes Council has identified for potential urban growth. Future urban development in this area is strongly linked to plans for upgrading SH30 Te Ngae Road and supporting transport infrastructure."<sup>68</sup></li> <li>• Additionally, the preferred programme is also considered to make best use of a key corridor that prioritises multi-modal use and freight. The corridor is a regional status road and forms a key connection from Tauranga, Whakatane, and Gisborne to Rotorua. The preferred programme includes provision for active modes, motor vehicles, public transport, and freight.</li> </ul>
Better travel options and improving freight connections (GPS 2021)	IAF to be developed – preferred programme likely to have good alignment.	<p>The draft 2021 GPS provides a slight change from the 2018 Access priority by splitting considerations into 'better travel options' and 'improving freight connections'. While an IAF is still to be developed the preferred programme appears to align well with the proposed changes for the following reasons:</p> <ul style="list-style-type: none"> <li>• The preferred programme provides for better travel options for all modes.</li> <li>• Freight connections will improve with increased capacity, and the economic development of the area will be helped through alignment with the East Side Development.</li> </ul>
Preferred programme GPS 2018/2021 Results Alignment Rating		High
BCR		<ul style="list-style-type: none"> <li>• Phase One: Medium (3 - 4.9)</li> <li>• Phased upgrade: Low (1 - 2.9)</li> </ul>
Priority Order Rating		<ul style="list-style-type: none"> <li>• Phase One: 4</li> <li>• Phase upgrade: 5</li> </ul>

The programme obtains a GPS priority rating of 'High' based on the anticipated access outcomes. Based on the programme's GPS results alignment rating, and estimated BCR range, the corresponding programme priority order number is 5.

If considered separately, Phase One would have a priority of 4.

<sup>68</sup> <https://cdn.boprc.govt.nz/media/760427/bay-of-plenty-regional-land-transport-plan-2018-web.pdf>

# **PART C: READINESS AND ASSURANCE**

## 23. RISK REVIEW

### 23.1 Uncertainty Log

The general uncertainty log for the project is provided as Table 23-1

Table 23-1: Uncertainty Log

FACTOR	TIME	UNCERTAINTY	IMPACT	COMMENTS
<b>FACTORS AFFECTING DEMAND</b>				
Wharenui Block residential development	Underway	Near certain	Low	<ul style="list-style-type: none"> <li>The initial stage is already under construction.</li> <li>The impact of the development has already been considered as part of the business case, and the CIP funding provides certainty for first phases of work.</li> </ul>
Rotorua Airport Masterplan	Next 5 years	More than likely	Medium	<ul style="list-style-type: none"> <li>Increase employment opportunities and traffic demands associated with an increased range of commercial activity (inc. increased private charter flights, emergency services training).</li> <li>Could bring forward the timeframe for the proposed Airport/Eastgate roundabout.</li> </ul>
Owhatiura South Block 5	Next 5 years	More than likely	High	<ul style="list-style-type: none"> <li>Increase employment opportunities and traffic demands.</li> <li>Masterplan currently being developed.</li> <li>Access via Basley Road intersection plus a left-in only mid-block access has been considered as part of design.</li> </ul>
Eastside Structure Wellness Plan / Ngati Whakaue Tribal Land Masterplan	Next 5 years	More than likely	High	<ul style="list-style-type: none"> <li>The impact of the Eastside Structure Plan has already been considered as part of the business case.</li> <li>Associated risk if the development does not happen in line with current expectations.</li> </ul>
Eastgate business park expansion	Beyond 10 years	Reasonably foreseeable	Low	<ul style="list-style-type: none"> <li>Potential expansion of the Eastgate Business Park, although no formal plans have been drawn up at this stage.</li> <li>The medium-long term vision for the corridor has assumed that a parallel local road will be connected between Wharenui Road and Gee Road.</li> </ul>
Mode shift to active and public transport	Ongoing	Reasonably foreseeable	High	<ul style="list-style-type: none"> <li>The business case proposes infrastructure that would seek to encourage modal shift. The extent to which mode shift would happen is dependent on several factors (inc. local road improvements).</li> <li>The greater the shift to active and public transport modes, the later the need to four lane other parts of the corridor (i.e. Phase 2 &amp; 3).</li> </ul>
Covid-19	Ongoing	Near certain	Medium	Short term impact to demand – relating to international tourism trips, and associated employment. May be some suppressed demand.
<b>FACTORS AFFECTING SUPPLY</b>				
Connect Rotorua Stage One	Underway	Near certain	High	Widening and upgrade of Stage One. Under construction.
RLC local road improvements	Underway	Near certain	Medium	CIP funding approved
BOPRC Bus Network	Beyond 10 years	Reasonably foreseeable	Medium	Improved services would make public transport more appealing and help to deliver mode shift – and consequently timing for Phase 2 and 3 upgrades.



FACTOR	TIME	UNCERTAINTY	IMPACT	COMMENTS
<b>FACTORS AFFECTING COST</b>				
Fuel prices	Beyond 10 years	Hypothetical	Low	Fluctuation in global fuel costs had an impact on travel demand in the 2008/9; a similar change in markets will reduce private travel and slow growth for a period.
Changes in public transport fares	Annually	Reasonably foreseeable	Low	Fares may rise (due to increased cost), or potentially decrease (strategic desire to encourage more public transport use)
Maintenance of roads	Next ten years	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.
<b>OTHER</b>				
Flooding from the Waingaehe Stream or Lake Rotokawa	Coming years	Reasonably foreseeable	Medium	These areas are known to cause flooding, and this is likely to delay construction during Phase 2
Contaminated material	Current	Reasonably foreseeable	Medium	There are 3 identified HAIL sites along the corridor. Proposed activity may not comply with the permitted activity requirements under the National Environmental Standards (NES). The projects may require Preliminary Site Investigations (PSIs)

## 23.2 Risk Management

Table 23-2 outlines how the main risks will be managed.

**Table 23-2: Risk Management**

NO	RISK	CAUSE	CONSEQUENCE	RISK CONTROL
1	Lack of geometric and topographical detail in the concept designs	<ul style="list-style-type: none"> <li>Significant design change during detailed design</li> </ul>	<ul style="list-style-type: none"> <li>Delays during construction and/or cause project scope change</li> </ul>	<ul style="list-style-type: none"> <li>Incorporate the recently completed topographic survey into the concept design to ensure that any assumptions made during the development of the concept design can be verified and provide further assurance around the necessary treatment of driveways.</li> <li>Undertake a preliminary geometric design to determine the footprint of the project so draft land requirement plans can be prepared.</li> </ul>
2	Crashes occurring on SH30	<ul style="list-style-type: none"> <li>Retaining the flush median increases the number of crashes</li> <li>Unsafe access to the Owkata Medical Centre</li> </ul>	<ul style="list-style-type: none"> <li>Death or serious injury</li> </ul>	<ul style="list-style-type: none"> <li>Width of the flush median is such that a solid median could be introduced in the future (if required).</li> <li>Post-implementation monitoring.</li> <li>Alternative options for the Owkata Medical Centre have already been identified.</li> </ul>
3	Prolonged (or difficult) property purchase	<ul style="list-style-type: none"> <li>Difficulty obtaining the necessary land from various parties.</li> <li>Owhatiura South Block 5 land - while this land is classed as 'general land', it is owned by a Māori landowning organisation and it appears the Māori Land</li> </ul>	<ul style="list-style-type: none"> <li>Increased cost or need to change design</li> <li>If the Māori Land Court is to be involved in a purchase transaction, settlement is expected to be significantly delay</li> </ul>	<ul style="list-style-type: none"> <li>Phase 1 does not include any essential property purchase. Some property purchase in the Owhatiura South Block 5 land would allow a 3.0m shared path to be constructed (rather than a 1.5m footpath) – but not essential for delivering the desired outcomes of investment.</li> <li>Phase 2 includes some property purchase. Early engagement with owners has already happened.</li> </ul>

NO	RISK	CAUSE	CONSEQUENCE	RISK CONTROL
		Court has jurisdiction over it.		<ul style="list-style-type: none"> <li>Continue to engage with the landowner representatives to progress discussions for Waka Kotahi to purchase this land.</li> </ul>
4	Lack of integration with local road improvements	<ul style="list-style-type: none"> <li>Misalignment with project timeframes and design.</li> <li>RLC inputs (stormwater, local road improvement) are not coordinated.</li> </ul>	<ul style="list-style-type: none"> <li>Could result in prolonged construction period due to unforeseen risks arising.</li> </ul>	<ul style="list-style-type: none"> <li>Continue to work alongside RLC to ensure an integrated approach is taken to a) design and b) timeframes.</li> <li>Engage a local Rotorua-based Programme Manager to manage physical works.</li> <li>Utilise Waka Kotahi's CIP Programme Manager to ensure careful programme management and progress towards the CIP construction commencement deadline.</li> </ul>
5	Inaccurate cost estimate	<ul style="list-style-type: none"> <li>Level of available data at this concept stage, including utility information.</li> </ul>	<ul style="list-style-type: none"> <li>Under or overestimated costs</li> </ul>	<ul style="list-style-type: none"> <li>Prior to the detailed design stage additional work is being undertaken to reduce design and cost risks. This includes 3D geometric design and a utilities investigation.</li> </ul>
6	Delays in starting construction	<ul style="list-style-type: none"> <li>Reduced lane capacity during construction</li> </ul>	<ul style="list-style-type: none"> <li>Increased travel times, rat-running and poor journey time reliability during construction</li> </ul>	<ul style="list-style-type: none"> <li>Strong and early communications with the community relying the likely impact, so people can plan their journeys better.</li> <li>Construction of the shared path first. This could be done without significant impact to vehicle travel, and when works within traffic lanes are required, people would then have an option to use the shared path (to avoid traffic congestion).</li> </ul>
7	Covid-19 impacting delivery timeframes	<ul style="list-style-type: none"> <li>A return to Level 3 or 4 restrictions</li> </ul>	<ul style="list-style-type: none"> <li>Potentially influence timeframes to complete the detailed design, or extend construction periods (and potentially cost)</li> </ul>	<ul style="list-style-type: none"> <li>Continue to work with online meetings and seek opportunities to reduce delivery timeframes. This will provide some buffer if events beyond our control occur – i.e. look to deliver 4 weeks ahead of usual time.</li> </ul>
8	Community expectations that the improvements will be delivered sooner than is realistic or affordable.	<ul style="list-style-type: none"> <li>Media articles, or unclear Waka Kotahi communications</li> </ul>	<ul style="list-style-type: none"> <li>Reputation risk and complains from the community and local stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Clear communications, and regular updates to the community – particularly whilst construction is occurring.</li> </ul>
9	Not being 'shovel ready'. Access to the CIP funding is contingent on physical construction materially commencing by 1st Sept 2021	<ul style="list-style-type: none"> <li>Delays in procurement for the Detailed Design for Phase 1</li> </ul>	<ul style="list-style-type: none"> <li>Funding being removed.</li> </ul>	<ul style="list-style-type: none"> <li>The design of the raised tables for Phase 1 will progress immediately, ahead of the tendering for the Detailed Design for the complete Phase 1 of works. This means that there will be a 'ready to go' element of the project that can be constructed without delay.</li> </ul>
10	Over or under design of pavement	<ul style="list-style-type: none"> <li>Estimated traffic volumes do not eventuate</li> </ul>	<ul style="list-style-type: none"> <li>Higher costs than necessary to Waka Kotahi</li> </ul>	<ul style="list-style-type: none"> <li>Low risk for Phase 1 where there is limited mid-block widening. Risk mainly associated with Phase 3 works (est. 2035) – at which time traffic volumes could be monitored and pavement design reassessed.</li> </ul>
11	Stormwater drainage requires complicated design	<ul style="list-style-type: none"> <li>Difficulties in conveying runoff to outfall</li> </ul>	<ul style="list-style-type: none"> <li>High costs associated with pumping / elaborate stormwater drainage methods.</li> </ul>	<ul style="list-style-type: none"> <li>Review site levels, current drainage patterns during Detailed Design.</li> </ul>

NO	RISK	CAUSE	CONSEQUENCE	RISK CONTROL
12	Unresolved stakeholder concerns	<ul style="list-style-type: none"> <li>Owhatiura South Block 5 landowner representatives have communicated their perception Waka Kotahi is not supportive of their development.</li> <li>Fire and Emergency have commented what is being proposed will be detrimental to their emergency response rates.</li> </ul>	<ul style="list-style-type: none"> <li>There is a risk that this discontent could escalate and be made public or legal action sought.</li> </ul>	<ul style="list-style-type: none"> <li>Continue to engage with these stakeholders through pre-implementation and implementation, noting that not all stakeholders' expectations and desires will be met.</li> </ul>
13	Reputation/ Relationship	<ul style="list-style-type: none"> <li>Perception that Waka Kotahi and RLC do not have a coordinated plan for the area which addresses the transport needs and future growth.</li> </ul>	<ul style="list-style-type: none"> <li>Opposition from key stakeholders and the local community</li> </ul>	<ul style="list-style-type: none"> <li>Ensure pro-active and regular communications are provided to stakeholders, treaty partners and the public.</li> <li>Independent project, design, and construction management</li> <li>Stage design and construction</li> </ul>
14	Planning and consenting	<ul style="list-style-type: none"> <li>Environmental and planning matters can significantly influence programme, and the Phase One timing is relatively tight.</li> </ul>	<ul style="list-style-type: none"> <li>Delays to the programme</li> </ul>	<ul style="list-style-type: none"> <li>Ensure planning and consenting requirements are adequately integrated into the project programme from the outset to minimise the risk of project delays</li> <li>Designation alteration and associated approvals for Phase 1 are sought first</li> <li>Standard two-step Council process is recommended for both the designation alteration and required resource consents</li> </ul>
15	Procurement	<ul style="list-style-type: none"> <li>Lack of local supplier interest or availability due to perceived entry requirements and risks.</li> </ul>	<ul style="list-style-type: none"> <li>CIP FTE outcomes compromised</li> </ul>	<ul style="list-style-type: none"> <li>Stage delivery through enabling works and major construction contracts supported by comprehensive design and less complex contracts.</li> </ul>
16	Growth and local road network development assumptions	<ul style="list-style-type: none"> <li>The DBC assumes development will occur in line with the Eastside Structure Plan, which includes a new local road connection parallel to Te Ngae Road, from Wharenui Road to Gee Road.</li> </ul>	<ul style="list-style-type: none"> <li>If this local connection is not built, development off Gee Road will result in trips of all modes being directed onto SH30 Te Ngae Road. This will result in a greater number of trips being made on the state highway than what has been allowed for in the modelling.</li> </ul>	<ul style="list-style-type: none"> <li>Risk for Phase 2 and 3. Waka Kotahi will need to work with RLC and set out a clear MoU with Council.</li> </ul>
17	Assumption of reduced speed along SH30	<ul style="list-style-type: none"> <li>The proposed design has assumed that the speed of SH30 will be reduced in accordance with the SH30 urban speed review recommendations.</li> </ul>	<ul style="list-style-type: none"> <li>If the speed is not reduced, there will be a higher safety risk for all users.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor and influence the progress of the Urban Speed Review process.</li> </ul>
18	Dependency on other initiatives to reach mode shift outcomes	<ul style="list-style-type: none"> <li>The infrastructure improvements proposed in this DBC is only one element to achieving mode shift. Other critical dependencies to mode shift being achieved include car parking management and</li> </ul>	<ul style="list-style-type: none"> <li>For mode shift to be realised, the entire journey from home to destination needs to be safe and appealing.</li> </ul>	<ul style="list-style-type: none"> <li>These dependencies will predominantly be delivered by RLC and BOPRC. Continuing to build on existing relationships with RLC and BOPRC and influence the delivery of these programmes will be vital to ensure that are delivered.</li> </ul>

NO	RISK	CAUSE	CONSEQUENCE	RISK CONTROL
		pricing strategies, school and employment travel demand planning, quality and frequency of public transport services, local network improvements etc.		
19	Scope change of Phase One results in CIP project deliverables not matching those publicly announced	<ul style="list-style-type: none"> <li>Cost increases result in reduced scope to Phase One to keep the project within the \$35 million CIP funded budget.</li> </ul>	<ul style="list-style-type: none"> <li>CIP expectations and outcomes not fully met.</li> </ul>	<ul style="list-style-type: none"> <li>Early identification of risks which could increase costs and careful financial management will minimize this risk occurring. Early reporting to CIP will manage expectations.</li> </ul>

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## 24. COMMERCIAL CASE

### 24.1 Implementation Strategy

#### 24.1.1 General

The next stage for this project is pre-implementation and implementation of Phase One.

Phase One has funding committed from the COVID-19 Response and Recovery Fund, administered by Crown Infrastructure Partners (CIP). The CIP funding was secured to support residential development in Rotorua's east side. RLC was also granted funding to deliver stormwater upgrades and local road improvements to support residential development. The improvements to be delivered in Phase One will remove triggers set against the Wharenui development in the Rotorua District Plan and will support housing development. Access to the CIP funding is contingent on physical construction materially commencing by 1 September 2021.

Therefore, this Commercial Case focuses on minimising risks during pre-implementation to ensure that Phase One works commence and are delivered within the timeframe set by CIP. Consideration has been given to the following:

- Minimising risk during construction by completing site specific investigations to inform consent requirements and detailed design.
- Designing the procurement strategy to support the project to progress at pace.
- The extent of land acquisition and consideration of Māori land ownership.
- Efficient programme management and coordination with RLC and the wider CIP package.

Phases Two and Three will be delivered in response to growth along the corridor. The timing of delivery of these future phases is therefore dependent on when and how quickly that development progresses. It is recommended that normal Waka Kotahi business case requirements and funding processes are followed to progress Phases Two and Three to pre-implementation, when the development along the warrants their delivery. This will include a point of entry being completed to reassess the need for investment and the best way forward.

#### 24.1.2 Pre-Implementation and Detailed Design

Once the scheme designs have been finalised (including peer reviews) the next stage is pre-implementation and detailed design. This phase will focus on (i) refining the design to avoid effects; and (ii) developing appropriate mitigation measures to manage any environmental effects.

The following considerations will shape and inform the final strategy:

- **Technical Risks.** Issues that require further consideration during the technical investigations, concepts for and decisions about structural form, detailed design, consultation, and resource consent applications.
- **Procurement Approach.** The recommended programme may influence the procurement approach adopted to deliver the detailed design.
- **Need for, and extent of, land acquisition.** The design for Phase One looks to avoid any land acquisition. If agreement can be sought, that would be some purchase for land within the Owhatiura South Block 5 site to deliver a 3.0m shared path.



## 24.2 Consenting Strategy

Ensuring planning and consenting requirements are adequately integrated into the project programme from the outset will minimise the risk of project delays. The proposed works will require statutory approvals from both RLC and BOPRC as follows:

- Designation alteration and outline plan from RLCs' District Plan
- Regional consent for earthworks, stormwater discharges, and alterations to culverts
- Consent may also be required under the NES Soil from RLC as there are several HAIL sites adjacent to SH30 Te Ngae Road on sections of road subject on all three project phases; to be confirmed at pre-implementation.

A desktop assessment has determined that a Wildlife Permit and/or Heritage New Zealand Pouhere Taonga Act 2014 approvals are unlikely to be necessary, but this needs to be confirmed by further assessments at the pre-implementation phase. As land may be required from Pukepoto Scenic Reserve as part of Phase Two. Reserves Act and the Conservation Act approvals may also be applicable.

It is recommended that the designation alteration and associated approvals for Phase One are sought first, separately from Phase Two and Three. This is due to the urgent timing of Phase One and its relative lack of complexity in terms of required approvals compared to Phase Two. Furthermore, Phases Two and Three are subject to developer demands and the details are subject to future change. The standard two-step Council process is recommended for both the designation alteration and required resource consents. This process involves the consent application being lodged with and heard by the local council.

A number of specialist assessments will be required to support the consent applications and alterations to the designation to consider potential adverse effects and any mitigation measures required. The requirement for, and scope of these assessments will be confirmed as part of Phase One pre-implementation.

Environmental and planning matters can significantly influence programme, and the Phase One timing is relatively tight. Therefore, it is critical to ensure these matters are adequately integrated into the project programme from the outset to minimise the risk of project delays. Post DBC approval, the project manager should discuss the next steps to progress these elements with the relevant representatives of the Consents and Approvals Group and Environments Team.

A full consenting strategy and Environmental and Social Responsibility Screen (ESR) for the DBC has been completed and is attached as **Appendix V**.

## 24.3 Property Strategy

In total there are 21 property interests required for all three stage of the DBC. Only one property affects Phase One work and the balance are required in Phase Two.

### Phase One (Owhatiura South Block 5)

The Owhatiura South Block 5 land between 366 and 410 Te Ngae Road sits within the Phase One scope of works. Approximately 420m<sup>2</sup> from this property is required to construct the shared path on SH30 Te Ngae Road. The Owhatiura South Block 5 land parcel is owned by Māori interests and any transaction is likely to require approval by the Māori Land Court.

A Land Requirement Plan for this land will be developed as part of the next steps, prior to detailed design. Once the Land Requirement Plan has been approved by Waka Kotahi, it is estimated to take 22-24 months to process the transaction through the Māori Land Court. This timeframe sits outside of the critical path for to meet the CIP delivery timeframe. There is also a risk that the Māori Land Court does not accept this property purchase.

As noted in section 12.6 of this DBC, Waka Kotahi is also in ongoing engagement with Owhatiura South Block 5 landowner representatives about their development plans for the land, and the associated impact of this development on the transport network.

It is recommended that negotiations for property interests required for future phases commence at a later date, when the future phases look to proceed.

A full property strategy for all three phases of the DBC has been completed.

## 24.4 Procurement Strategy

A procurement plan for all three of Waka Kotahi's CIP funded projects has been approved at the relevant delegation level. This approved plan provides the procurement approach to pre-implementation and implementation of Phase One and has been informed by the detail provided in this section of the DBC. A key focus of the procurement plan is on ensuring Phase One can continue to progress with speed, so the CIP funding deadline is met. It also places a strong emphasis on providing opportunities for local job creation.

### 24.4.1 Advisory services

Stantec, as the consultant that prepared this DBC, has been retained to provide additional advisory services to ensure detailed design is well informed. This will enable early identification of risks through comprehensive risk management and data gathering. The additional services provided by Stantec will include the following tasks and do not preclude Stantec from tendering for detailed design:

- Preliminary design
  - Integrate the topographic survey into the concept design
  - Preliminary geometric design
  - Confirm the project extents
  - Land requirement plans, updated cost estimates, updated staging plan
- Utilities investigation
- Preliminary site investigations (PSI) for Hazardous Activities and Industries List (HAIL) sites
- Final consultation tasks
- Additional traffic modelling
- Concept sketches to inform consultation
- Traffic advice to the local developers
- Initial lighting investigation
- Benefits realisation plan

The Property Group will also be retained to continue to delivery property acquisition advisory services relating to Phase One works through to delivery. This too will reduce the risk of project delay.

### 24.4.2 Project Management

Procuring a local supplier through direct appointment who has experience working with RLC and the contracting industry is expected to deliver cost savings to Waka Kotahi and ensure Waka Kotahi and RLC integrate their project solutions. It will also ensure the base data required to inform detailed design, and the enabling works can be procured early so the project can progress at speed.

An independent project manager will be directly appointed to:

- Develop and manage the project programme and finances
- Work with RLC to co-ordinate design and construction activities
- Procure suppliers to collect base (factual) data and site information. This is will be a key input into the design services contract and is expected to include:
  - Detailed site survey
  - Services – type, confirmed location and current capacity

- Detailed (intrusive) geotechnical investigation
- Lead the procurement of:
  - Professional services to complete the design and documentation of activities to be delivered under Phase One and obtain statutory approvals. Rather than managing the physical works phase, the design consultants would provide specialist advice to resolve specific design and construction issues
  - Enabling works packages to complete corridor works such as service relocation and/or upgrade, fencing and acoustic barriers, foot and cycle paths, lighting etc.
  - Physical works contractors to complete the major works such as the intersection upgrades, the final scope of which would depend on remaining budget, benefits realisation etc.
- Manage the design and construction phases.

#### **24.4.3 Design and MSQA**

A design consultant will be procured through traditional open PQM to:

- Complete the detailed design and associated documentation
  - This may include providing services to RLC. The design will be phased to allow for enabling works to be completed ahead of the main contract
- Mitigate project risks through good design
- Provide specialist advice to resolve construction issues
- Confirm the completed works comply with the design and consent documentation

#### **24.4.4 Physical works**

Independent local suppliers will be procured through open LPC to complete enabling works such as:

- Service relocations
- Raised tables
- Shared paths and shoulder works
- Drainage activities etc.

Main contractors will be procured through open PQM. It is envisaged these works will include

- Signalised intersections
- Four laning.

## **24.5 Communications and Engagement**

Communication and engagement with key stakeholders took place over ten months while the DBC was being developed. Feedback received from stakeholders has helped to shape the preferred option, as noted in Sections 16 and 17 of this DBC.

Engagement during pre-implementation will focus on closing out existing gaps and ensuring ongoing engagement with key stakeholders including Hapu leaders, local developers, local schools, RLC and BOPRC. A property consultant and RMA planner should provide input into the comms and engagement plan for pre-implementation and implementation to ensure effective integration of any property issues with the RMA consenting phase.

The engagement activity which Stantec will continue to deliver through pre-implementation of Phase One includes:

- Updated Memorandum of Understanding with hapū leaders to include Stage 2 construction monitoring

- Enhanced Ōwhata Medical Centre access at the Wharenui Road intersection with Ōwhata Marae, RLC and Simply Fresh
- Cycleway transition treatments with Rotorua Cycle Action Network
- Bus stop facilities with BOPRC, RLC and impacted property owners
- Scoping and design of landscape design elements with hapū, RLC and Kainga Ora
- Land-owners whose property access is impacted by new signals
- Final review with all partners and stakeholder organisations who provided advice during the concept stage

Other actions being led by RLC relating to street calming and travel choice / education programmes are not included in the engagement plan; however, the project team will support that work.

Hapū have provided positive feedback on the approach to engagement taken by the Connect Rotorua Stage One team during pre-implementation and implementation of the Stage One project. The approach taken has focused on ensuring hapū leaders are regularly updated on project progress through monthly meetings and regular project bulletins which the hapū leaders share with their wider community. This engagement approach should be replicated during pre-implementation and implementation of the Stage Two - Phase One project.

### Formal consultation under Section 22AD of the Land Transport Act

The removal of existing, and installation of new, bus stops and other traffic control devices such as cycle lanes, shared pedestrian/cycle paths, stopping restrictions, and turning restrictions must be gazetted under the Agency's Traffic Controls on State Highway Bylaw. The purpose of this is to stop other vehicles from using these facilities and to allow infringements to be issued. A component of the bylaw process is the completion of the formal consultation under Section 22AD of the Land Transport Act. This states that the road controlling authority must give notice in writing to the following, and provide them with reasonable time to make submissions on the proposal:

- A. The occupiers of any properties adjoining the road to which the proposed bylaw would apply
- B. Any affected road controlling authorities that are responsible for roads that join, or are located near, the road to which the proposed bylaw would apply
- C. The territorial authority for the area where the road is located
- D. Any affected local community
- E. The Commissioner of Police
- F. Any other organisation or road user group that the road controlling authority considers affected
- G. Internal engagement with the necessary teams within Waka Kotahi.

This formal consultation should be factored into the comms and engagement plan and completed during pre-implementation/ prior to construction commencing so that any changes resulting from the consultation process can be incorporated into the design.

## 24.6 Risk Allocation

The key risk types that could delay the project are:

- **Technical risks** where effects either lead to significant design change or cause significant cost escalation (by introducing or increasing the scope of mitigation).
- **Programme risks** caused by, for example, discussions with affected parties and stakeholders, staff resourcing, or hearings and appeal processes.
- **Property effects** type issues which cause either design change or cost escalation (by introducing or increasing the scope of mitigation).
- **Reputation risks** caused by strong local opposition to project.

Table 24-1 outlines how these risks will be managed.

**Table 24-1: Commercial Management Risk**

<b>RISK</b>	<b>MANAGEMENT APPROACH</b>
Technical	Robust technical reviews and robust submissions for statutory approvals
Programme	Careful programme management against realistic deliverables
Property	Early engagement with potentially affected landowners
Reputational	Ensure pro-active and regular stakeholders, treaty partners and public communications

## **24.7 Contract Management**

The contract for the detailed design is likely to extend to lodgement of RMA applications and include provision for the successful consultancy team to then supply services and resources for the phases up to granting of consent.

The RMA consenting phase will likely focus on maintaining levels of constructability and design flexibility to better enable subsequent procurement decision making.



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## 25. MANAGEMENT CASE

As Phase Two and Three will not be delivered immediately, this Management Case predominantly focuses on the delivery of Phase One activities. When Phase Two and Three are to be delivered, this will be subject to a Point of Entry (PoE).

### 25.1 Project Governance and Management

A Waka Kotahi CIP programme manager has been appointed to programme manage all of Waka Kotahi's CIP funded projects. The CIP programme manager is responsible for reporting to CIP on the progress of the CIP projects against the milestones and reporting requirements set out in Waka Kotahi's signed Letter of Exchange with CIP. In summary, the reporting requirements include:

- Monthly reporting on:
  - Project progress
  - Costs (actuals and forecasts)
  - Risks (including mitigations)
  - FTE (actual and forecasted)
  - Health and safety performance
  - Other information requested by CIP
- Quarterly reporting on:
  - Costs (actuals and forecasts)
  - Progress towards outcomes being delivered
  - Progress towards project completion dates set in the CIP Letter of Exchange
  - Media marketing and communications activities
- Post implementation reporting

The design and delivery project managers will provide detail to the CIP programme manager on the reporting requirements set out above, on a monthly basis, five working days prior to when CIP expect the reporting. The CIP Programme Manager, along with the OPPP Delegations Committee will provide governance oversight, and advice on the Phase One project.

Endorsement of this DBC and support to progress Phase One to pre-implementation and implementation will be sought from the OPPP Delegations Committee. However, as CIP funding is already available and committed for Phase One, funding approval to progress is not required.

#### Partnership with Rotorua Lakes Council

As noted earlier in this business case, RLC also has a programme of local road improvements and stormwater upgrades which are funded through CIP as part of a wider package of funding for eastern Rotorua. RLC's local road improvements focus on ensuring the walking and cycling connections from SH30 continue through the local road network. They also provide some traffic calming to help minimise the likelihood of 'rat running' through the local network. Initial local road improvements being delivered by RLC include shared paths and traffic calming on:

- Vaughan Road
- Porikapa Road
- Morey Street
- Warwick Drive
- Warwick Drive to Tarawera Road

The stormwater activity includes stormwater retention ponds and the upgrade of culverts. RLC is currently master planning the stormwater requirements but the activity to be delivered may include the upgrade of a stormwater culvert which passes through SH30 Te Ngae Road at the Basley Road intersection and through Vaughan Road to the lake.

A signed partnership agreement between RLC and Waka Kotahi has been reached. This sets the expectation that RLC and Waka Kotahi will work collaboratively to ensure successful delivery of the CIP programme of works in eastern Rotorua.

### **Project and contract management**

As noted in the Procurement Strategy, a local Rotorua based project manager will be sought to manage Waka Kotahi enabling works and main construction. The CIP programme also has project management resource to fill any gaps between DBC completion and the local project manager coming on board.

The system design team will stay involved and lead Phase One through pre-implementation and detailed design. Once Phase One progresses to delivery, it will be handed over to a Bay of Plenty based project manager in the delivery team who will manage it through to project completion.

## **25.2 Delivery and staging Plan**

### **25.2.1 Pre-implementation staging plan**

This provides an overview of the approach to the next phase to ensure physical works commences within the CIP timeframe of 1 September 2021.

Scope contingency and delivery scheduling is key to ensuring Phase One is delivered within the fixed CIP funded budget and delivers the outcomes sought. A more detailed staging plan for Phase One will be produced as part of the additional services being provided by Stantec through pre-implementation. The staging plan will:

- Provide further disaggregation of the delivery timing for Phase One, including which elements should be delivered first
- Any independencies between elements of the project
- Inform the detailed design process (e.g. whether elements of the design can be completed in stages), procurement schedule and project management

This staging plan will also help to identify elements of the Phase One project which could be removed from, or added to, the scope without impacting the outcomes being sought. Initial indications suggest the following are elements of the Phase One project which could act as scope contingency:

- Removal of slip lanes beyond Wharenui Road
- Extension of the shared path beyond Wharenui Road
- Robinson Avenue intersection upgrade
- Airport / Eastgate roundabout

This staging plan will need to be coordinated with RLC and tie into the work they are also delivering along the corridor. This is particularly important for delivery of the Basley Road culvert upgrade and intersection improvements.

An indicative sequencing plan for Phase 1 is provided as **Appendix X**.

### **25.2.2 Property purchase during Phase One**

#### **Owhatiura South Block 5**

Due to the timeframes set by CIP to deliver Phase One, it is expected that the shared path from 366 – 410 Te Ngae Road cannot be delivered as part of Phase One. As such, a 1.5m footpath (similar to the existing facility) will be designed and constructed at Phase One as that base case option. While this is not ideal from a design perspective, it retains the status quo level of service for pedestrians.

During Phase One, discussions can continue with the Owhatiura South Block 5 landowner representatives. If agreement to sell is reached, this sale should be put to the Māori Land Court.

The timing of a decision made by the Māori Land Court will determine whether a shared path can be delivered in Phase One or not. If a sale and purchase is granted prior to the footpath being constructed, the shared path can be delivered instead. If it is granted after construction of the footpath, the shared path construction should be scheduled for delivery as part of Phase Two. If the Māori Land Court does not approve the sale and purchase, a footpath will remain in place.

Compulsory acquisition is not recommended for this land.

The above approach mitigates the expected timing delay associated with land purchase through the Māori Land Court and provides scope contingency should the land not be available to Waka Kotahi.

### **Fresh Choice (542-550 Te Ngae Road)**

If the Owhatiura South Block 5 land is to be purchased during Phase One, it is also recommended that Waka Kotahi purchase a small amount of land from the properties at 542-550 Te Ngae Road (the Fresh Choice supermarket), which has an existing footpath through it. This land parcel juts out from the rest of the land on the northern side of SH30 Te Ngae Road and while it is not required for Phase One work to proceed, purchasing it will tidy up the corridor.

The owner of 542-550 Te Ngae Road has agreed to the sale of the land with the footpath on it and has asked that they be given an equivalent portion of RLC owned land on the northern / Vaughan Road side of their property which is already being utilised for a fire emergency water tank. RLC has agreed in principle to this land swap. It is recommended that this arrangement be facilitated by Waka Kotahi and involve the following transactions:

- Waka Kotahi purchase land with existing footpath off the landowners of 542-550 Te Ngae Road
- 542-550 landowner purchases land on northern side of property with existing water tank off RLC

The benefit of processing this land purchase and facilitating the land swap between the owners of 542-550 Te Ngae Road with RLC during Phase One if the Owhatiura South Block 5 land is acquired during this phase is that it can also be wrapped into the designation alteration which will be completed for Phase One. If agreement cannot be reached for the Owhatiura South Block 5 land, there is no value in proceeding with this arrangement as part of Phase One.

### **25.2.3 Staging of public transport facilities**

BOPRC is currently undergoing a review of the public transport network for Rotorua.

The current low level of public transport provision and uptake means a phased approach to public transport infrastructure improvements will best align with any improved service provision. The bus stop designs have been incorporated into current and future design plans to ensure there is sufficient space for their inclusion.

Staging of the improvements for public transport are recommended:

- **Phase One:** Enhanced infrastructure at bus stops. Provision of quality shelters and seating. Possible landscaping and real time journey information.
- **Phase Three:** Four laning of corridor to potentially incorporate bus lanes combined with other congestion management initiatives such as high occupancy traffic lanes (e.g. T3) or dedicated freight lanes.

## 25.3 Assurance & Acceptance

As noted throughout this document, several peer reviews have been completed through the development of this DBC and have informed the recommended programme. External and internal peer reviews have been completed on the following:

- Traffic modelling (Appendix N)
- Economics (Appendix S)
- Cost estimates (Appendix U)
- Road safety audit (Appendix R)

An independent review of the full business case has also been completed and is provided as **Appendix T**. It is expected that Phase One detailed design will be subject to the normal project review processes, including those detailed in Table 26-2.

**Table 26-2**

ITEM	DETAIL
Design review	<ul style="list-style-type: none"> <li>• Lighting design peer review (if relevant); and</li> <li>• Road safety audit (for the scheme/detailed design).</li> </ul>
Cost review	<ul style="list-style-type: none"> <li>• The costs produced at the next stage will be reviewed internally, against the cost estimates provided in this DBC.</li> <li>• An independent peer review of the costs is not expected to be required at the next stage as this has already occurred during concept design as part of this DBC. However, if the design cost estimate changes considerably from the concept design estimate, a parallel cost estimate should be sought.</li> </ul>
Road Safety Audit	<ul style="list-style-type: none"> <li>• An internal road safety audit will be completed on the detailed design.</li> </ul>
Economics review	<ul style="list-style-type: none"> <li>• An internal review against the project economics will be completed.</li> </ul>
RMA and other statutory documentation	<ul style="list-style-type: none"> <li>• As noted in the Consenting Strategy, the technical assessments to support consent applications will be confirmed in consultation with Waka Kotahi's Environment's team as part of the detailed design phase. Waka Kotahi's legal team will also review consenting applications and other statutory documentation to be produced during the next phase.</li> </ul>
Physical works document review	<ul style="list-style-type: none"> <li>• The project manager and Waka Kotahi procurement expert will review the tender documentation to ensure completeness, accuracy and currency.</li> </ul>

## 25.4 Cost Management

The project design includes mitigation and design risk factors that are already allowed for in the current concept-level project cost. The environment effects assessment together with topographic and geotechnical investigations which will be completed during pre-implementation will help provide certainty around the scope of any further mitigation needed.

The cost estimate will be revised prior to implementation and if the estimate exceeds \$35 million (the maximum CIP funding available), the project scope will be reduced. Waka Kotahi has acknowledged through the signed Letter of Exchange with CIP that CIP or the New Zealand Government have no obligation or responsibility to cover any project overruns of funding shortfalls relating to the project. Therefore, careful cost management is required to ensure a scope change is not needed.

## 25.5 Change Control

Changes to project scope will be documented through Planview. It is expected that while the scope of Phase One may change through delivery as the mechanism to manage cost increases, the outcomes being sought in Phase One will remain. Any activity not delivered in Phase One should be incorporated into and delivered as part of Phase Two work.

Applicable Waka Kotahi delegations should be followed for all approvals and scope changes through pre-implementation and implementation.

## 25.6 Issues Management

Issues and risks are proposed to be managed through the project risk register and through Planview. The project manager should update project issues and risks weekly with the top issues and risks to be reported monthly to the CIP Programme Manager, System Design Portfolio Manager and RLC project managers and Infrastructure Manager. Issues and risks which have a high impact and high likelihood of occurring should be reported to Waka Kotahi System Design Managers as they are identified.

## 25.7 Post Implementation Monitoring

A benefits realisation plan is being developed in pre-implementation and will address potential gaps in the evidence base. These gaps relate to active travel counts and recent traffic data. Current travel times between the Airport and Iles Road will be obtained, using the TomTom travel time database, for the AM, inter and PM peak hours. The data will be broken down into light and heavy vehicles. Bus reliability information will also be sought from BOPRD if this information is available. This benefits realisation plan will enable us to create a clear linkage between the problem statements and benefit, including the degree of shift required to support the desired future state and ensure the corridor functions at the target levels of service that have been identified.

Once Phase One is complete post implementation monitoring assessment / benefits realisation will be needed to ensure that the desired benefits, as outlined within the business case, have been achieved. This assessment will measure how well the project has delivered on its objectives and should be undertaken again after each of the future phases of the project are delivered.



## 26. FINANCIAL CASE

### 26.1 Project Delivery Costs

Project delivery costs at this stage are based on a concept level design and are provided as **Appendix U**. These include a comprehensive, costed risk assessment and associated contingency (analysed and funding). These costs have been used to inform the economic analysis.

A peer review and a full parallel cost estimate were completed for the business case. This was considered particularly prudent for Phase One due to it having a fixed funding stream. The project cost estimates will be revised prior to implementation. If they change considerably another parallel estimate will be sought.

Table 27-1 shows the baseline (50<sup>th</sup> percentile) cost estimate for all three phases, along with the 95<sup>th</sup> percentile estimate. Note that the cost estimates for Phase Two and Phase Three are based on a scenario where everything included in the phase is constructed at the same time. As noted in the economic case (Section 20.2), there would be some cost inefficiencies in 'coming back' and constructing the remaining aspects of Phases 2 and 3.

**Table 27-1 – 50<sup>th</sup> and 95<sup>th</sup> percentile cost estimates**

ITEM	TOTAL EXPECTED PROJECT COST	95 <sup>TH</sup> PERCENTILE PROJECT COSTS
<b>Phase One</b>		
Pe-implementation	\$3,402,800	\$3,796,000
Property	\$660,500	\$737,000
Physical Works	\$28,913,500	\$32,515,000
<b>Total Phase One Costs</b>	<b>\$32,976,900</b>	<b>\$37,047,000</b>
<b>Phase Two</b>		
Pe-implementation	\$3,712,200	\$4,141,000
Property	\$9,094,800	\$6,798,000
Physical Works	\$31,091,400	\$34,981,000
<b>Total Phase Two Costs</b>	<b>\$40,898,300</b>	<b>\$45,920,000</b>
<b>Phase Three</b>		
Pe-implementation	\$549,200	\$613,000
Property	\$390,000	\$435,000
Physical Works	\$4,537,000	\$5,060,000
<b>Total Phase Three Costs</b>	<b>\$5,476,200</b>	<b>\$6,108,000</b>
<b>Total Programme Costs</b>	<b>\$79,351,000</b>	<b>\$89,075,000</b>

### 26.2 Cost Risk

Table 27-2 illustrates the contingency and funding risk applied to the cost estimates.

**Table 27-2 – Contingency and funding risk**

ITEM	ESTIMATE	
	Phase One	Full programme (3 phases)
Base estimate	\$24,836,000	\$59,904,000
Contingency	\$8,141,000	\$19,447,000
Project estimate	\$32,977,000	\$79,351,000
Funding risk	\$4,070,000	\$9,724,000
Project estimate (P95)	\$37,047,000	\$89,075,000

The 95<sup>th</sup> percentile cost of Phase One exceeds the \$35m funding by \$2.05m.

Careful cost and project management will be necessary through pre-implementation and implementation to ensure the Phase One project costs remain within the \$35m allocated funding.

Section 24.2 of this business case provides a comprehensive risk management plan. The risks which could increase Phase One design and delivery costs and/ or put funding of the project at risk are detailed further in Table 27-3.

**Table 27-2 – Cost risk and mitigation**

COST RISK	MITIGATION
CIP funding can be withdrawn if the deadline of 1 September 2021 for physical construction materially commencing is not met.	Confirmation has been given that enabling works is considered physical construction for the purpose of CIP reporting. Once the preliminary geometric designs have been completed and the project boundaries confirmed, enabling works can commence. Commencing with detailed design of the raised during pre-implementation also provides an independent element of the project which can be scheduled for delivery ahead of detailed design of the whole corridor being completed. This too will ensure the CIP deadline is met and the funding remains available.
Time delay as result of Covid-19 level 3 or 4 restrictions, environmental planning requirements, property purchase, procurement process etc.	Undertaking preliminary geometric design early to determine the footprint of the project means draft land requirement plans can be prepared and property requirements confirmed prior to detailed design. Having a design mitigation strategy in place for the section of the corridor where land is required means we are not reliant on the property purchase being successful to deliver the project.
Uncertainties/ unknowns in the current design and sub surface.	Investigating services, storm water requirements and contaminated land sites during pre-implementation will reduce the likelihood of additional work being identified during implementation. This will provide greater cost certainty at detailed design.

## 26.3 Project Schedule and Cashflow

To determine the project costs estimates, the corridor has been split into the following sections:

1. Four laning between Iles to Basley
2. Intersection - SH30 & Basley Road
3. SH30 Basley Road to Owhata Road
4. Intersection - SH30 & Owhata Road
5. SH30 Owhata Road to Wharenui Road
6. Intersection - SH30 & Wharenui Road
7. SH30 Wharenui Road to Robinson Avenue
8. SH30 Robinson Avenue to Work End
9. Airport/Eastgate (After Alfred Road)

The schedule for delivering the project elements which are to be delivered in Phase One will be confirmed during pre-implementation. At that point, an annual project cashflow will be determined. An assumption has been made that construction of Phase One would take 12 months to build if it were to be built all in one go.

## 26.4 Project funding

### 26.4.1 Phase One funding – CIP

As noted earlier in this DBC, \$35m has been committed from the COVID-19 Response and Recovery Fund, administered by Crown Infrastructure Partners (CIP) for pre-implementation, implementation, and property costs of Phase One.

While the current Phase One cost estimates include contingency, there is no flexibility to request project price level increases from the NLTF should costs increase beyond the allocated \$35m. Waka Kotahi has also acknowledged through the signed Letter of Exchange with CIP that CIP or the New Zealand Government have no obligation or responsibility to cover any project overruns of funding shortfalls relating to the project. Therefore, if the Phase One cost estimate exceeds \$35m (the

maximum CIP funding available) following detailed design, or at any point through delivery of Phase One, the project scope will be reduced.

#### **26.4.2 Future phases funding – National Land Transport Fund**

The NLTF is the primary mechanism for Crown investment in the New Zealand land transport system. The National Land Transport Programme (NLTP), reviewed and updated every three years in line with the release of the Government Policy Statement on land transport (GPS), identifies the projects to be funded by the NLTF. It is anticipated that NLTF will be sought for Phases Two and Three.

Phases Two and Three currently align with the Government's focus on safety and supporting growth. However, when they are ready to proceed to pre-implementation, they will be subject to an assessment against the GPS priorities at the time and other national priorities being delivered. It is anticipated that financial contribution from the NLTF for Phases Two and Three would not be required until the 2027-30 NLTP period onwards.

### **26.5 Project Revenues**

No revenue is expected to be generated from the delivery of transport infrastructure in any of the phases in this business case.

### **26.6 On-Going Maintenance**

The proposed works will result in new assets and therefore a corresponding change to the ongoing maintenance and operation. The ongoing maintenance and renewals requirements will be covered by Waka Kotahi. Most of the new on-going maintenance costs will be a result of the new widened paved areas, and drainage facilities. New associated signage and line markings may also require maintenance additional to what is already undertaken.

