41 SOUTH
create ▶ innovate ▶ challenge

TRANSPORT AGENCY INVESTMENT PROPOSAL

Re-Evaluation
Ōtaki to North of Levin (O2NL)

12 October 2018

Final Report

Prepared by s 9(2)(a)

PREFACE

This report has been prepared for New Zealand Transport Agency by s 9(2)(a) s 9(2)(a)

DOCUMENT REVISION HISTORY

Revision no.	Description	Status	Date
1	for Internal Review	Draft	02/10/2018
2	for Client Review	Draft	04/10/2018
3	for Submission	Final	12/10/2018
4			
5			

DOCUMENT REVIEW

Action	Name	Signature	Date
Prepared by:	s 9(2)(a)		12/10/2018
Checked by:			12/10/2018
Authorised by:			12/10/2018

LIST OF ABBREVIATIONS

AADT	Annual Average Daily Traffic
Accelerate 25	Implementation programme from Manawatū–Whanganui Growth Study
BCA	Business Case Approach
CMP	Corridor Management Plan
DBC	Detailed Business Case
DSI	Deaths & Serious Injury
ESR	Environmental and Social Responsibility
FAR	Funding Assistance Rate
GDP	Gross Domestic Product
GPS	Government Policy Statement (on Land Transport)
GWRC	Greater Wellington Regional Council
HCV	Heavy Commercial Vehicle
HDC	Horowhenua District Council
Horizons	Manawatu-Whanganui Regional Council
HPMV	High Productivity Motor Vehicle
IAF	Investment Assessment Framework
IBC	Indicative Business Case
ILM	Investment Logic Map
KCDC	Kāpiti Coast District Council
KPI / KPI's	Key Performance Indicator/s
MCA	Multi-Criteria Analysis
NIMT	North Island Main Trunk
NLTP	National Land Transport Programme
NZTA	New Zealand Transport Agency
O2NL	Ōtaki to North of Levin
ONRC	One Network Road Classification
RoNS	Road of National Significance
SH	State Highway
TAIP	Transport Agency Investment Proposal
TREIS	Traffic Road Event Information System

VAC	Value Assurance Committee
WNC	Wellington Northern Corridor

TABLE OF CONTENTS

This page is intentionally blank.

EXECUTIVE SUMMARY

The 2018 Transport Agency Investment Proposal (TAIP) re-evaluation of the north of Ōtaki to North of Levin (O2NL) project is one of 16 projects to be re-evaluated to help ensure the 2018-21 National Land Transport Programme (NLTP) delivers on the 2018-28 Government Policy Statement (GPS) on Land Transport funding.

In undertaking this re-evaluation the primary source of:

- Methodology is the Draft TAIP Re-Evaluation Guidance, July 2018
- Information has been the Draft IBC Report (Stantec), April 2018 and supporting information requested of the project team.

The combination of high traffic volumes and highway deficiencies have resulted in high numbers of fatal and serious crashes with 49 Death & Serious Injury (DSI) crashes in the period 2013-2017. Unfortunately, this trend is increasing with 16 DSI in the first half of 2018 being the highest recorded in the study area over the last 10 years.

Thus the O2NL project is investigating transport options to provide safer, more resilient and reliable access to Levin, Palmerston North, Taupo and destinations further north via State Highway (SH) 1 and SH57.

The re-evaluation review of the Problem and Benefit Statements concluded that there remains a strong case for addressing safety and resilience on these sections of the state highway network. The 'near certain' uncertainty factor with the greatest impact on timing for this project is the opening of the Peka Peka to Otaki Expressway, immediately to the south of this project and the opening of Transmission Gully both of which are expected to occur in 2020. The uncertainty associated with this element is the amount of traffic that could be attracted to the highway.

The subsequent re-evaluation review of the Investment Objective Statements, derived from the re-evaluated Problem and Benefit Statements, concluded that the investment objectives are appropriate to ensure the project addresses the safety and resilience issues on these sections of the state highway network.

Under the activity class for regional, local road and state highway improvements, the Otaki to North of Levin corridor is consistent with the requirements for a **Very High Results Alignment**, in response to the Safety Strategic Priority. The project also contributes to a High results alignment to the Access Strategic Priority ('Thriving Regions' via access to opportunities, enables transport choice and access, and is resilient).

The Indicative Preferred Strategy is route protection for an (yet to be confirmed) off-line option to be progressed as soon as possible including working further with Horowhenua District Council (HDC) on identifying the most appropriate option for the northern section which provides the best balance of land-use and transport outcomes. The *Function, Form* and *Phasing/Staging* of the off-line improvement will be further developed, and confirmed, through the DBC, with a view

to determining whether the off-line improvement should be developed as a four-star KiwiRAP single carriageway road with at grade intersections but future proofed for four-lanes and grade separation. Undertaking this work in the DBC will be imperative to ensure that the effects of undesired induced traffic is appropriately limited.

In considering the phasing/staging of investment the New Zealand Transport Agency (NZTA) and HDC should reinvestigate the desirability for, and effectiveness of, a partial bypass of Levin utilising existing roads as much as possible. The phasing/staging discussion of such a possible bypass should form part of completing the DBC.

Because delivery of an off-line option will take some time to develop and given the significance of the existing safety risk in the state highway corridors, in parallel with route protection it is recommended that on-line safety enhancements be progressed immediately between Ōtaki and Levin. These enhancements should include speed management, enforcement and education packages as well as infrastructure investment. Any infrastructure proposed should be developed such that it is value for money, effective and appropriate for, ultimately, a revoked state highway.

1 INTRODUCTION

Through the development of the 2018 Transport Agency Investment Proposal (TAIP), 16 state highway improvement proposals have been identified as being in need of re-evaluation and a more comprehensive assessment against the 2018 Investment Assessment Framework (IAF). The north of Ōtaki to North of Levin (O2NL) project is one of the 16 projects to be re-evaluated. Completing the re-evaluation of the 16 projects will help ensure the 2018-21 National Land Transport Programme (NLTP) delivers on the 2018-28 Government Policy Statement (GPS) on Land Transport funding.

The 16 projects were identified because the New Zealand Transport Agency (NZTA) needed to ensure project investment objectives are aligned to help the NLTP give effect to the 2018 GPS. This re-evaluation is an opportunity to review the project and test whether the initial IAF assessment is robust.

The re-evaluation is a first principles review of the investment proposal to ensure the nominated investment proposal gives effect to the GPS and achieve value for money prior to inclusion in the NLTP.

In undertaking this re-evaluation the primary source of:

- Methodology is the Draft TAIP Re-Evaluation Guidance, July 2018
- Information has been the Draft IBC Report (Stantec), April 2018 and supporting information requested of the project team.

2 BACKGROUND

LOCATION

This project is predominantly located within the Horowhenua District, just over an hour north of Wellington, from Taylors Road in the south (being the northern end of the Peka Peka to Ōtaki expressway) through to the Manawatu River, north of Levin, on State Highway (SH) 1 and approximately Heatherlea East Road on SH57.

Refer to Figure 1.01.

The Manawatu-Whanganui (Horizons) Regional Council / Greater Wellington Regional Council (GWRC) and Horowhenua District Council (HDC) / Kāpiti Coast District Council (KCDC) boundary is located within the project extent being south of Manakau at Atkins Road.

REGIONAL CONTEXT

SH1 is a nationally significant route connecting Wellington and the South Island to the upper North Island. It provides an essential economic connection to Palmerston North, the largest, yet still growing, freight node in central New Zealand. Similarly, SH57 is a nationally significant route providing an alternative route to SH1 and SH2 respectively between Wellington and Palmerston North and the Hawkes Bay.

The Wellington Region has the second largest economy in New Zealand. It contains the centre of Government, 11% of the nation's population and 13% of the Gross Domestic Product (GDP). The economy is dominated by knowledge-intensive industries, with 60% of the region's jobs located in Wellington City.

By contrast the Manawatu-Whanganui economy has been experiencing slow or static growth, ageing and declining populations and employment. However, it is full of promise with rich farmland and strong agricultural industries. It has therefore been identified by the Ministry of Business, Innovation and Employment as one of nine Regional Economic Development (RED) regions which should be prioritised to increase jobs, income and investment. An action plan (Accelerate 25) is underway to facilitate this upturn. Initial indicators of tourism, GDP, building consents and traffic volumes over the last couple of years shows that growth is starting to accelerate:

- SH1 annual traffic growth has risen strongly in the five years to 2017, at 3.9% south of Levin and 3.3% in north Levin. Over the same period SH57 north of Levin has grown by 3.2%

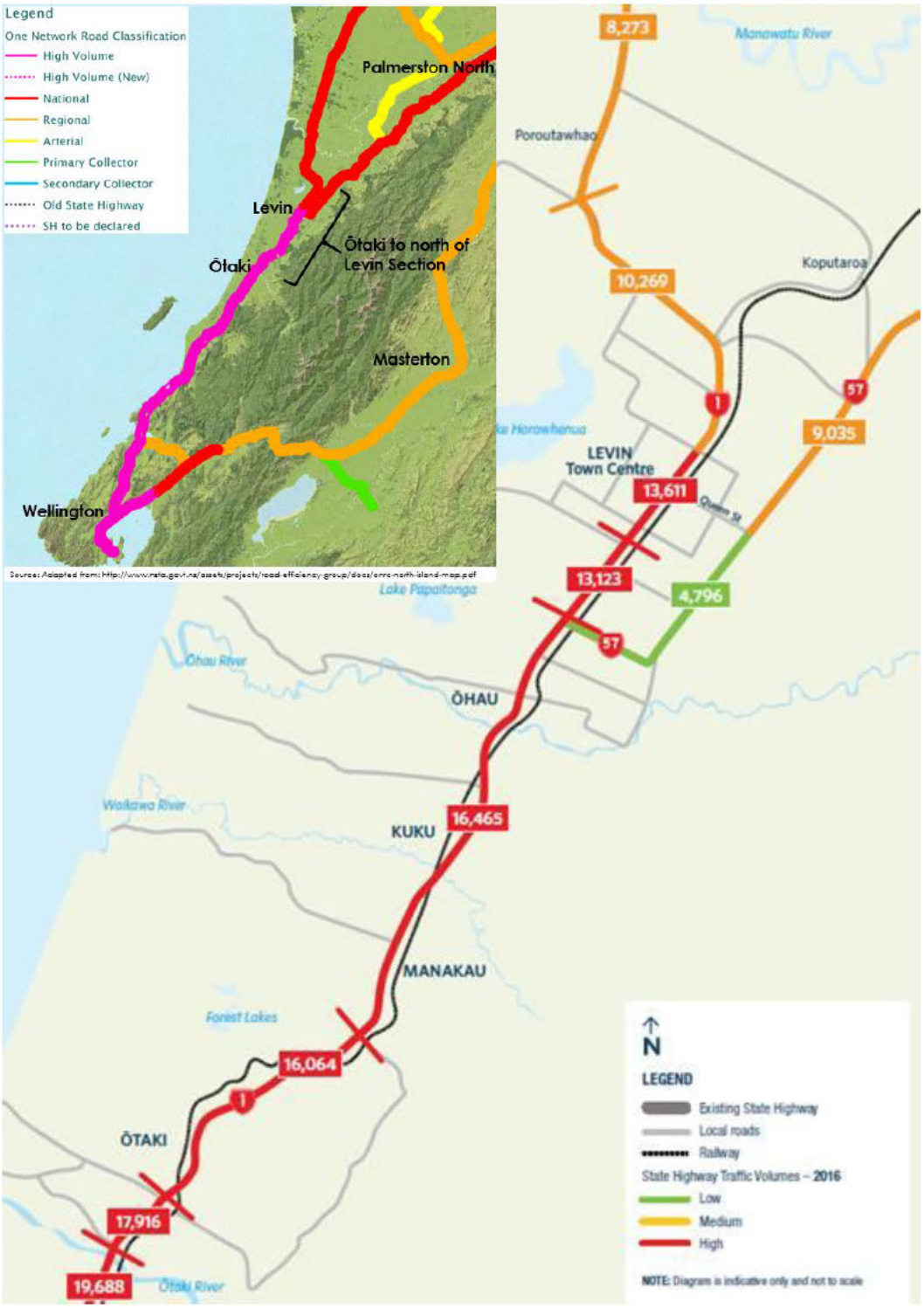

Legend
One Network Road Classification
High Volume
High Volume (New)
National
Regional
Arterial
Primary Collector
Secondary Collector
Old State Highway
SH to be declared
Palmerston North
Levin
Ōtaki
Ōtaki to north of Levin Section
Masterton
Wellington
Source: Adapted from: http://www.nzta.govt.nz/assets/projects/road-efficiency-group/docs/ems-north-island-map.pdf
8,273
Manawatu River
Poroutawhao
Koputaroa
10,269
1
57
9,035
LEVIN
Town Centre
13,611
Queen St
13,123
4,796
57
Lake Papaitonga
Ōhau River
ŌHAU
Waikawa River
KUKU
16,465
MANAKAU
Forest Lakes
16,064
1
ŌTAKI
17,916
19,688
Ōtaki River
N
LEGEND
Existing State Highway
Local roads
Railway
State Highway Traffic Volumes – 2016
Low
Medium
High
NOTE: Diagram is indicative only and not to scale

FIGURE 1.01

annually[1]. This is greater than the annual average traffic growth over the lower North Island which was 2.3%[2]
- Tourism employment growth has been at or above 8% per annum since 2015 (higher than the NZ average)[3]
- Horowhenua District has also had strong GDP annual growth of up to 3.8% in 2016 and 2017, higher than NZ overall at 3.6%[4]
- Building consents are up around $400,000 compared to an average of $270,000 over the preceding 10 years[5].

Construction of the SH1 Peka Peka to Ōtaki expressway is due to be completed by 2021. Once complete, this would provide a minimum 4-lane expressway from the Wellington CBD to north of Ōtaki (Taylors Road), as the Mackays to Peka Peka expressway opened in February 2017 and Transmission Gully is due for completion in 2020. To the north of Levin, the construction of the Whirokino Trestle and Manawatu River Bridge replacement project has begun, which is expected to result in additional High Productivity Motor Vehicle (HPMV) usage of SH1 through the northern extents of the project area. This project is also expected to be completed by mid/late 2020.

ISSUES

To continue Wellington's and Manawatu-Whanganui's growth, it is vital to get people and freight moving safely and reliably between these regions and to and from the rest of the North Island. Indeed Palmerston North, with its distribution hubs and inland ports, is the largest freight node in central New Zealand. However, facilitating growth is not necessarily just about providing increased transport linkage capacity as the existing transport corridor has significant safety and resilience issues.

In terms of **safety**, the current highway network is seriously deficient due to;

- Narrow shoulder widths
- Severe roadside hazards
- High traffic volumes
- Lack of median barrier separation
- Limited passing opportunities
- Bridges with limited remaining life on poor alignments
- Side friction from numerous direct accesses

---

1 Annual Average Daily Traffic (AADT) volumes extracted from four (4) NZTA traffic count locations near Levin.

2 This is a weighted average AADT of all national State Highway telemetry sites (except Manawatu Gorge and those with incomplete 2013-2017 data) for Gisborne, Hawkes Bay, Manawatu-Wanganui, and Wellington NZTA regions.

3 https://ecoprofile.infometrics.co.nz/Horowhenua%20District/Tourism/TourismEmployment

4 https://ecoprofile.infometrics.co.nz/Horowhenua%20District/Gdp/Growth

5 http://archive.stats.govt.nz/infoshare/SelectVariables.aspx?pxID=ffed213a-c0b4-4067-a189-806934d50e4f

- Intersection deficiencies
- Poor highway geometry.

These deficiencies are a significant problem when considering the current and future Annual Average Daily Traffic (AADT) and the function of this route.

			ESTIMATED AADT	
SH	LOCATION	2017 AADT	2031	2041
1	Ōhau	17,725[6]	17,400 – 20,000	18,900 – 22,900
1	(through) Levin	14,200	17,100	
57	(north of) Heatherlea East Road	9,200	10,500	11,700

Clearly the 2031 and 2041 predicted traffic volumes on SH1 are very conservative with traffic volumes now expected reach the 20,000 vpd mark by 2030. Both SH1 and SH57 traffic volumes consist mainly of freight and private vehicle trips, i.e. regional/intraregional freight and the intraregional/local access movement of people.

Heavy Commercial Vehicle (HCV) traffic currently represents ~11% of total volumes and the volumes of freight related trips required to be transported along this corridor is expected to grow faster than demand for non-freight trips so the overall proportion of heavy vehicles along SH1 (and SH57) is expected to increase. Crashes involving HCV's are currently over represented, accounting for 17% of high severity crashes.

Refer to 10-year Crash History in Appendix A.

The combination of high traffic volumes and highway deficiencies have resulted in high numbers of fatal and serious crashes with 49 Death & Serious Injury (DSI) crashes in the period 2013-2017. Unfortunately, this trend is increasing with 16 DSI in the first half of 2018 being the highest recorded in the study area over the last 10 years.

The current KiwiRAP star rating is two (2) which is below the highway minimum of 3-star rating and well below the 4-star rating expected for National Strategic High Volume thus safety could be further compromised when the expressways to the south become operational. Based on collective risk, personal risk and the KiwiRAP star rating, the corridor falls into the 'Safe Systems Transformation Works' / 'Safer Corridors' treatment strategy of the Agency's High Risk Rural Roads Guide.

In respect of **Resilience**, there are currently no parallel alternative transport routes between Manakau and Ōhau to SH1 and the immediately adjacent North Island Main Trunk (NIMT) rail line, both which are susceptible given the four (4) major at-risk structures impacting both transport corridors being two (2) substandard overbridge crossings of the NIMT and the crossings

[6] With 2016 AADT of 16,465 growth is 3.9%

of both the Ōhau River and the Waikawa Stream. Any resilience related impacts, which includes not-uncommon surface flooding in addition to crashes can leave the impacted transport corridor closed for many hours at a time.

Thus, this project is investigating transport options to provide safer, more resilient and efficient access to Levin, Palmerston North, Taupo and destinations further north.

PROJECT HISTORY

The O2NL project investigation was commissioned in 2011 and was the northernmost section of the Wellington Northern Corridor (WNC) Road of National Significance (RoNS). The WNC project aims to improve journey times, enhance safety of travel as well as inter-regional and national economic growth and productivity. All sections between Wellington and Ōtaki are either complete or will be completed by the end of 2021. The focus of the WNC improvements was on the movement of people and of freight, where notably SH1 is a National Strategic Road (High Volume) that forms part of the critical key freight route between Auckland/ Tauranga, Palmerston North (via SH57) and Wellington and beyond to the South Island. The improvements envisaged in 2011 were to deliver a four-lane expressway-standard road comprising grade separated interchanges.

Investigations for the O2NL project commenced in 2011 and concluded that traffic volumes forecast at that time did not justify development of a four-lane expressway between Ōtaki and the Manawatu Bridge/ Whirokino Trestle. On 12 June 2012 the Transport Agency board resolved:

> *The existing alignment of the Ōtaki to Levin section of the Wellington Northern Corridor Roads of National Significance (RoNS) programme will progressively be upgraded to create a combination of 2+1 and 4 lane sections with intersection and safety improvements that will achieve the RoNS objectives of delivering a suitable level of travel time, safety and capacity improvement appropriate to future demands of this section of the Wellington RoNS corridor.*

Following the resolution in 2012, investigations focussed on immediate improvements that were needed to SH1 and SH57 to solve known safety hot spots and geometrically deficient parts of the state highway network.

For the section north of Levin (Levin to the Manawatu Bridge/ Whirokino Trestle) investigations concluded that on-line safety improvements to SH1 will meet the Project Objectives (Value Assurance Committee (VAC) resolution 151029-031 of 29 October 2015). In respect of the sections through, and to the south of, Levin investigations in 2013 – 2014 focussed on a dozen or so localised safety improvements and led to improvements to SH1 through Ōhau and Manakau being implemented in 2015.

Investigations of the remaining sections of the state highway network concluded that more often than not the best way to address the localised safety and resilience problems, and avoid significant local constraints, was to go off-line. Thus, when considering the entirety of the corridor, this meant that only ~30% of the existing state highway alignment would be able to be

utilised. Further, to provide an on-line standard of SH that is consistent with customer expectations (One Network Road Classification (ONRC) Customer levels of service expectation) very significant investment would be required and that these could likely deliver less than optimal environmental outcomes.

It was also apparent that off line solutions could provide additional transport benefits, notably and critically an off-line solution would provide an alternative transport corridor between Manakau and Ōhau where currently there is no alternative corridor. Thus, in an event that this corridor is closed, those coming to or from Ōtaki, Kāpiti and Wellington would need to undertake an ~2.5 hour detour via Palmerston North and the Rimutaka Hill Road (SH2).

Accordingly, the NZTA Board resolved in December 2015 that the scope of the investigations also include consideration of:

> '*off-line proposals to progressively upgrade the Ōtaki to North of Levin section of the WNC*'.

Ensuing investigations focussed on off-line solutions between Ōtaki and Levin and also included options to bypass Levin town centre. The investigations considered how these options could be implemented progressively (i.e. a staged implementation process). The investigations also considered interim safety improvements that could be undertaken to SH1 in advance of an off-line route being constructed. During 2017 significant engagement exercises with the local community to better align the scope of proposed improvements with local expectations were undertaken. Consultation on the off-line improvement options and interim safety improvements to SH1 was undertaken in February and March 2018. At that time the intention was report the outcomes of the process the middle of 2018.

Prior to this re-evaluation process the project objectives were:

- Reduce travel times on the state highway network
- Reduce deaths and serious injuries on the state highway network
- Enhance the resilience of the state highway network
- Provide appropriate connections that integrate the state highway and local road networks to serve urban areas.

3 STRATEGIC CONTEXT

An assessment of key strategic documents and their impact in terms of the GPS, on Land Transport, is shown in the following table:

DOCUMENT	HISTORIC CONTEXT	CURRENT CONTEXT	IMPACT ON CURRENT PROPOSAL
National documents			
Government Policy Statement (GPS) on land transport	RoNS focussed (2015/16-2024/25): • Supporting economic growth and productivity • Delivering greater value for money • Improving safety.	Updated to reflect the Government's new priorities (2018/19 – 2027/28): • Safety • Mode neutrality • Liveable cities • Regional economic development • Protecting the environment • Delivering the best possible value for money.	Review of Problem, Benefit and Investment Objective Statements
NZTA Statement of Intent (2017-21)	Guided by GPS	To be updated to reflect the Government's new priorities as set out in the GPS.	Review of Problem, Benefit and Investment Objective Statements
NZTA IAF	Used by the Transport Agency in developing the NLTP and to make investment decisions in line with the relevant GPS (2015/16-2024/25)	2018-21 IAF is based on 2018/19 – 2027/28 GPS	Review of Problem, Benefit and Investment Objective Statements
Safer Journeys Action Plan 2016-20 (3rd and final action plan of the Safer Journeys Strategy)	Vision to establish a safe road system, increasingly free of death and injury, using the Safe System approach	No change	No additional impact

DOCUMENT	HISTORIC CONTEXT	CURRENT CONTEXT	IMPACT ON CURRENT PROPOSAL
Ministry of Transport Statement of Intent	As for GPS	As for GPS	Review of Problem, Benefit and Investment Objective Statements
Wellington to Palmerston North Corridor Management Plan (CMP)	Customer service delivery story	As for NZTA Statement of Intent	No additional impact
Regional Documents Note: Regional Documents all relate to Horizon's (Manawatu-Whanganui) Regional Council as no residential centres are located within the Greater Wellington Regional Council part of the project area (the regional council boundary being south of Manakau at Atkins Road).			
Accelerate 25 (Horizons Regional Council)	Implemented the Manawatū-Whanganui Economic Action Plan	Supported by new GPS	No additional impact
Regional Land Transport Plan (2015-2025)	2018 Review based on 2015/16-2024/25 GPS	As for GPS	Review of Problem, Benefit and Investment Objective Statements
Regional Public Transport Plan (2015-2025)	Funding governed by 2015/16-2024/25 GPS	As for GPS	Review of Problem, Benefit and Investment Objective Statements

DOCUMENT	HISTORIC CONTEXT	CURRENT CONTEXT	IMPACT ON CURRENT PROPOSAL
Local Documents Note: Local Documents all relate to the Horowhenua District Council as no residential centres are located within the Kāpiti Coast District Council area (the district council boundary being south of Manakau at Atkins Road).			
Long Term Plan	Council's key strategic planning document outlining Council's financial situation as well as the levels of service Councils has committed to for the activities they undertake, and capital projects work programme for at least ten years, with a focus on the first three years	Limited effect beyond identified enhancements such as Levin Town Centre and developments such as Gladstone area. GPS identifies footpath maintenance as now being eligible to receive a Funding Assistance Rate (FAR) subsidy.	No additional impact
Horowhenua Development Plan	(June 2008) identifies and addresses a range of growth pressure issues for the next 20 years and beyond, planning how to manage the development of the Horowhenua into the future, and reflects Council's desire to provide a proactive framework for managing growth.	Limited effect beyond identified enhancements such as Levin Town Centre and developments such as Gladstone area. Effect of GPS may impact on rate of development	Review of Problem, Benefit and Investment Objective Statements
Economic Development Strategy (2014-2017)	Identifies challenges, priorities, actions and initiatives required to achieve increased investment, more jobs, higher skills, increased household income and an enhanced reputation of the District	Limited effect. Effect of GPS may impact on rate of development	Review of Problem, Benefit and Investment Objective Statements

DOCUMENT	HISTORIC CONTEXT	CURRENT CONTEXT	IMPACT ON CURRENT PROPOSAL
Draft Town Centre Strategy	The Levin Town Centre has a key role in supporting the regional economy and local employment. It is also a fundamental component to attracting and supporting growth of the District.	Limited effect. Effect of GPS expected to be associated with timing of a SH1 bypass	Review of Problem, Benefit and Investment Objective Statements
Draft Growth Strategy	Prepared to guide decisions about where and how to accommodate the projected increase of population, households and jobs to the year 2040	Limited effect. Effect of GPS expected to be associated with timing of a SH1 bypass	Review of Problem, Benefit and Investment Objective Statements

KEY PERFORMANCE INDICATORS

The Key Performance Indicators (KPI)'s of the draft IBC re-evaluation process are/were (deleted text is shown as being ~~struck out~~ and new text is in *italics*):

PROJECT OBJECTIVE REFERENCE					
RE-EVALUATED	ORIGINAL	DESCRIPTION	REASON	KPI/S	
A.	B.	Reduce deaths and serious injuries ~~on the state highway network~~.	To save lives and debilitating injuries.	1	Deaths and serious injuries over a five (5) year period on the current and future ~~state highway~~ network.

PROJECT OBJECTIVE REFERENCE				
RE-EVALUATED	ORIGINAL	DESCRIPTION	REASON	KPI/S
B.	C.	Enhance the resilience of the state highway network.	There is only one north-south route through the area and it is subject to flooding and crashes. There are also four (4) at-risk aging structures.	1 Provide an alternative north-south route between Ōtaki and Levin. 2 Number of closures and partial closures on the state highway network. 3 *Number of structures with a high or significant earthquake outage risk.*
C.	-	*Support safe, efficient, growth in Horowhenua.*	*To support economic growth and productivity in local townships, and the Horowhenua District.*	*1 New transport network changes fit into agreed future road hierarchy.* *2 Increase in trip length for local trips.* *3 Development in identified growth areas are supported due to good land use / transport integration.*

PROJECT OBJECTIVE REFERENCE				
RE-EVALUATED	ORIGINAL	DESCRIPTION	REASON	KPI/S
D.	-	*Support the improvement of Levin's main retail area attractiveness.*	*To enhance economic growth in Levin.*	*1 Reduce the number of trucks in the main retail areas of Levin.* *2 Reduced noise and emissions.* *3 Reduction in pedestrian crashes.* *4 Improve intersection performance (especially for West-East movements).*
E.	A.	Reduce travel times on the state highway network.	To enhance inter-regional economic growth and productivity.	2041 AM, IP and PM period travel times along three (3) key routes: 1 Taylors Road (SH1) to/from Koputaroa (West) Road (SH1). 2 Taylors Road (SH1) to/from Potts Road (SH57). 5 Taylors Road (SH1) to/from Levin (SH1).

PROJECT OBJECTIVE REFERENCE				
RE-EVALUATED	ORIGINAL	DESCRIPTION	REASON	KPI/S
	~~D.~~	~~Provide appropriate connections that integrate the state highway and local road networks to serve urban areas.~~	~~To support local townships and enhance economic growth in Levin and the Horowhenua.~~	~~1 Traffic uses the expressway to access central Levin rather than local roads/old SH1.~~ ~~2 Expressway and connections fits into agreed future road hierarchy.~~ ~~3 Increase in trip length for local trips.~~

UNCERTAINTY LOG

An Uncertainty Log has been developed by the O2NL project team as part of this re-evaluation process.

The 'near certain' uncertainty factor with the greatest impact on timing for this project is the opening of the Peka Peka to Otaki Expressway, immediately to the south of this project and the opening of Transmission Gully both of which are expected to occur in 2020. The uncertainty associated with this element is the amount of traffic that could be attracted to the highway.

The Uncertainty Log is included at Appendix B.

4 PROBLEM AND BENEFIT STATEMENTS

Having been in progress since 2011, which pre-dates the Agency's Business Case Approach (BCA), the O2NL project has never had a formal Investment Logic Map (ILM) process undertaken. Nonetheless the project team clearly defined the problem themes as Safety, Resilience and Access.

As part of this re-evaluation process an experienced ILM facilitator[7] was engaged to challenge the Problem and Benefit Statements developed by the project team.

It is recognised that the re-evaluated Problem and Benefit statements will need to be discussed and confirmed with stakeholders when completing the Business Case.

Questions considered in this part of the re-evaluation included:

- To what extent has the priority given to the original problems changed as a result of the new strategic context?
- Has the magnitude of the originally identified problems changed due to external factors?
- Are there additional problems that have much greater significance as a result of the change in strategic context?
- Given any change to the identity of the problems, and their relative priority, what is the impact on the benefits of addressing the revised problems?
- Is the evidence sufficient to comprehensively support the cause and effect of the problem/opportunity statements?
- Is additional evidence needed to re-evaluate the problems?

PROBLEM STATEMENTS

New problem statements were developed by the project team (with the re-evaluation Project Director and ILM facilitator challenging the project team) in response to the re-evaluation process considering the above questions.

Refer to Figure 4.01 for the re-evaluated Problem and Benefit Statements included in the draft Investment Objectives map.

[7] Roger Burra, 41S Principal Project Manager

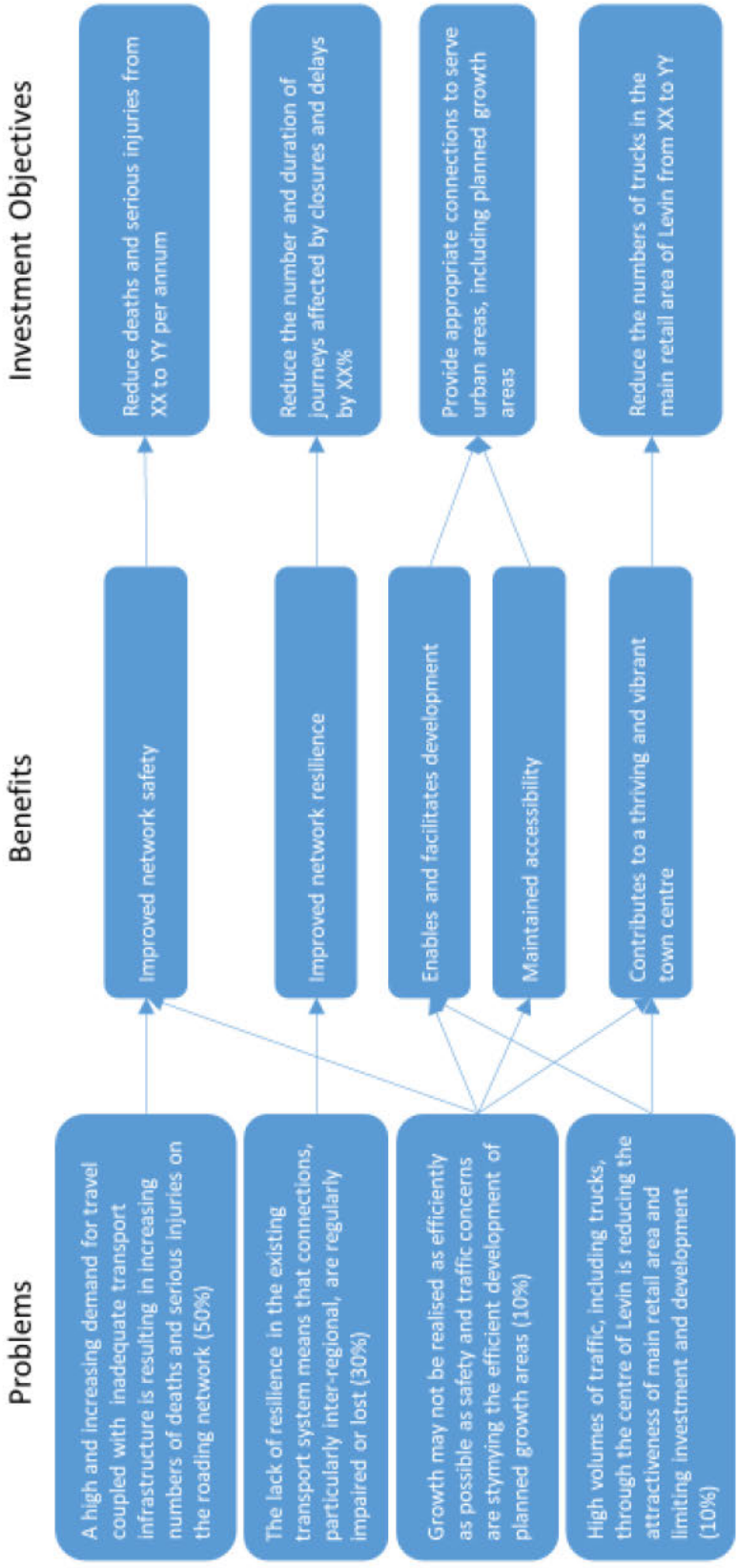


FIGURE 4.01

The revised problem statements, and supporting evidence, are summarised as:

- Safety:

  A high and increasing demand for travel coupled with inadequate transport infrastructure is resulting in increasing numbers of deaths and serious injuries on the roading network

  - Almost 50 deaths and serious injuries have occurred on the state highways within the study area in the last 5 years
  - The highways are classified as High Risk Rural Roads and are well below the Star Rating that is expected for this class of highway
  - SH1 from the Wellington Boundary to Levin ranks as the 8th worst rural state highway section in New Zealand in terms of fatal and serious crashes per year, per km, on an average of the five years 2013 to 2017 placing this section within the top 2%.
  - 50% weighting.

- Resilience:

  The lack of resilience in the existing transport system means that connections, particularly inter-regional, are regularly impaired or lost

  - There is no alternate route to SH1 between Manakau and Ohau necessitating significant additional travel via SH2 (which itself includes the high-risk Rimutaka Hill) and this section of SH1 is also at high risk of closure due to the five (5) at-risk aging structures and regular flooding
  - The detour route south of Manukau is limited to one-way HCV movements with the alternative being significant additional travel via SH2
  - At least two full road closures due to flooding in the past three years (2015 – 2017) and Traffic Road Event Information System (TREIS) data as supplied by the NZ Transport Agency's Wellington Transport Operation Centre also recorded nine (9) other cautions or delays caused by flooding many of which were on sections that have no alternative route
  - This route is a fundamental economic and social lifeline and closures add over 2 hours to any journey (much more in peak periods)
  - 30% weighting.

- Growth:

  Growth may not be realised as efficiently as possible as safety and traffic concerns are stymying the efficient development of planned growth areas

  - Horowhenua is growing faster than predicted and the District Council are pro-actively planning for further growth
  - A number of growth areas have been identified though a robust process but some are unable to be efficiently developed due to current and predicted traffic and

safety issues. It is noted that some of these growth areas are also under highway alignments recently consulted upon
- Not facilitating growth will mean that growth will be stifled or that it will occur in locations with more adverse outcomes.
- Economic growth of the Horowhenua region is contributed by improving regional/inter-regional connectedness for all
- 10% weighting.

- Levin Town Centre:

  High volumes of traffic, including trucks, through the centre of Levin is reducing the attractiveness of main retail area and limiting investment and development

  - The Levin Town Centre faces a number of challenges due to earthquake prone-buildings, limited retail and hospitality offerings, limited transport choice and is compromised by heavy traffic on SH1 (Oxford Street) which is also the main retail street
  - The HDC have been consulting on a plan to "Transform Levin" and transport aspects are both problems and opportunities that are central to the transformation
  - 10% weighting.

BENEFIT STATEMENTS

The re-evaluated Benefit Statements were derived from the re-evaluated Problem Statements noting that multiple benefits can be generated from solving any given problem:

- Improved network safety:
  - To reduce harm.
- Improved network resilience:
  - To keep economic and social lifelines open as much as possible.
- Enables and facilitates development:
  - Including retail, commercial and residential.
- Maintained accessibility:
  - Even with the high growth and any transport changes.
- Contributes to a thriving and vibrant town centre:
  - As envisaged by the HDC Town Centre Strategy.

UNCERTAINTY

An immediate outcome of the ILM challenge process was the need to create an Uncertainty Log to test unknown variables to provide guidance/evidence into subsequent re-evaluation processes when completing the IBC and subsequent DBC (e.g. robustness/challenge of Multi Criteria Analysis etc.).

CONCLUSION

The review of the Problem and Benefit Statements concludes that when considering the key questions to be considered there remains a strong case for addressing safety and resilience on these sections of the state highway network.

5 INVESTMENT OBJECTIVE STATEMENTS

Questions considered in this part of the re-evaluation included:

- How has the new strategic context influenced the existing investment objectives?
- If there has been any change to a problem or benefit, how will this impact on the relevant investment objective?
- Should new investment objectives be considered?
- How do any revised investment objectives reflect the IAF priorities of safety, access, environment and value for money?
- How do the investment objective relate to the problem statements and benefits?
- How do the investment objectives encourage the widest consideration of alternatives?
- Is It clear that investment objectives are not "self-serving" - by being framed in a way that only leads to consideration and selection of certain types of option?

Noting that the targets for each of the Investment Objectives will be confirmed at the end of the IBC phase the draft re-evaluated Investment Objective Statements derived from the re-evaluated Problem and Benefit Statements are:

- Reduce deaths and injuries from XX to YY per annum
- Reduce the number and duration of journeys affected by closures and delays by XX%
- Provide appropriate connections to serve urban areas, including planned growth areas
- Reduce the numbers of trucks in the main retail area of Levin from XX to YY.

The re-evaluated Investment Objectives map is included at Appendix C.

It should also be noted that the resilience investment objective reflects the fact that resilience is affected by the frequency of events, the severity of the event/s and the effectiveness of the alternative options (e.g. mode options and route options).

CONCLUSION

The review of the Investment Objective Statements, derived from the re-evaluated Problem and Benefit Statements, concludes that when considering the key questions to be considered the investment objectives are appropriate to ensure the project addresses the safety and resilience issues on this section of the state highway network.

6 INVESTMENT ASSESSMENT FRAMEWORK (IAF) RESULTS ALIGNMENT

Based on the re-evaluation review and revised Investment Objectives map an assessment against the IAF has been undertaken. The assessment is limited to the strategic result alignment and the, to be completed, IBC will contain a more fulsome IAF assessment.

In addition to the investment objectives there are a number of principles that cover other aspects of the project and its objectives that have been used throughout the project in the option selection processes. These include:

- Value for money
- Understanding and reducing the effect of the project (social, ecological, severance, cultural, landscape, etc.)
- Maximising benefits of the project (travel times, emissions, walking and cycling, etc.).

The following table presents how the problem statements reflect the GPS / IAF priorities:

PROBLEM STATEMENT	GPS / IAF PRIORITIES					
		Access				
	Safety	Opportunities	Choice	Resilience	Environment	Value for Money
1: Safety	✓				??	✓
2: Resilience				✓	??	✓
3: Growth		✓	✓			✓
4: Levin Town Centre		✓	✓			✓

This project has not yet identified any confirmed environmental "problems" to warrant exclusive transport investment however the identification of flooding issues could, via further investigation, lend itself to warrant transport investment. Nonetheless, there are some very significant environmental factors which need to be carefully understood and managed throughout the process to ensure that the project minimises adverse effects.

Value for Money also is not an identified "problem" but will be managed through continuing the business case process including the undertaking of a cost benefit analysis.

RESULTS ALIGNMENT

Under the activity class for regional, local road and state highway improvements, the Otaki to North of Levin corridor is consistent with the requirements for a **Very High Results Alignment**, in response to the Safety Strategic Priority.

With 'Safety' as a GPS Priority defined *as "a safe transport system free of death and serious injury"*[8] a Very High results alignment must only be given if the activity addresses one or more of the following criteria:

- Implements a speed management approach focusing on treating the top 10 percent of the network that will result in the greatest reduction in deaths and serious injuries:
  - The Otaki to Levin section of highway is within the Top 10% with high benefit opportunities according to the NZ Transport Agency's Speed Management Guide and is classified as an "Engineer Up" project.
- Targeting areas of high collective risk with high DSI reduction measures that achieve a DSI reduction of at least 40%:
  - The Otaki to Levin section of highway is classified as a high-risk rural road with sections of high collective risk on SH1 and SH57
  - All shortlisted options are expected to achieve a minimum 50-60% reduction in network DSI.

The project also contributes to a High results alignment to the Access Strategic Priority ('Thriving Regions' via access to opportunities, enables transport choice and access, and is resilient) by:

- Enabling a significant regional economic development opportunity in an approved RED programme
- Addresses a significant resilience gap (e.g. no alternate route on SH1 between Manakau and Ohau south of Levin)
- Makes best use of key corridors that prioritise national freight and tourism.

Based on the re-evaluation work and the IAF the initial results alignment assessment is Very High.

[8] 'Regional, local road and state highway improvements' activity class table, page 24, of Investment Assessment Framework for the 2018-21 National Land Transport Programme (https://www.nzta.govt.nz/assets/planning-and-investment/nltp/IAF-for-GPS-2018.pdf)

7 OPTION DEVELOPMENT

Questions that needed to be considered in this part of the re-evaluation included:

- How has the NZTA's intervention hierarchy been considered and applied?
- Has a sufficiently broad range of demand, supply, and productivity options been explored and considered? Is the breadth of options described appropriate?
- What are the new options to be considered in the long list as a result of the change in strategic context?
- If options were previously considered out of scope for the long list, do they need to be reconsidered in light of policy changes or the change in the strategic context?
- What is the rationale for eliminating options to develop the short list? Is it robust and sufficient?
- Are the shortlisted options the best way to respond to the problems and deliver the expected benefits?
- How is the multi-criteria analysis fit for purpose and transparently applied?
- If weightings were used in the multi-criteria analysis, is there clear rationale for why?
- Is the technical information about each option suitable to assess each option, including potential costs, risks and dis-benefits?
- Are the shortlisted options likely to be acceptable to the public, affordable and feasible to deliver and operate?

In addition, the proposed re-evaluation methodology recommended a review of the existing option development and assessment process also needed to consider:

- The breadth of the long list:
  A review and possible expansion of the original long list is required to capture all possible options, to address the revised problems and objectives with a particular focus on:
  - Technology:
    Options that consider the potential impact of new and emerging technology's must be carefully considered.
  - Mode Neutrality:
    It is important that options for all modes are considered in the assessment and not focussed on a single mode. This may require consideration of previous assessments that have discounted other modes in earlier stages of the BCA to ensure they are still valid conclusions and were not given a cursory assessment.
  - Integrated Transport/Land Use:
    Interaction with land use is an integral component of the transport solution. It is important that consideration of this integration has occurred.
- The rationale for how other options were previously discounted via the Multi-Criteria Analysis (MCA) and/or Environmental and Social Responsibility (ESR) assessments.
- The clarity and transparency in which decisions have been documented.

A review of the MCA shows:

- On-line options are severely limited with ~70% of an 'on-line' option actually having to be off-line due to the extent of geometric and place constraints, including the proximity of marae and urupa etc. and the four (4) sub-standard rail or river bridges
- A sufficiently broad range of options have been considered to address the primary issues of safety and resilience
- The ability to choose one of multiple northern corridors to match with one of multipole southern corridors thus ensuring significantly enhanced flexibility in the options assessment.

Through the re-evaluation review and the documents considered evidence of a formal ESR assessment has not been found. However a full constraints analysis has been undertaken and a broad range of experts were involved in the MCA which has considered significant factors such as:

- Lake Horowhenua
- Lake Papaitonga
- Waterways
- Tāngata whenua values including urupa and marae
- Scenic Reserves
- Recreation areas
- Heritage values
- Lifelines
- Landscape absorption capability.

Given the robustness of the pre- and post- re-evaluation Problem and Benefit Statements the re-evaluation review is satisfied that the Option Development of the draft IBC answers the questions raised by the re-evaluation process.

With respect to technology, mode neutrality and integrated transport/land use the option development process considered:

- Technology:
    - Technology solutions are limited due to the rural nature of the corridor and limited alternative routes
    - Speed management systems are unlikely to achieve significant additional speed reductions below the existing relatively low average speeds (~80 km/h) without an extensive roving enforcement presence which, unfortunately, is not viably available
    - Real Time Public Transport (PT) information is of no use until enhanced PT services are in place and neither GWRC or Horizon's have any PT enhancement projects proposed currently however a PT Business Case should consider this aspect
    - Other technology aspects are likely to be complementary to a wider solution.
- Mode Neutrality:
    - GWRC have been exploring the cases for expanding the Palmerston North – Wellington – Palmerston North Capital Connection service, for new rolling stock as well as developing a Park and Ride strategy for the NIMT rail corridor however, it does not include Ōtaki or communities further north

  - Given the very low percentage of PT use even doubling or tripling the patronage of PT will have a negligible effect on state highway volumes
  - Existing state highway corridor is not conducive to active transport modes however off-line solutions will consider active transport modes
  - Revocation of the existing state highway does not preclude separate cycle/pedestrian ways.

- Integrated Transport/Land Use:

  - The project team have been meeting with HDC and Horizon's monthly for the past 3+ years to better understand the envisaged land use options and how these can be integrated with transport opportunities the knowledge of which has been brought into the MCA process.

STATE HIGHWAY IMPROVEMENT

The re-evaluation has examined the optioneering process which has been undertaken with regard to improving the State Highway network which has been extensive over the seven (7) years that the NZTA has been reviewing the corridor most recently. With respect to improvements, the key consideration has been:

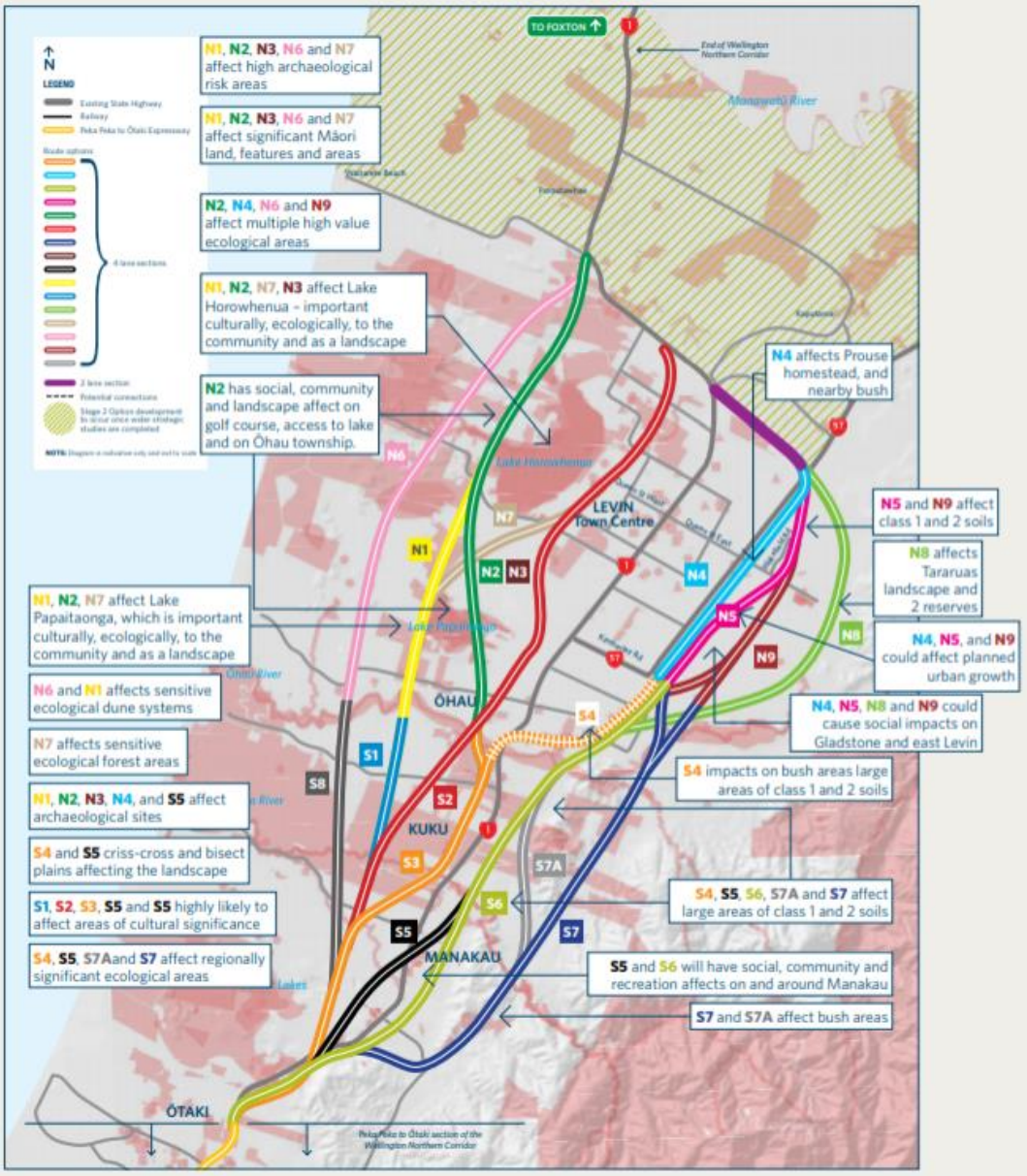
- Is there a safe and resilient on-line option that delivers value for money, if not,
- What is the most appropriate off-line option that provides a safe and resilient option for the best value.

Work to date has concluded that upgrading the existing highway from Ōtaki to north of Levin is not considered viable for the following reasons:

- The requirement for replacing four (4) old sub-standard bridges (at the railway crossings and river crossings) meant that the highway would need to be off-line through those sections to avoid culturally sensitive areas.
- The highway would need to be significantly realigned at a number of deficient curves with significant safety risk to meet design standards and avoid historical constraints.
- There are a large number of constraints adjacent to the existing alignment including Marae, Urupa, historic buildings and a large number of accessways and intersections which make improvements complex to deliver or will lead to sub-optimal safety outcomes.
- To provide an appropriate level of service on the existing alignment, within the confines of the above constraints leads to over 70% of the upgraded SH1 being off-line (at a preliminary estimated cost of around $300m) with low safety returns, residual resilience issues and greater social, environmental and cultural impacts.

By way of an example of the breadth of the long list a summary of the long list of off-line options showing key issues that were identified by workshop participants is shown in the following figure[9].

[9] Refer to Figure 7-3 of the Draft IBC Report (Stantec), April 2018



A summary of the assessment of this long list is replicated below:[10]

Cells containing two scores are reflective of different views at the workshop. The workshop group elected to use a scoring range of 1 (Good) to 5 (Poor) and a score of 5* where it was considered that an adverse effect in relation to a criterion may be a fatal flaw.

[10] Refer to Tables 7-2 and 7-3 of the Draft IBC Report (Stantec), April 2018

OPTION	CRITERIA											
	landscape/Visual impact	Ecological Impact	Impact on heritage	Tangata Whenua Cultural Values	Productive land Values	Social/Community/Recreation impacts	Impact on Dwellings	District Development	Fit to Project objectives	Property Degree of Difficulty	Engineering Considerations	Cost
N1	5	4	4	5*	2	3	3	1	3	4	3	2
N2	5	5*	4	5*	2	3/4	4	1	3	4	3/4	3
N3	4	2	4	5*	3	5	5	4	1	5	2/3	2
N4	2	4/5	4	3	3	4	5	4	1	3	2	1
N5	2	1	2	3	3	3/4	5	4	1	3	2	1
N6	2	5	4	5	2	2	3	1	3	4	3/4	4
N7	5	4	4	5*	3	5	4	4	3	4	3/4	2
N8	4	1	2	3	4	4	5	3	3	3	2	2
N9	1	5	2	3	4	3/4	5	4	1	3	2	2
S1	2	1	4	5/4	3	2	3	1	3	5	3	2
S2	2	2	4	5	3	2	3	1	1	5	3	2
S3	3	3	4	5	3	2	3	1	1	5	3	2
S4	4	5	4	3/5	4	3	5	2	2	5	3	4
S5	4	4	4	4	4	5	5	3	1	5	2/3	4
S6	2	2	2	2	4	5	5	3	1	4	2	3
S7	3	5	2	3	4	2	4	1	3	4	3	4
S8	2	1	4	5	2	1	3	1	3	5	3	2

CONCLUSION

The conclusion from the re-evaluation is that when considering the key questions there is a case for investment to address a significant level of service gap for safety and resilience on this section of the nationally significant (high volume) SH1 from north of Ōtaki to the north of Levin.

With forecast growth levels there is also a case for some degree of enhanced capacity in the corridor to support economic growth. Therefore the recommended investment direction for the corridor is:

- A safer and more resilient SH1 corridor with limited additional capacity which balances providing for economic growth without limiting the scope for inducing new travel by public transport and active modes
- Explore opportunities for enhanced inter-regional and regional public transport including:
  - The triggers for enhancing inter-regional rail between Levin and Wellington by extending electrification of the NIMT rail line to Ōtaki and Levin;
  - The triggers and options for park and ride at Ōtaki and Levin further into the future;
  - Options for regional rail between Levin and Palmerston North.

The above is expected to be taken forward in collaboration with HDC, HRC and GWRC to best develop an integrated transport and land-use package with investment timed to growth and land-use change.

INDICATIVE PREFERRED STRATEGY

It is recommended that route protection for an (yet to be confirmed) off-line option be progressed as soon as possible including working further with Horowhenua District Council on identifying the most appropriate option for the northern section which provides the best balance of land-use and transport outcomes, noting that they are all broadly the same capital cost. The *Function, Form* and *Phasing/Staging* of the off-line improvement will be further developed, and confirmed, through the DBC, with a view to determining whether the off-line improvement should be developed as a four-star KiwiRAP single carriageway road with at grade intersections but future proofed for four-lanes and grade separation. Undertaking this work in the DBC will be imperative to ensure that the effects of undesired induced traffic is appropriately limited.

In considering the phasing/staging of investment the NZTA and HDC should reinvestigate the desirability for, and effectiveness of, a partial bypass of Levin utilising existing roads as much as possible. If viable, a partial bypass could reduce traffic, and heavy commercial vehicles in particular, from Levin town centre to support improved accessibility, wider community outcomes and the economic re-development of the town centre. However, as a partial bypass would also be longer, especially if it linked SH1 and SH57 to the north of Levin, it would likely be less attractive and would need to be supported by other measures, such as bylaws limiting HCV access and traffic calming and speed reduction through the town centre. There would be significant enforcement complexities (as it is not possible to limit HCV's delivering in the area). To be successful, as an early measure, it would be necessary to link it to a wider urban regeneration project with viable short-term returns and require close working with the freight industry to obtain their buy-in. Thus the phasing/staging discussion should form part of completing the DBC.

In parallel with route protection, it is recommended that on-line safety enhancements be progressed immediately between Ōtaki and Levin. This is because delivery of an off-line option will take some time to develop and given the significance of the existing safety risk in the state highway corridors,

These safety enhancements should include speed management, enforcement and education packages as well as infrastructure investment. Any infrastructure proposed should be developed such that it is effective and appropriate for, ultimately, a revoked state highway. Doing so now will provide greater value for money.

HIGH LEVEL COMPARISON OF INDICATIVE PREFERRED STRATEGY

When considering the implementation options of an off-line investment there is essentially two (2) options:

- Staged:
  - Short term safety improvements estimated to be in the range of approximately $50 to $150M with earliest estimated opening being five (5) years after starting
  - Implementation of a Levin northern bypass (possibly connecting SH57 and SH1 north of Levin) with earliest estimated opening being seven (7) years after starting (assuming it is consented as part of the entire off-line route)
  - Implementation of possible public transport improvements including, double tracking and electrification to Levin and park and ride facilities at Otaki and Levin with earliest estimated opening being seven (7) years after starting subject to a separate business case by GWRC and Horizons looking at infrastructure and service opportunities and options
  - Four (4) lane off-line expressway from Otaki to North of Levin open in Year 15.
- Non-staged:
  - Four (4) lane off-line expressway from Otaki to North of Levin with earliest estimated opening being seven (7) years after starting with no other major on-line improvements beforehand

    It would not be palatable to wait seven (7) years for a long term off-line solution to be operative without doing at least some safety works, on-line in the interim. Ideally the desired short-term on-line improvements should be implemented first, but these are five (5) years in the making so only two (2) years before the off-line non-staged option is available and it introduces five (5) years of disruption without an alternative route. Further it would be desirable to undertake the revocation works post implementation of the off-line solution when additional capacity is available to minimise disruption to state highway traffic. So, adding the Short Term Safety element to the non-staged Four (4) lane off-line expressway is, theoretically, not correct but something should be done in the first 12-24 months

- Interim safety improvements (sign, lines, barriers etc) implemented in Years 1 and 2 with an estimated cost of $10M with an expected DSI reduction of around one (1) per annum.[11]

The following table outlines the outcomes of the elements:

OUTCOME	ELEMENTS			
	EXPRESSWAY	SHORT TERM SAFETY	NORTHERN BYPASS	PT IMPROVEMENT
DSI Saved	30-40 in 5 years	5 in 5 years (years 5-15 plus some ongoing)	1 in 5 years (years 7-15 only)	3 in 5 years (years 7-30)
Resilience	Yes – resilient parallel route	Improved resilience of current route but no alternate route	No change	Another mode available but still limited trips and capacity
Access to Growth Areas	Yes – takes pressure of all growth areas	No impact	Negligible benefit for Levin East area	No impact
Levin Town Centre Revitalisation	Yes – allows full re-vitalisation	No impact	Some benefit but unlikely to remove all SH1 HCV's	Yes – attracts residential development close to town centre
Mode choice	No	No	No	Yes
Comparative Cost	~$700M*	~$180M	~$50M	~$300M

* *Assumes some essential Short-Term Improvement and post implementation Revocation costs are included.*

How the outcomes of the elements applies over a 30 year period is presented in the following table:

[11] Refer to *Quick Wins* and *Block Funding / Safer Corridors* options in Appendix D of *Otaki to North of Levin RoNS: Interim Safety Improvements*, (MWH/Stantec) 25 September 2017.

The project team's assessment is that the interim safety projects could save 5-7 DSIs every 5 years.

OUTCOME	NON-STAGED	STAGED
DSI Saved	160 over 30 years	135 over 30 years
Resilience	Yes – resilient parallel route	Safety improvements result in fewer incidents and PT provides another mode but still has limited trips and capacity. Full resilience not realised until expressway built
Access to Growth Areas	Yes – takes pressure of all growth areas	Negligible impact on growth areas until expressway built
Levin Town Centre Revitalisation	Yes – allows full re-vitalisation	Some benefit early with bypass and PT attracts residential development close to town centre
Mode choice	No	Yes – provides more opportunities for rail trips to the south including inter-peak and weekend
Comparative Cost	~$700M*	~$1.2B**

* *Assumes some essential Short-Term Improvement and post implementation Revocation costs are included.*

** *Includes an estimate for PT infrastructure improvements.*

8 RE-EVALUATION CONCLUSION

Having been in progress since 2011, which pre-dates the Agency's BCA, the O2NL project has never had a formal ILM process undertaken and what de facto ILM work was undertaken was no longer fit for purpose (in terms of the recent GPS). The revised Investment Objectives map confirmed strategic context has remained essentially the same with some further considerations to be confirmed in completing the IBC and DBC.

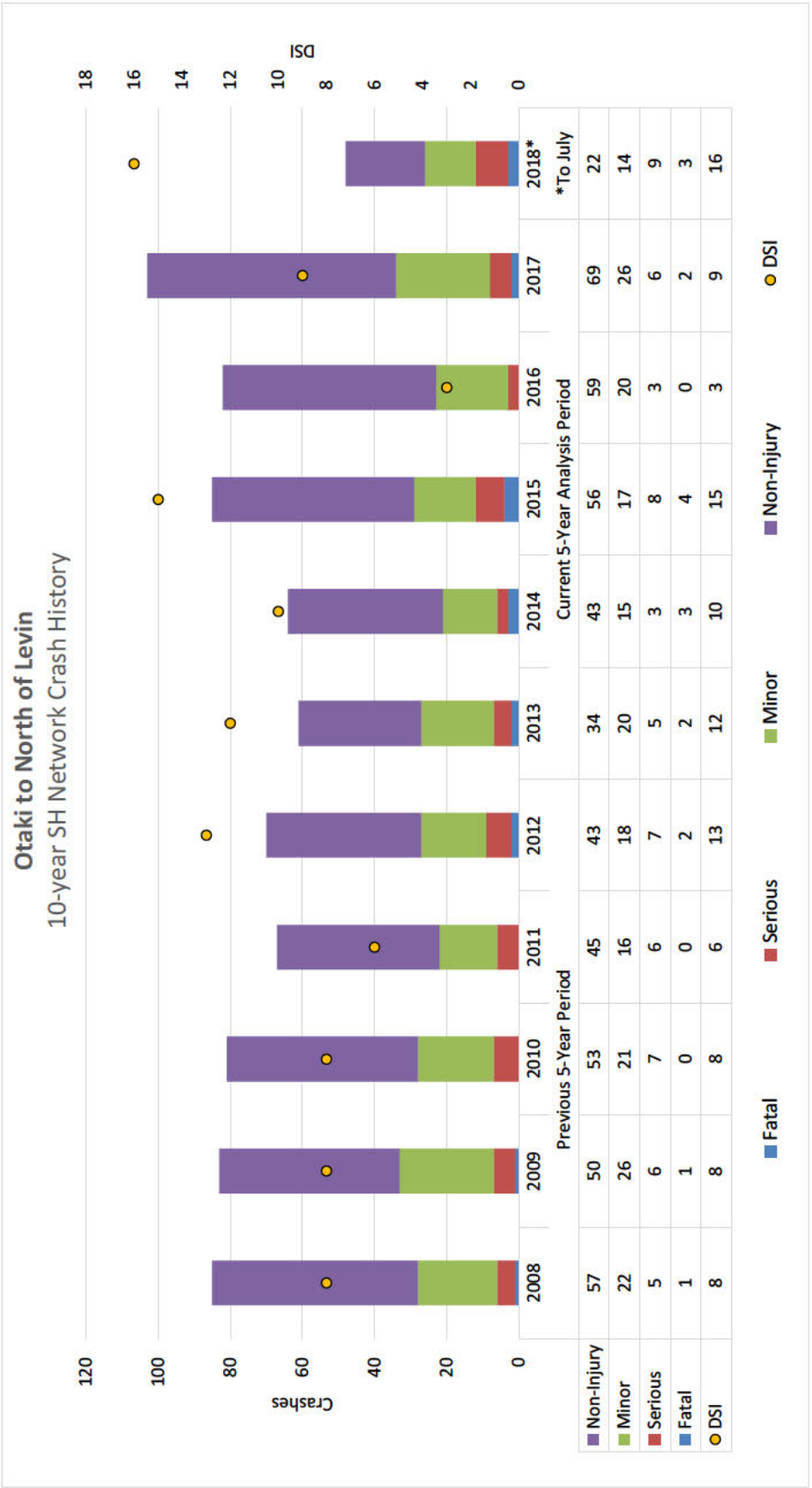
Of significance is the confirmation that the Otaki to North of Levin corridor is consistent with the requirements for a **Very High Results Alignment**, in response to the Safety Strategic Priority. The project also contributes to a High results alignment to the Access Strategic Priority ('Thriving Regions' via access to opportunities, enables transport choice and access, and is resilient).

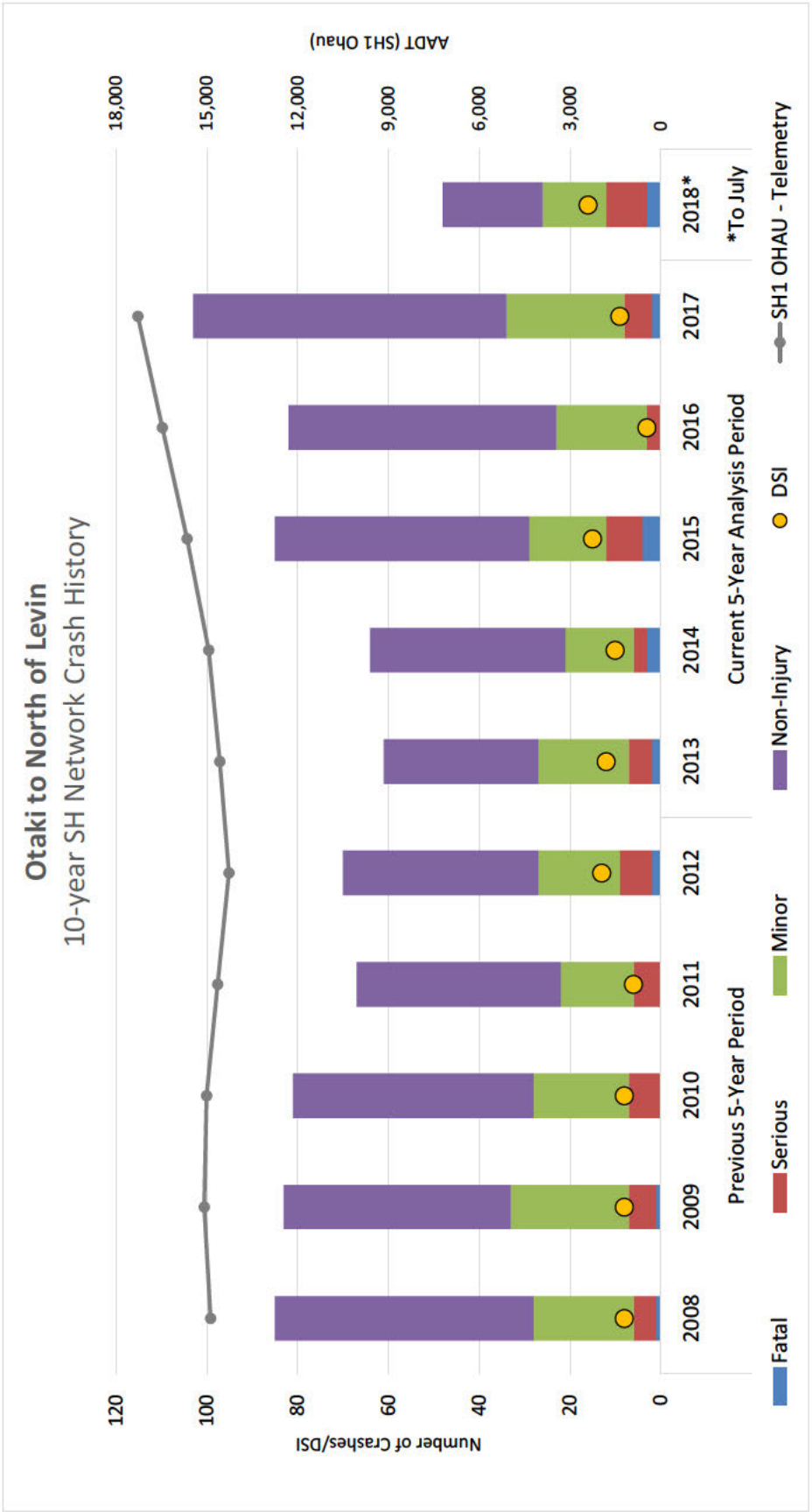
With the strategic context re-confirmed the robust optioneering is sufficient to identify appropriate safety, resilience and improvement options.

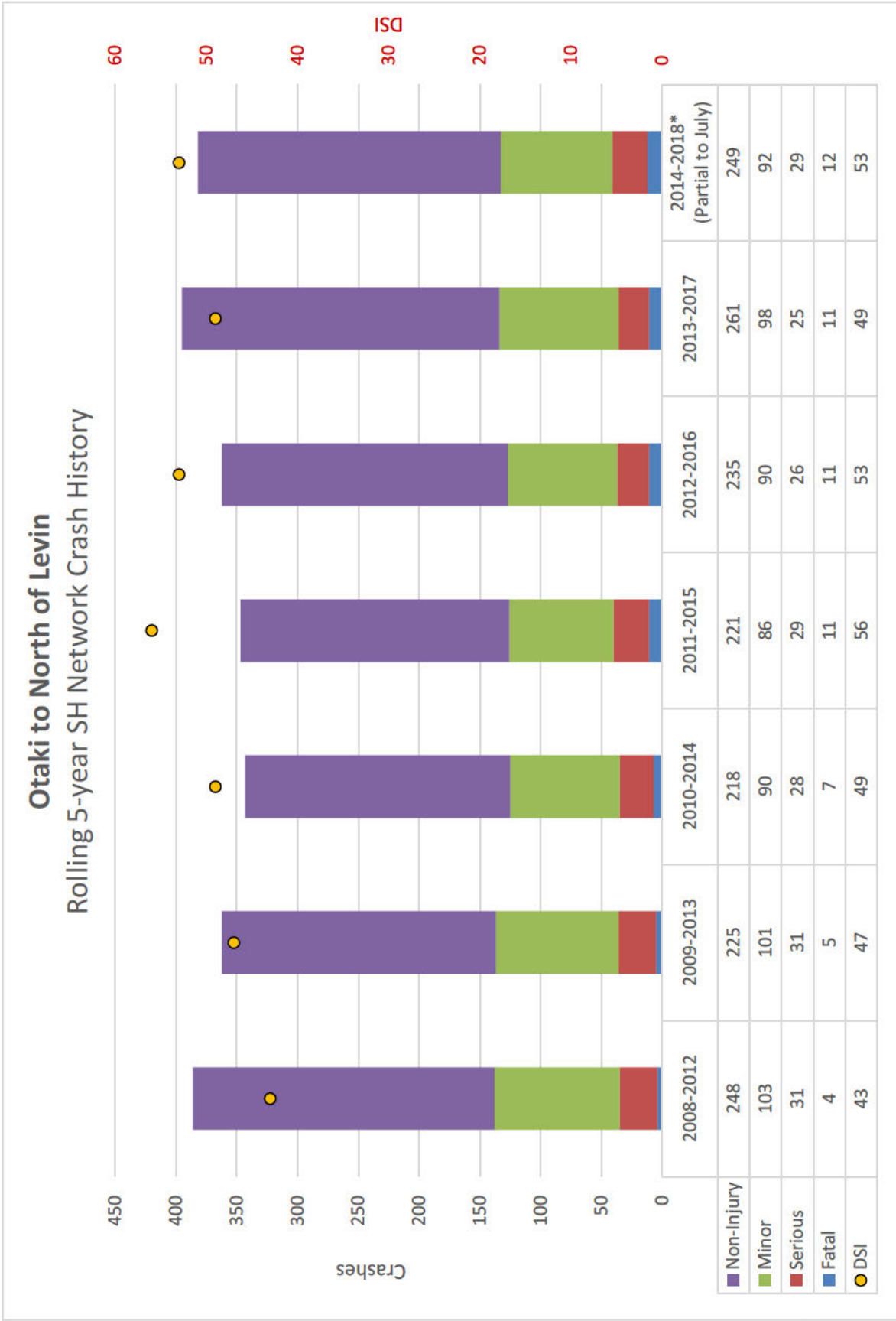
The recommended strategy is a staged approach consisting of:

- Short term:
  - Addressing safety and resilience issues via online improvements
  - Route protection for an (yet to be confirmed) off-line option
  - Place making improvements in Levin as part of expected revocation of SH1
  - PT improvements plan.
- Medium term:
  - Implement findings of the PT improvements plan
  - Possible partial, northern, bypass.
- Long term:
  - Full off-line Levin bypass.

APPENDIX A – CRASH DATA




Otaki to North of Levin
10-year SH Network Crash History
AADT (SH1 Ohau)
18,000
15,000
12,000
9,000
6,000
3,000
0
Number of Crashes/DSI
120
100
80
60
40
20
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018*
*To July
Previous 5-Year Period
Current 5-Year Analysis Period
Fatal
Serious
Minor
Non-Injury
DSI
SH1 OHAU - Telemetry



APPENDIX B - UNCERTAINTY LOG

The table reflects those items of uncertainty where these factors could influence project need, option selection and timing

Factor	Time	Probability	Impact on programme	Comments
Factors affecting demand				
Population growth in Levin greater than expected	Underway to beyond 20 years	Near certain	Low	Stats NZ growth is modest but two alternate forecasts are much higher. Any change in growth will be an increase in demand. The current network has severe safety and resilience issues and any increase in demand increases the urgency for a solution. May also affect option form e.g. interchanges.
Population growth in Manakau greater than expected	Underway to beyond 20 years	Near certain	Low	As above. Wellington Northern Corridor projects make Manakau more desirable.
Population growth in Ohau greater than expected	Underway to beyond 20 years	Near certain	Low	As above. Wellington Northern Corridor projects make Ohau more desirable.
Employment growth in Horowhenua greater than expected	10 - 20 years	More than likely	Low	Increased population results in increased employment, changes traffic demands and puts more pressure on the network.
National economic growth changes	ongoing	Hypothetical	Low	Changes in economic growth affects demand, but unlikely to result in traffic reductions therefore need to address current issues remains
Factors affecting supply				
Opening of PP2O and Transmission Gully	2020	Near certain	Medium	Any increase in demand from upgrading PP2O and Transmission Gully will still be an increase and therefore would only bring forward the need for the project.
Speed reductions on local roads	Within 5 years	Reasonably foreseeable	Low	State Highway does not have an alternate route so would not affect the demand for the project.
Town Centre Strategy	Underway to 10 years	Near certain	Low	All current options re-inforce need for state highway to be located outside of the town centre. Uncertainty relates to whether the strategy is implemented and the timing in relation to the project construction.
Increase role of Palmerston North as a Freight Hub	5 - 20 years	More than likely	Low	Would increase or decrease heavy vehicle demand depending on mode choice of freight logistics. Increased employment would increase travel demand.
Increased investment in rail as public transport between Wellington and Levin/Palmerston North	5-20 years	Reasonably foreseeable	Low	If double tracking and electrification then drop in traffic demand, but not enough to significantly affect problems. Increased attrativeness of Horowhenua may subsequently increase demand again.
Whirokino Trestle	2019	Near certain	Low	Increase in numbers of HCVs through Levin uncertain but would be an increase - therefore no reduction to project need or timing
Factors affecting cost				
Fuel prices	Anytime	Hypothetical	Medium	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 of time. Similarly a sustained decline in cost could have the converse effect. There is no real way of accurately forecasting this.
Changes to Road Pricing	Anytime	Hypothetical	Medium	Investigation into alternative road pricing mechanisms is currently underway nationally and in major cities. This has the potential to affect the cost of travel and the use of motor vehicles. This has a wide range potential impacts but cannot be accurately forecast.

This page is intentionally blank.