TECHNICAL REPORT 1

TRAFFIC AND TRANSPORT ASSESSMENT

DECEMBER 2016

NZ TRANSPORT AGENCY
WAKA KOTAHI

East West Link

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Revision schedule

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0	December 2016	Final for Lodgement	Kara Hartshorne, Andrew Murray, Catherine Rochford	Andrew Murray	Patrick Kelly

EXECUTIVE SUMMARY

1. This transport assessment forms part of the Assessment of Effects on the Environment Report (AEE) prepared for the NZ Transport Agency's East West Link Project (the Project). Its purpose is to inform the AEE and to support the new Notice of Requirement (NoR) and alterations to existing designations required for the Project.

2. This report prepared by the East West Link Alliance considers the operational transportation and traffic effects of the Project. The range of benefits and extent of the effects are such that only key highlights are included in this Summary. A more detailed summary of the outcomes is outlined in the Conclusion Chapter at the end of this report.

3. Given the dynamic and on-going changes in travel patterns and performance, the Project has been assessed against a future Without Project scenario. It has covered impacts on:
   - Travel times, travel reliability and traffic flows;
   - Walking and cycling;
   - Public transport network; and
   - Parking, access and roads with increased traffic.

Existing and Future Baseline Environment

4. The analysis found that there are significant issues with the transport network in this area, including:
   - Highly congested, unreliable and inconsistent journey times accessing SH20 and SH1;
   - Poor accessibility for local businesses, with conflict between through and local access traffic on Neilson Street, Church Street and Great South Road;
   - Congested and unreliable journeys for buses between SH20 and Onehunga Town Centre;
   - Use of residential streets, particularly by trucks, to access the industrial hub due to congested strategic connections and
   - Connectivity, severance and amenity issues for pedestrians and cyclists.

5. There are also significant land use growth pressures both locally and across the Region that will result in increased traffic demands and exacerbate the congestion and amenity problems that already exist.

Assessment of Travel times, travel reliability and traffic flows

6. There are significant positive outcomes regarding travel time and reliability accessing the Onehunga-Penrose area, as well as positive effects on the wider road network. These include:

- Significant travel time savings for business vehicles accessing the Onehunga-Penrose industrial area to the strategic network, including[1]:
  - Reductions accessing SH1 north of up to 6.3 minutes (37%)
  - Reductions accessing SH1 south of up to 18 minutes (68%)
  - Reductions accessing SH20 north of up to 4.1 minutes (43%)
  - Reductions accessing SH20 south of up to 6.5 minutes (48%)
- When expressed in changes in average speed, these improvements include:
  - Increases from 25 to 60km/h from SH1 south
  - Increases from 36 to 52 km/h from SH20 south

7. The Project is expected to improve journey times over a much wider area than just Onehunga-Penrose, including up to nine minutes between SH20 and Highbrook and some three minutes between Royal Oak and the Airport.

8. Significant improvements in the consistency and reliability of travel times for trips accessing the strategic network from the Onehunga-Penrose area are predicted. These include the range of travel times (across the directions and times of day) accessing SH1 south reducing from 16 minutes without the Project to two minutes with the Project. With the Project in place, the access times become much more consistent and reliable across the day, which is expected to allow improved and more flexible journey and logistics planning for businesses in the area, and result in increased freight efficiency.

9. When the Project is in place, travel times on SH1 and SH20 have been shown to stay the same or experience marginal improvements. This shows that the extra capacity provided on SH1 (as part of the Project) and on SH20 (as separate works), means that the extra EWL ramp flows can be accommodated without a detrimental impact on the travel along SH1 and SH20.

10. The general pattern of changes in daily flow suggest that traffic moves from the adjacent corridor to the EWL, with large reductions in flow (and therefore congestion), seen on Neilson Street, Church Street and Great South Road. This will allow easier access to properties and local streets.

11. There is a decrease in vehicle and truck movements predicted on other routes in the wider network, particularly in residential areas, therefore improving amenity for residents. This includes streets such as Favona Road, Mt Smart Road, Mt Albert Road and Campbell Road.

Assessment of Walking and cycling

12. The Project will have significant positive impacts on pedestrians and cyclists and will provide approximately 24 km of new or replacement cycling and walking facilities. The proposed direct route between Māngere Bridge and Sylvia Park Town Centre will also be approximately 1.6km shorter than the current route.

13. The Project will improve safety and accessibility for cycling and walking between Onehunga Town Centre and Sylvia Park Town Centre by providing high quality, off-road and continuous

[1] Note: The time savings vary across the peak periods and forecast years. For the purposes of this summary the highest (maxima) indicated savings are referenced.

links connecting these key destinations. New and enhanced north-south connections will improve connectivity to the Māngere foreshore from the residential community north of Neilson Street, including at Captain Springs Road and Alfred Street.

14. Significant connectivity and accessibility improvements are expected through the provision of new high amenity pedestrian and cycling facilities on both sides of EWL, including shared paths, boardwalks, commuter cycle lanes and footpaths.

15. The shared paths on Princes Street and Frank Grey Place and the signalisation of the northbound on/off-ramp intersection will significantly improve safety and amenity for pedestrians and cyclists crossing SH1 at Princes Street.

16. The proposed new bridge that will provide for pedestrian and cycling over Ōtāhuhu Creek removes the severance of SH1 and the creek and provides highly significant improvements in connectivity. The bridge will link the two isolated communities east of SH1 (being Princes Street and Panama Road communities) with a route that is up to 4km shorter than the existing route.

Assessment of Public transport network

17. The Project will address the key issue of congested travel times and poor journey time reliability for buses travelling between SH20 and Onehunga Town Centre. Faster travel times are predicted for northbound buses accessing the town centre from SH20 with savings of up to five minutes, and become uncongested and consistent over the day. This increased reliability is expected to improve attractiveness of the bus system, improve linkages to the rail network and reduce bus operating costs.

18. In addition to the positive impacts for bus passengers accessing Onehunga Town Centre there are expected to be significant journey time savings on eight other bus routes, due to the reduced traffic flows and congestion on those routes.

19. The at-grade design of the EWL at Galway Street will not preclude future mass transit plans to the airport at this location and the Project integrates with Auckland Transport's proposed AMETI bus link at Sylvia Park Town Centre.

Assessment of Parking, access and roads with increased traffic

20. There are some properties on Gloucester Park Road, Onehunga Mall, Onehunga Harbour Road and Sylvia Park Road that require some access movements to be via a longer route. However, these are all off-set by the significantly improved access to SH1 and SH20 (and the local roads), offered by the Project.

21. The upgraded interchange at Princes Street is expected to better manage motorway queuing on the local network, and allow non-motorway traffic to move around any residual queues. This is anticipated to significantly improve the quality and resilience of access to this community.

22. The change in function on key roads such as Onehunga Harbour Road, Galway Street, Captain Springs Road, Hugo Johnston Drive and Sylvia Park Road will require loss of some existing parking. Generally, this loss can be accommodated by the existing spare parking capacity. However, specific mitigation of the loss of parking has been recommended, as outlined further below.

Recommendations

23. Specific local mitigation to be included either in the design or subsequent agreements with stakeholders have been identified as outlined below:

  - The redundant section of Onehunga Harbour Road should be used to provide for replacement car parking lost outside The Landing and the informal parking under SH20 for those users of the Waikaraka Cyclepath.
  - Provision of clearways on Captain Springs Road and consideration of clearways on Galway Street to allow for off-peak parking.
  - Removal of some parking on Hugo Johnston Drive, along with the consideration of upgraded street lighting to accommodate the change in function.
  - Provision of a u-turn facility and additional parking at the southern end of Hugo Johnston Drive.
  - Explore the potential to allow internal access arrangements to 8 Sylvia Park Road via 1 Pacific Rise.
  - Inclusion of Māngere as a destination into any existing or any future highway signage on Mount Wellington Highway directing motorists to perform a right turn into Sylvia Park Road rather than using Vestey Drive.
  - Reinstatement of the right turn into Onehunga Mall from Neilson Street.
  - It is recommended that ongoing engagement is undertaken to ensure the shared path at the eastern end of the EWL main alignment is delivered in conjunction with AT and extends through to the Sylvia Park Town Centre boundary.
  - The detail of the type of walking and cycling infrastructure will be developed in the detailed design process, including both the form and connections. It is recommended that a process is established with Auckland Transport in regard to engagement and approvals during the detailed design.
- It is recommended that the process of engagement and approvals with AT for the design of specific locations where the Project interfaces with the existing local road network is established. This includes the design objectives, features and mitigation measures of Hugo Johnston Drive, Captain Springs Road, Pacific Rise intersection, the re-instatement of right turn from Hillside Road and the re-instatement of right tuning movements at 781 Great South Road is established.

Conclusion

24. The assessment has found substantial positive improvements to the transport system in the Onehunga-Penrose and Ōtāhuhu areas. These positive outcomes cover a wide range of modes and an extensive study area. They range from improved business access to the strategic network, improvements to walking, cycling and bus networks and improved local access between communities. They affect both local communities and the wider strategic movement.

25. The assessment concludes that the Project will strongly contribute to the all three of the Project Objectives and addresses the key issues identified in the report.

Table of Contents

Appendices

List of Figures

List of Tables

Glossary of Technical Terms/Abbreviations

Abbreviation	Term
ACRPS	Auckland Council Regional Policy Statement
AEE	Assessment of Effects on the Environment
AMETI	Auckland-Manukau Eastern Transport Initiative
AT	Auckland Transport
ATCOP	Auckland Transport Code of Practice
BCR	Benefit Cost Ratio
BoI	Board of Inquiry
CAS	Crash Analysis System
CBD	Central Business District
CRL	City Rail Link
CMA	Coastal Marine Area
CPTED	Crime prevention through environmental design
DBC	Detailed Business Case
DM	Do-Minimum
EEM	Economic Evaluation Manual
EPA	Environmental protection authority
EWL	East West Link
EWLA	East West Link Alliance
FSI	Fatal Serious Injury
GPS	Global Positioning System
GPSLT	Government Policy Statement on Land Transport
HCM	Highway Capacity Manual
HCV	Heavy Commercial Vehicle
ITP	Integrated Transport Programme
ITA	Integrated Transport Assessment
JMAC	Joint Modelling Application Centre
LRT	Light Rail Transit
LoS	Level of Service
LTMA	Land Transport Management Act
LTP	Long Term Plan
MMEWS	Multi Modal East West Study
NES	National Environmental Standard
NLTP	National Land Transport Programme
NPS	National Policy Statement
NoR	Notice of Requirement
NSAAT	No Stopping At Any Times
NZ Transport Agency	The New Zealand Transport Agency
ONRC	One Network Road Classification
ONLs	Outstanding Natural Landscapes

Abbreviation	Term
PBC	Programme Business Case
PAUP	Proposed Auckland Unitary Plan
RLTP	Regional Land Transport Plan
RLTS	Regional Land Transport Strategy
RPTP	Regional Public Transport Plan
RMA	Resource Management Act 1991
RUB	Rural Urban Boundary
SEART	South Eastern Arterial
SFN	Strategic Freight Network
SH(x)	State Highway (number)
T2 lane	Transit 2 lane
The Plan	The Auckland Plan
VMS	Variable Message Signs
VPH	Vehicles per hour
vpd	Vehicles per day
WRR	Western Ring Route

1 Introduction

1.1 Purpose and scope of this report

This report forms part of a suite of technical reports prepared for the NZ Transport Agency's East West Link Project (the EWL or Project). Its purpose is to inform the Assessment of Effect on the Environment Report (AEE) and to support the resource consent applications, new Notices of Requirement and an alteration to existing designations required for the EWL.

This report assesses the traffic and transportation effects of the proposed alignment of the Project, once operational, as shown on the Project Drawings in *Volume 2: Drawing Set, Drawing Set 3: Road Alignment*. This report assesses the Project including the proposed grade separation at Great South Road (described at Section 6: Project Description of the AEE).

The purpose of this report is to:

1. Identify and describe the existing traffic and transport environment, including the key issues facing that environment;
2. Describe the potential positive and negative traffic and transportation effects of the Project;
3. Recommend measures (including any conditions/management plans required); as appropriate to avoid, remedy or mitigate potential adverse traffic and transportation effects; and
4. Present an overall conclusion of the level of potential traffic and transportation effects of the Project after recommended measures are implemented.

1.2 Project description

The EWL Project involves the construction, operation and maintenance of a new four lane arterial road from State highway 20 (SH20) at the Neilson Street Interchange in Onehunga, connecting to State highway 1 (SH1) at Mount Wellington, as well as an upgrade to SH1 between the Mount Wellington Interchange and the Princes Street Interchange at Ōtāhuhu. New local road connections are provided at Galway Street, Captain Springs Road, the ports link road, Hugo Johnston Drive and Great South Road. Cycle and pedestrian facilities are provided along the route. Grade separation of the through east-west movements at the Great South Road intersection is included.

A full description of the Project including its design, construction and operation is provided in Part C: Description of the Project in the Assessment of Effects on the Environment Report contained in *Volume 1: AEE* and shown on *Volume 2: Drawings.*

The Project alignment is shown on Figure 1-1.

Figure 1-1: Project Alignment

1.3 Project objectives

The Project objectives are discussed in full in the main AEE report. For ease of reference, they are:

1. To improve travel times and travel reliability between businesses in the Onehunga-Penrose industrial areas and SH1 and SH20;
2. To improve safety and accessibility for cycling and walking between Māngere Bridge, Onehunga and Sylvia Park, and accessing Ōtāhuhu East; and
3. To improve journey time reliability for buses between SH20 and Onehunga Town centre.

1.4 Functional intent of the Project

The detailed description of the Project is provided in the main AEE report. The following outlines the key functional intent of the Project, in terms of transport movement:

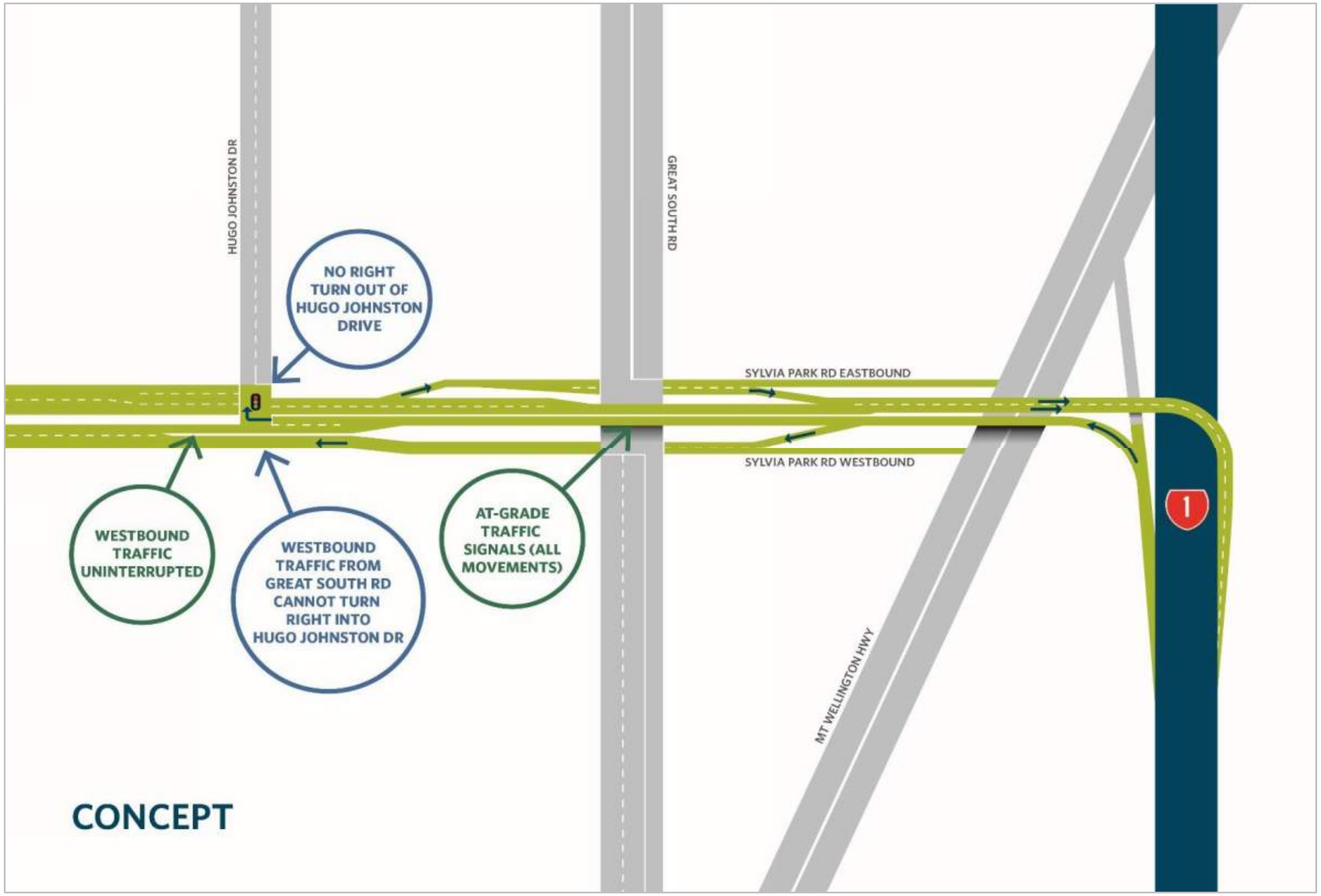
1.4.1 Motorway access

- Provide additional capacity at the SH20 interchange and separate local (Onehunga) and freight and general traffic for the industrial area. This includes reducing traffic (and especially trucks) in the area between the Onehunga Town and the foreshore/Old Māngere Bridge;
- Access to SH1 south is proposed to be via new south-facing ramps, to provide a more direct access into, and from, the Onehunga-Penrose area. Access to SH1 north would be both via the existing South Eastern Arterial (SEART) ramps (and into Church Street), or via the existing Mount Wellington ramps then onto the EWL at Sylvia Park Road;
- Additional capacity is included on SH1 between the EWL and Princes Street to both accommodate the extra flows and provide consistent 4-lanes for the section between the EWL and Highbrook interchange;
- The widening of SH1 requires the upgrade of the Princes Street interchange, which has focussed on improved pedestrian and cycle facilities and extra capacity to reduce the effects of motorway ramp queuing on the local network; and
- Provide priority to freight, high occupancy vehicles on the motorway on-ramps, where operationally feasible.

1.4.2 An East-West corridor

- The key intent is to provide a new four lane, parallel, arterial road that reduces the through-traffic on the Neilson Street / Church Street / Great South Road corridor, so that those roads can revert towards more of a business-access function;
- This new road is proposed as an arterial road with multiple access points to be able to increase accessibility to the widely dispersed business area;
- Key access roads are proposed at Galway Street, Captain Springs Road, Hugo Johnston Drive and Great South Road;
- Grade separation of the east west through movements at the Great South Road intersection, to provide improved reliability and future resilience as seen on Figure 1-2. Through movements to and from EWL to Sylvia Park are provided at grade at Great South Road to provide connectivity to the local street network. Westbound traffic on EWL will not be able to turn right into Hugo Johnston Drive.
- Auckland Metro have advised that they have no plans to run bus services along the EWL road: and
- There will be no dedicated lanes for heavy vehicles on the EWL road.

Figure 1-2: Great South Road Grade Separation



1.4.3 Public transport

- Reduce the significant current congestion for buses accessing Onehunga from SH20. This is done via the upgraded SH20 interchange at Onehunga and the decongested link to Onehunga Mall.

1.4.4 Walking and cycling

- Enhance the quality of the already popular north-south movement between the Old Māngere Bridge and Onehunga, both through enhanced off-road facilities and reduced traffic flows;
- Provide an eastern extension of the Waikaraka Cyclepath to connect to Sylvia Park Town Centre;
- Improve the western link into Taumanu-Onehunga Foreshore; and
- Provide increased north-south connectivity from the Waikaraka Cyclepath into the residential areas north of Neilson Street.
- Provide improved access into Ōtāhuhu East, via safe connections over Ōtāhuhu Creek to link the communities of Panama Road and Princes Street areas.

1.5 Report authors

A team of authors, contributors and reviewers prepared this report. It was subject to wider review both within the Project Team and by the Transport Agency.

1.5.1 Andrew Murray

The reviewer and co-author of this report has 25 years' experience in transportation with core experience in traffic engineering, transportation planning and transport modelling. He has prepared or reviewed Transport Assessments for a range of large-scale projects, including both land use changes and transport infrastructure. He regularly provides expert evidence to the consenting process, including Council hearings, Environment Court and Boards of Inquiry (Waterview Connection, MacKays to Peka Peka Expressway and Christchurch Southern Motorway Stage 2).

Andrew Murray has a BE (Hons) (Civil) from the University of Auckland (1990) and is a Member of the Transportation Group of IPENZ and Committee member of NZ Modelling User Group.

Andrew has been involved in the East West Connections (EWC) and the EWL Project since 2013 providing technical inputs to the Programme Business Case. He was then the lead transportation planner for the Indicative and Detailed Business Cases for the East West Connections elements of that project. He is very familiar with the Project transport issues due to his involvement in the EWL Business Case and also familiar with adjacent projects through his inputs to the Waterview Connection, Manukau Harbour Crossing (MHX) and AMETI projects.

Andrew has been involved in the following relevant projects:

- East West Connections Business Cases: The Transport Agency and Auckland Transport, 2013-2015;
- SH20 Waterview Connection: The Transport Agency, 2000 – present;
- MacKays to Peka Expressway: The Transport Agency, 2010 – 2013;
- Auckland-Manukau Transport Initiative (AMETI): Auckland Transport, 2009 – 2015;
- Wellington Modelling Advice: The Transport Agency, 2015;
- Christchurch Southern Motorway Board of Inquiry Consenting: The Transport Agency, 2012; and
- SH1 Constellation to Greville Scheme Assessment: The Transport Agency, 2013.

1.5.2 Kara Hartshorne

The co-author of the report is Kara Hartshorne who has fourteen years' transport planning experience in the United Kingdom and New Zealand. She has prepared, delivered and reviewed a variety of Transport Assessments for private and public sector clients relating to infrastructure and land development projects. Kara Hartshorne has a Bachelor of Planning from Auckland University, New Zealand, obtained in 1998.

She has been involved in preparing Transport Assessments for projects in Auckland for water infrastructure projects and for the educational, commercial and leisure sectors. In the United Kingdom, Kara prepared a suite of Transport Assessments to support the planning application for the construction of the new 60,000 seat Arsenal Stadium in London and further applications to increase the number of concerts held at the stadium.

1.5.3 Catherine Rochford

Catherine Rochford was a key contributor to the report and has over 14 years' experience, both in New Zealand and prior to that in the UK. Catherine has a degree in Geography from University of Liverpool and has been involved in the EWL project since the Programme Business Case phase in 2013. Most recently as the senior modeller for the IBC and this Transport Assessment. Catherine was involved in the Waterview Connection project from 2007 – 2012 and assisted with the preparation of evidence for the MacKays to Peka Peka project.

1.6 Report structure

Following this introduction this Traffic and Transportation Assessment has been structured as follows:

Section 2 describes the methodology used to assess the impact of the Project on the transport environment including on traffic flows, travel times and travel time consistency, walking and cycling, public transport, property access, parking and safety.

Section 3 provides a summary of the transport planning framework for the Project.

Section 4 provides a description of the existing and future transport environment (Without the Project) including traffic flows, travel times, congestion, public transport network, walking and cycling network, crash performance and on and off street parking.

Section 5 provides an assessment of the effects of the Project on traffic flows, travel times and travel time consistency via a comparison between scenarios Without the Project and With the Project, for both 2026 and 2036 future years.

Section 6 provides an assessment of the Project on parking, property access arrangements and impact of those roads with increased traffic volumes.

Section 7 comprises an assessment of effects of the Project on the future pedestrian and cycling network including forecasts of potential usage of new connections.

Section 8 provides an assessment of the effects of the Project on the future public transport network with particular focus on travel time savings and reliability for buses between SH20 and Onehunga Town Centre.

Section 9 provides a discussion of road safety performance and **Section 10** provides the conclusions.

2 Assessment Methodology

2.1 Introduction

This section describes the methodology used to assess the impact of the Project on the future transport environment, including general and freight traffic (impact on traffic flows, travel times and travel time consistency), walking and cycling, and public transport. Included in this chapter is a description of the assessment methodology to predict changes in regional and local demand for vehicle and public transport travel across the Auckland region, and the resulting outcomes in terms of travel times and traffic flows. The methodology used to assess the impact of the Project on property access, parking and safety performance is also discussed in this chapter, as well as a brief description of the design process that led to the Project being assessed.

2.2 Guidance and scope

The preparation of this Transport Assessment has taken into account the guidance set out in the Auckland Transport (AT) document "Integrated Transport Assessment Guidelines" (January 2015) and the NZ Transport Agency document "Integrated transport assessment guidelines" (November 2010).

It considers the operational effects of the Project on the following elements of the transport system:

- Road network (general and freight traffic flows, travel times and travel time consistency);
- Public transport network;
- Cycling and walking network (from a transport function, noting some overlap with urban design elements);
- Property access;
- Parking; and
- Safety performance.

This Transport Assessment has included an iterative process with the design to avoid or remedy the transport effects of the Project, wherever possible, with mitigation proposed where identified.

2.3 Early works separate from the Project

There are identified 'early works', which are separate from the EWL Project, and include the following:

- Additional capacity on SH20 (widened from six to eight lanes) between Queenstown Road and Neilson Street to accommodate the extra flows both on the Western Ring Route (WRR) and from the EWL;
- Local widening of Neilson Street; and
- Implementation of a clearway on Neilson Street between Alfred Street and Angle Street with likely hours of operation to be between 6am and 7pm Monday to Friday.

Those works were previously included as part of the package of works assessed in the Business Cases. However, as they are now being implemented as separate works, they are treated here as part of the 'existing' environment.

2.4 Transport environment for assessment

It is recognised that the transport environment is constantly changing as a result of new transport initiatives coming on-line, land use changes and changes in network performance. Assessment of the Project against the existing (2016) environment is therefore not considered appropriate. Instead, key parts of the assessment have used transport models to simulate the following future scenarios for comparison purposes:

- Future network Without Project (“Base Case” scenario) – 2026 and 2036; and
- Future network With Project (“Project” scenario) – 2026 and 2036.

The 2013 traffic models (and recent traffic data) have been used to provide context to the future-year comparisons and to describe the existing traffic environment. These are the base models developed and calibrated for use in the Business Cases.

Calibrated 2016 models have not been developed as it is not standard practice to update them after such a short period. Although there has been traffic and patronage growth between 2013 and 2016, the 2013 models are still considered to provide a useful context to the future year predictions of 2026 and 2036.

Forecast model years are 2026 and 2036, providing predicted effects of the Project for two future scenarios. These years align with those available in the regional ART3[2] models, and broadly relate to short term (2026 would be shortly after potential opening), and long-term assessments. Higher weighting is provided to the 2026 predictions because forecasting uncertainties increase with the longer time horizon.

2036 is considered to be an appropriate longer-term forecast date as it is approximately 10-13 years after EWL could open. Regional forecasts for 2046 are available in the ART3 model, however those results at a local level become highly sensitive to assumptions about growth, travel behaviour and especially to any other projects included (or not) in the networks.

There a number of assumptions used in the modelling of the future environment. The key ones include:

- Medium level population forecasts (Auckland Plan Scenario I-9);
- Committed or likely regional projects, such as the CRL, AMETI, widening of SH20 Maioro to Hillsborough, removal of selected rail crossings, SH20b upgrade, Northern Busway Extension and Travel Demand Management initiatives (TDM);
- The modelling includes assumed behavioural responses to non-price TDM measures that reduce car usage and increase public transport, walking and cycling travel. These regional initiatives include work place initiatives (such as work place travel planning), assumptions about increased walking/cycling in mixed-use growth centres and changes in travel mode in response to education and personal travel planning initiatives. These changes are in addition to changes in public transport mode share as a result of changes in the service quality, which are modelled directly. The modelling also includes economic assumptions, such as increases in parking costs, fuel costs and public transport fares; and
- Committed local projects such as the widening of SH20 south of Maioro Street and between Queenstown Road and Neilson Street and local widening of Neilson Street (these latter two items are an ‘early work’ component identified in the Detailed Business Case for the Project).

A comparison of the changes to the road network under two future scenarios “Without” Project and “With” Project has determined the transport effects of the Project.

For the assessment of effects on the walking and cycling network recent survey data of current movements have been used along with growth forecasts estimated from comparative projects, (rather than models).

[2] The ART3 model is owned and operated by the Joint Modelling Application Centre (JMAC) which is a collaboration between Auckland Council, Auckland Transport and the NZ Transport Agency.

2.5 Transport modelling

A key element of the assessment of the future operational transport effects is the development of the traffic modelling methodology. The Project follows the hierarchical modelling structure used on other major transport projects across the Auckland Region and New Zealand. This hierarchy involves key components, all of which operate with different geographical scope and network detail:

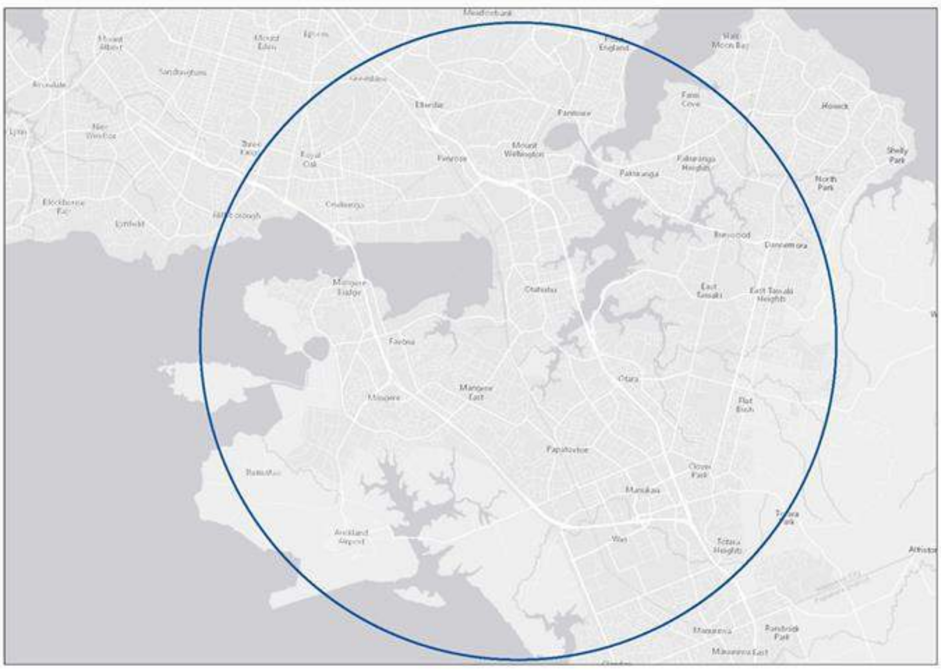
- A Strategic demand model (ART3) that relates land use (such as population and employment) to travel patterns at a strategic, region-wide level;
- A Project model (SATURN) which looks at a smaller geographical area to the strategic model (the extent of the model is from Mount Albert Road in the north to Manukau City Centre in the south as shown in Figure 2-1). This model loads the vehicle trip patterns onto the road network to investigate traffic effects at a more detailed level; and
- Design / Operational models which uses micro-simulation (AIMSUN) and intersection packages (SIDRA) to look at traffic operation in even greater detail on the EWL itself.

The ART3 model has been used to estimate impacts on regional travel patterns and public transport demand (including diverted and induced traffic). The ART3 model uses the future bus network.

The SATURN model is the main tool used for estimating traffic impacts for this assessment. The 2013 models were calibrated to observed AM, Interpeak and PM peak counts and travel times. The process to estimate daily flows from the three peak periods was calibrated to observed daily flows on representative roads. However, although calibrated to an appropriate level, it is recognised that the model will not perfectly replicate the exact traffic flow on every road. The model has been independently peer reviewed and deemed 'Fit for Purpose'. It was used for the development of the Project through the Indicative and Detailed Business Cases. The business case SATURN models have been updated for this assessment to reflect the refined Project design and to use the latest regional land use and network assumptions.

The study has included liaison with JMAC regarding the modelling approach and key outcomes.

Figure 2-1: Extent of the Project SATURN model



2.5.1 Land Use forecasts and PAUP Zoning

A critical input to the future year predictions are the land use forecasts used in the transport model. The growth forecasts used in this assessment are those developed original by Auckland Council as part of the Auckland Plan. These have been refined over the last few years to reflect the emerging planning direction, with the current version (referred to as Scenario I-9) generally representing the notified version of the PAUP. The land use zoning is used in the predictions as an indication of the capacity of an area, however the take-up rate of development is estimated by considering the regional demand and relative attractiveness across all areas in the Auckland region. There are therefore clearly uncertainties in the estimate of development rates.

In July 2016, the Independent Hearings Panel (IHP) delivered its recommendations on the Proposed Auckland Unitary Plan (PAUP) to Auckland Council. On 19th August 2016, the Council notified its decisions on the recommendations.

In terms of the overall population growth projections for the Region, the IHP appear to have relied on the growth projections of the Auckland Plan, in particular that Auckland will have 2.5 million people by 2041. The IHP have also justified many of their recommendations on the basis that they are needed to provide for the growth anticipated in the Auckland Plan. Given that Scenario I-9 has been developed from the work on the Auckland Plan, we can assume that they are broadly consistent with the PAUP.

In terms of the distribution of PAUP-enabled growth across the Region, the Panel have specifically found that their recommended provisions "are consistent with the development strategy maps D.1 and D.2 in the Auckland Plan", which describe at a high level where growth is expected to occur (IHP Panel report to AC Overview of recommendations, 22 July 2016, at pg. 53). So while the exact percentages of growth to be expected in, say, Mt Wellington/Ōtāhuhu may have changed slightly, we can assume that the current figures are broadly consistent with the new PAUP provisions.

It is anticipated that the Joint Modelling Application Centre (JMAC) will update the regional growth forecasts to reflect the specific PAUP zonings in early 2017. However, it is not anticipated that the new PAUP zonings will have a significant change to the modelling results.

2.6 Model outputs (flows, travel times and reliability)

The regional ART3 and local-area SATURN models represent three weekday periods, namely the AM, PM and Inter peak periods. The models represent average weekday conditions, rather than seasonal peaks (such as can often occur in March). The models separately represent light vehicles and trucks (comprising both medium and heavy commercial vehicles). Although the peak-period models have been used to inform the design, this Assessment mostly presents only estimated daily flows. As is common practice, those daily flows have been estimated by combining the three peak period flows and this is a valid, industry accepted approach.

The SATURN models separately predicts both “demand” traffic flows (being the number of vehicles wanting to make their journey in the two hour period), and actual “arrival” flows, which are those that can actually progress through the peak-hour, based on the network capacity. Where demand flows exceed capacity the vehicles are still assumed to travel, albeit shifted in time to the shoulder peaks. Due to the congested conditions, the daily flows are estimated from the demand flows in each peak so delayed trips are not ignored.

Other periods (such as Saturdays), can become congested in parts of the Auckland network, especially near retail areas. However, this Onehunga-Penrose business area has significantly lower traffic activity and congestion on weekends compared to weekdays, so explicitly modelling weekend periods is not considered necessary to understand the effects and outcomes of this Project.

The SATURN models predict average travel times for the periods, and as such do not include predictions of travel time variability. The predicted changes in average travel times are therefore the key indicator used to represent vehicle journeys.

Typical definitions of travel time reliability (such as those in the NZ Transport Agency's Economic Evaluation Manual), refer to the variability in times for the same journeys leaving at the same time each day. Although that variability can be measured on the existing network, the SATURN models do not predict such variability. Additionally, the Onehunga-Penrose industrial study area has substantial volumes of business trips, including for freight transport and logistics activities. Travel from such businesses would be more dispersed in their destinations and their times of day, and as such, consistency across the day would be an important measure of reliability.

Accordingly, the assessment has developed a consistency measure, which can use the model outputs and is likely to be a better indicator of journey *reliability* for business trips. To avoid confusion, this measure is used as a proxy for journey time reliability, but is referenced as travel time consistency.

The consistency measure considers the variability for a movement at different times of day and for either direction of travel. This has been applied to the three modelled peak period average travel times, and across the inbound and outbound movements. The three peaks and two directions therefore provide six predicted averages, from which the range, median and standard deviation can be estimated. Minimising the range of those movements would therefore represent more consistent and reliable access to this area.

2.7 Transport and traffic assessments

2.7.1 Road network (general and freight traffic)

The assessment of the effects of the Project on the road network has considered changes to traffic flows, travel times and travel time consistency for general and freight traffic. It is recognised that cars and trucks generally have the same journey times in congested urban networks.

The assessment uses predicted changes to average truck travel times and total traffic flows on the key freight corridor as the basis for the impact on freight and general traffic movement. It considers the time and journey consistency accessing the Onehunga-Penrose area, and the wider strategic network. The total traffic flows on the key corridors in the industrial study area are used as a measure of the conflicts and delays associated with trying to access properties (or minor side roads) from the key arterial roads.

As is demonstrated later in this report (see 4.8.2), the variability of travel time is significant accessing this area. Although future variability cannot be predicted in the models, it should be noted that the use of average travel times for each peak period will tend to underestimate the flow and congestion conditions on busier days. However, the use of three separate peak periods and two forecast years is considered appropriate to be able to assess the likely impact of the Project on the transport network.

2.7.2 Public transport network

The effects on the public transport network has focused on the following aspects:

- Direct impacts on bus routes and bus stops;
- Impacts on travel times for buses accessing Onehunga from SH20 (from the SATURN model);
- Changes in traffic flows and impacts on travel times for other bus routes in the area;
- The consistency of travel times (as defined above); and
- Wider regional impact on public transport usage, informed by the ART3 model.

2.7.3 Walking and cycling network

The assessment has considered the potential effects of the Project on pedestrians and cyclists. This has been primarily via a qualitative assessment of changes in the type and quality of connections and facilities provided, as indicated in *Volume 2: Drawing Set, Drawing Set 3: Road Alignment*. Simple estimates of future potential usage have been made based on comparable projects, rather than detailed modelling. The future usage estimates have been based on data collected on the Waikaraka Cycleway during June 2016 with a seasonal and growth factors then applied which have been derived from Auckland Transport cycle surveys.

2.7.4 Property access

The assessment has considered the potential effects of changes in property access, based on the *Volume 2: Drawing Set, Drawing Set 3: Road Alignment* Local access impacts have been assessed in terms of extra travel or manoeuvres required. They are considered within the context of the wider access route, not just the immediate entry point.

2.7.5 Parking

This includes assessment of potential physical impact of reducing properties on-site parking spaces as well as any on-street parking that may be impacted by the Project.

2.7.6 Safety performance

The previous Business Case investigations did not identify road safety as a significant issue in this area, and it is not a specific Project Objective. However, the Transport Agency have an over-arching objective to operate a safe and efficient highway network.

Subsequently, safety considerations have been an important element of the design project, with specific Safety Audits and Safety in Design assessments undertaken at regular intervals during development of the Project.

This assessment has therefore discussed the existing key safety issues and the key design features, rather than undertaking a comprehensive network-wide assessment of likely crashes. The safety performance assessment has considered the impact of the Project on existing roads, new roads and pedestrian and cyclist safety.

This crash history for the existing network has been analysed for a 5-year period to estimate current issues.

2.8 Design process

Altering or incorporating features into the design of the Project alignment to avoid or reduce any adverse transport impacts has been at the forefront of the design process. The design of the alignment has been an iterative process which has included taking on board comments from numerous stakeholders including Auckland Transport (Network Operations, Parking, Walking and Cycling, Buses), Bike Auckland, KiwiRail, Panuku Development Auckland and major landowners.

Wherever possible the design of the Project has aimed to minimise land requirements, impacts on parking and access and ensuring the Project didn't preclude future transport projects (e.g. mass transit to the airport. A description on how mass transit to the airport has been protected is included in Section 9.8 of this report). The design has included similar iterative processes in regard to other impacts such as environmental and social.

Changes to the design of the alignment relevant to transport performance have included:

- Use of traffic signals and restricted movements at Hugo Johnston Drive to reduce through traffic;
- Widening of Captain Springs Road to accommodate the higher flows and increased (arterial) function of the road;
- Reinstating the currently banned right turn movement from Neilson Street into Onehunga Mall (north) to mitigate the removal of the right turn into Gloucester Park Road and Galway Street;

- Separation of cycle and pedestrian movements along the foreshore to reduce safety risks;
- Changes to the SH20 interchange at Onehunga to reduce the risk of queues blocking back onto the motorway;
- Changes to the local connections at Onehunga to separate local and industrial traffic;
- Changes to road and intersection alignment at Great South Road;
- Provision for clearways to reduce the impact on parking on Captain Springs Road; and
- Grade separation of the Great South Road intersection for east-west through movements to improve reliability, provide future resilience and enhance pedestrian and cycle movements.

There have been changes to the design of the alignment to reflect comments from Auckland Transport (Walking and Cycling Team) and Bike Auckland where possible. This process will continue and the detail of the type of walking and cycling infrastructure, will be developed in the detailed design process, including both the form and connections. A process to work collaboratively with the Auckland Transport Walking and Cycling Team during the detailed design process is recommended as discussed in Section 7.

Regular liaison meetings were held with transport specialists from Auckland Transport and the Transport Agency on the design. Ongoing liaison is expected with key stakeholders including Auckland Transport, KiwiRail and individual landowners as the design is developed in more detail post-consenting. A formalised process of liaison with Auckland Transport regarding specific design details and the integration into the existing network is recommended, as discussed in Sections 6 and 7.

2.9 Study area Sectors

The AEE has defined specific six sectors for the assessment process. However, transport movements generally traverse multiple sectors with interactions between them, depending on the activities and travel conditions. As such, this assessment generally segments the assessment by mode or issue rather than by geographical sectors.

3 Transport Planning Framework

The detailed assessment against the objectives and policies of these statutory documents is undertaken in *Volume 3: Report 2 – Statutory Planning Analysis*. This section highlights the parts of the frameworks that are of particular relevance to transport and should be read aside Report 2.

3.1 National Policy Framework

The Government announced on the 27th January 2016 that the Project is regarded as a Project of National Significance and would go through a stream-lined consenting process during 2016 to bring forward its construction.

3.1.1 National Land Transport Programme

The National Land Transport Programme (NLTP) for 2015–18 contains all the land transport activities, including public transport, road maintenance and improvement, and walking and cycling activities, that the NZ Transport Agency anticipates funding over the next three years.

The 2015–18 NLTP focuses on four themes, underpinned by the continued emphasis on value for money:

- Encouraging economic growth and productivity;
- Making journeys safer;
- Shaping smart transport choices; and
- Effective and resilient networks;

In terms of freight, a key objective for the NTLP is to deliver a safer and more efficient freight system. Upgrading some of the key constraints on significant high volume routes (such as the East West Link in Auckland) is identified in the NLTP as an opportunity for improving the safety and efficiency of freight movements.

The NLTP also includes a focus on providing greater journey time predictability for urban customers. This is particularly important for businesses, with delays hampering the efficient movement of freight. The Project is identified as a freight investment project that will focus on travel time reliability and efficiency.

3.1.2 Government Policy Statement on Land Transport (GPS) 2015/15 – 2024/25

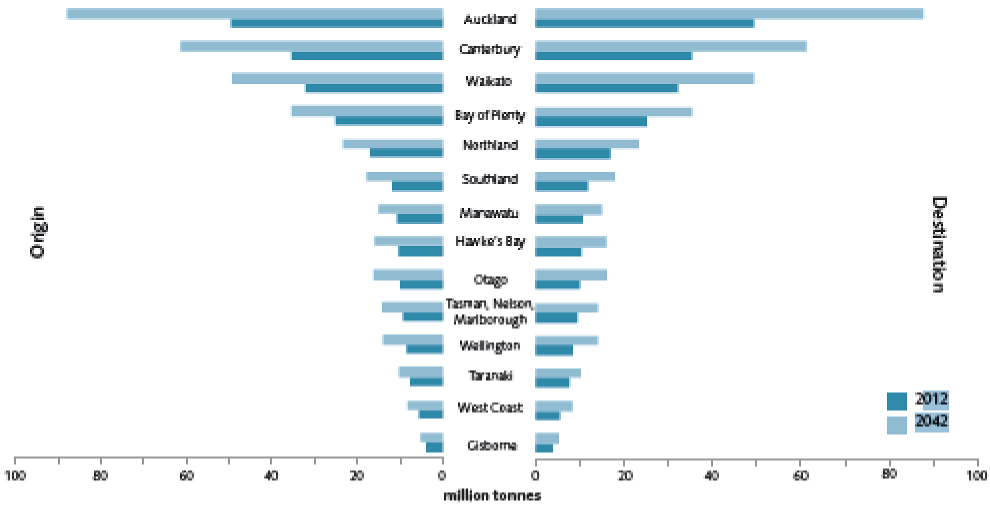
The Government Policy Statement on land transport (the GPS) sets out the Government's strategic and policy goals for land transport, as well as the funding direction necessary to achieve them.

The GPS states the following in relation to Freight Movement:

> *13. Effective and efficient freight movement is critical to the economic health of an exporting nation. Reducing the internal transport costs experienced by producers, processors and exporters of primary produce is one way to improve our international competitiveness. Gains that can be made in this area flow into the rest of the economy.*

14. New Zealand's freight task[3] is forecast to grow by 58 percent in tonnes by 2042 (from 236 million tonnes in 2012 to over 373 million tonnes). This rate of growth is slower than forecast in 2008, but still represents about 1.5 percent per annum. As illustrated in Figure 3-1 growth will be uneven with Auckland and Canterbury predicted to experience the greatest increases in freight, followed by the Waikato. Road transport is expected to remain the primary mode for freight, accounting for about 70 percent of tonne kilometres.

Figure 3-1: Freight Movements 2012 and 2042



Source: National Freight Demand Study, Ministry of Transport, 2014

3.1.3 National Freight Demand Study 2014

The "National Freight Demand Study" was published by the Ministry of Transport in 2014 and provides forecasts of existing and future activity at a national and regional level. This study shows that the dominant mode for freight is road transport and accounts for 91% of tonnes moved in 2012. The study also highlighted that there is significant freight movement within Auckland and there is considerable freight flows in both directions between Auckland and Waikato and Bay of Plenty, which reflects Auckland's role as a major market and distribution hub. The study also shows that Auckland has role as a national distribution hub, with freight moving from Auckland to Manawatu, Wellington and Canterbury.

Overall, the study forecasts that the freight task (rail, coastal shipping and road) in terms of tonnage, is predicted to grow considerably for each mode in the next 30 years over current levels as seen. Rail is expected to grow by 51%, coastal shipping by 81% and road by 58% as seen in Table 10 of the National Freight Demand Study and reproduced as Figure 3-2 below.

[3] It is noted that forecasted freight task includes rail, coastal shipping and road transport modes

Figure 3-2: Forecast Growth in Freight by Mode 2012-2042

Table 10
Forecast Growth in Freight by Mode 2012-2042 (million tonnes)

Year	Rail	Coastal Shipping	Road	Total
2012	16.1	4.2	216.0	236.3
2042	24.3	7.60	341.0	372.9
Growth to 2042	51%	81%	58%	58%

Source: National Freight Demand Study, Ministry of Transport, 2014

The study also forecasts significant changes in the volumes of freight originating in the Auckland Region (including the freight flows moving wholly within the Auckland region) as seen in Figure 9 of the National Freight Demand Study reproduced below as Figure 3-3. The National Freight Demand Study states that *"This highlights the high growth forecast for the Auckland region reflecting its growing share of population and economic activity and its increasing role as a national distribution centre*"

Figure 3-3: Changes in Freight Flows by Origin Regions 2012-2042 (million tonnes)

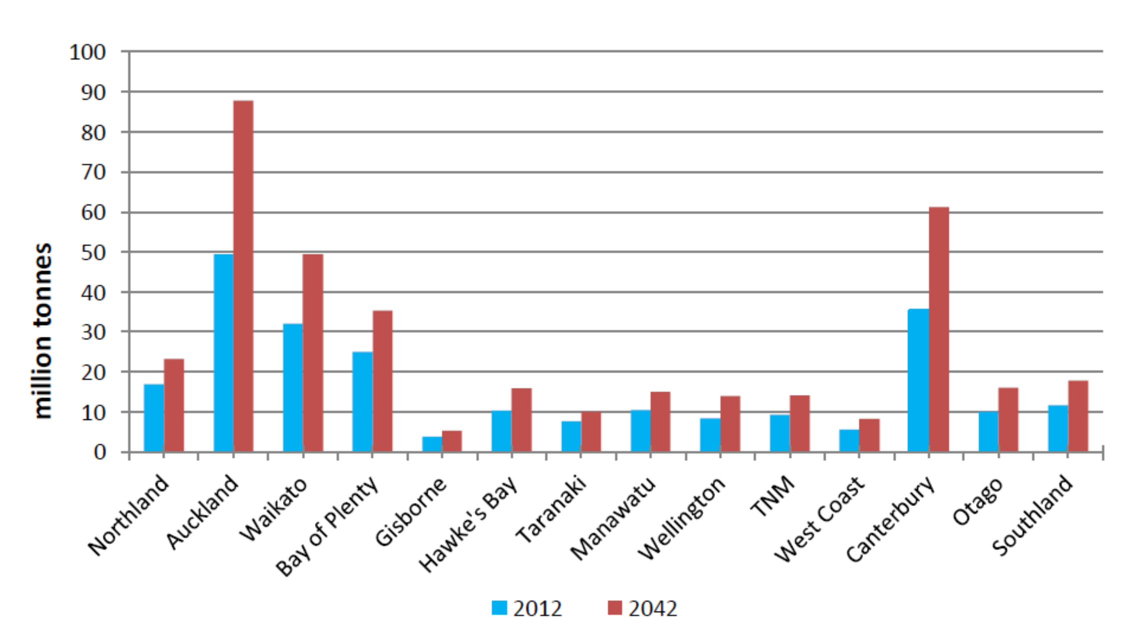


Figure 9
Changes in Freight Flows by Origin Regions 2012 and 2042 (million tonnes)

3.2 Regional Policy Context

3.2.1 Auckland Regional Policy Statement

The 1999 Auckland Council Regional Policy Statement (ACRPS) is used to provide an overview of resource management issues of the region and policies and methods to achieve integrated management of resources of the whole region. It is still operative until the Auckland Council Proposed Unitary Plan (PAUP) comes into force. The major direction of transport policy is set out by the ACRPS and is more fully developed through the Regional Land Transport Strategy (RLTS).

The relevant transport objectives of the ACRPS are sets out in Chapter 4. Objective 4.3(2), 4.3(3) and 4.3(4) are relevant as they are concerned with avoiding, remedying or mitigating the adverse effects of transport on the environment, developing a transport network which provides an acceptable level of accessibility by encouraging transport choices that are efficient, convenient and practical and a transport network that is safe and practical.

The policies which give effect to these objectives include encouraging a significant increase in the amount of travel made by public transport, walking and cycling and the need to reinforce and efficient and effective public transport systems within and connecting High Density Centre and Intensive Corridors.

Policies around improving public transport systems and improving walking and cycling opportunities are also relevant. Policy 4.4 states that the efficiency of congested transport Corridors will be increased by supporting public transport, encouraging increases in freight carrying capacity and encouraging walking and cycling. A discussion on the PAUP in relation to the ARPS is found in Report 2.

3.2.2 The Auckland Plan (2012)

The Auckland Plan (2102-2042) is a strategic local government document that assists to guide Auckland's future over the next 30 years and addresses issues including reducing transport and housing shortages.

The Project is identified as one of three highest priority transport projects in the Auckland Plan.

Strategic Direction 13 is concerned with creating better connections and accessibility within Auckland, across New Zealand and to the world and the relevant priorities for the Project are:

- Priority 2: Integrate Transport Planning and Investment with Land-Use Development;
- Priority 3: Prioritise and optimise investment across transport modes.

A Strategic Direction 13 target relevant to the Project is as follows:

> *Reduce congestion levels for vehicles on the strategic freight network to at, or below, the average of 2006-2009 levels (average daily speed of 45km/h and average delay of 32 seconds per kilometre by 2021*

It is recognised that particular emphasis must be given to freight movement on Auckland-wide transport corridors, the transport system must be easily accessible and ensure reliable journey times and safe and convenient walking and cycling routes must be effected for the transport system to supports Auckland's vision and future growth and development.

The Plan recognises that the AMETI and East-West Link Project are critical to Auckland's future growth and Directive 13.5 states:

> *Jointly progress planning for AMETI and the East-West Link and implementation by 2021*

The Plan describes the Project as a critical project for Auckland's future growth that will address the high traffic and freight movements between SH20 and SH1, and between industrial areas and the port and the airport as well as improvements for public transport, walking and cycling.

Completion of the East West Link is identified as a priority project in the first decade 2011 to 2020 and a High Priority Transport Project.

It is considered that the Project aligns with Directive 13.5 of the Auckland Plan.

3.2.3 Auckland's Integrated Transport Programme (ITP) 2012 - 2041

Auckland's ITP sets out the 30-year investment programme to meet the transport priorities outlined in the Auckland Plan across modes covering the responsibilities of all transport agencies. Developed by Auckland Transport (AT) and The Transport Agency in collaboration with Auckland Council, the ITP provides a consolidated transport investment programme across the transport system over the next 30 years. The programme covers state highways and local roads, railways, buses, ferries, footpaths, cycleways, intermodal transport facilities and supporting facilities such as parking and park-and-ride.

The relevant impacts of the ITP are as follows:

- Auckland's transport system moves people and goods efficiently; and
- Increased access to a wider range of transport choices.

The ITP recognises that there is a need to invest in new infrastructure and that major transport improvements will be crucial to maintain good levels of service for freight and commercial vehicles. The ITP maintains the Auckland Plan's priorities for major network improvements, which include the Multi Modal East West Study (MMEWS) which encompasses the East West Link Project.

The ITP recognises that the one of the key challenges for the strategic freight network is:

> *Maintaining the ability of the freight network to offer convenient and reliable connections between businesses, industrial parks and ports due to growing congestion on the arterial road network.*

The ITP recognises that there will be increased intervention focus over the next 5-10 years on making better use of networks and investing in new infrastructure for freight traffic. The ITP sets out key future directions and the Project is identified as a priority and major road and freight project (2012-2041) and critical regional infrastructure that needs completing as part of the regional road and regional freight network.

Key future directions for the regional road network relevant to the Project are:

- Improve priority access for freight and public transport where this aids in journey time reliability (State highways and motorways);
- Target network improvements in areas which will benefit freight and economic productivity State highways and motorways);
- Improve freight and public transport productivity through improved access (primary and secondary arterials);
- Improve opportunities for cycling and walking in all road projects (primary and secondary arterials, collector and local roads); and
- Complete critical regional infrastructure (MMEWS) (primary and secondary arterials).

Key future directions for the regional freight network relevant to the Project are:

- Improve priority access for freight transport where this aids in journey time reliability (State highways and motorways);
- Complete critical regional infrastructure (MMEWS and Neilson Street upgrade); and
- Improve parking and access to businesses and properties for freight (collector and local roads).

3.2.4 Regional Public Transport Plan (RPTP) 2013

The RPTP is a statutory document that describes the services that are integral to Auckland's public transport network and the policies and procedures that apply to those services. The RPTP also describes the public transport services that AT proposes for the region over a 10-year period and outlines how this vision will be delivered.

Key challenges identified in the RPTP relevant to the Project for bus travel are as follows:

- Uncompetitive travel times with cars (e.g. stop-start travel); and
- Impact of congestion on bus operations.

The RPTP recognises that the ability of public transport system to offer an attractive alternative to private vehicle travel can be compromised when services are affected by traffic congestion. This increases bus travel times, reduces reliability, and makes connections between services difficult to achieve.

A convenient and reliable public transport system using modern vehicles (Objective 4 of the RPTP) is relevant to the Project. The RPTP acknowledges that the most important consideration for public transport users is reliability, that is, whether a trip leaves on time and arrives at (or very close to) the scheduled time.

Policy 4.2 seeks to address this objective and aims to “improve public transport journey times to provide a service that is competitive with car travel’. Actions identified to fulfil the policy include identifying and eliminating significant delay points for public transport services and provide bus priority measures along key corridors to reduce bus journey times and improve reliability.

3.2.5 Regional Land Transport Plan (RLTP) 2015 – 2025

The RLTP is a plan of how transport delivery agencies intend to respond to growth and other challenges facing Auckland over the next 10 years. It includes a 10-year prioritised delivery programme of transport services and activities for Auckland, and is the combined transport programme of the NZ Transport Agency, Auckland Transport and KiwiRail.

The East West Connections project is identified in the RLTP as the fourth highest priority project with the State Highway component ranked fifth.

In June 2013, the Government announced an accelerated package of transport infrastructure improvements for Auckland including the East West Connections package (this includes the East West Link). The decision was based on forecast increase in freight demand around New Zealand, particularly in Auckland, combined with a growing population.

Two outcomes for State highways identified within the RLTP are to progress Auckland’s Accelerated State Highway Programme (which includes the Project) and early work on East West Connections.

An outcome for arterial and local roads within the RLTP is to start the local roading, walking and cycling and public transport elements of the East West Connections.

An outcome for Public Transport identified within the RLTP is substantial travel time savings and an outcome for Walking, Cycling and travel demand management is increased level of cycling, safety benefits and improved links to public transport.

3.2.6 The 10 Year Budget - Long-Term Plan 2015-2025 (LTP)

The Long-term Plan (LTP) 2015 to 2025 provides an overview of the Councils’ plans, strategies and budgets for the next 10 years. The LTP identifies improving East West connections in the Onehunga, Penrose, Ōtāhuhu, Sylvia Park and Māngere areas as a key project.

3.2.7 Auckland Transport Alignment Project (ATAP)

The Auckland Transport Alignment Project (ATAP) is a joint project involving Auckland Council, the Ministry of Transport, Auckland Transport, the NZ Transport Agency, the Treasury and the State Services Commission.

A final report "The Recommended Strategic Approach" was published in September 2016 and recommends an aligned strategic approach, including an indicative package of transport investment, for the next 30 years.

The Project is identified as a committed project with agreed investment and forms a key part of the indicative package of transport investment in the first decade. The East West Link is identified as becoming part of the Proposed Future Strategic Road Network.

3.3 Summary

These statutory documents identify that the Project is one with national significance and is one of one of three highest priority transport projects identified in the Auckland Plan and within a range of other regional planning documents.

4 Existing and Future Transport Environment

4.1 Introduction

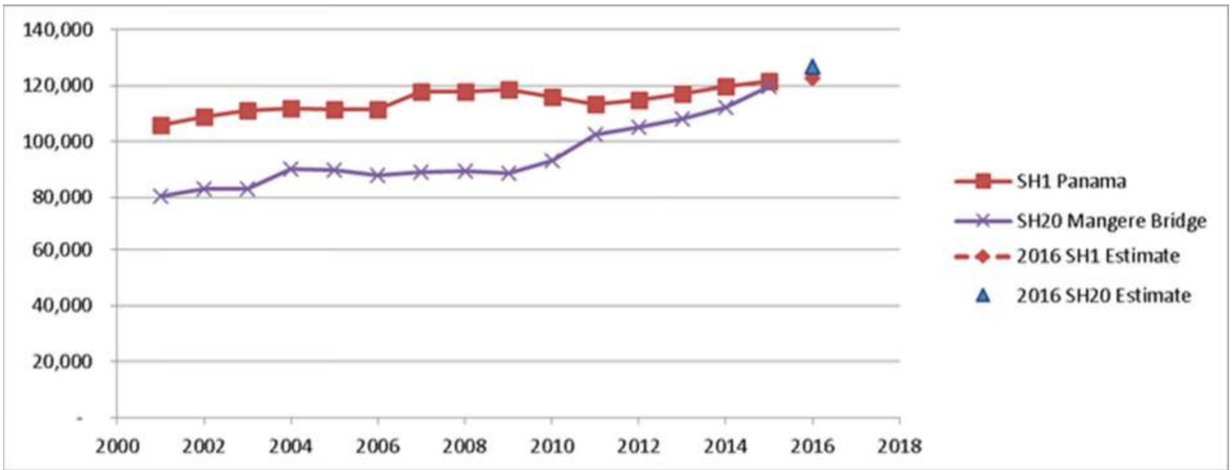
This section describes the existing and future (Without Project) road, public transport and walking and cycling network for the Project area. The Project Area can generally be described as the areas between the Neilson Street interchange (SH20) in the west and SH1 (Southern Motorway) Mount Wellington interchange in the east and along SH1 to Princes Street. The existing corridor referred to in this report is generally described as Neilson Street, Church Street and Great South Road.

This section also describes the historic and predicted growth, traffic volumes for the 2026 and 2036 years, existing travel characteristics, existing and predicted travel times for general traffic and trucks and the crash environment.

4.2 Historic traffic growth

The modelling methodology uses land use growth as an input, with traffic and patronage growth generated as an output. Historic traffic growth rates are not directly used as an input to the models. However, they are useful to help provide context and validation of the predicted future growth. Figure 4-1 shows the historic traffic growth on SH1 and SH20. Very substantial growth has occurred on SH20 since 2009 due to other projects being completed along the Western Ring Route (WRR) and this is expected to continue with the completion of the WRR.

Figure 4-1: Historic Traffic Growth



Since 2009, when the adjacent section of SH20 was extended to Maioro Street, the daily traffic flow on the Manukau Harbour Bridge increased at an average rate of nearly 6% per annum. The adjacent section of SH20 north of Neilson Street has growth even more, increasing by 38,000vpd in that period, equivalent to 9% per year.

The growth on SH1 has been very low over that period, averaging only some 0.4% per annum. This reflects that this section of SH1 operates at capacity during extensive parts of the day, with little ability for further growth in its current form. The effect of this capacity constraint includes extending the length of the peak periods, with northbound congestion on SH1 now typically extending for over three hours (6:30-9:30am and 3:30-6:30pm).

Estimates of the 2016 counts have been made using available data for the first six months of 2016. This suggested a further 1% increase over 2015 on SH1 and a 6% increase on SH20.

4.3 Existing land use

The Project Area includes the suburbs of Onehunga, Te Papapa, Penrose, Mount Wellington and Ōtāhuhu as shown previously on Figure 1-1.

A detailed description of the land use zoning within the Project Area is included in the AEE. However, the existing land uses adjacent to the alignment include, and can generally be described as, commercial/industrial around the Neilson Street interchange, industrial (ports) and recreational land use adjacent to the Māngere Inlet, commercial and industrial land use between the inlet and SH1 with residential land use adjacent to SH1 and at Princes Street and Panama Road.

The Onehunga/Penrose area is the main industrial, transport and distribution hub of Auckland and of the Upper North Island. Inland ports served by rail links from the Port of Tauranga and Auckland enable national and international freight to be trucked to its destinations. Most major freight and logistic businesses in Auckland have depots in the Project Area. The Project Area is a major manufacturing hub and the location for almost 40% of Auckland's manufacturing jobs[4].

MetroPort and Ports of Auckland are an international gateway for freight. Other major freight generating and attracting areas are located to the south (the Airport and Manukau) and to the east (East Tamaki) of the study area. Minor freight generating and attracting areas are also located to the north (Mount Wellington and Panmure), south (Māngere and Ōtāhuhu) and to the east (Highland Park)

Onehunga Town Centre and Wharf have been identified as a priority development area by Panuku Development Auckland. Recent investment in the area includes the Taumanu-Onehunga Foreshore project, upgrades to the Onehunga Mall, transport investment in the rail station and SH20 upgrades.

4.4 Future land use growth

The most significant influence on the current transport system is the expected growth, both locally and across the Auckland Region. The EWL Business Case investigations identified that the travel demands in this study area were a function of regional, rather than just local growth plans. This is because the freight and logistics industries are heavily influenced by regional consumption, rather than local growth, and because this particular area is located where between the northern and southern parts of Auckland, which are connected by only a small number of roads. This means that a significant proportion of growth in the region must pass through this area.

The future year scenarios are based on land use predictions generated by Auckland Council. The regional models use land use growth Scenario I-9, which reflects the Medium Growth scenario developed for the Auckland Plan, and modified at a zonal level to address recent changes in growth outside the RUB, Special Housing Areas (known at the time) and the direction of the PAUP. Those regional growth forecasts are however quite 'strategic', rather than being precisely based on individual consents or plan changes. The ART3 regional model generates vehicle and passenger travel demands from these forecasts of population, households and employment.

The predicted land use growth is summarised in Table 4-1, for a range of sectors shown in Figure 4-2. The sectors are not of equal size but were chosen to identify changes in travel demands.

[4] Regional Land Transport Programme

Figure 4-2: Sectors Used for Growth Analysis

Table 4-1: Forecast Population and Employment Growth

Groups	Population						
	2013	2026	Growth over 2013	% Growth	2036	Growth over 2026	% Growth
Population Growth							
North Shore	351,054	440,889	89,835	26%	513,230	72,341	16%
CBD	75,378	107,861	32,483	43%	130,090	22,228	21%
Central Isthmus/West	398,205	484,383	86,178	22%	538,641	54,258	11%
Eastern Isthmus	121,553	158,156	36,603	30%	182,101	23,945	15%
Onehunga Penrose	19,537	26,908	7,371	38%	31,879	4,971	18%
Māngere and Airport	58,438	65,433	6,995	12%	68,948	3,516	5%
Mt Wellington/Ōtāhuhu	18,607	22,537	3,929	21%	24,940	2,403	11%
East	144,168	164,160	19,992	14%	174,896	10,736	7%
Manukau and South	284,168	347,318	63,150	22%	399,518	52,200	15%
Regional Total	1,471,108	1,817,645	346,537	24%	2,064,243	246,597	14%
Employment Growth							
North Shore	133,957	155,301	21,345	16%	171,604	16,302	10%
CBD	137,342	172,038	34,696	25%	198,888	26,849	16%
Central Isthmus/West	118,032	133,648	15,615	13%	145,879	12,231	9%
Eastern Isthmus	38,755	41,746	2,992	8%	44,099	2,353	6%
Onehunga Penrose	25,354	25,679	325	1%	25,961	282	1%
Māngere and Airport	25,409	32,566	7,157	28%	38,097	5,531	17%
Mt Wellington/Ōtāhuhu	13,652	14,080	429	3%	14,427	347	2%
East	45,912	49,998	4,087	9%	53,199	3,201	6%
Manukau and South	79,740	97,876	18,135	23%	116,686	18,810	19%
Regional Total	618,152	722,932	104,780	17%	808,840	85,908	12%

This shows regional growth in population of 24% between 2013 and 2026, with a further 14% between 2026 and 2036 (40% combined growth 2013 to 2036). The predicted growth in employment is 17% to 2026 with a further 12% to 2026 (a combined growth of 31% 2013 to 2036).

These growth predictions are expected to generate significant additional travel demands in this part of the transport network. In the vicinity of this Project, the most significant predicted change is the high population growth predicted in Onehunga and Ōtāhuhu, with the high employment growth in Māngere and the Airport area.

As discussed previously in Section 2, the decisions in the PAUP is consistent with the Medium level growth forecasts (Auckland Plan Scenario I-9). It is anticipated that JMAC will update the ART3 model to reflect the PAUP zonings and new regional forecasts will be released in early 2017. However, it is not anticipated that the new PAUP zonings will have a significant change to the modelling results.

4.4.1 Future Travel Growth

The predicted growth in travel demands are illustrated in Table 4-2 below, which shows the growth in trips for each sector. This growth is forecast in the regional, multimodal model (ART3), and reflects the land use, network and policy inputs. For simplicity, these daily trips are estimated from the three peak periods only and use the same expansion factors for vehicle and public transport demands. Demands between two sectors were split equally between the origin and destinations to give an average growth in trips for each area. The 2026 demands are from the 'Without Project' baseline.

Table 4-2: Predicted Growth in Travel (2036)

Estimated Daily Vehicle Trips				
Sector	**2013**	**2036 without Project**	**Growth**	**% Growth**
North Shore	1,032,887	1,361,321	328,434	32%
CBD	410,344	412,050	1,706	0%
Central Isthmus/West	897,601	1,086,206	188,605	21%
Eastern Isthmus	286,465	353,185	66,720	23%
Onehunga Penrose	94,450	109,546	15,097	16%
Māngere and Airport	153,866	224,243	70,377	46%
Mt Wellington/Ōtāhuhu	62,656	72,814	10,158	16%
East	308,662	358,526	49,863	16%
Manukau and South	639,400	939,253	299,852	47%
Region Total	3,886,332	4,917,144	1,030,813	27%

Estimated Daily Public Transport Trips				
Sector	**2013**	**2036 without Project**	**Growth**	**% Growth**
North Shore	37,920	114,852	76,932	203%
CBD	83,743	204,649	120,907	144%
Central Isthmus/West	52,443	152,944	100,500	192%
Eastern Isthmus	16,412	45,812	29,400	179%
Onehunga Penrose	3,893	12,837	8,944	230%
Māngere and Airport	6,301	12,224	5,923	94%
Mt Wellington/Ōtāhuhu	3,326	6,497	3,170	95%
East	14,700	33,101	18,401	125%
Manukau and South	25,538	74,619	49,081	192%
Region Total	244,277	657,534	413,258	169%

This data indicates that:

- Between 2013 and 2036, regional vehicle trips are predicted to increase by 27% while public transport trips are predicted to increase by 169%. Given that the population is expected to grow by 40% over this period, this demonstrates a significant increase in the mode share for passenger transport in the future year models;
- The most significant proportional growth in vehicle trips are for the airport and Manukau/south areas, both of which are relevant to this area;
- The Onehunga/Penrose area has the highest percentage increase in passenger transport trips predicted, albeit from a low base.

Overall, there are significant regional and local growth pressures that will impact the future transport system. There is also very clear evidence of rapid growth in the SH20 corridor, which is expected to accelerate with the opening of the Waterview Tunnel.

4.5 Road network

4.5.1 Introduction

The key roads for the Project are shown in Figure 4-3 and will provide new connections with the EWL, be upgraded or realigned or experience a change in traffic volumes.

Figure 4-4 presents Auckland Transport's Road Classification for these key roads. The AT road classification is used to determine the role and function of the road. It was agreed with AT to use their road classification for the EWL Project for planning purposes as the Project will have an impact on the future use of the roads. Some road classifications may change because of the Project as discussed in Section 6.

The roads within the Project area include a mix of, motorways, strategic arterials, primary arterials, secondary arterials, collector roads and local roads.

For completeness, Figure 4-5 shows the Proposed Auckland Unitary Plan (PAUP) (Decisions Version) road classification. It is noted that only arterial roads are classified under the PAUP.

The Project area includes Auckland's main manufacturing area and is a regional hub for transport and distribution activities. As such, the area includes many roads which form part of Auckland's Regional Freight Network and shown on Figure 4-6 AT have advised that Auckland's Regional Freight network is classified into three different levels with Level 1 the Strategic Freight Network, Level 2 the Local Area Freight Networks and Level 3 supporting freight networks. Most of the key roads within the Project area have been classified with the highest freight classification as seen in Table 4-3 including SH1, SH20, Onehunga Harbour Road, Onehunga Mall, Neilson Street, Church Street, SEART, Mount Wellington Highway and Sylvia Park Road.

Table 4-3: Freight Network Descriptions

Roads	Freight Network Level	Description
SH1, SH20, Onehunga Harbour Road, Onehunga Mall, Neilson Street, Church Street (between Neilson Street and Hugo Johnston Drive), SEART, Mount Wellington Highway, Sylvia Park Road	Strategic Freight Network (SFN) Level 1 A	Arterials where freight movements have high priority: Freight movements across these roads are actively supported and improved to enhance freight performance levels. Arterials in this category include the motorways, most of the State highways and specific arterials that is of strategic value to freight movements.

Roads	Freight Network Level	Description
Great South Road	Strategic Freight Network (SFN) Level 1B	Arterials where freight movements are to be actively encouraged but where competing land uses require active management to ensure that freight movements receive the highest priority for road use.
Hugo Johnston Drive, Captain Springs Road (north of Neilson Street only), Church Street (between Captain Springs Road and Neilson Street)	Local Area Freight Network Level 2	The local area freight networks consist of arterial, collector and local roads which primarily serve local freight areas such as industrial centres and where there are no competing land use demands i.e. the land adjacent to these roads are primarily used for freight purposes and free from sensitive community or other residential impacts.
Panama Road, Mount Wellington Highway (partial), Carbine Road (partial)	Supporting freight networks Level 3	The supporting freight network comprises of arterials and local roads which HCV will use of necessity primarily due to lack of viable alternatives. It is recognised that the nature of the land uses adjacent to the road is such that freight movements are not actively encouraged or supported and the priority for road use is not for freight purposes. Provision for HCV movements will mainly focus on ensuring that the identified roads are technically able to perform such tasks but will not offer particular inducements for freight.

The existing key movements between businesses in the Onehunga – Penrose industrial hub and SH1 and SH20 are presented in Figure 4-7 and represent the most direct route for vehicles. However, it is noted that due to congested access particularly those vehicles accessing the industrial hub from SH1 (south) vehicles use other routes as discussed further in this section. A designated over-height and over-dimension route runs along the northern arm of Great South Road and along Sylvia Park Road.

Figure 4-3: Key Roads

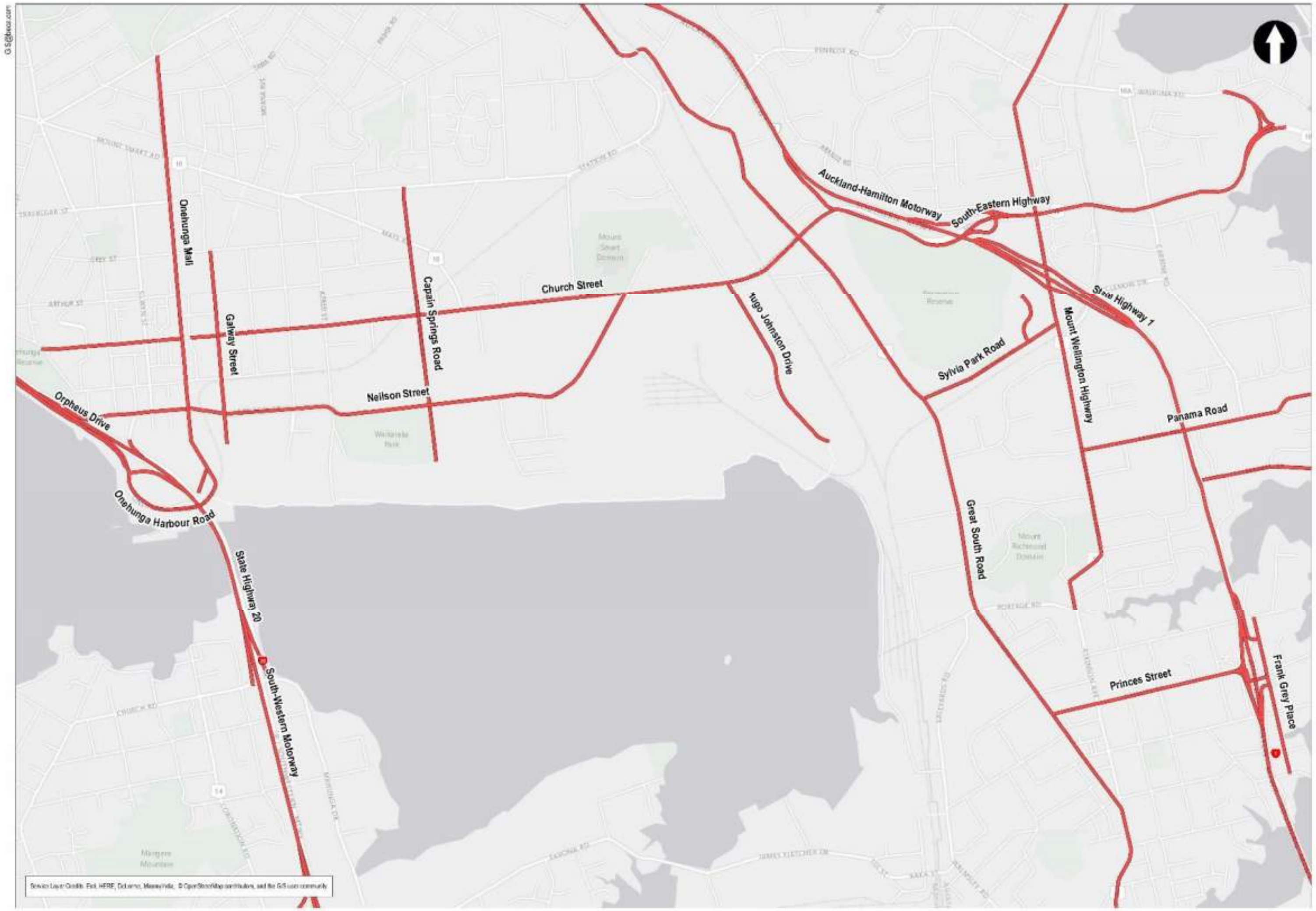


Figure 4-4: Auckland Transport Road Classification

Figure 4-5: Proposed Auckland Unitary Plan Road Classification

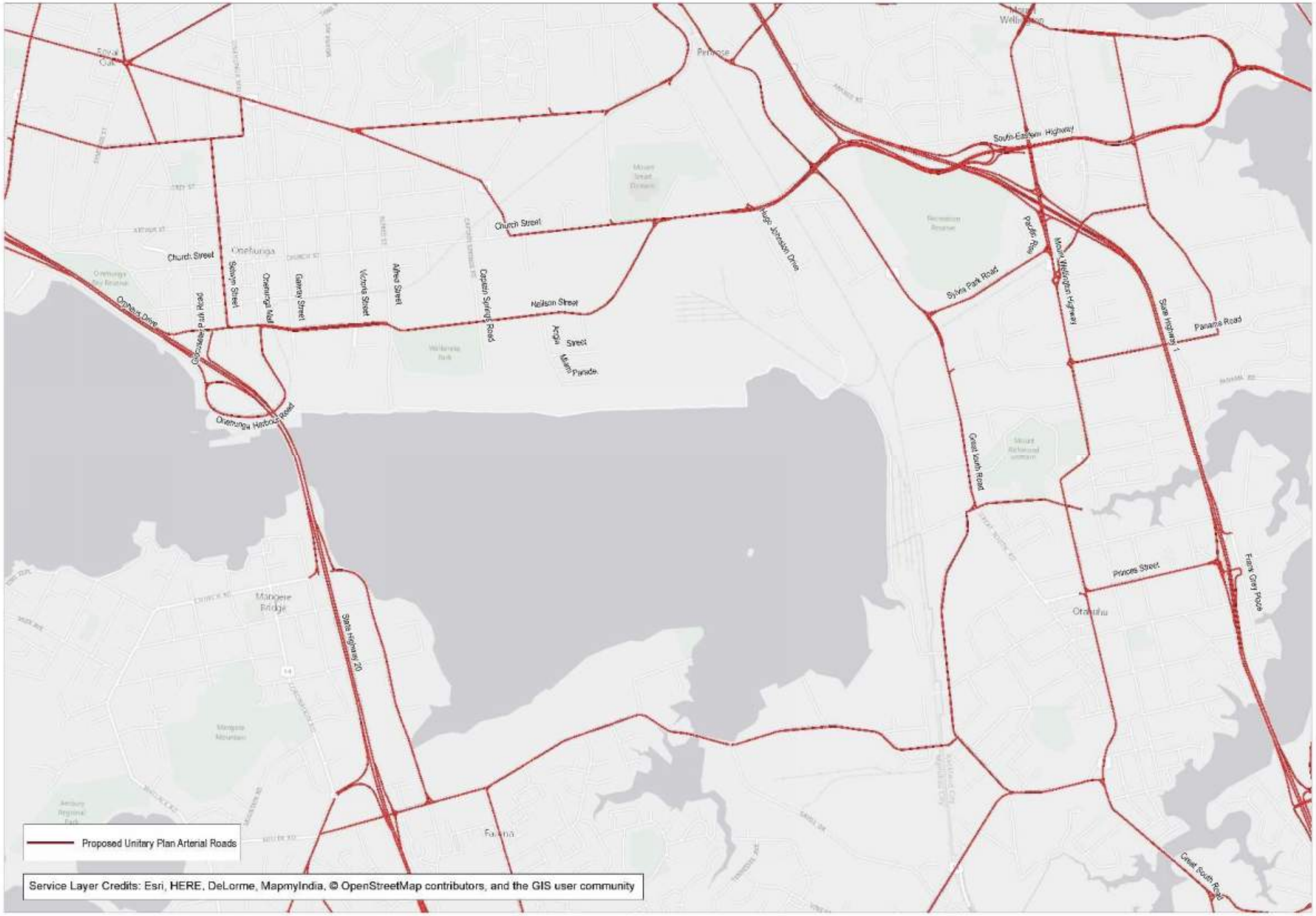


Figure 4-6: Regional Freight Network

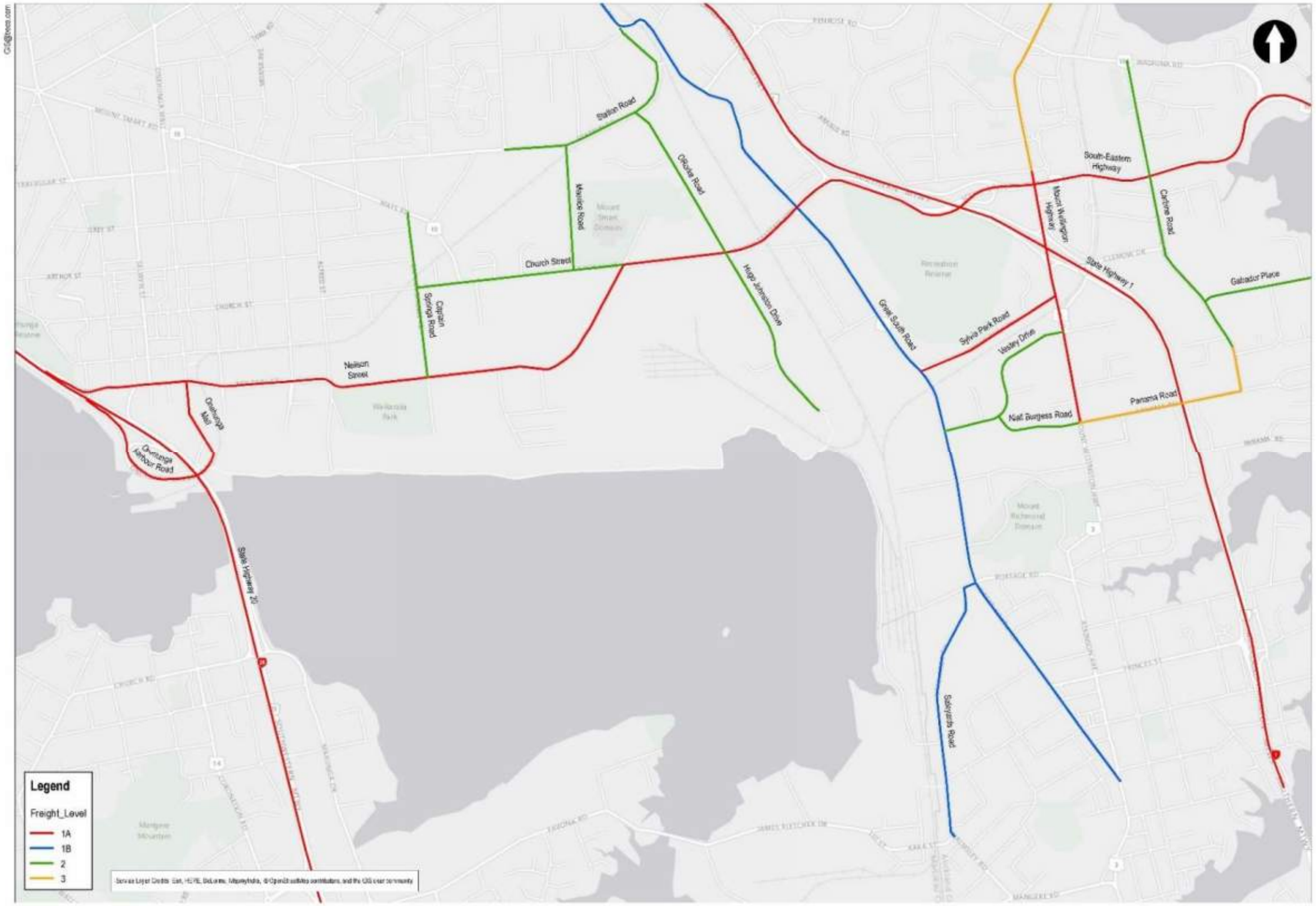
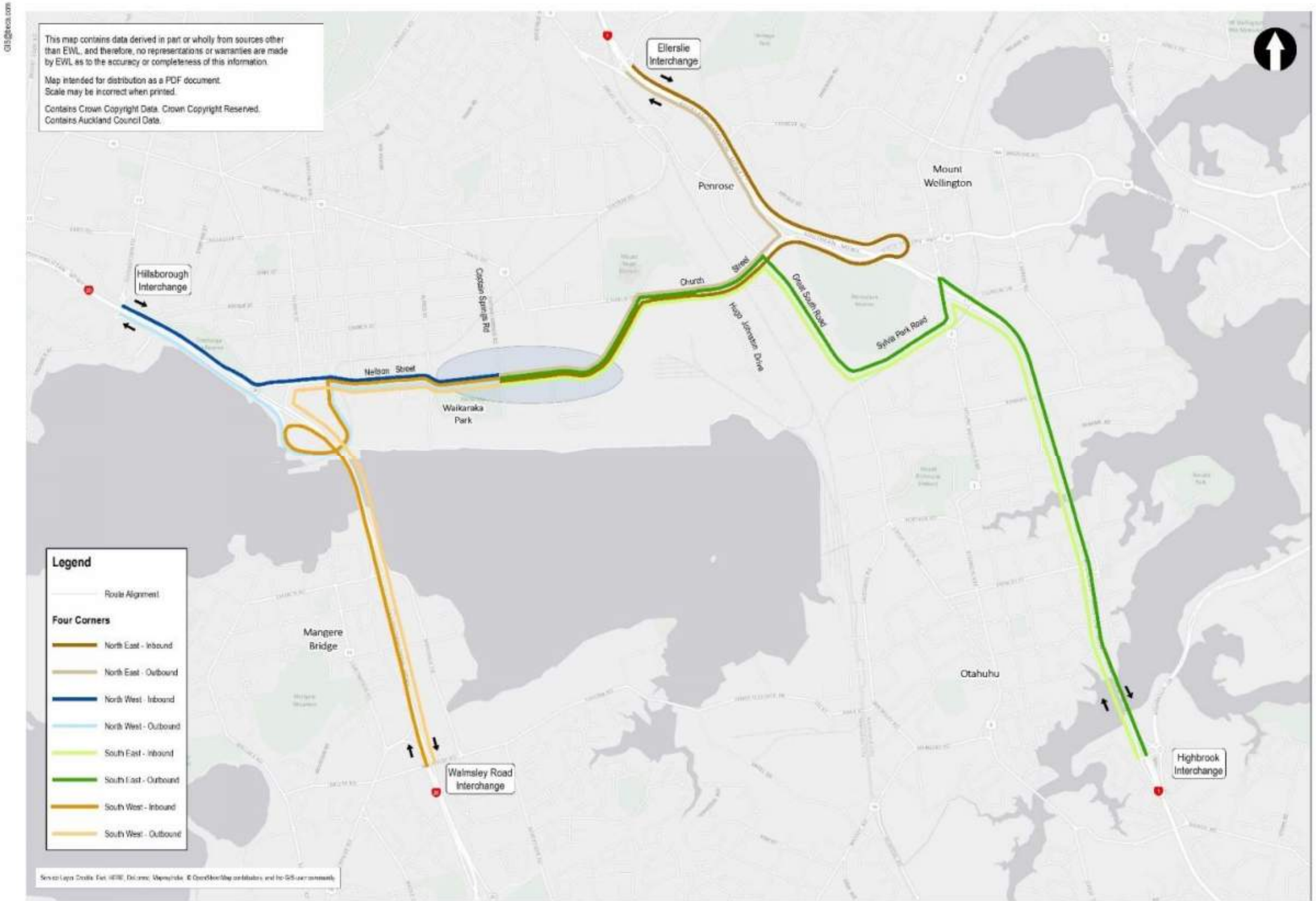


Figure 4-7: Existing Key Movements



4.5.2 Existing and Future Road Network

4.5.2.1 Approach

The approach taken for describing the existing and future road network has been to focus and provide more detail on those roads and environments where changes are expected.

Further detail on the existing and future road network is provided below (from west to east) and have been classified as per Auckland Transport's Road Classification and under the PAUP. It is noted that the PAUP only classifies arterial roads.

A more detailed description of the existing walking and cycling conditions of the road network is provided in sub-section 4.14 and this includes commentary on existing facilities and commentary on connectivity and amenity. The impact of the Project on the walking and cycling facilities is discussed in Section 7.

Where there is predicted to be an impact on on-street parking (e.g. permanent or temporary removal of parking) more detail has been provided on the parking environment of these roads and parking surveys have been undertaken. These local roads include Captain Springs Road, Hugo Johnston Drive, Galway Street and Sylvia Park Road. The description of the on-street parking environment has been provided in sub-section 4.16 and the impact of the Project on these roads are discussed in Section 6.

This section does not provide detailed 2016 traffic counts for every road as the focus of our assessment is comparing future years With and Without the project. However, we have provided 2013 modelled counts as proxy for the existing traffic counts. We have included some 2013 modelled traffic flows in Table 4-4 of this section of key roads such as Church Street, Great South Road, Neilson Street, SH1 and SH20 only to illustrate the magnitude of change into the future. A more detailed analysis, including the 2013 modelled traffic flows (as a proxy for existing traffic flows) for over 50 roads in the Project Area are shown in Table 5-7, Table 5.8 and Table 5-9 in Section 5. These modelled flows include heavy vehicles. To demonstrate the high proportion of heavy vehicles on Neilson Street, 2016 heavy vehicle counts have been included in Section 4.7.

The number of lanes for each road is described below however it isn't considered necessary to describe the width of each road unless it is relevant to the expected effect. For example, the width of Hugo Johnston Drive is described below as there are existing pinch points which are relevant to the proposed impact of the Project. The existing crash history for roads within the study between 2011 and 2015, including a commentary on pedestrian and cyclists crashes, is included in Appendix D. Where the design process has required safety performance to be assessed (e.g. Hugo Johnston Drive), the existing crash environment has been discussed as part of the assessment in Section 6.

Data is also provided on travel times and congestion for both vehicles and buses entering this area. This data demonstrates the scale of the existing congestion issues. However, as the main assessment of effects is based on comparing future scenarios, the effects assessment is based on the modelled travelled times.

4.5.2.2 State highway 20

Existing

- SH20 operates between SH1 at Manukau City Centre in the south and Maioro Street (New Windsor) in the north. It is classified as a motorway, Arterial Road (PAUP) and is part of the Strategic Freight Network (SFN) Level 1A. The motorway provides connections to the suburbs of Wiri, Puhinui, Māngere, Māngere Bridge, Onehunga, Hillsborough and Mount Roskill. SH20 has eight lanes south of the Neilson Street on/off-ramps and six lanes north of Neilson Street on/off-ramps;
- Northbound off-ramp: A single lane which joins Onehunga Harbour Road. There is a right turn mid-way on the off-ramp leading into either Orpheus Drive or the northbound on-ramp, and is a priority controlled intersection. Slow moving queues are often seen for the majority of the length of the ramp; and
- Northbound on-ramp: Two lanes one of which is a relatively short T2 lane. The on-ramp merges with the mainline traffic.

Future

SH20 forms part of the Western Ring Route, which on completion in 2017 will create a 48km alternative route around Auckland, reducing dependence on SH1. An integral part of this Project is the Waterview Connections project which includes tunnels connecting SH20 and SH16.

In the future SH20 will be widened from six to eight lanes (Neilson Street to Queenstown Road) which will be implemented separately by the Transport Agency in 2016/17 as part of the early works for the Project. Construction of an additional lane south of Maioro Street is already underway.

4.5.2.3 Orpheus Drive

Orpheus Drive is classified as a local road and is a two way (one lane in each direction) lightly trafficked road providing a connection between the residential area of Hillsborough (northern end) to Onehunga Harbour Road (southern end). It provides access to the Onehunga Foreshore area, the Manukau Cruising Club and Aotea Sea Scouts Hall. Orpheus Drive is generally narrow, particularly south of the Manukau Cruising Club. A segregated 3m wide, 700m long cycle route is provided on Orpheus Drive north of the Manukau Cruising Club.

4.5.2.4 Onehunga Harbour Road

Onehunga Harbour Road is classified as a Strategic Arterial and is part of the Level 1A freight network. It is classified as an arterial road under the PAUP. It predominantly consists of the SH20 northbound on and off-ramps but also provides access to The Landing, Airport Harbour View Motel and residential apartments. Queuing is common in both directions. Traffic has a large proportion of trucks in both directions and this is the main route for buses accessing Onehunga Town Centre from SH20.

4.5.2.5 Onehunga Mall

South of Neilson Street

The cul-de-sac end of Onehunga Mall is classified as a local road and is mix of residential and commercial land uses. The end of the cul-de-sac connects to the shared path which passes under SH20 to the Old Māngere Bridge.

Onehunga Mall (between Onehunga Harbour Road and Neilson Street) is classified as a Strategic Arterial. Queuing is common in both directions with traffic comprising a large proportion of trucks. This is the main route for buses accessing Onehunga Town Centre from SH20. South of Neilson

Street, Onehunga Mall has one lane in each direction until the approach to the intersection with Neilson Street where it widens to provide three northbound lanes to facilitate turning movements.

North of Neilson Street

North of Neilson Street Onehunga Mall becomes a local road with access to the train station and is the main shopping and business area of Onehunga. There is two-way traffic, two pedestrian crossings and parking on both sides of this section of Onehunga Mall. Traffic speeds are very slow in this commercial area and the right turn into Onehunga Mall from Neilson Street is banned.

4.5.2.6 Gloucester Park Road

Gloucester Park Road, north of Neilson Street, is classified as a local road and provides for two-way traffic flow. Business are located along this length of Gloucester Park Road which have access to both Neilson Street, to the south, and Princes Street to the north. Six driveways provide access to businesses on Gloucester Park Road (north). All turning movements are provided at both these intersections. At the approach to the Neilson Street intersection the road widens and provides for left and straight ahead turning movements. Gloucester Park Road, north of Neilson Street, will become a cul-de-sac to allow for improved performance of the existing Gloucester Park Road and Neilson Street signalised intersection.

South of Neilson Street, Gloucester Park Road is classified as a motorway as it the on-ramp for SH20. There is a T2 / Truck lane (which buses can use) on Gloucester Park Road (south of Neilson/on-ramps) which commences on Neilson Street at the intersection of O'Rorke Street. There are also businesses located on the western and eastern side of Gloucester Park Road (adjacent to the on-ramps). Vehicles wanting to turn right out the businesses on the eastern side currently cross three lanes of southbound SH20 on-ramp traffic.

4.5.2.7 Neilson Street

Existing

Neilson Street is a busy Strategic Arterial road and is part of the SFN Level 1A and generally consists of two through lanes between the SH20 ramps and Alfred Street with a solid median. Neilson Street reduces to a single lane of traffic between Alfred Street and Church Street. It is situated in a largely industrial and commercial area, is well used by heavy commercial vehicles (HCVs) and provides access to many industrial and commercial premises. It is classified as an arterial road under the PAUP.

Waikaraka Park stretches across the southern side of Neilson Street between Alfred Street and Captain Springs Road. The intersection with Captain Springs Road is a signalised intersection. All other intersections are priority controlled.

Future

A clearway will be implemented on Neilson Street between Alfred Street and Angle Street with likely hours of operation to be between 6am and 7pm Monday to Friday. The clearway is likely to be implemented in the last quarter of 2016 and will provide up to four lanes (depending on the time of day).

4.5.2.8 Selwyn Street (North of Neilson Street)

Selwyn Street (north of Neilson Street) is classified as a Secondary Arterial. Between Neilson Street and Church Street the road has four lanes, no parking on either side and provides access to adjacent commercial properties. It is classified as an arterial road under the PAUP.

4.5.2.9 Alfred Street

Alfred Street (south of Neilson Street) is a local road (one lane in each direction) and provides access to Waikaraka Park and Waikaraka Cemetery. There are no stopping lines on the western side of Alfred Street likely to allow for two-way flow. There are commercial / industrial properties on the western side of Alfred Street only. North of Neilson Street, Alfred Street has a railway level crossing.

4.5.2.10 Galway Street

Galway Street (south of Princes Street) is a local road and is a two-way, low trafficked, cul-de-sac with no centre line. The adjacent land uses are commercial and industrial. There are no parking restrictions on this length of Galway Street. North of Princes Street Galway Street becomes a Collector Road and there is a rail level crossing just before Princes Street.

4.5.2.11 Captain Springs Road (South of Neilson Street)

Captain Springs Road, south of Neilson Street, is shown on Figure 4-8 and is classified as a local road. South of Neilson Street, Captain Springs Road is a local cul-de-sac road which intersects with Neilson Street at the northern end and at the southern end is a private cul-de-sac road that serves O-I Glass. North of Neilson Street the road changes function to a Collector road and becomes part of the SFN Level 2.

The main function of Captain Springs Road is to provide access to the businesses and recreational activities on Captain Springs Road. The entire western side of the road adjoins Waikaraka Park, with a pottery studio and Onehunga Sports Club located on this side. The Onehunga Sports Club holds football training on a weekday evening and on a Saturday morning children's football takes place as well as the first team playing in the afternoon. The on-site car park accommodates 80 cars.

The entrance to Pikes Point Transfer Station is located on the eastern side. There are no white centre lines marking the lanes of traffic apart from at the northern end of the street at the intersection with Neilson Street.

Figure 4-8: Captain Springs Road (Northern end, facing south).

As seen in Figure 4-9 Captain Springs Road is wide and parking is uncontrolled for most of the length. There are No Stopping At Any Times (NSAAT) lines close to the intersection with Neilson Street and just south of the entrance to Onehunga Sports Club/Waikaraka Park at the southern end of the road. There are two northbound movements/lanes and one southbound movement/lane. The remainder of the road is two lanes (one lane in each direction) without a centreline or a median reserve. As Captain Springs Road is a cul-de-sac it has no through traffic.

There are currently no footpaths on either side of Captain Springs Road between O-I Glass's Private Road and Neilson Street. The private road has footpaths and recessed parking on both sides.

Figure 4-9: Captain Springs Road near entrance to Waikaraka Park looking North

4.5.2.12 Angle Street/Miami Parade

Angle Street/Miami Parade intersects with Neilson Street at the northern end and is cul-de-sac with room to turn at the southern/western end. It is a wide two lane road (one lane in each direction) with the primary function being access to businesses. On the western side, at the northern end of Angle Street there is no parking, with parking being permitted on the rest of the road (other than marked NSAAT on the corners). Although the majority on on-street parking is unregulated, indented parking for six vehicles is provided at the southern end of Miami Parade. Due to the nature of the businesses on the road, the route is used by many large vehicles. Angle Street and Miami Parade are both classified as a local roads. Miami Parade/Angle Street also provides access to the heliport and Ports of Auckland.

4.5.2.13 Hugo Johnston Drive

Hugo Johnston Drive (south of Church Street) is classified as a local road and forms part of the SFN (Level 2). Hugo Johnston Drive intersects with Church Street at the northern end and provides a turning head at its southern cul-de-sac end. The main function of the road is providing access to businesses. Southpark Place and Autumn Place are two cul-de-sacs, which gain access from Hugo Johnston Drive and also provide access to local businesses. There are two recreational land uses on Hugo Johnston Drive: Southdown Reserve located at the southern end and Simson Reserve located at the northern end. Hugo Johnston Drive is lined on both sides with mature trees and in places has generous grass frontages as seen in Figure 4-10. Hugo Johnston Drive provides for 2-way flow, but there are no white centre lines marking the lanes of traffic apart from at the northern end of the street at the intersection of Church Street. Hugo Johnston Drive widens on the approach to the intersection with Church Street to provide three northbound lanes and two southbound lanes to facilitate turning movements.

Figure 4-10: Hugo Johnston Drive Northern end (facing south).

Hugo Johnston Drive is narrower at the northern end (6.4m) in places compared to the southern end where the carriageway width is over 11m in places. There is a significant amount of recessed parking along the length of Hugo Johnston Drive. No Stopping At Any Time (NSAAT) lines are implemented on the northern stretch of both sides of the road between Autumn Place and Church Street. These no stopping lines are typically opposite areas of recessed parking to provide an appropriate carriageway width for traffic.

There is less activity at the far southern end of Hugo Johnston Drive as seen in Figure 4-11. Southdown Reserve is on the western side and the Southdown Co-generation facility (Mighty River Power) and large car park is on the eastern side. There are no footpaths on most of the western side of Hugo Johnston Drive at the northern end.

Hugo Johnston Drive, north of Church Street, changes to a Collector road.

Figure 4-11: Hugo Johnston Drive Southern end (facing north).

4.5.2.14 Victoria Street

Victoria Street is classified as a Collector road along its length. Victoria Street, between Neilson Street and Church Street, can be described as having two lanes, uncontrolled parking on both sides (except at intersections) and provides access to adjacent commercial properties. There is a level rail crossing which vehicles need to cross. North of Church Street the land use changes to residential.

4.5.2.15 Church Street

The function of Church Street changes along its length and is classified as a combination of Arterial and Regional roads and Level 1A and 2 of the SFN.

- The western end of Church Street (from Beachcroft Avenue to Selwyn Street) is a two lane road with unrestricted parking on each side and is classified as a Collector road. The northern side is residential, with businesses on the southern side;
- Through Onehunga Town Centre (Selwyn Street to Galway Street) it is classified as I local road. It is a two lane road, with parking on each side;
- Church Street becomes a Collector two lane road between Galway Street and Mays Road and is primarily residential. There is NSAAT at various locations on the southern side of with parking permitted on the northern side. There is also an at grade level rail crossing; and
- Between Mays Road and Neilson Street, becomes a Primary Arterial road, but changes from residential with businesses along both sides. It is wide, with a painted median, NSAAT on the southern side and parking permitted on the northern side.
- Between Neilson Street and Hugo Johnston Drive, Church Street is classified as a Strategic Arterial road.

4.5.2.16 Great South Road / Sylvia Park Intersection

The intersection of Great South Road and Sylvia Park Road is a signalised intersection consisting of three approaches.

- South approach: Two lanes and a right turn lane and is the busiest of all approaches. More vehicles travel straight through the intersection than those that turn right from Great South Road;
- North approach: Two lanes and a left turn slip lane. More vehicles travel straight through the intersection than those that turn left from Great South Road; and
- East approach: One left turn slip lane and two right turn lanes. The traffic turning right and left from Sylvia Park Road are relatively low.

Great South Road is classified as a Primary Arterial road and forms part of the SFN Level 1B.

4.5.2.17 Sylvia Park Road

Sylvia Park Road is classified as a Primary Arterial Road and forms part of the SFN Level 1A. It is classified as an arterial road under the PAUP. Sylvia Park Road is a busy two lane road, increasing to four lanes at each end near the intersections with Great South Road and Mount Wellington Highway. Large commercial businesses are located on both sides of the road. Halfway down the northern side, Mutukāroa-Hamlins Hill is adjacent to the road with vehicle access provided from Sylvia Park Road. Pacific Rise is the only side road on Sylvia Park Road and provides access to commercial businesses.

4.5.2.18 Vestey Drive

The western end of Vestey Drive is classified as a Collector road and, along with Niall Burgess Road, provides a connection between Great South Road and Mount Wellington Highway. The eastern end of Vestey Drive is classified as a local road. The 323 bus service, proposed for Central Suburbs, will be routed along the western end of Vestey Drive.

At the western end of Vestey Drive, on the approach to the signalised intersection with Great South Road, the road widens and provides a left turn lane onto Great South Road and two right turns onto Great South Road. This intersection also provides a left and right turn into Vestey Drive from Great South Road. There is a short length of raised and flush median close to the intersection of Great South Road and a flush median on the bend at the eastern end. Vestey Drive is wide, with large commercial businesses with generous landscaped set backs and the majority of it is tree-lined. On-street parking is generally permitted expect the approaches to the intersection with Great South Road and Mount Wellington Highway. Although Vestey Drive is wide, NSAAT lines are also implemented at several locations to maintain two-way flow of traffic and aid visibility of vehicles accessing driveways. At the eastern end of Vestey Drive, on the approach to the Mount Wellington Highway intersection, the road widens and provides a left turn and a single lane to enter the roundabout. A left turn traffic lane into Vestey Drive from Mount Wellington Highway and the roundabout is also provided.

4.5.2.19 SH1

SH1 is the main motorway operating though the centre of the North Island. It is to the eastern end of the Project study area and is classified as a motorway and an arterial road (PAUP) and forms part of the SFN Level 1A.

In the area relating to the Project, SH1 consists of three lanes in the northbound direction, which then reduces to two lanes after the Mount Wellington northbound off-ramp (three lanes to two lanes merge). The southbound direction consists of two lanes at the interchange and becomes three lanes after the southbound on-ramp.

4.5.2.20 Panama Road Overbridge

Panama Road is classified as a Secondary Arterial road and is a two-way residential street (one lane in each direction) which connects two Ōtāhuhu communities via a bridge over SH1. Panama Road forms part of the SFN (Level 3) and is an arterial road under the PAUP.

4.5.2.21 Princes Street

Princes Street and Princes Street East is classified as a Secondary Arterial road, and is an arterial road under the PAUP. It provides the main access into the community east of SH1. The only other connection is the Trenwith Street underpass. Queues from the motorway regularly block this interchange, severing restricting all vehicle access into this community. The Princes Street interchange has different number of lanes leading to and from the on and off ramps and to facilitate turning movements. Princes Street bridge provides one lane in each direction. It is noted that this interchange is going to be significantly reconfigured.

4.5.2.22 Frank Grey Place

Frank Grey Place is a two-way residential street and between the SH1 on-ramps and Trenwith Street is classified as a Collector road. The short length between Princes Street East and the on-ramps is classified as Secondary Arterial. North of Princes Street East, road classification of Frank Grey Place changes to a local road. Frank Grey Place widens to three lanes on the approach to Princes Street East and the motorway ramps.

4.6 Traffic Volumes

4.6.1 Existing and Future Traffic Volumes

Table 4-4 also shows the 2013 modelled flows and anticipated daily traffic flows at key locations Without the Project for 2026 and 2036. This table shows that without the Project the traffic flows will increase significantly by 2036 at key locations.

The assessment does not provide detailed traffic counts for every street for 2016 as the focus of our assessment is comparing future years with and without the project. However, we have provided 2013 modelled counts as proxy for the existing traffic counts.

This table provides useful context, however a more detailed comparison of future years With and Without the Project in 2026 and 2036 is discussed in detail in Section 5 of this report.

Table 4-4: Future Traffic Volumes Without the Project

Key Road	2013	2026 Without Project	2036 Without Project	Growth 2013 - 2036
Church Street east of Neilson Street	43,300	48,400	51,200	7,900 (18%)
Great South Road at Southdown Lane	31,900	32,900	33,000	1,100 (3%)
Neilson Street east of Victoria Street	27,700	31,400	35,200	7,500 (27%)
SH1 at Panama Road	123,600	137,900	145,900	22,300 (18%)
SH20 Māngere Bridge	108,800	170,700	188,000	79,200 (73%)

4.7 Travel Characteristics

4.7.1 Existing Truck Mode Share

Figure 4-12 details the vehicle composition by percentage on Neilson Street near Angle Street on a weekday in March 2016 between 7am and 7pm. The traffic count data shows that the number of trucks as a percentage of all vehicles varies throughout the day, from some 7% in the evening to 28% during the day.

It is recognised that although the truck counts were collected for one day during 2016 these were found to be consistent with those counts undertaken previously. Whilst daily variability is acknowledged, the data is considered to be representative of the percentage of trucks using Neilson Street on a weekday.

The mode share of trucks during the morning, interpeak and evening peaks are also shown below in Table 4-5.

Figure 4-12: Vehicle Composition by Percentage (Neilson Street at Angle Street)

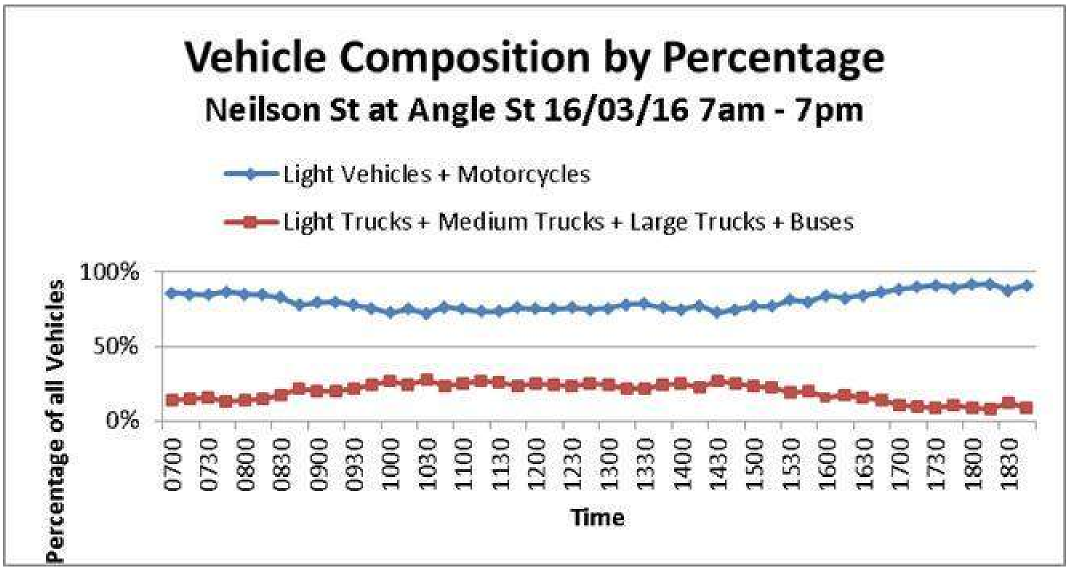


Table 4-5 details the total percentages of vehicles by class travelling along Neilson Street near Angle Street. The traffic count data shows that 19% of vehicles are trucks (including small trucks) and 80% of vehicles are light vehicles. The remaining 1% of vehicles is comprised of small trucks, motorcycles and buses.

Table 4-5: Vehicle Composition by Percentage (Neilson Street at Angle Street)

Vehicle Class	Total Percentages	AM Peak (7-9am)	Interpeak (10am-2pm)	PM Peak (4-6pm)
Light Vehicles	80%	84%	75%	86%
Small Trucks	4%	3%	5%	2%
Medium Trucks	7.5%	6%	10%	4%
Large Trucks	7.5%	6%	9%	6%
Buses	1%	0%	1%	1%
Motorcycles	0%	1%	0%	1%
Total	100%	100%	100%	100%

Trucks	Percentage of all vehicles			
Medium & Large Trucks	15%	12%	19%	10%
All trucks*	19%	15%	24%	12%
*All Trucks = Light, Medium & Large Trucks				

For modelling purposes “trucks” include only medium and heavy trucks which comprise some 15% of vehicles.

The traffic count data show that 70% of vehicles are trucks and 30% are light vehicles entering and exiting the MetroPort/Toll Driveway on Neilson Street and 69% are medium and large trucks. By way of comparison Neilson Street truck proportions are 19%.

4.8 Travel Times and Consistency – General and Commercial Vehicles

4.8.1 Existing Travel Times

The existing Project corridor can be described as Neilson Street / Church Street / Great South Road. Currently existing travel time variability is a problem on all major access points to the existing corridor, and the problem occurs throughout much of the day – it is not restricted to peak times. The connections to the State highways are unreliable and some are convoluted. On the western side access to SH20 is constrained by congestion at the Neilson Street/Onehunga Mall intersection, which results in a “bottle neck”.

The connection to the eastern side to SH1 north is quite direct via existing SEART ramps but is subject to significant congestion. The route to SH1 south is convoluted, congested and has a large number of traffic signals all contributing to large trip time variations. There are 12 sets of traffic signals on the route between SH20 (Gloucester Park Road) and SH1 (Mount Wellington Interchange).

4.8.2 Existing Travel Time Variability

To understand the existing variability in travel times for vehicles traveling between the Project Area and four locations to the north and the south, analysis was undertaken using commercial vehicle Global Positioning System (GPS) data. Tens of thousands of commercial vehicles across New Zealand now use electronic Global Positioning Systems (GPS) for paying road user charges. The anonymised GPS data was obtained for the Project Area for the first three weeks of March 2016 (excluding Easter). This data (i.e. recorded truck movements) was collected continuously, every day, over the three-week period. This resulted in over 17,000 recorded trips.

Four external points (on SH1 and SH20) outside the Project Area were chosen at interchanges on the State highways as seen in Figure 4-13 and have been named the “Four Corners”. Two internal points within the Project Area (MetroPort and corner of Neilson Street / Captain Springs Road (Waikaraka Park) were chosen as the origin/destinations representative of the study area. The times would be different to different locations, however these are considered suitable for illustration. The journey times were then calculated along the routes between the Four Corners and the Project Area as seen on Figure 4-13.

The truck travel times to/from the Four Corners deliberately do not distinguish between weekday and weekend trips as trucks operate on the weekend and it is important to understand the variability occurring both on weekdays and weekends. This analysis therefore shows variability across the whole week, rather than just the peak periods.

Table 4-6 presents the number of recorded truck movements accessing the Project Area from the Four Corners. Table 4-6 shows that there is a range of truck movements recorded with 6,700 trucks recorded accessing SH20 (south) from Waikaraka Park, 5,000 trucks recorded accessing

Waikaraka Park from SH20 (south) and 1,000 trucks recorded accessing MetroPort from SH1 (north). It is considered that this three-week sample is representative of the variability in journey times of trucks accessing the Project Area from the Four Corners.

Table 4-6 summarises the minimum, median and 95th percentile travel times. The 95th percentile times were used to represent the maximum times by excluding outlying data. This data has been assessed across the whole day and as such represents the consistency of access. Table 4-6 shows the following approximate variability in journey times accessing the Project Area from the Four Corners:

- The range of times can be up to 12 minutes, with the greatest on the northbound route between SH1 south and MetroPort;
- The southbound route between MetroPort and Highbrook also has a range of up to 10 minutes; and

On many routes the range is the same as or greater than the median journey time.

Figure 4-13: Routes Accessing the Project Area from the Four Corners

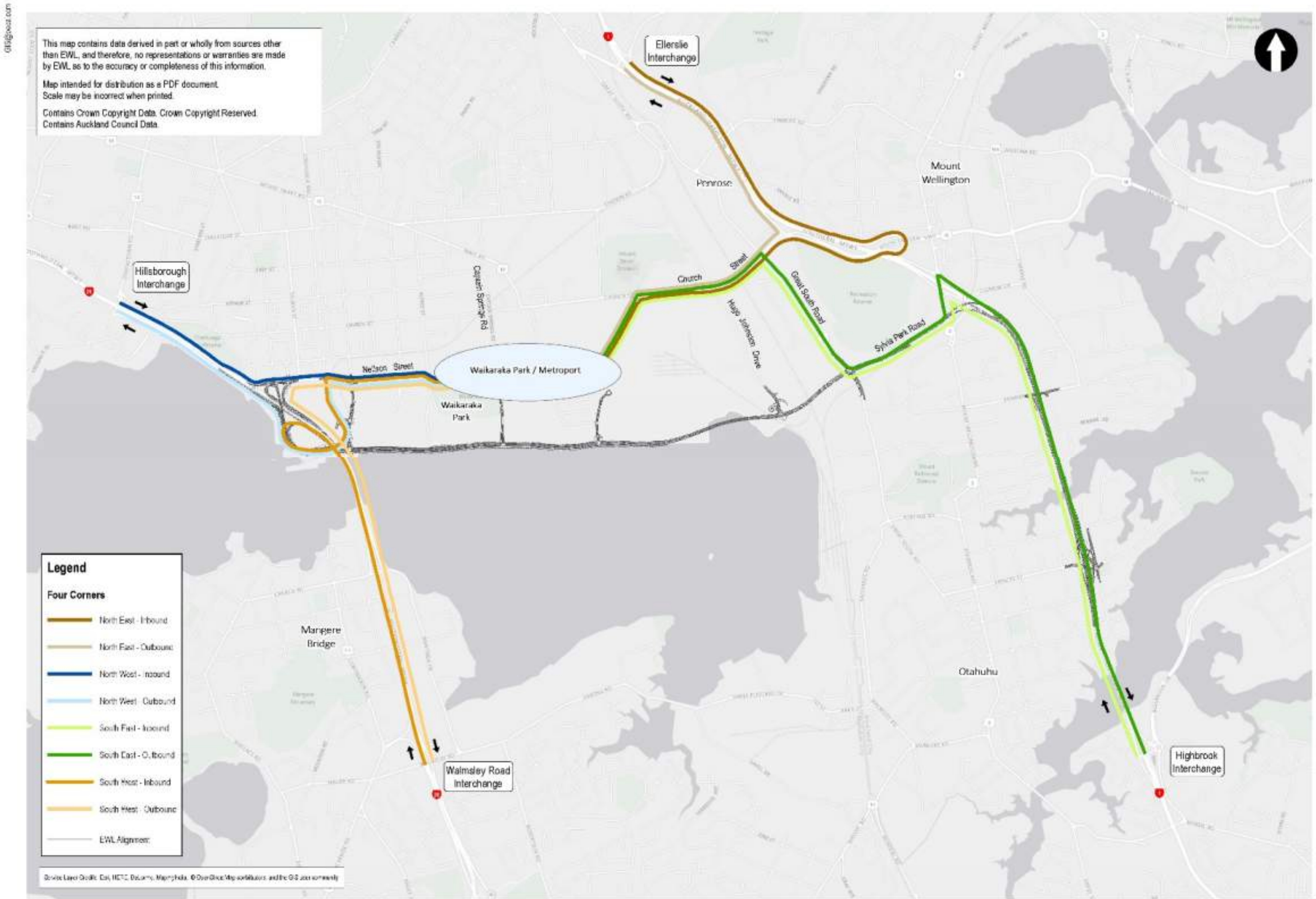
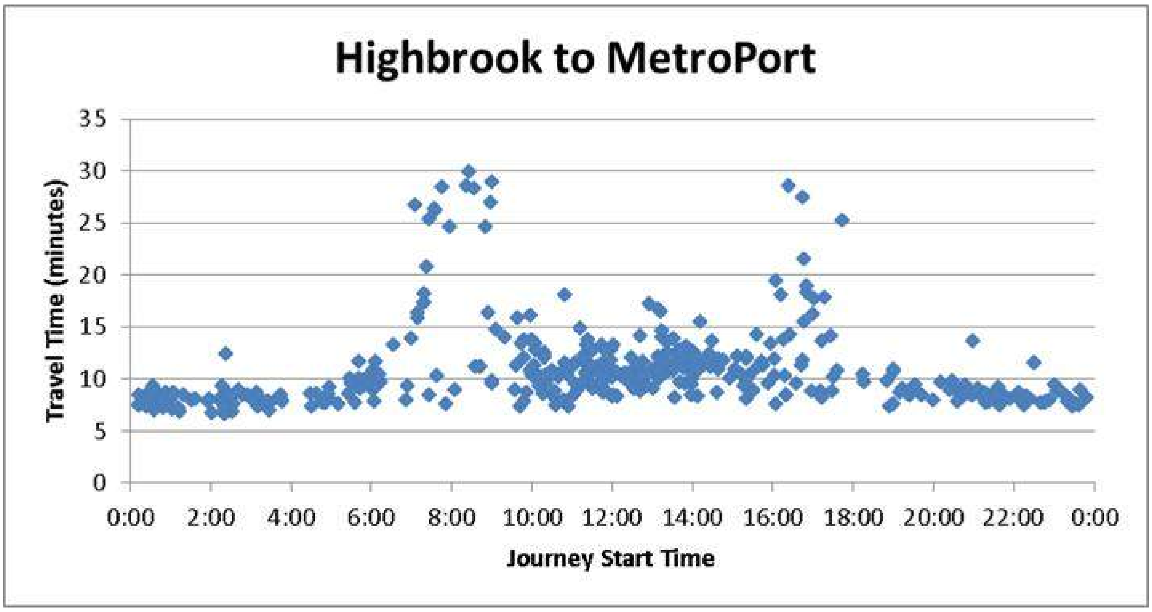


Table 4-6: 2016 Existing Travel Times Accessing the Project Area from the Four Corners (all day)

From	To	Minimum (minutes)	Median (minutes)	95th Percentile (minutes)	Range (minutes)	No. of Recorded Truck Movements (GPS)
SH20 south	Waikaraka Park	3.7	6.8	10.7	7	5,200
Waikaraka Park	SH20 south	2.9	5	9.6	6.7	6,700
SH1 south	MetroPort	6.1	9.8	18.1	12	450
MetroPort	SH1 south	7.1	11.8	17.5	10.4	640
Waikaraka Park	SH20 North	3.4	5.6	10.8	7.4	900
SH20 North	Waikaraka Park	2.5	4	5.6	3.13	1,700
SH1 North	MetroPort	4.5	6.7	9.7	5.2	1,090
MetroPort	SH1 North	2.7	6.1	10.8	8.1	919

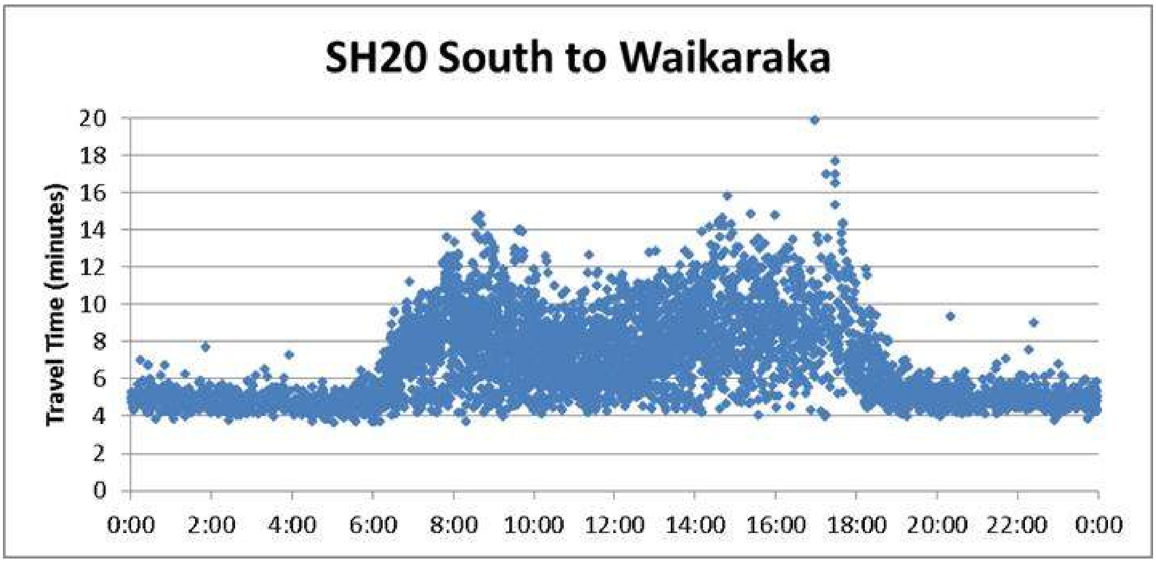
A scatterplot in Figure 4-14 shows all the journeys surveyed from one of these movements (Highbrook Drive to MetroPort/Neilson Street) for a seven day week over a three-week period in March 2016. Figure 4-14 shows that there is a high degree of variability in journeys on this route during the morning peak (between seven minutes and 28 minutes) and between (seven minutes and 27 minutes) in the evening peak. The interpeak also shows journey times varying substantially typically between seven – 18 minutes.

Figure 4-14: Highbrook to Neilson Street (MetroPort) Journey times (7 day Week) during March 2016



Similar data entering Onehunga from SH20 south is shown in Figure 4-15. This data shows both the high levels of congestion across the whole day, as well as the very high levels if variability.

Figure 4-15 SH20 to Waikaraka Journey times (7 day Week) during March 2016



Overall, these travel times demonstrate that this area is congested and travel times are unreliable and inconsistent across the day.

It should be noted that these travel times cannot be directly compared to the 2013 modelled data for the following reasons:

- The GPS data used different start and end points in order to capture the truck movements;
- The GPS data is for 2016 whereas the modelled data is 2013. There has been significant growth in the last three years;
- The model is built to represent average peak period conditions on weekdays, exclusive of major incidents on the network. Whereas the GPS data was collected continuously over a three week period inclusive of evenings, weekends, different weather conditions, incidents.

4.8.3 Future Travel Times

The Table 4-7 below shows that by 2026 Without the Project travel times (averages) on the key routes into the industrial area are predicted to increase by between half a minute to six minutes compared to 2013. This table provides useful context, however the most important comparison for the Project is to compare future years travel times With and Without the Project in 2026 and 2036 which is assessed in Section 5.

Table 4-7: Future Travel Times Without the Project compared to 2013 (AM Peak)

Route	2013 Model Travel Time (minutes)	Without Project 2026 Travel Time (minutes)	Difference to 2013 Travel Time (minutes)	Without Project 2036 Travel Time (minutes)	Difference to 2013 Travel Time (minutes)
To SH20 South (Māngere)	5.5 minutes	11.4 minutes	+ 5.9 minutes	15.5 minutes	+10 minutes
To SH20 North (Hillsborough)	4.4 minutes	5.9 minutes	+ 1.5 minutes	5.1 minutes	+ 0.7 minutes

Route	2013 Model Travel Time (minutes)	Without Project 2026 Travel Time (minutes)	Difference to 2013 Travel Time (minutes)	Without Project 2036 Travel Time (minutes)	Difference to 2013 Travel Time (minutes)
To SH1 South (Highbrook)	18.2 minutes	22.9 minutes	+ 4.7 minutes	26.7 minutes	+ 8.5 minutes
To SH1 North (Ellerslie)	11.8 minutes	13 minutes	+ 1.2 minutes	17.0 minutes	+ 5.2 minutes
From SH20 South (Māngere)	10.8 minutes	12.4 minutes	+ 1.6 minutes	13.6 minutes	+ 2.8 minutes
From SH20 North (Hillsborough)	4.7 minutes	8.8 minutes	+ 4.1 minutes	9.3 minutes	+ 4.6 minutes
To SH1 South (Highbrook)	14.8 minutes	18.2 minutes	+ 3.4 minutes	16.3 minutes	+ 1.5 minutes
To SH1 North (Ellerslie)	8 minutes	8.5 minutes	+ 0.5 minutes	7.3 minutes	- 0.7 minutes

Increasing travel times will decrease accessibility between businesses in the industrial hub and SH20 and SH1 and also means businesses can face increased transport costs and inefficient movement of their goods.

The inconsistency of travel times will likely get worse in the future as traffic volumes and travel times increase. Forecast issues with journey time will mean planning is difficult for individuals and businesses (including freight operators). This is further discussed in Section 5.

4.9 Accessibility for Local Businesses

4.9.1 Existing Accessibility

Congestion and conflicts within the existing corridor create accessibility issues for local businesses, which detracts from both efficiency and safety.

The SATURN modelled flows on Neilson Street for 2013 is 24,000 – 32,000 vehicles per day (vpd). The high density of property accesses on Neilson Street creates conflicts between through movements and turning movements. The sparsely spaced traffic signals provide few platooned-vehicle gaps in the through vehicles to safely turn to/from these roads.

An investigation into the Transport Agency's Crash Analysis System (CAS) data between 2011 and 2015 shows that on Neilson Street between the SH20 off-ramp and Church Street show the most common types of crashes resulting in Fatal Serious Injury (FSI) and non-injury crashes were rear end/obstruction (30%), crossing/turning (25%) and overtaking (29%). The percentage of crossing/turning crashes can be attributed to conflict between through and local access traffic trying to access side roads and driveways.

4.9.2 Future Accessibility

The future SATURN modelled flows on Neilson Street is expected to increase in 2026 without the Project to 30,000 - 36,000vpd. This is a significant increase to an already congested corridor and this volume of traffic would make it more difficult for local traffic to access businesses on Neilson Street. It is anticipated that with the predicted increase in traffic volumes it will be correspondingly more difficult in the future to access driveways and local roads.

4.10 Residential Amenity

4.10.1 Existing Amenity

It is likely that vehicles are currently using residential streets to access the Onehunga-Penrose industrial area due to congestion on the main routes. The prevalence of such movements is very hard to identify on the network. However, such movements were indicated from the modelling, especially in the Ōtāhuhu and Onehunga areas.

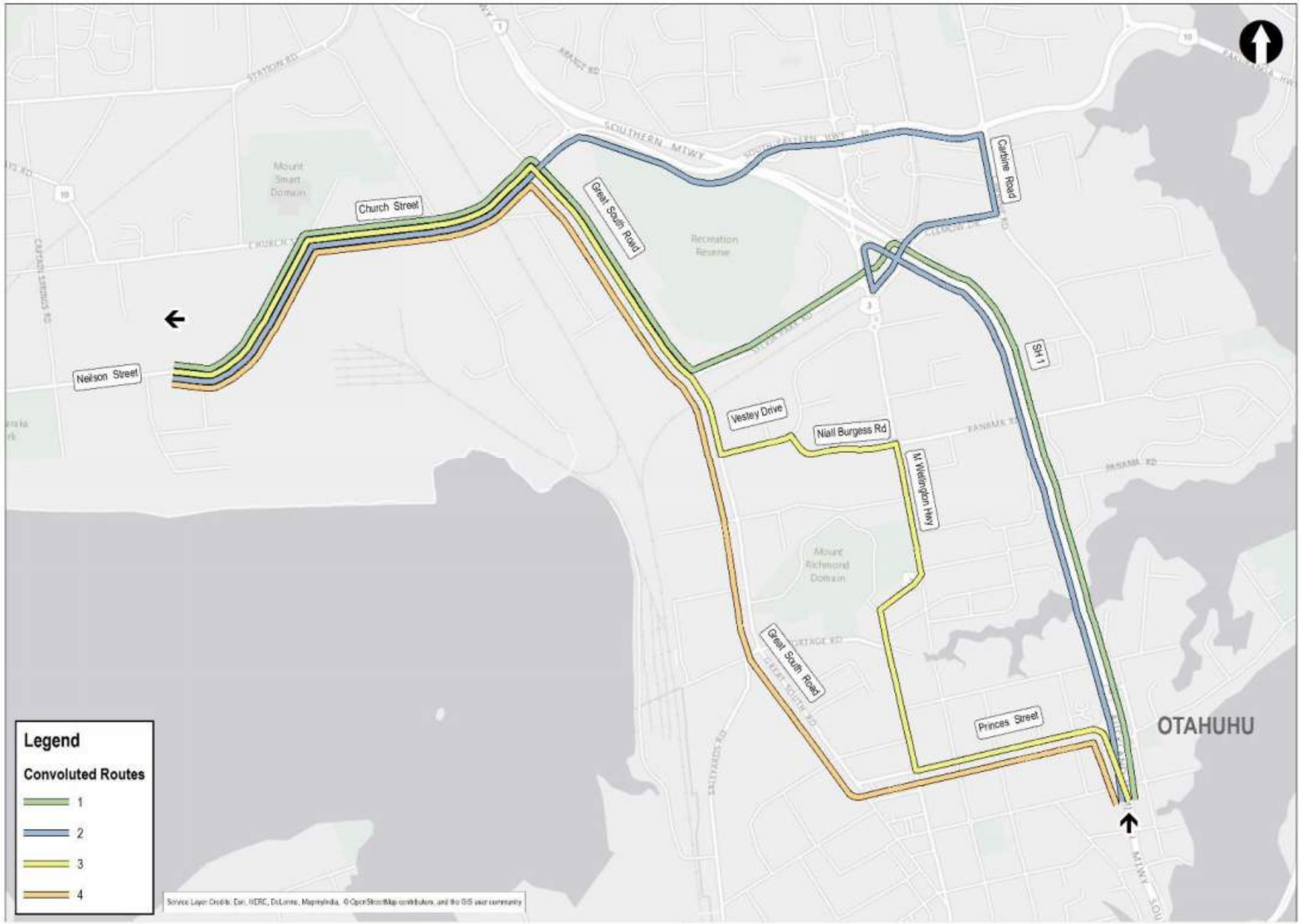
One likely existing movement is the use of residential streets in Ōtāhuhu to access the industrial hub to avoid congestion at Mount Wellington. The GPS data of heavy vehicles on SH1 (south of Princes Street) to Neilson Street for the whole month of March 2016 (weekdays and weekends) was interrogated. The routes with the largest number of trips are displayed in Figure 4-16, and no detailed analysis was undertaken (e.g. route preference and percentage split). Figure 4-16 indicates that a route through the Princes Street residential areas is being used as one of the many routes taken from SH1 to access the industrial hub. The GPS data, along with the models, indicate that there are vehicles currently diverting through residential areas.

Section 5 provides an assessment of where the Project will result in a reduction in traffic flows on residential streets.

4.10.2 Future Amenity

The residential amenity of these streets are expected to get worse in future years. As the industrial area of Onehunga-Penrose is expected to become more congested, vehicles will continue to use these residential streets. Subsequently, it is anticipated that without the Project, traffic volumes are expected to increase on selected residential streets.

Figure 4-16: Multiple Routes Taken from SH1



4.11 Public Transport Network (Buses)

4.11.1 Existing Bus Network

Auckland Transport is currently converting the existing bus routes within the Project area into new South Auckland and Central Suburbs bus networks. The existing network provides "direct connections from everywhere to everywhere" but results in infrequent services.

The proposed new South Auckland Bus Network is anticipated to be implemented in October 2016. The new Central Suburbs bus network was agreed by Auckland Transport in July 2016 and is anticipated to be implemented during 2017.

The impact of the Project on the future South Auckland and Central bus networks has been assessed rather than the existing bus network. This is deemed appropriate as the future bus networks have been approved by Auckland Transport and will be in place before the EWL could be completed.

Skybus is a private bus service operating between the CBD and Auckland Airport. It follows two different routes, Dominion Road and Mt Eden Road. These routes use the on and off-ramps at Queenstown Road to access SH20 and the airport / CBD.

4.11.1.1 Existing Bus Priority for Buses Accessing Onehunga Town Centre

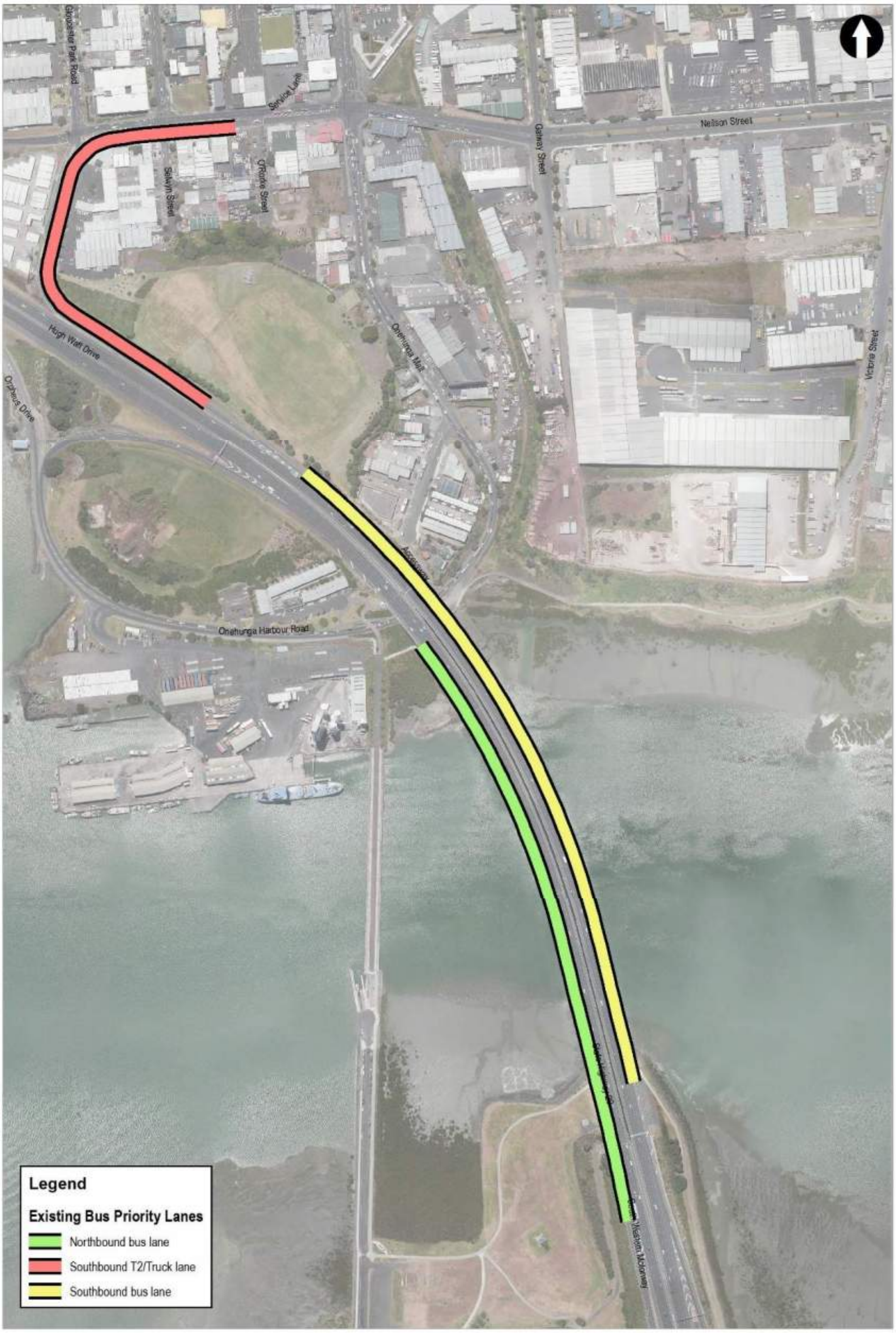
The existing bus priority is shown on Figure 4-17 for those buses accessing Onehunga Town Centre to/from SH20.

For northbound buses, there is currently a bus priority lane on SH20, which ends just before the Neilson Street off-ramp.

For southbound buses, there is a T2 / Truck lane (which buses can use) on Neilson Street, which starts at the intersection of O'Rorke Street and continues on to Gloucester Park Road and the SH20 southbound on-ramp and ends at the start of the on-ramp where it merges with SH20. The south bound bus lane then commences a short distance after the T2/Truck lane ends and continues until the southern end of SH20 bridge (Māngere).

The T2 / Truck lane on Neilson Street is proposed to be converted into a bus only lane. The impact of this conversion on T2 users is assessed in Section 8.

Figure 4-17: Existing Bus Priority



4.11.2 Future Bus Network

The future bus network will be split into five sections across suburban Auckland and is an important step in providing a simpler and more integrated public transport network for Auckland. The aim is to deliver a new network of buses that will change the way people travel.

The key idea for the future bus network is to run high frequency services on fewer routes, reducing the need for timetables. The goal of the future network is to provide the ability to turn-up and ride. To achieve this, frequent, connector, local and peak services are going to be implemented. These types of services are described in Table 4-8 below.

Table 4-8: Proposed types of bus services on the future network

Types of Services	Description
Frequent	Operate on key routes across Auckland. Run at least every 15 minutes 7am - 7pm, 7 days a week.
Connector	Run at least every 30 minutes 7am-7pm, 7 days per week.
Local	Frequency and days vary.
Peak Period	Services that operate during the weekday peak.

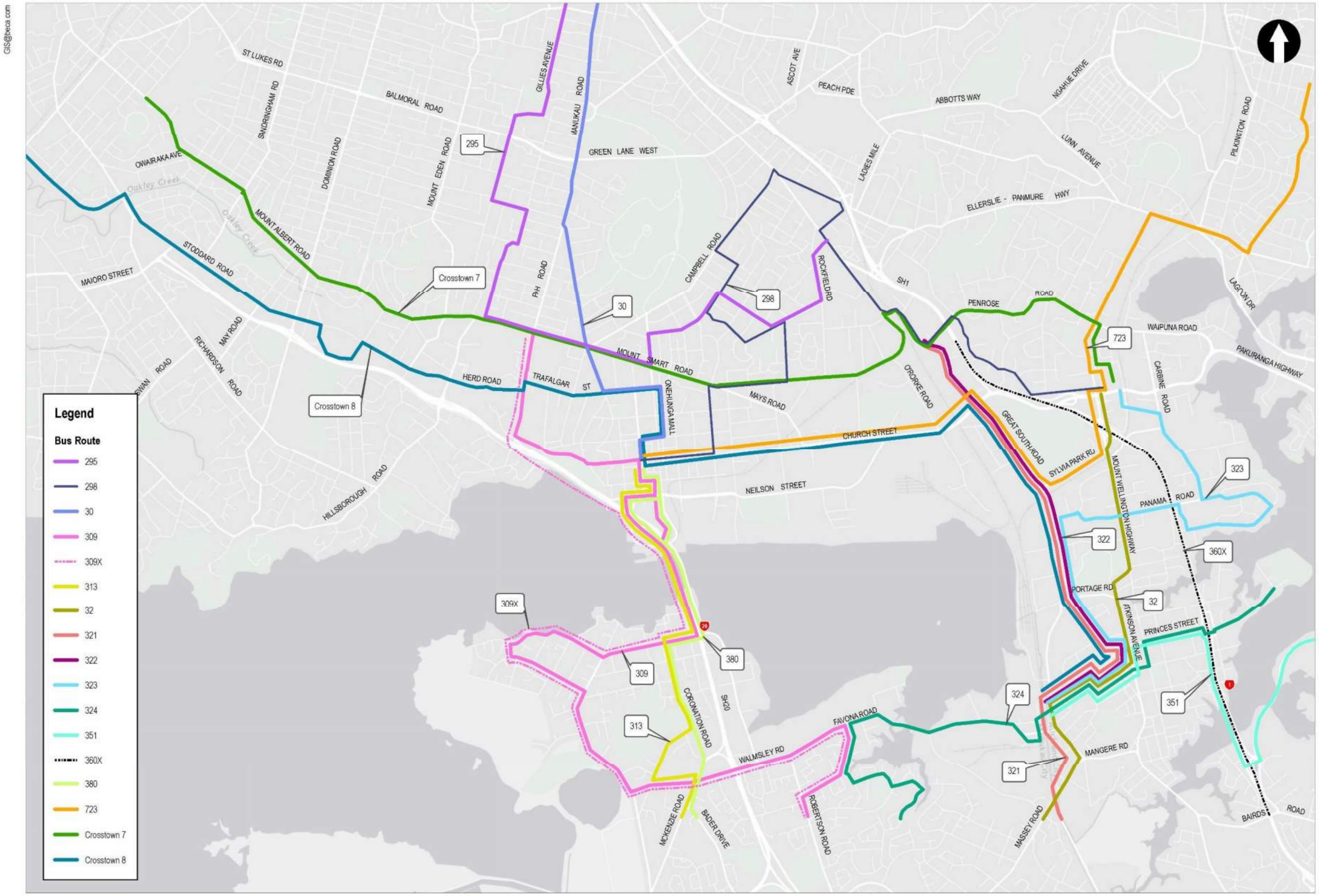
4.11.2.1 New South Auckland Network

It is anticipated that from the 30th October 2016 the new South Auckland Bus Network will be in operation. The future bus routes that are relevant to the Project area are shown in Figure 4-18.

Future services 309, 313 and 380 will access Onehunga Town Centre via SH20 from southern areas including Māngere. These will all be connector services operating at a 30-minute frequency during weekdays and the weekend. There are currently approximately 18 bus services accessing Onehunga Town Centre from SH20 so the reduction to three bus services and much more frequent services under the new networks is a significant change.

The Airporter operates between Onehunga and Manukau via Papatoetoe train station and the Airport. This service is provided by Auckland Transport and will use the service number 380 included on Figure 4-18.

Figure 4-18: Proposed New South Auckland and Central Bus Networks in the Project Area



4.11.2.2 New Central Suburbs Network

The future new Central Suburbs bus network was approved by Auckland Transport in July 2016 and will be implemented in 2017. The proposed new Central Suburbs bus routes that are relevant to the Project are described in Appendix A and shown on Figure 4-18.

4.11.2.3 Future Bus Stops

Two new bus stops are proposed by Auckland Transport as part of the new Central Suburbs Network on both sides of Great South Road north of the intersection with Sylvia Park Road. It is anticipated that these two bus stops are likely to be constructed before the EWL is open.

4.11.3 Existing Bus Travel Time between SH20 and Onehunga Town Centre

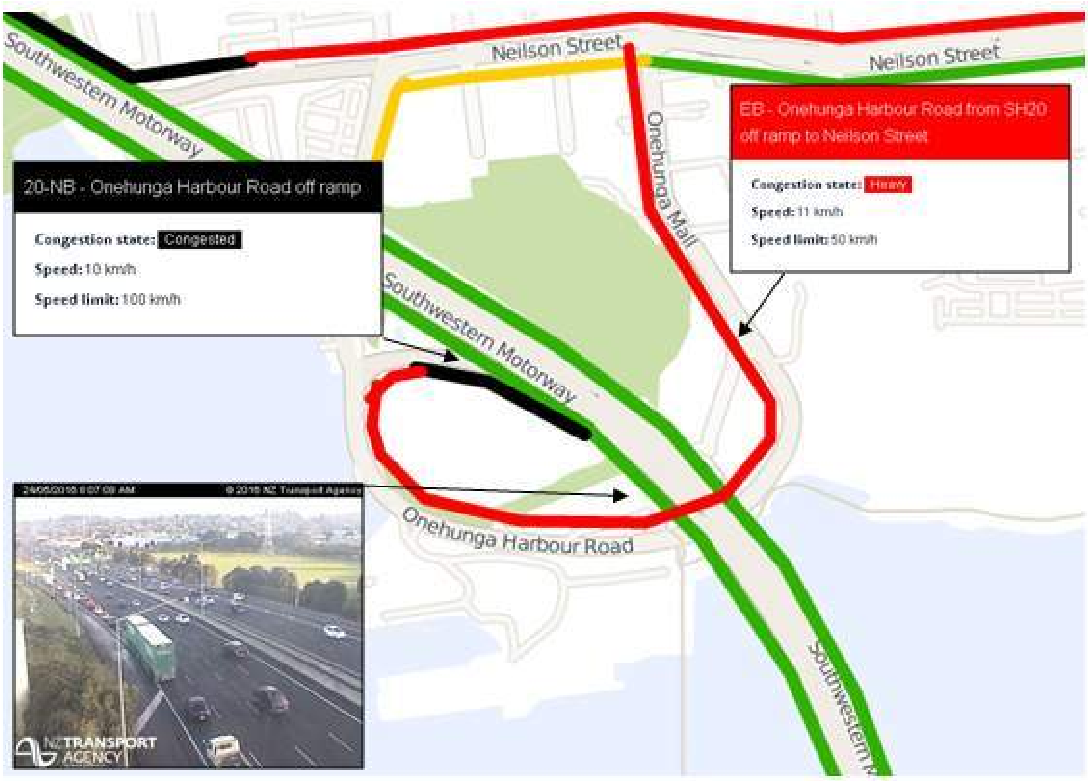
Travel time reliability for buses between SH20 and Onehunga Town Centre is a key issue for the Project. Buses travelling northbound from Māngere use SH20, and then Onehunga Harbour Road and Onehunga Mall to access the Onehunga Town Centre.

Onehunga Harbour Road and Onehunga Mall are subject to regular congestion through most of the day which results in increased and unreliable journey times for buses accessing Onehunga Town Centre from the south via SH20. The unreliability impacts upon onward journeys by rail or bus to the City and other destinations if people miss their connections.

Buses travelling southbound from Onehunga Town Centre to Māngere use Onehunga Mall, Neilson Street, Gloucester Park Road and the Onehunga on-ramp southbound, SH20, Rimu Road off-ramp. There is a T2 / Truck lane (which buses can use) on Neilson Street which starts at the intersection of O'Rorke Street and continues Gloucester Park Road and the SH20 southbound on-ramps and ends at the start of the on-ramp where it merges with SH20. The southbound bus lane then commences a short distance after the T2/Truck lane ends and continues until the southern end of SH20 bridge (Māngere). This southbound route is much less impacted by congestion due to this T2 lane.

The congestion at the Onehunga Mall/Neilson Street intersection causes queues that regularly block traffic down Onehunga Mall (south), onto Onehunga Harbour Road and to the start of the motorway off-ramps. The existing congestion can be observed from Auckland Transport's live traffic congestion monitoring. The off-ramp queue consistently encroached onto SH20 in the morning peak. Figure 4-19 below shows the peak congestion where speeds on the off-ramp were around 10km/h, at approximately 8:10am on the 24th May 2016. This is typical of the ramp during weekday peak periods. This congestion continues from the off-ramp along Onehunga Harbour Road and Onehunga Mall with heavy congestion and speeds of 11km/hr.

Figure 4-19: Congestion Map of Neilson Street Interchange



Source: Auckland Transport

4.11.3.1 Bus Travel Times (Northbound)

Travel times for those northbound buses travelling between Māngere and Onehunga Town Centre using SH20, Onehunga Harbour Road and Onehunga Mall have been calculated using Auckland Transport data for the first three weeks of March 2016 (excluding Easter). The data collected for the route is shown in Figure 4-20.

The travel times for buses accessing Onehunga Mall (north of Neilson Street) from Māngere via SH20 is shown in Table 4-9 for the 99th percentile, the median and the 1st percentile for the morning, inter and evening peaks. The reason the 99th percentile and 1st percentile of bus journeys was chosen, instead of the maximum (slowest journeys) and minimum (fastest journeys), was to eliminate any extreme outliers, e.g. a broken down bus.

Figure 4-20: Northbound and Southbound Buses: Location of Bus Stops for Travel Time Calculations

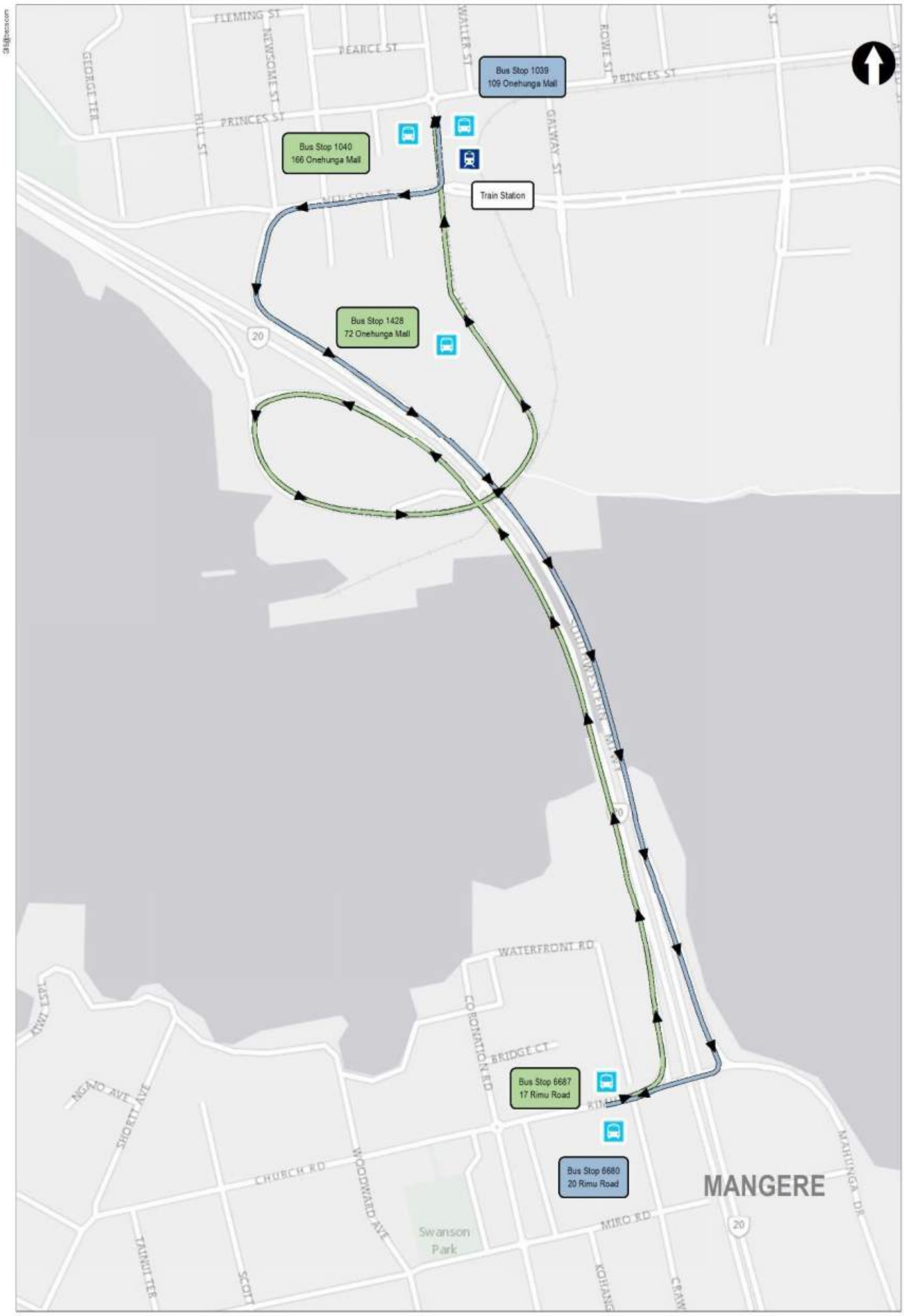


Table 4-9 shows the following approximate variability in bus journey times accessing Onehunga Mall (south of Neilson Street) from SH20:

- 6-minute range during the morning peak, on a 6.7-minute median;
- 8 minute range during the inter peak, on a 6.3 minute median;
- 10-minute range during the evening peak, on a 6.1-minute median; and
- 5-minute range during the off peak (overnight) on a 4-minute median.

The congestion creates unreliability for buses throughout the day which has increased operational costs and reduced attractiveness of public transport to passengers. It is anticipated that the existing unreliability of buses has implications for passengers to miss their onward rail connections at Onehunga.

These travel time include traffic signal delays at Neilson Street intersection and time for boarding and alighting at bus stop 1428 (72 Onehunga Mall), located south of the Neilson Street intersection.

Table 4-9: Bus Travel Times (minutes) – Between Māngere (Rimu Road) and 116 Onehunga Mall

	AM Peak (minutes)	Inter Peak (minutes)	PM Peak (minutes)	Off Peak (minutes)
99th Percentile	9.8	11.5	13.5	7.7
Median	6.7	6.3	6.1	4.0
1st Percentile	4.0	3.5	3.5	3.0
Range	**5.8 minutes**	**8 minutes**	**10 minutes**	**4.7 minutes**

4.11.3.2 Number of Passengers and Routes

Northbound bus passenger data received from Auckland Transport for a typical week in July 2016 indicate that on average approximately 1,500 passengers per weekday enter Onehunga Town Centre via SH20 (including school bus passengers). These passengers currently travel on 15 different bus routes which are going to be rationalised and replaced as part of the new Southern Bus Network which is described later in this section.

4.11.3.3 Southbound Bus Travel Times

The two bus stops chosen to calculate the travel times for southbound buses are also shown on Figure 4-20.

The bus travel times for those buses accessing Māngere from Onehunga Mall (north of Neilson Street) via SH20 is shown in Table 4-10 for the 99th percentile, the median and the 1st percentile for the morning, inter and evening peaks.

The travel times in Table 4-10 show that the lower congestion and T2 lane available to buses make this movement much quicker and routes more reliable than the northbound buses. The range is three minutes in the morning peak, three minutes in the interpeak and 3.5 minutes in the evening peak.

Table 4-10: Bus Travel Times (minutes) – Between 109 Onehunga Mall and Māngere (Rimu Road)

	AM Peak (minutes)	Inter Peak (minutes)	PM Peak (minutes)	Off Peak (minutes)
99th Percentile	5.8	5.4	6.5	5.4
Median	4.0	4.1	4.4	3.6
1st Percentile	2.7	2.7	2.9	2.6
Range	**3.1 minutes**	**2.7 minutes**	**3.6 minutes**	**2.8 minutes**

4.11.4 Future Bus Travel Times

As traffic volumes increase and congestions increase it is likely that inconsistency of travel times will get worse in the future. As indicated later in Chapter 8, the average modelled time Without the Project are expected to increase by some three minutes. This is likely to mean continued increased operational costs and reduced attractiveness of public transport to passengers in the future. The continued future unreliability of bus travel times may also mean passengers continue to miss onward rail connections at Onehunga Train Station.

4.12 Public Transport Network (Rail)

4.12.1 Introduction

Rail is also an important mode with frequent train services from Onehunga Town Centre to the CBD and an additional two train stations within or in close proximity to the Project Area. Auckland Transport is also investigating a possible future mass transit between the CBD and the airport via Onehunga.

4.12.2 Existing Rail Network

Some passengers are using buses to make connections with rail services at Onehunga. As described previously in this section there is variability in journey times for buses accessing Onehunga so some bus passengers may be missing their rail connections. There are three train stations within or in close proximity to the Project area as seen in Figure 4.20. Onehunga and Te Papapa train stations are on the Onehunga line which travels between Britomart and Onehunga station. Sylvia Park Station is on the Eastern line which travels between Britomart through Mount Wellington and terminates at Manukau as seen on Figure 4-21. The frequencies of these train services are described in Table 4-11 below.

Table 4-11: Rail Service frequencies

Station	Line	Weekday frequency (towards CBD)	Weekend frequency (towards CBD)
Onehunga, Te Papapa	Onehunga Line	Every half hour between 5.33am-10.03pm plus additional services Friday night	Every half hour between 6.15am-10.15pm plus additional service Saturday night
Sylvia Park	East Line	Every eight to thirty minutes between 5.35am-10.16pm plus additional services Friday night	Every Half hour between 6:50am-10:20pm plus additional services Saturday night

Figure 4-21: Existing Operative Rail Network in Relation to the Alignment

4.12.3 Future Rail Network

4.12.3.1 Rapid Transport Network: 2016 – 2026

The existing Western train line runs between Swanson and Britomart and the existing Onehunga line runs between Onehunga and Britomart. Following the completion of the City Rail Link (CRL) trains will be able to travel between Swanson and Onehunga via the CBD as seen in Figure 4-22.

4.12.3.2 Rapid Transport Network: 2026 – 2036

Investigations into mass transit options are being undertaken by Auckland Transport and the Transport Agency. This is part of an integrated transport scheme for SH20 to improve access to the Airport and employment areas.

Auckland Transport is currently developing a business case considering mass transit route options for rail to Māngere and the Airport employment area.

The light rail option would see the extension of a Light Rail Transit (LRT) route via Queen Street and Dominion Road (currently being investigated) to Onehunga, Māngere Bridge, Māngere and the Airport as seen in Figure 4-22.

The future rail corridor follows a route through Neilson Street Interchange area from Onehunga Train Station south between Onehunga Mall and Galway Street/Galway Street extension/Galway Street EWL eastbound exit to the foreshore and across the Māngere Inlet as presented in *Volume 2: Drawing Set*. Auckland Transport has advised that this will be an elevated route over Neilson Street and over the EWL as it crosses the Manukau Harbour.

Figure 4-22: Future Rapid Transit Network (2026- 2036)

Source: Auckland Transport

4.13 Committed Public Transport Projects

4.13.1.1 AMETI

The Auckland Manukau Eastern Transport Initiative (AMETI) is focused on developing an integrated multimodal transport system that supports population and economic growth in east Auckland and Manukau. The project aims to provide better transport choices and to significantly enhance the safety, quality and attractiveness of passenger transport and the walking and cycling environment, while recognising that not all transport demand can be accommodated by these three modes.

The AMETI Package 2 – Sylvia Park Bus Lane project is one part of the wider AMETI project. With the increase of developments surrounding the Sylvia Park Town Centre area, the project aims to provide better pedestrian and cycling facilities and improved access for buses within the centre.

The AMETI project includes a future proposed bus access to Sylvia Park from the Mount Wellington Highway / Sylvia Park Road intersection and passing under SH1. This new bus route aims to create a bus route that avoids the more congested parts of Mount Wellington Highway. Additional bus improvements include a new bus station adjacent to the Sylvia Park rail station.

A new shared path is proposed along Mount Wellington Highway and will pass under SH1 and provide new connectivity between Sylvia Park and Pacific Rise. Other improvements include a new path beside the bus lane providing a direct route from the south to the centre.

Currently Auckland Transport are committed to progressing land acquisition through the Environment Court process to accommodate the land requirements for this project. It is expected that a Notice of Requirement or Resource Consent procedure will follow shortly after the decision. Scheme Assessments have been completed and funding confirmed for both detailed design and construction phases of this project however timing of their completion is very subject to a successful outcome through the Court process.

An assessment of how the proposed pedestrian and cycling facilities interact with the AMETI walking and cycling improvements at Sylvia Park is discussed in Section 7.

4.13.2 Route 32

Route 32 is a new high frequency bus network that will be implemented on 30th October 2016 between Māngere Town Centre and Sylvia Park via Ōtāhuhu Station, Ōtāhuhu Town Centre. A major upgrade of that route to facilitate more reliable bus journeys, as well as improved walking and cycling facilities was developed as part of the wider EWL Business Case. That upgrade is being progressed as a separate project by Auckland Transport.

4.14 Walking and Cycling Network

4.14.1 Introduction

This section discusses the current and future pedestrian and cycling facilities provided within the Project area and immediate surrounds. One of the key issues for pedestrians and cyclists in the Project area is safety and accessibility between Māngere Bridge, Onehunga and Sylvia Park.

4.14.2 Predicted Key Walking and Cycling Destinations

Key walking and cycling destinations relevant to the Project are identified to be Taumanu-Onehunga Foreshore Project, Onehunga Town Centre, Onehunga Train Station, Waikaraka Cycleway, Waikaraka Park, Mutukāroa-Hamlins Hill and Sylvia Park Town Centre. It is noted that some parts of the Project area have a lower provision of cycling and walking infrastructure and may not currently generate many walking and cycling trips, but are anticipated to be key destinations accessible by pedestrians and cyclists in the future. It is also recognised that the Onehunga High School may be a key cycling destination and access for pupils from Māngere Bridge to the school is via Old Māngere Bridge.

4.14.3 Existing Pedestrian and Cycle Facilities

Auckland Transport's "Central Cycle Map" identifies the existing cycle routes, including shared paths, within and close to the Project Area including the suburbs of Onehunga, Te Papapa, Penrose, Southdown, Ōtāhuhu and Sylvia Park. Shared paths allow use by pedestrians and cyclists. These routes are further defined as either a shared path, dedicated cycle lane, shared bus/cycle lane, a route on quieter roads recommended by cyclists or a route with a space for cyclists (which may be on busy roads).

These existing Auckland Transport cycling routes, including shared paths and greenways (local routes), are reproduced on Figure 4-23 and the types of routes in each sector are discussed in more detail below. Figure 4-23 shows that there is an absence of existing facilities at the eastern end of the Project Area and the presence of shared paths along Old Māngere Bridge and the Taumanu-Onehunga Foreshore environment.

The significant pedestrian and cycling facility within the Project Area is the Waikaraka Cycleway is located along the foreshore of the Māngere Inlet as shown on Figure 4-23. Part of the recently completed Taumanu-Onehunga Foreshore project is immediately to the north of the Project area and comprises two new cycle routes (commuter and recreational).

In order to describe the existing walking and cycling conditions the Project area has been broken up into five sectors, based on logical changes in the condition of the walking and cycling network as follows:

1. Taumanu-Onehunga Foreshore, Orpheus Drive and south to the Aotea Sea Scouts Hall;
2. North/South connection Māngere Bridge to Onehunga Town Centre;
3. Waikaraka Cycleway;
4. Anns Creek to Sylvia Park Road; and
5. SH1 (Princes Street, Panama Road).

Figure 4-23: Existing Pedestrian and Cycling Facilities

4.14.3.1 Sector 1: Taumanu-Onehunga Foreshore, Orpheus Drive, Aotea Sea Scout Hall

Within this sector there is an existing shared footpath on the southern side of Onehunga Harbour Road and Orpheus Drive between the Old Māngere Bridge and the Aotea Sea Scout Hall. The length of Orpheus Drive between the Sea Scout Hall and Manukau Cruising Club is described on the Auckland Transport's Cycle Network Map as a "route on quieter roads recommended by cyclists". This is likely due to the low traffic flows on Orpheus Drive. Further north along Orpheus Drive a new 3m wide and 700m long, bi-directional 'commuter' cycle route separated from traffic by a low concrete barrier commences at the Manukau Cruising Club and continues north to connect with the newly created Taumanu-Onehunga Foreshore project. A 1km long recreational route for pedestrians and cyclists is integrated with the new landscaping of this project and commences approximately at the Cruising Club as seen in Figure 4-24.

Pedestrians and cyclists are obliged to use the lightly trafficked Orpheus Drive between the shared path (Sea Scouts Hall) and the 3m wide cycle route (Manukau Cruising Club) and this is considered a network gap as seen in Figure 4-25. However, this is mainly a network gap for pedestrians as Orpheus Drive is a recommended route for cyclists.

Figure 4-24 Orpheus Drive – Route on quieter road recommended by cyclists "Network gap"

Figure 4-25 Taumanu - Onehunga Foreshore Walking and Cycling Facilities

Although SH20 provides a physical barrier between the Onehunga community and the foreshore there are two connections (pedestrian bridges) over the State highway. These bridges are approximately 200m apart.

The existing pedestrian and cycle environment for this sector is summarised as follows:

- **Connectivity**: There is a minor network gap on Orpheus Drive between the Manukau Cruising Club and the Sea Scout Hall where pedestrians and cyclists have to use the lightly trafficked Orpheus Drive when connecting between the shared path and a segregated 3m wide commuter cycle path/recreational path at Taumanu-Onehunga Foreshore;
- **Amenity**: The facilities are generally high amenity including a shared path and segregated cycle path and nearby recreation cycle and pedestrian route as part of the Taumanu-Onehunga Foreshore project. The visual presence and noise of the adjacent SH20 is acknowledged; and
- **Severance**: Although SH20 provides a physical barrier, there are two connections from Taumanu-Onehunga Foreshore to Onehunga communities over SH20.

4.14.3.2 Sector 2: North/South connection Māngere Bridge to Onehunga Town Centre

Within this sector the Old Māngere Bridge shared path is well used and connects Māngere Bridge and Onehunga across the Māngere Inlet. Onehunga High School pupils living in Māngere Bridge are likely to use Old Māngere Bridge to travel to and from school on bike. The generous proportions of the Old Māngere Bridge and associated connecting shared path (between 8-11m wide) ensures it is a high quality route and attracts other recreational activities such as fishing. It is noted also that the connection across the inlet is duplicated by a bridge under SH20 however, it is believed that this route is not favoured by pedestrians and cyclists due to personal security issues (Figure 4-26).

Figure 4-26: Māngere Bridge and SH20 Underbridge, connections across Māngere Inlet

The walking and cycling connection to the north is important as there are two key destinations within very close proximity; the Town Centre and Train Station. However, there is a lack of segregated facilities connecting to these destinations from Māngere Bridge/ Waikaraka Cycleway. The existing pedestrian and cycle connections from the foreshore / Old Māngere Bridge to/from Onehunga Harbour Road and Onehunga Mall are shown on Figure 4-27.

Figure 4-27: Existing Cycle and Pedestrian Connections

Heading north towards the Town Centre and Train Station from Māngere Bridge/Waikaraka Cycleway there is a 4m wide shared path overbridge over Onehunga Harbour Road and then an underpass under SH20 (Figure 4-28). This link connects to the southernmost extent of Onehunga Mall, a cul-de-sac with light industrial and residential land uses adjacent. Cyclists and pedestrians then continue north on this quietly trafficked short section of Onehunga Mall before using the high volume and freight and bus dominated section of Onehunga Mall to Neilson Street. Southbound pedestrians and cyclists can use Onehunga Harbour Road to connect back into Waikaraka Cycleway or an underpass to connect back onto Māngere Bridge. The existing AT Cycle Network map describes the southern end cul-de-sac end of Onehunga Mall as a route on quieter roads recommended by cyclists with the northern part of Onehunga Mall as a route with space for cyclists but may be on busy roads.

Figure 4-28: Onehunga Harbour Road Overbridge, underpass under SH20

The existing pedestrian and cycle environment for this sector is summarised as follows:

- **Connectivity**: There is a network gap between the cul-de-sac end of Onehunga Mall to Onehunga Town Centre / train station;
- **Amenity**: The facilities are generally high amenity. The visual presence and noise of the adjacent SH20 is acknowledged; and
- **Severance**: Although SH20 provides a physical barrier, there are two connections (underpasses).

4.14.3.3 Sector 3: The Waikaraka Cycleway

The Waikaraka Cycleway is a 2.9km high amenity route with a 3m wide concrete shared path as seen in Figure 4-29. Pedestrians and cyclists use a 200m quiet section of cemetery road immediately adjacent to the Waikaraka Cemetery before re-joining the shared path. It is noted that due to the location adjacent to the foreshore and industrial uses there is a lack of passive surveillance on the route and some potential for personal security issues.

Figure 4-29: Waikaraka Cycleway

There are five connections from the Waikaraka Cycleway into the adjacent local area as shown in Figure 4-30.

1. Alfred Street
2. Waikaraka Cemetery (west)
3. Waikaraka Cemetery (east)
4. Miami Parade
5. Hugo Johnston Drive.

The shared path stops at Hugo Johnston Drive and does not continue to provide a connection to nearby key destinations of Mutukāroa-Hamlins Hill, Sylvia Park Town Centre and Train Station.

Figure 4-30: Waikaraka Cycleway - Connections into the local area

The existing pedestrian and cycle environment for this sector is summarised as follows:

- **Connectivity**: There are no networks gaps (the land adjacent to the cemetery being a functional albeit unofficial part of the walking and cycling network);
- **Severance**: There are five connections back to the local community over a distance of around 2.9 km; and
- **Amenity**: The facilities are high amenity. However, it is noted that the cyclepath lacks any passive surveillance and therefore has potential personal security issues.

4.14.3.4 Sector 4: Anns Creek to Sylvia Park Town Centre

For cyclists wanting to get from the end of the Waikaraka Park at Hugo Johnston Drive to Sylvia Park Town Centre their route is not direct and comprises of a circuitous, low amenity, mainly on-road route via one of two ways:

- Largely on-road (with the exception of a small portion of shared path on Great South Road) via Hugo Johnston Drive, Church Street East (or Neilson Street), Great South Road, Sylvia Park Road and Mount Wellington Highway (a total distance of around 4.1km); or
- A mixture of on-road and off-road via Hugo Johnston Drive, Church Street East (or Neilson Street), South Eastern Highway (off-road shared path adjacent to Mutukāroa-Hamlins Hill) and shared path into Sylvia Park Town Centre (around 3.5km). This is the most direct route.

Hugo Johnston Drive is identified in the Auckland Transport cycle network as a route for space for cyclists, but may be busy.

The most direct connection from Anns Creek to Great North Road (and then Sylvia Park) is severed by railway lines and the Anns Creek coastal environment. The shared path adjacent to the north of Mutukāroa-Hamlins Hill is high-quality in that it is well separated from traffic on SEART with a concrete barrier. It is safe and provides a reasonable width for passing (around 3m). However, it is acknowledged this shared path is adjacent to a busy arterial road so has lower amenity.

The short length of "shared path" running along Great South Road is narrow, around 2.2m in width, and is partially separated from traffic by a kerb. The infrastructure is available on both sides of the street (dual directional shared path on both sides) from the intersection with Sylvia Park Road to the entrance to Mutukāroa-Hamlins Hill Regional Park (around 180m). It is acknowledged this shared path is under width at 2.2m and adjacent to a busy arterial road so has low amenity. Its usefulness is limited as it does not connect to many destinations except for the Regional Park.

a. Access to Mutukāroa-Hamlins Hill Regional Park

The main pedestrian/cycle/vehicular access to Mutukāroa-Hamlins Hill Regional Park is provided from Great South Road and provides access to the car park where visitors can continue on foot or cycle only. Usage of the Regional Park is understood to be currently low, however Auckland Council have advised that they are planning on enhancing the park in the future.

The Waikaraka Shared Path finishes at Hugo Johnston Drive and pedestrians and cyclists coming from the west can use the road and pedestrian network to access the Mutukāroa-Hamlins Hill Regional Park via Hugo Johnston Drive, Church Street and Great South Road. Pedestrians and cyclists coming from the north would use Great South Road and the short stretch of "shared path" along Great South Road to the entrance to the Regional Park. From the south pedestrians and cyclist will use Great South Road and those arriving from the east would use Sylvia Park Road and the short length of "shared path' along Great South Road to the entrance to the Regional Park. There are few facilities for these users, namely a short distance of on-road cycle lane at the intersection of Great South Road and Sylvia Park Road, sporadic foot paths (often only on one side of the road) along Hugo Johnston, Great South Road and Sylvia Park Road. Pedestrians and cyclists use the signalised crossings points at the Great South Road/Sylvia Park Road intersection.

The closest train station is Westfield almost 25 minute walk from the entrance and bus services run along Great South Road with a bus stop close to the entrance to the Regional Park on Great South Road.

No signalised pedestrian crossing facilities are provided on any leg of the Sylvia Park Road/ Mount Wellington Highway intersection. There is no footpath on the southern side of Sylvia Park Road outside Hirepool. Similarly, the footpath on the western side of the northern arm of Mount Wellington Highway is short in length and finishes approximately 50m from the corner. The footpath on the eastern side of the northern arm of Mount Wellington Highway is continuous. Both sides of the southern arm of Mount Wellington Highway have footpaths.

The existing pedestrian and cycle environment for this sector is summarised as follows:

- **Connectivity**: There are mostly significant network gaps with sporadic infrastructure that is in parts narrow;
- **Amenity**: The facilities are generally low amenity (with few people being willing to walk or cycle from Anns Creek to Sylvia Park Town Centre);
- **Severance**: There is severance from Anns Creek to Sylvia Park Town Centre with an indirect journey that is approximately 3.5 to 4.1 km (depending on route) and mostly on the road.

4.14.3.5 Sector 5: Princes Street and Panama Road Areas

Princes Street

Westbound pedestrians moving between the Ōtāhuhu residential communities on either side of SH1 use the existing footpaths and controlled pedestrian crossing on Frank Grey Place and then footpaths on the Princes Street Bridge.

However, on reaching the SH1 Princes Street on-ramp pedestrians cross, uncontrolled in two stages, two lanes of on-ramp traffic via a pedestrian refuge as seen in Figure 4-31 below. This is not considered a safe crossing point for pedestrians. Eastbound pedestrians use existing footpaths and follow a fairly indirect route to the bridge. Pedestrians cross uncontrolled in two stages, two lanes of SH1 off-ramp traffic via a pedestrian refuge as seen in Figure 4-32 below. This staggered uncontrolled crossing point has tactile paving installed on the dropped kerbs and on the island. This is not considered a safe crossing point for pedestrians. There are narrow footpaths on either side of the Princes Street Bridge and there are no facilities for cyclists.

The existing pedestrian and cycle environment for this sector is summarised as follows:

- **Connectivity**: There are no facilities for cyclists.
- **Amenity**: Footpaths on either side of Princes Street Bridge, narrow footpaths on Princes Street Bridge. Pedestrians have to undertake four uncontrolled crossing movements across SH1 on and off-ramps which is not considered to be safe.
- **Severance**: There is one connection across SH1 at this location via the Princes Street Bridge.

Figure 4-31: Uncontrolled staggered pedestrian crossing point across the SH1 on-ramps.

Figure 4-32: Uncontrolled staggered pedestrian crossing point across the SH1 off-ramps.

Panama Road

The Panama Road Area has no facilities for cyclists however; it has footpaths on either side of the bridge. The footpaths on the bridge are narrow as seen on Figure 4-33.

- **Connectivity**: There are no facilities for cyclists. Footpaths on either side and on Panama Road Bridge;
- **Amenity**: Narrow footpaths on Panama Road Bridge; and
- **Severance**: There is one connection across SH1 at this location via the Panama Road Bridge.

Figure 4-33: Panama Road Bridge

4.14.4 Summary of Existing facilities

There are approximately:

- 6.1 km of off-road shared paths, including recreational routes in the vicinity of the Project; and
- 1.2 km of on-road cycleways with a physical separation between cyclists and motorists.

Most of the existing off-road shared paths within the Project Area comprise the Waikaraka Cycleway provides approximately 3km of off-road shared path used for recreation and commuter purposes between Waikaraka Cemetery and Hugo Johnston Drive. In addition, a 1km off-road shared path links to the Cyclepath between the overbridge over Onehunga Harbour Road to the western extent of the Waikaraka Cemetery.

Between Onehunga Harbour Road overbridge and the northern extent of Orpheus Drive there is 1.2km of separated on-road cycleway with a 300m gap in facilities between the Sea Scout Hall and the Manukau Cruising Club.

There is almost 1 km of off-road shared path between Māngere Bridge overbridge (over Onehunga Harbour Road) and the Onehunga Mall cul-de-sac providing a north-south connection between Old Māngere Bridge towards Onehunga Town Centre.

There is only a short distance (400m) of off-road shared path between Anns Creek and Sylvia Park Town Centre.

4.14.5 Existing Usage of Waikaraka Cycleway

Manual count surveys were undertaken on Sunday 18th June 2016 and Monday 19th June 2016 between 7am and 5pm and the weather conditions were clear. This provides a representation of the use during a winter weekend and a weekday. It is recognised that June is a winter month, does not represent a typical time of year and counts may be significantly higher in summer however this was due to Project timeframes. The data was collected in order to estimate the likely usage of the proposed Project walking and cycling infrastructure. Percentage increases were applied to the winter data to take account of this seasonal variation as discussed in Appendix C which includes the methodology used to predict likely future usage of the proposed walking and cycling infrastructure. It is noted that data will be collected on the pedestrian and cycle usage of the Waikaraka Cyclepath during the summer months of 2016/17.

Due to the long length of the cycleway surveyors were positioned at between Māngere Bridge and Alfred Street and approximately 1km west of Hugo Johnston Drive.

4.14.6 Existing Pedestrian and Cycling Use of Old Māngere Bridge

Auckland Transport collects automatic monthly counts of cyclists at destinations all over Auckland including Old Māngere Bridge. During September 2016 a total of 7,253 cyclists were recorded using Old Māngere Bridge. The total number of cyclists using the bridge during September 2016 on weekdays was 4,567 and 2,686 on weekends. The highest recorded number of daily cyclists was on a Sunday with 645 cyclists recorded using the bridge on Sunday 11th September 2016. The average daily number of cycle trips using the bridge on a weekday during September was 207. The average daily number of cycle trips is higher on the weekend with 335 cycle trips during September 2016.

It is likely that some school children living in Māngere Bridge, and within the Onehunga High School zone, would use Old Māngere Bridge to cycle to school. It is estimated to be between a 15 and 20-minute cycle ride between the northern part of Māngere Bridge (which is in zone for the secondary school) and Onehunga High School. The AT Monthly Cycle Count data is automated and records the number of cycle trips and thus does not distinguish between different user groups (e.g.. school children). It is not anticipated that not many children would choose to walk to Onehunga High School as it is estimated to be a 50 – 60-minute walk.

4.14.6.1 Cycle Usage

The key findings from the cycling survey are:

- The shared path is used by significantly more cyclists on a weekend compared to a weekday. 250 cyclists used the path on the Sunday compared to 55 cyclists on a Monday;
- On Sunday around 25% turned back around half way so the actual number was more like 190;
- The majority of trips on Sunday are group trips (more than a single cyclist travelling together) while majority of the Monday trips are individual cyclists;
- On Sunday the morning peak hour was at 9am with a peak of 100 cyclists traveling both directions which decreased gradually every hour until 1pm to 20 cyclists. The peak hour in the afternoon occurred at 3pm with 34 total cyclists traveling both directions;
- On Monday the number of cyclists were relatively low throughout the day with only slightly distinguishable peaks morning and midday peak volumes at 7am and 12pm with 26 and 35 cyclists respectively; and
- On Monday only 16% travelled in groups, suggesting that majority were likely to be commuter trips.

4.14.6.2 Pedestrian Usage

The shared path is used by significantly more pedestrians on a weekend compared to a weekday. 135 pedestrians used the path on the Sunday compared to 36 pedestrians on a Monday.

4.14.7 Future Pedestrian and Cycle Facilities

Figure 4-34 shows the future Auckland Transport proposed walking and cycling network Without the Project and includes urban cycleway funded projects, other new cycleways to be completed by June 2018 (dependent on funding and consents), planned cycleways beyond 2018 and proposed greenways (local routes).

4.14.7.1 AMETI Walking and Cycling Improvements

The AMETI project aims to deliver improved walking and cycling facilities to and from Sylvia Park, along with the bus improvements discussed earlier in this Section. An assessment of how the proposed pedestrian and cycling facilities interact with the Route 32 walking and cycling improvements at Sylvia Park is discussed in Section 7.

4.14.8 Route 32 Walking and Cycling Improvements

Route 32 is a new high frequency bus network that was implemented on 30th October 2016 between Māngere Town Centre and Sylvia Park via Ōtāhuhu Station, Ōtāhuhu Town Centre. Walking and cycling facilities are also proposed in future stages of the Route 32 project.

Currently Auckland Transport is developing concept option plans, which integrates the Route 32 walking and cycling improvements with the proposed AMETI project and walking and cycling improvements planned for Ōtāhuhu.

An assessment of how the proposed pedestrian and cycling facilities interact with the Route 32 walking and cycling improvements at Sylvia Park is provided in Section 7.

4.14.9 Interaction with New Old Māngere Bridge

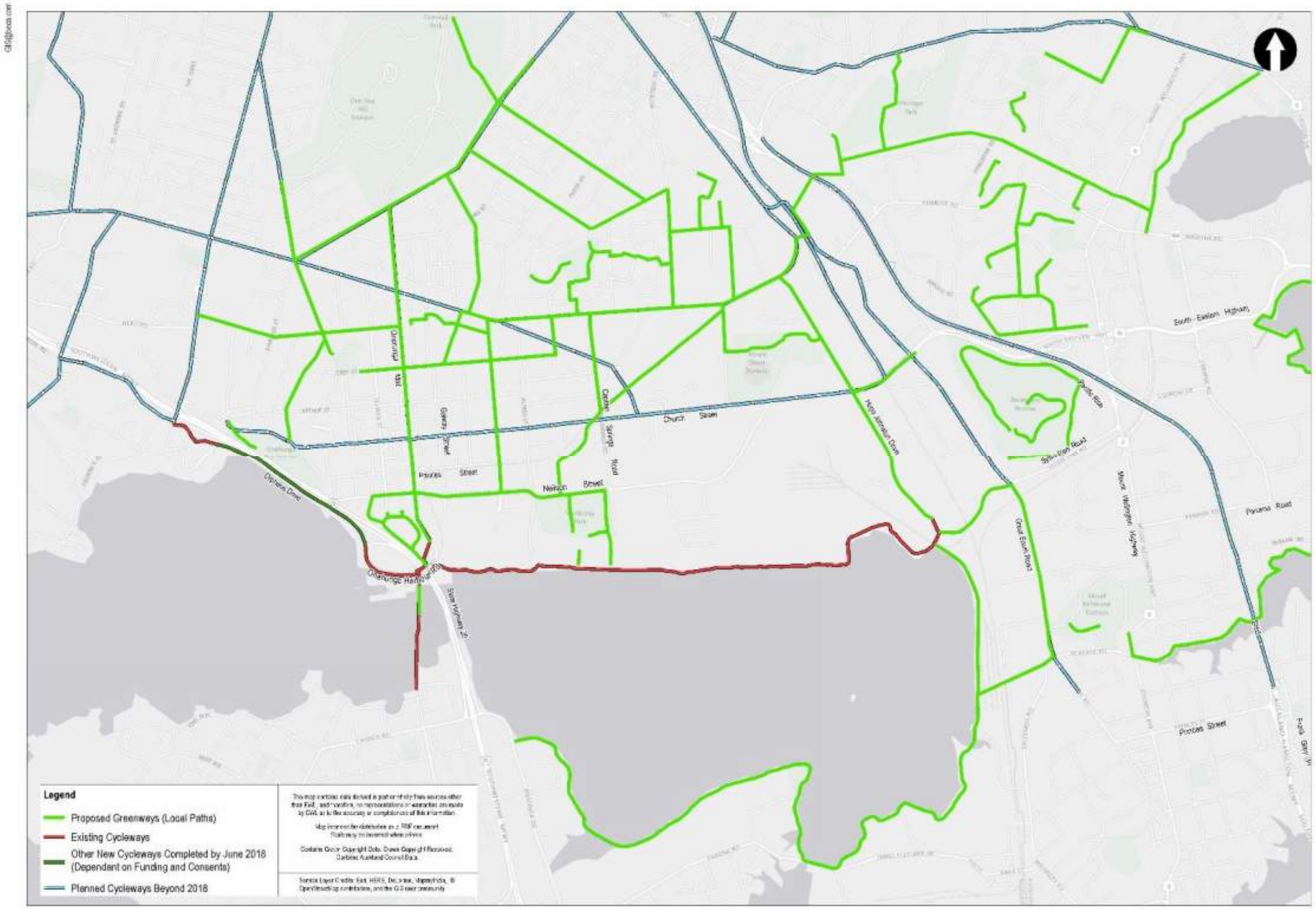
The Transport Agency plans to replace the existing Old Māngere Bridge with a New Old Māngere Bridge. The replacement Old Māngere Bridge will provide continued walking and cycling access between Māngere Bridge Township and Onehunga. It is required to be replaced as the existing structure is aging and in poor condition. The Transport Agency has been granted resource consents for the complete replacement of this bridge with a new structure for recreational use. This project is an important component of walking and cycling access between Māngere Bridge township and Onehunga Town Centre.

4.14.10 Summary of Key Walking and Cycling Issues

The key issues of the existing walking and cycling network are as follows:

- Minor network gap on Orpheus Drive between the Manukau Cruising Club and the Aotea Sea Scout Hall where pedestrians and cyclists have to use the lightly trafficked Orpheus Drive;
- There is a network gap between the cul-de-sac end of Onehunga Mall to the key destinations of Onehunga Town Centre / train Station. The very high truck and traffic flows also contribute to poor amenity on this route;
- Five connections on the Waikaraka Cycleway to the local road network over a distance of around 2.9 km; and
- The Waikaraka Cycleway ends at Hugo Johnston Drive and does not extend to key destinations of Mutukāroa-Hamlins Hill Regional Park and Sylvia Park Town Centre and Sylvia Park Train Station which is considered a network gap.

Figure 4-34: Proposed Walking and Cycling Network



- Convoluted and indirect route (up to 4kms) from Anns Creek to Sylvia Park Town Centre with low amenity and sporadic infrastructure (with few people being willing to walk or cycle from Anns Creek to Sylvia Park Town Centre);
- Pedestrians moving between the two Ōtāhuhu communities either side of SH1 using Princes Street have to undertake four uncontrolled crossing movements across the SH1 on and off-ramps which is not considered to be safe. There are no facilities for cyclists on Princes Street. Narrow footpaths on Princes Street Bridge; and
- Narrow footpaths on Panama Road Bridge.

4.15 Crash Environment

4.15.1 Introduction

The NZ Transport Agency Crash Analysis System (CAS) database was used to extract the reported crash data for the identified study area. The study area was divided into five main sections including the route along Neilson Street, Church Street, Great South Road, Panama Road, and SH1 ramp intersections with Princes Street and Frank Grey Place. The study period is inclusive of crashes occurring from 2011 to 2015 (5-year period) and includes commentary on pedestrian and cyclist crashes. A description for each section is included in Appendix D.

4.16 On-Street Parking Environment

4.16.1 Introduction

The Project will mean a change to the function to some roads in order to accommodate the increase in traffic volumes. These roads will need to be upgraded which will require some existing on-street parking to be removed. More detailed parking occupancy surveys were undertaken on those roads where existing parking demand was high and where it was anticipated there was going to be a significant increase in traffic and would require the removal of parking (e.g. Hugo Johnston Drive and Captain Springs Road). It was considered that less detailed parking surveys were required on the other roads where it was visually observed to be lower.

Data on the existing on-street parking environment has been collected and summarised below. The key roads include Onehunga Mall, Galway Street, Captain Springs Road, Hugo Johnston Drive and Sylvia Park Road.

4.16.2 Onehunga Harbour Road

There are approximately 38 on-street car parking spaces on the cul-de-sac end of Onehunga Harbour Road in front of The Landing Restaurant and Bar. It was observed that visitors to the Landing, Airport Harbour View Motel and members of the public accessing the foreshore use these car parking spaces and the usage was observed to be highly variable. Parking is not permitted along the remainder of Onehunga Harbour Road as it is an on/off ramp for SH20. It was not considered necessary to undertake a parking utilisation survey in this location as it was agreed early in the design process that any on-street parking could be re-provided in close proximity and there would be no net-loss of parking. This is discussed in more detail in Section 6.

4.16.3 Onehunga Mall (south of Neilson Street)

The function of Onehunga Mall (south of Neilson Street to the start of Onehunga Harbour Road) will change from a highly trafficked, congested road with a high proportion of trucks to a quiet road with a 3m wide shared path for pedestrians and cyclists on its western side and a footpath on its eastern side. A significant proportion of this length of Onehunga Mall has existing NSAAT lines however there is some available parking.

Nine parking spaces are available on the western side and eight parking spaces are available on the eastern side (three of these spaces are restricted to 60 minutes). The highest number of cars observed parking on street was six at 1:30pm on Wednesday 3rd August 2016 which represents 35% utilisation. No cars were observed parking on this length of Onehunga Mall at 9:15am and two cars were parked at 4:20pm (12% utilisation).

4.16.4 Galway Street (south of Neilson Street)

Galway Street (south of Neilson Street) will be upgraded from a low trafficked industrial cul-de-sac with no centre line to a four lane road providing a new connection to EWL.

A snap shot survey was undertaken on Wednesday 3rd August 2016. The total available car parking spaces is 30 on this section of Galway Street. These were observed to be significantly under-utilised with 12 the highest number of cars observed parking on street at 9am and 1:30pm which is around 40% occupancy. The businesses on Galway Street were observed to have extensive off-street parking.

4.16.5 Under SH20

Pedestrian and cycling surveys were undertaken on Waikaraka Cycleway on a Saturday during June 2016 between 7am and 5pm. Surveys also included observations under SH20 to understand the use for parking for recreational cyclists driving and using the shared path. The peak for parking under the bridge was 1pm when seven cars were recorded parking at this location. The majority of the vehicles parked were families or a couple either going on a walk (around 50%) or going for a bicycle ride (50%) It is assumed all these cars were associated with using the Waikaraka Cycleway.

4.16.6 Captain Springs Road

Parking occupancy and length of stay surveys were undertaken on a weekday in May 2016 between 7am and 7pm and on a Saturday. A Tuesday and a Saturday were chosen as these were the busiest days at the Onehunga Sports Club. The parking surveys were undertaken on the length of road between Neilson Street and the start of the private road accessing Seamount Glass. The results are included in Appendix B and summarised below for each sector for Captain Springs Road.

As shown in Table 4-12, there are 70 available parking spaces along the length of Captain Springs Road. The average occupancy across the day was 54%, or 38 car parking spaces, with an average peak occupancy across the day of 81%.

Table 4-12 shows that middle and southern end of Captain Springs Road on a weekday experiences a higher level of parking activity (66% and 56% average occupancy levels) compared to the northern end where average occupancy levels are much lower at 40%.

Parking is busiest at the southern end of Captain Springs Road between 12pm and 3pm where the average occupancy is 81%. The middle sector is also busy with an average occupancy of 79% between 7am and 3pm. The northern end of Captain Springs Road is not as busy with average occupancy between 7am and 12pm of 48% and between 12pm and 3pm of 60%.

The parking survey results suggest that there is available parking capacity at the northern end of Captain Springs Road with approximately 14 spaces available (on average).

Table 4-12: Parking Occupancy Survey Results – Captain Springs Road Tuesday 24th May 2016

	Sector	Number of car parking spaces available	Average Occupancy	Average Peak Occupancy	Average Occupancy (7am-12pm)	Average Occupancy (12pm-3pm)	Average Occupancy (3pm-7pm)	Average Occupancy (7pm-10pm)
1	Northern	24	40%	67%	48%	60%	31%	13%
2	Middle	25	66%	94%	79%	79%	54%	41%
3	Southern	21	56%	82%	79%	81%	42%	0%
	TOTAL	**70**						

Table 4-13: Parking Occupancy Survey Results: Captain Springs Road Saturday May 28th 2016

	Sector	Number of car parking spaces available	Average Occupancy	Average Peak Occupancy	Average Occupancy (7am-12pm)	Average Occupancy (12pm-3pm)	Average Occupancy (3pm-7pm)	Average Occupancy (7pm-10pm)
1	Northern	24	23%	43%	34%	17%	14%	0%
2	Middle	25	47%	74%	62%	32%	41%	0%
3	Southern	21	30%	51%	35%	22%	30%	0%
	TOTAL	**70**						

The Saturday parking survey as seen in Table 4-13 showed that there is plenty of capacity on Captain Springs Road even during the busiest time at the Onehunga Sports Centre. The Onehunga Sports Carpark was at capacity on Saturday afternoon and a minor amount of overspill parking was observed. The Sports Centre car park was the busiest on a weekday evening at 7pm when evening training was being held, however, the carpark was only 30% utilised.

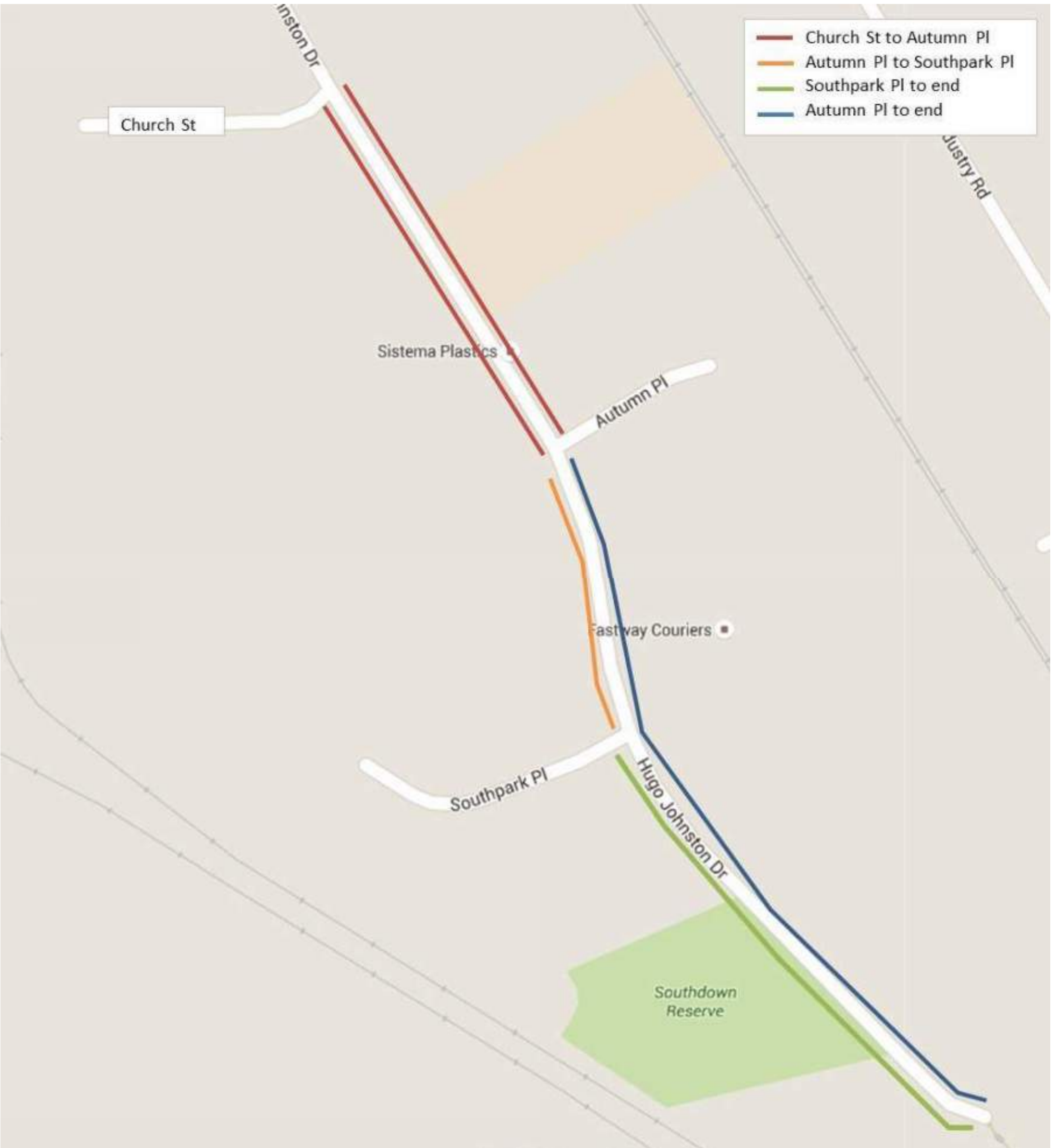
4.16.7 Hugo Johnston Drive

Hugo Johnston Drive will change from a two lane cul-de-sac to a through road providing a connection to the new EWL at the southern end. Traffic is predicted to significantly increase at the southern end. Parking occupancy and length of stay surveys were undertaken on Hugo Johnston Drive, and the two side roads Southport Place and Autumn Place during a weekday in May 2016 between 7am and 7pm as shown on Figure 4-35.

4.16.7.1 Car Parking Survey Results

The results are included in Appendix B and summarised in Table 4-14 below for each of the four sectors along Hugo Johnston Drive.

Figure 4-35: Hugo Johnston Drive Parking Survey Sectors



There are 182 available parking spaces along the length of Hugo Johnston Drive. The average occupancy across the day was 50%, or 92 car parking spaces, with a peak average occupancy across the day of 63%.

Table 4-14 shows that northern end of Hugo Johnston Drive experiences a higher level of parking activity (73% and 84% average occupancy levels) compared to the southern end where average occupancy levels are much lower at 38% and 33%.

Parking is busiest at the northern end of Hugo Johnston Drive between 12pm and 3pm where the average occupancy is 89%, 7am and 12pm is also a busy time for parking with 83% average occupancy. The southern end of Hugo Johnston Drive is not as busy as the northern end with approximately 30-40% average occupancy between 7am and 12pm and approximately 40% - 50% between 12pm and 3pm.

The parking survey results suggest that there is significant available parking capacity at the southern end of Hugo Johnston Drive with approximately 74 spaces available in Sectors 3 and 4 (on average).

Table 4-14: Parking Occupancy Survey Results – Hugo Johnston Drive Tuesday 24th May 2016

	Sector	Number of car parking spaces available	Average Occupancy	Average Peak Occupancy	Average Occupancy (7am-12pm)	Average Occupancy (12pm-3pm)	Average Occupancy (3pm-7pm)
1	Church Street to Autumn Place (both sides)	44	73%	94%	83%	89%	49%
2	Autumn Place to Southpark Place (west side of the road only)	22	84%	95%	95%	95%	61%
3	Southpark Place to end of cul-de-sac (west side of the road only)	56	38%	49%	39%	47%	29%
4	Autumn Place to end of cul-de-sac (east side of the road only)	60	33%	44%	32%	42%	29%
	TOTAL	182					

The average parking occupancy for the two cul-de-sacs are high particularly in the peaks:

- Southpark Place – 83% average occupancy, 91% peak occupancy;
- Autumn Place – 63% average occupancy, 82% peak occupancy.

Pedestrian and cycling surveys were undertaken on Waikaraka Cycleway on a Saturday during June 2016 between 7am and 5pm. The surveys also included observations at the end of Hugo Johnston Drive to understand the use for parking for those recreational cyclists driving and using the shared path. Three families arrived together in three separate cars with bikes on racks and went cycling for approximately 3-4 hours. Two additional groups turned up independently with bikes on racks and went cycling for around two hours each. The peak for parking at the end of the cul-de-sac was 1pm when nine cars were recorded parking at this location. It is assumed all these cars were associated with using the Waikaraka Cycleway.

4.16.8 Sylvia Park Road

It was not considered necessary to undertake detailed parking occupancy surveys on Sylvia Park Road as it was frequently observed on site visits that parking was significantly underutilised. Further, during the design process it was known that the majority of the businesses on the southern side of Sylvia Park Road are required for the Project so the associated demand for parking will also be removed. Therefore, snap shot surveys were considered appropriate for Sylvia Park Road.

NSAAT lines are implemented for a short length on both sides of Sylvia Park Road close to these two intersections. Sylvia Park Road will be upgraded from two lanes to four lanes and NSAAT are proposed to be implemented along its length removing all existing on-street parking.

There is potential for approximately 80 cars to park on-street on the northern side and approximately 70 cars on the southern side, so a total of 150 cars to park on-street. There are three recessed parking bays on the southern side, two nearer the Mount Wellington Highway end and one near the Great South Road end. A parking snap shot survey was undertaken on Sylvia Park Road on Wednesday 3rd August 2016 at three different times of the day to understand how many vehicles currently park on-street. The results are presented in Table 4-15.

Table 4-15: Sylvia Park Road (snapshot) parking survey on Wednesday 3 August 2016

Time	Northern side	Southern side	Total
8:30	1 truck	9 cars, 1 truck	11 (9 cars, 2 trucks)
12:15	0	9 cars	9 cars
16:40	0	6 cars	6 cars

The on-street parking on Sylvia Park Road is significantly under-utilised with nine the highest number of cars observed parking on-street at 8:30am and 12:15pm which equates to 6% occupancy. It is also noted that only the southern side was used for parking, and cars only parked in the recessed bays. The two recessed bays near Mount Wellington Highway were fully utilised and only one car was observed parking in the recessed bay near the Great South Road intersection. The northern side was not used for car parking and only 1 truck was observed parking during the three surveyed times. Two trucks were observed parking on Sylvia Park Road one on the northern side and one on the southern side.

The significantly low number of cars parking on street is likely to do with the busy nature and large proportion of trucks using Sylvia Park Road combined with ample off-street parking available observed at most businesses along the route.

4.17 On-site Car Parking

The Project will require a small amount of land at the front of 1016 Great South Road for the reconfiguration of the Great South Road/Sylvia Park Road intersection. This is likely to result in the loss of approximately eight parking spaces from this carpark along the front of the site. The existing car park provides 93 car parking spaces for the site.

During August 2016 the occupancy of the car park, including the front eight parking spaces, was observed from outside the property at three times during the day.

At 8:30am the car park was approximately 25% full with only one car occupying one of the front 8 car parking spaces. At 12:15pm and 4:40pm the car park was approximately 60% full with four cars occupying the front eight spaces. This means at 8:30am there was approximately 60 spaces available for parking and at 12:15 and 4:40pm there were 30 spaces available.

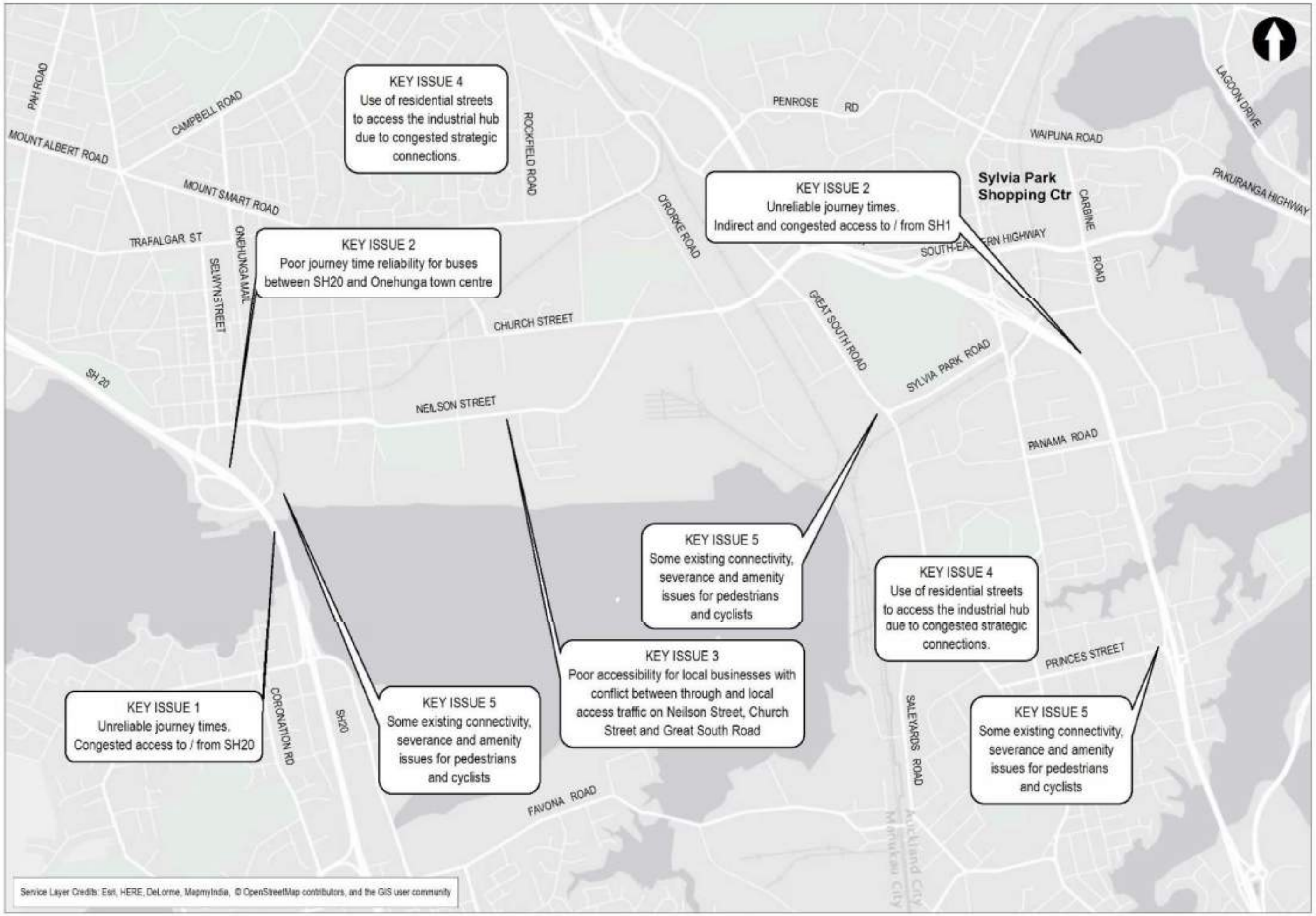
This would suggest that the existing car park can accommodate demand if the capacity was reduced.

4.18 Summary

The key issues of the existing transport environment are shown on Figure 4-36 and are as follows:

1. Unreliable and inconsistent journey times in the local and wider areas. Congested access to/from SH20 and indirect and congested access to/from SH1;
2. Poor bus journey time reliability for buses between SH20 and Onehunga Town Centre;
3. Poor accessibility for local businesses, with conflict between through and local access traffic on Neilson Street, Church Street and Great South Road;
4. Use of residential streets, particularly by trucks, to access the industrial hub due to congested strategic connections; and
5. Existing connectivity, severance and amenity issues for pedestrians and cyclists.

Figure 4-36: Key issues of the existing transport environment



5 Assessment of Effects on Travel Times, Travel Time Reliability and Traffic Flows

5.1 Introduction

This chapter summarises the expected effects of the Project on travel times, travel time consistency and traffic flows on the road network. This is via a comparison between a scenario Without the Project and With the Project for both 2026 and 2036 future years. The year 2026 has been chosen as it would be shortly after the potential opening of the Project. The year 2036 has been chosen for a future longer-term assessment. Higher weighting is given to the 2026 predictions because forecasting uncertainties increase with the longer time horizon.

The analysis informing this chapter is primarily based on the project SATURN modelling, and considers the following aspects:

- Predicted changes in travel times, both for accessing the strategic network from the Onehunga-Penrose area and between key locations in the wider network;
- Consistency and reliability of travel times accessing this area; and
- Predicted changes in daily traffic flows, both in the immediate vicinity and on the wider network.

Also included in this chapter is an assessment of changes in regional demand for vehicle and public transport travel across the Auckland region as a result of the Project. The Level of Service (LoS) for the key intersections and the expected performance of the new EWL road is also assessed, along with the expected impact on SH1 and SH20.

5.2 Predicted Changes in Travel Time between the Industrial Hub and the Strategic Network (SH1 and SH20)

Predicted changes in access to the strategic network were measured by identifying the predicted changes in travel times between a nominal point in the study area (being the corner of Neilson Street and Captain Springs Road), and each of the SH1 and SH20 motorways. Four interchange points on SH1 (north and south) and SH20 (north and south) were chosen to represent the "Four Corners" as shown on Figures 5.1 – Figure 5.3.

The choice of a central point being the intersection of Captain Springs Road and Neilson Street is representative, with the time savings altering depending on the specific location within the study area.

The changes to travel times With and Without the Project have been calculated along key routes to/from the businesses in the Onehunga/Penrose industrial area using the interchanges on SH20 and SH1. Where there are route options for access to/from SH20 the quickest route has been used.

The data presented is based on predicted travel times for trucks, rather than general traffic. In busy urban networks the speeds of cars and trucks are generally very similar due to the interaction of the high traffic flows. However, specific truck bypass lanes are provided in some locations, such as the bypass lanes at the motorway ramp signals. Therefore, the travel times for general traffic will be very similar to those presented here, except for movements using busy motorway on-ramps. The models indicate that general traffic times are typically 2-3 minutes longer than those for trucks at those locations.

The predicted travel times are presented in different ways to help summarise and contextualise the predicted changes:

- Figure 5-1 – Figure 5-3 presents the predicted 2026 travel times with and without the Project to the ‘four corners;
- Table 5-1 tabulates the predicted travel times, along with the absolute and percentage changes, for trucks accessing the strategic network for 2026 and 2036;
- Figure 5-4 - Figure 5-6 graphs the predicted travel times across the three peaks in 2026 to identify trends; and
- Table 5-2 tabulates the average speeds for the same movements. These averaged speeds are based on the same travel time data, but calculated as averaged speeds to assist understanding of the scale of change expected.

Figure 5-1: Predicted Journey Times to and from the "4 Corners" to the Industrial Hub 2026 (AM)

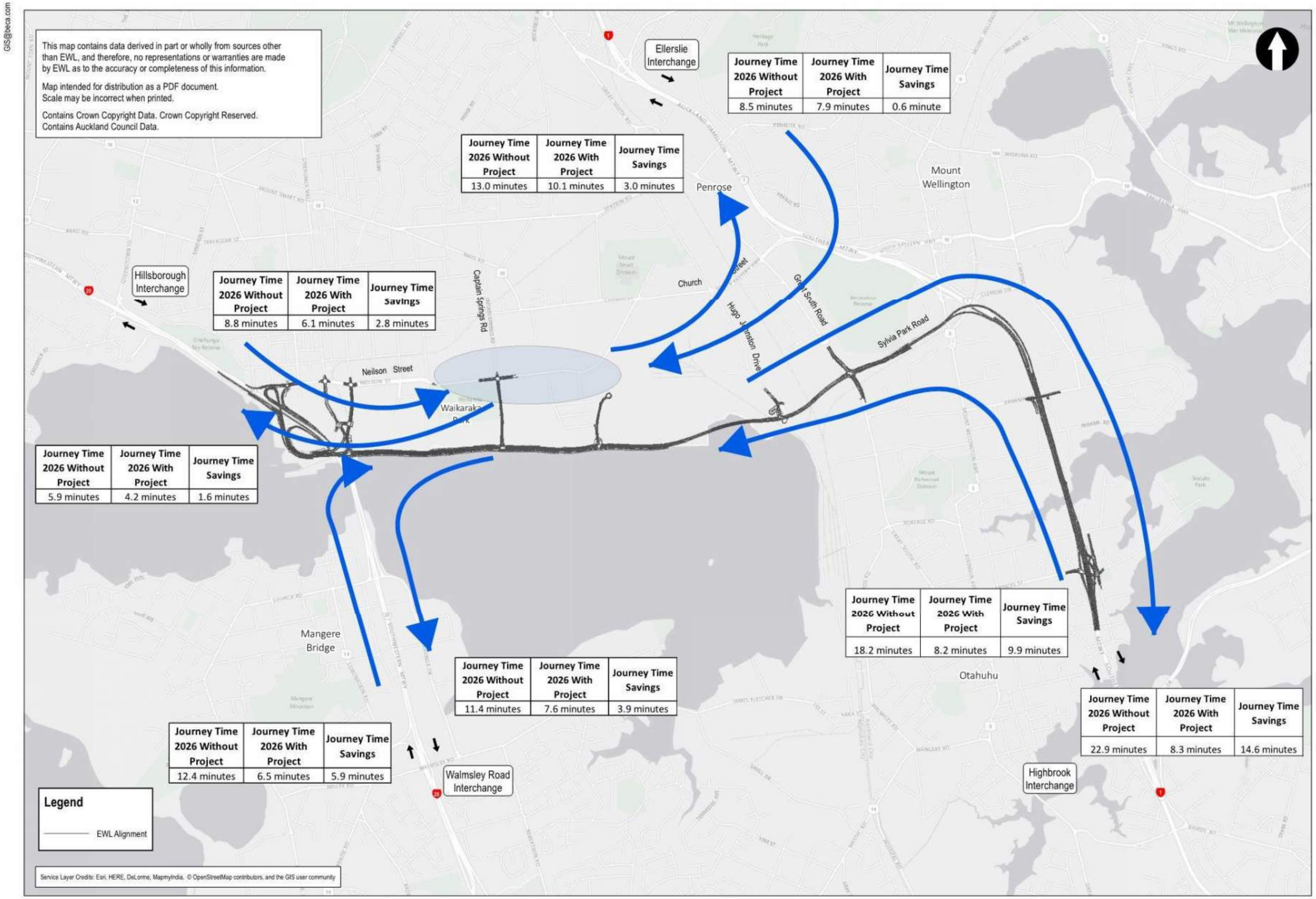


Figure 5-2: Predicted Journey Times to and from the "4 Corners" to the Industrial Hub 2026 (Inter Peak)

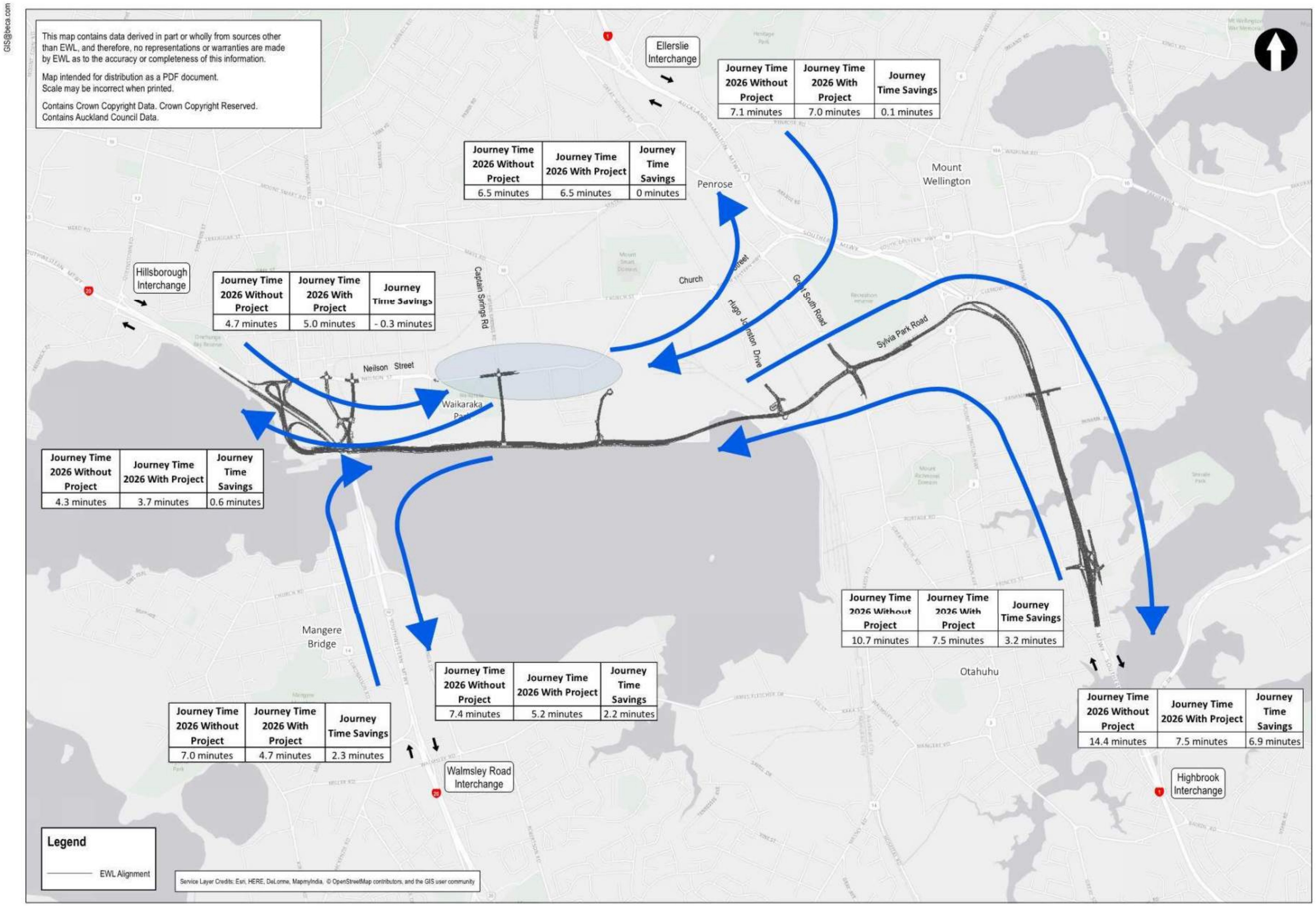


Figure 5-3: Predicted Journey Times to and from the "4 Corners" to the Industrial Hub 2026 (PM Peak)

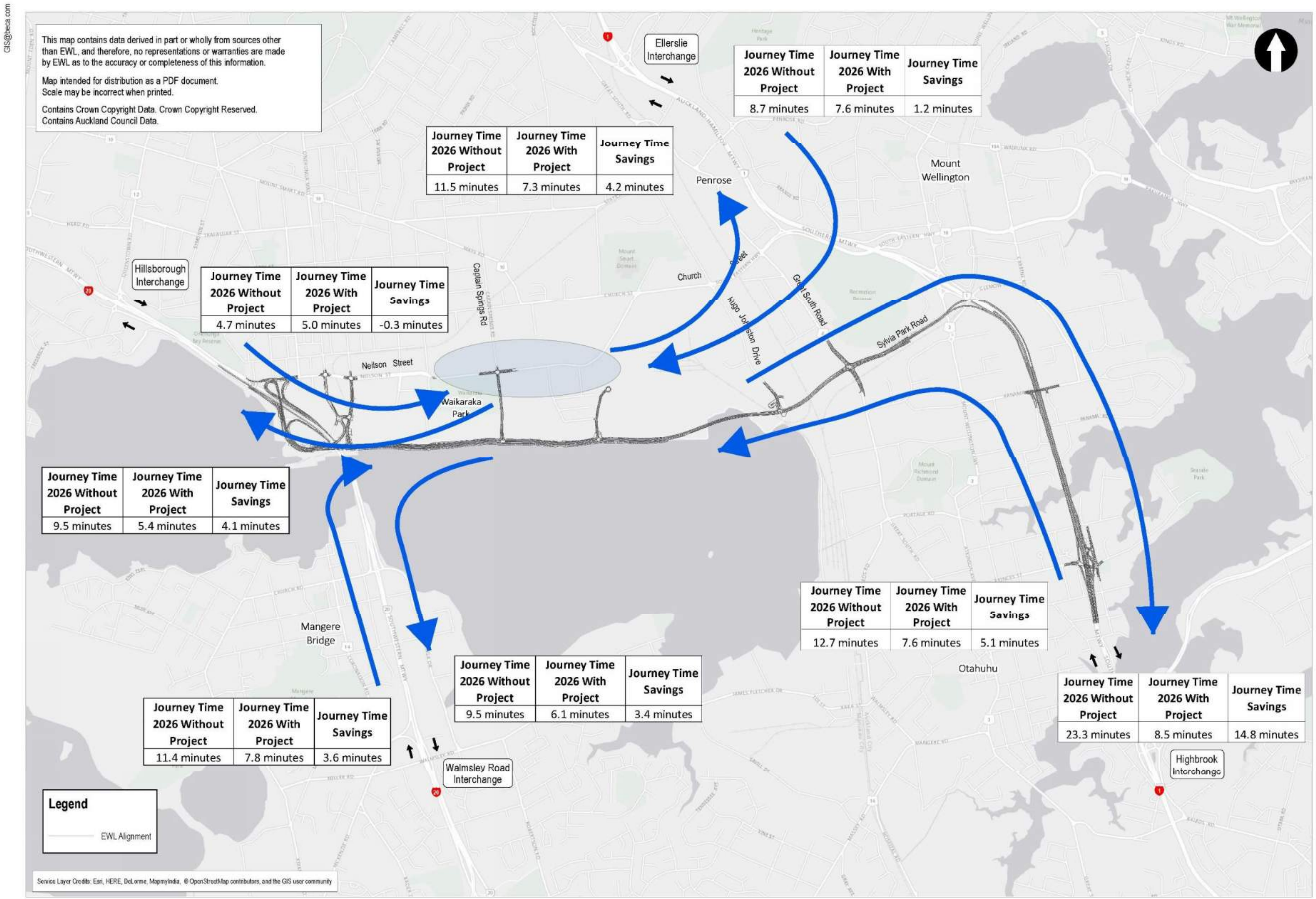


Table 5-1: Predicted Change in Travel Times for trucks accessing the Strategic Network

	2013	2026 (minutes)			2036 (minutes)		
		Without Project	With Project	Difference	Without Project	With Project	Difference
AM PEAK							
To SH20 South	5.5	11.4	7.6	-3.9 (-34%)	15.5	10.0	-5.5 (-35%)
To SH20 North	4.4	5.9	4.2	-1.6 (-28%)	5.1	4.5	-0.7 (-13%)
To SH1 South	18.2	22.9	8.3	-14.6 (-64%)	26.7	8.7	-18.0 (-68%)
To SH1 North	11.8	13.0	10.1	-3.0 (-23%)	17.0	10.8	-6.3 (-37%)
From SH20 South	10.8	12.4	6.5	-5.9 (-48%)	13.6	7.1	-6.5 (-48%)
From SH20 North	4.7	8.8	6.1	-2.8 (-31%)	9.3	6.0	-3.3 (-35%)
From SH1 South	14.8	18.2	8.2	-9.9 (-55%)	16.3	8.3	-8.0 (-49%)
From SH1 North	8.0	8.5	7.9	-0.6 (-7%)	7.3	7.6	0.3 (4%)
INTER PEAK							
To SH20 South	4.4	7.4	5.2	-2.2 (-30%)	5.7	5.4	-0.3 (-5%)
To SH20 North	4.1	4.3	3.7	-0.6 (-13%)	4.8	4.0	-0.8 (-18%)
To SH1 South	14.0	14.4	7.5	-6.9 (-48%)	16.0	7.8	-8.3 (-52%)
To SH1 North	6.2	6.5	6.5	0.0 (0%)	7.4	6.9	-0.5 (-7%)
From SH20 South	5.6	7.0	4.7	-2.3 (-33%)	8.1	5.3	-2.8 (-34%)
From SH20 North	4.0	4.7	5.0	0.3 (5%)	5.2	5.1	-0.1 (-2%)
From SH1 South	10.2	10.7	7.5	-3.2 (-30%)	11.2	7.3	-3.9 (-35%)
From SH1 North	6.8	7.1	7.0	-0.1 (-1%)	7.3	7.2	-0.1 (-1%)
PM PEAK							
To SH20 South	6.3	9.5	6.1	-3.4 (-36%)	8.8	6.3	-2.5 (-29%)
To SH20 North	6.2	9.5	5.4	-4.1 (-43%)	8.5	8.5	0.1 (1%)
To SH1 South	19.9	23.3	8.5	-14.8 (-63%)	25.0	9.1	-15.9 (-63%)
To SH1 North	8.8	11.5	7.3	-4.2 (-37%)	10.8	7.4	-3.4 (-32%)
From SH20 South	7.9	11.4	7.8	-3.6 (-31%)	11.9	9.5	-2.4 (-20%)
From SH20 North	4.4	4.7	5.0	0.3 (7%)	4.7	5.0	0.3 (6%)
From SH1 South	10.7	12.7	7.6	-5.1 (-40%)	15.9	7.8	-8.2 (-51%)
From SH1 North	7.3	8.7	7.6	-1.2 (-13%)	11.9	8.0	-3.9 (-33%)

It can be seen that in general, the 2036 travel times are higher than those in 2026, due to the predicted traffic growth. However, there some exceptions, where the 2036 travel times are predicted to be lower than those in 2026. Investigations of the models found that this was due to how traffic signals at key locations were assumed to operate. The assumed signal operation can make some movements quicker, whilst others at the same intersection become slower. In the Without-Project scenario especially, the lack of capacity can make the predicted delays much more sensitive to the assumed signal operation. The 2036 models have not had the signal timings reviewed as extensively as the 2026 models, especially as the exact signal operation becomes much more uncertain in the longer-term.

Note on interpreting travel time predictions:

As discussed in the Methodology, the models predict average travel times from 'average' days (i.e. weekly or seasonal peaks and days with capacity reductions from incidents or adverse weather are not represented). This means that the predicted average times do not reflect the times experienced within the most intense parts of the peak periods, nor on days with higher demands or reduced network capacity. Similarly, the models cannot predict the variability, both within peaks or across different days. As such, this means that the predicted average times will tend to understate the conditions on those *more adverse days. The models are however considered appropriate to indicate the trend and magnitude of changes, but this under-estimation of variability and above-average congestion should be considered when interpreting the modelled times*.

Figure 5-4: 2026 AM Peak Access Travel Times

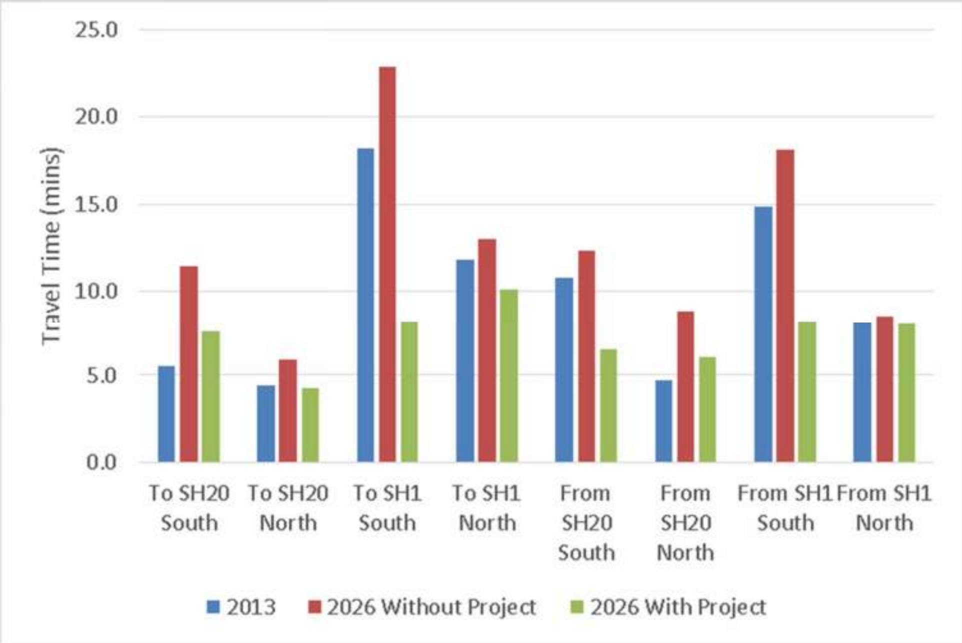


Figure 5-5: 2026 InterPeak Access Travel Times

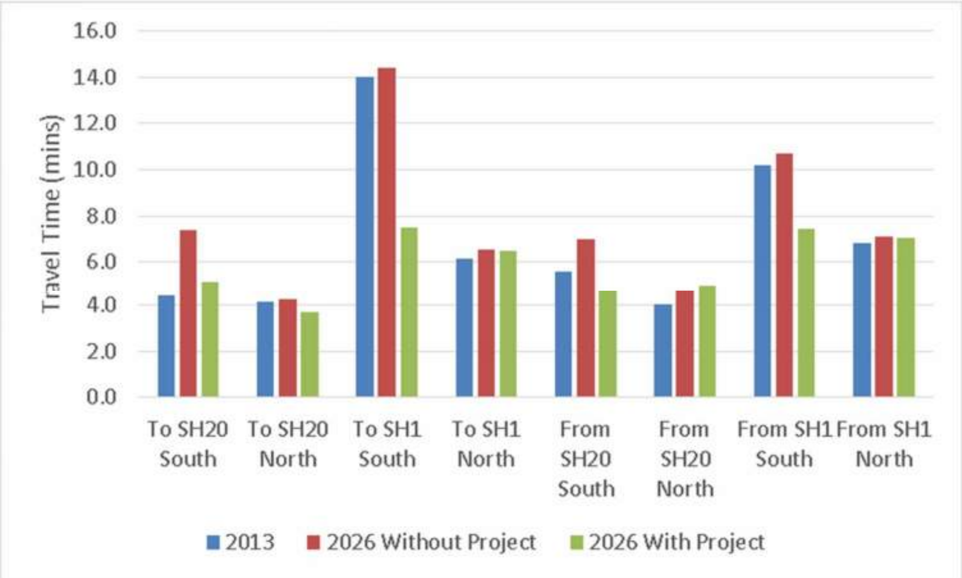


Figure 5-6: 2026 PM Peak Access Travel Times

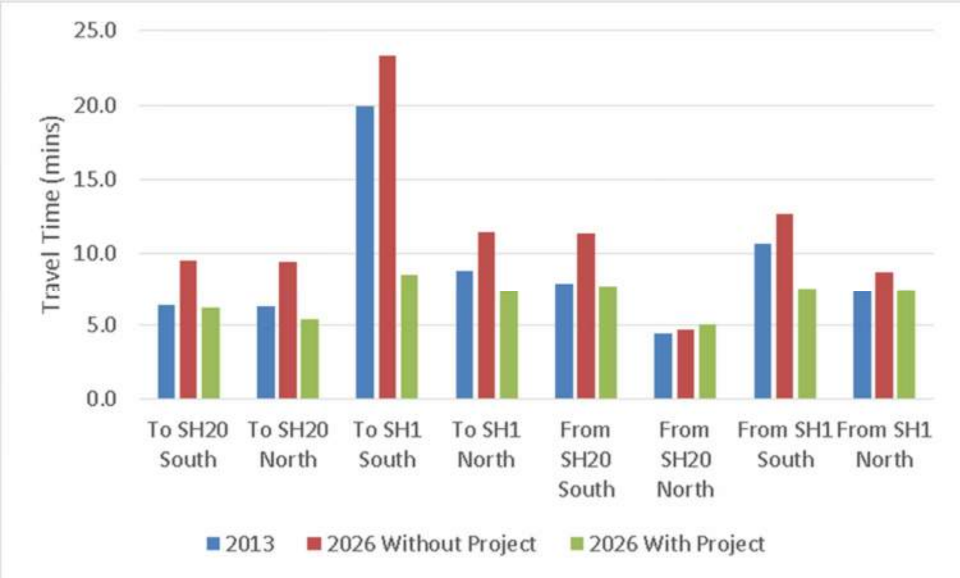


Table 5-2: Changes in Average speed

	2013 (km/h)	2026 without Project (km/h)	2026 with Project (km/h)	Difference (km/h)
AM PEAK				
To SH20 South	50.3	23.6	35.6	12.1
To SH20 North	55.5	42.0	52.0	10.0
To SH1 South	30.7	24.4	61.7	37.3
To SH1 North	21.0	19.0	26.7	7.7
From SH20 South	28.0	25.5	47.6	22.1
From SH20 North	49.3	23.3	32.0	8.8
From SH1 South	36.4	29.8	62.7	32.9
From SH1 North	44.1	41.6	47.3	5.7
INTER PEAK				
To SH20 South	62.9	36.5	52.0	15.5
To SH20 North	59.3	57.5	59.1	1.6
To SH1 South	39.8	38.9	67.7	28.9
To SH1 North	40.1	38.0	41.3	3.3
From SH20 South	54.0	45.1	65.7	20.5
From SH20 North	57.6	43.4	38.9	-4.5
From SH1 South	53.1	50.4	69.2	18.7
From SH1 North	51.9	49.7	53.4	3.6
PM PEAK				
To SH20 South	44.3	28.3	44.0	15.7
To SH20 North	39.4	26.0	40.9	15.0
To SH1 South	28.0	24.0	59.7	35.7
To SH1 North	28.2	21.6	37.0	15.5
From SH20 South	38.1	27.7	39.4	11.7

	2013 (km/h)	2026 without Project (km/h)	2026 with Project (km/h)	Difference (km/h)
From SH20 North	52.7	44.2	39.0	-5.2
From SH1 South	50.5	42.5	67.7	25.2
From SH1 North	48.9	40.6	49.6	9.0

5.2.1 Travel Times to/from SH1 South

Without the Project, the travel times are generally expected to increase significantly. For example, in the AM peak the average time heading to SH1 South is expected to increase from 18 minutes in 2013 to 26.7 minutes in 2036, a 47% increase. Even in the less congested interpeak period, the travel times are expected to increase by 10-14%.

With the Project in place, the most significant travel time savings are those between SH1 South (Highbrook Interchange) and the Onehunga-Penrose industrial area due to the new East West Link road and new access ramps at Tip Top Corner. The predicted travel time savings for trucks in 2026 are as follows:

- A significant 14 minutes' travel time saving in the AM peak for trucks travelling south from the Onehunga-Penrose industrial area to the SH1 Highbrook Interchange. It is predicted that truck travel times will be 64% quicker With the Project compared to Without the Project. It is predicted to be an 18-minute saving in 2036 (68%);
- A significant 15 minute (63%) travel time saving is predicted in the evening peak for trucks travelling south, rising to 16 minutes in 2036 (63%);
- Substantial time savings are also predicted in the interpeak for trucks travelling south, being 6.9 minutes (48%) in 2026 and 8.3 minutes (52%) in 2036;
- Heading north from SH1, the morning peak time savings are also significant, being 9.9 minutes (55%) in 2026, and 8.0 minutes (49%) in 2036;
- In the PM peak, northbound savings are more modest at 5.1 minutes (40%) in 2026, rising to 8.2 minutes (51%) in 2036;
- Similarly, in the interpeak peak, northbound savings are 3.2 minutes (30%) in 2026, rising to 3.9 minutes (35%) in 2036; and
- The significant scale of the expected improvements in access can be seen in the predicted changes in average speed; for example, southbound in 2026, average AM peak speeds are expected to increase from 24 to 62 km/h, while those in the interpeak increase from 39 to 68 km/h.

These travel times are between two specific points in the network so will vary depending on selected journeys. However, the primary beneficiaries of these savings will be those using the new south-facing ramps from Sylvia Park Road. The models predict around 17,400 daily vehicles in 2026 and 20,300 vehicles daily in 2036 using those ramps and hence benefiting directly from these levels of time saving.

5.2.2 Travel Times to/from SH20 South

Without the Project, the travel times are also expected to increase significantly. For example, in the AM peak the average time heading to SH20 South is expected to increase from 5.5 minutes in 2013 to 15.5 minutes in 2036, a 181% increase. Even in the less congested interpeak period, the travel times are expected to increase by 29-49%.

With the Project, significant travel time savings are expected to/from SH20, including:

- A significant 6.5 minutes (48%) saved northbound in the morning peak in 2036;
- A substantial 2.8 minutes (34%) saved northbound in the interpeak in 2036;

- A substantial 2.4 minutes (20%) saved northbound in the evening; and
- Expressed in terms of average speed, the improvements are significant, such as an interpeak increase from 36 to 52 km/h.

The primary beneficiaries of these savings will be those using the south-facing ramps at SH20. The models predict around 35,000 daily vehicles in 2026 and 40,000 daily vehicles in 2036 using those ramps, and hence benefiting from these levels of time saving.

5.2.3 Travel Times to/from SH20 North

The travel time savings to and from SH20 North (Hillsborough Interchange) are more modest as this movement is direct and less congested than others (there is existing congestion in the pm peak heading north but this is expected to be reduced with the pending widening of SH20 between Neilson Street and Queenstown Road). Time savings are typically 0-2 minutes, but are as high as 4.1 minutes (43%) northbound in the pm peak. Some very small increases (0.1-0.3 minutes) are predicted in some periods, due to the extra traffic signals added on Neilson Street.

The models predict around 32,000 daily vehicles in 2036 using the north-facing ramps, and therefore potentially benefiting from these savings.

5.2.4 Travel Times to/from SH1 North

The travel time savings to and from SH1 North (Ellerslie Interchange) are varied as these ramps remain unchanged and they are impacted by congestion further north on SH1, which is not expected to change significantly due to the Project. The most significant changes are due to reduced congestion on Church Street.

No major savings are expected during the interpeak period, however, up to six minutes (37%) is predicted to be saved in the peak periods. Expressed in terms of average speeds, the changes in the interpeak are of the order of an average 3km/h increase, while the increases in the peaks are between 6 and 16 km/h faster.

In order to identify the number of vehicles that could potentially benefit from the time savings, in this case the ramps have not been used as traffic from the east using SEART is also captured on these ramps. Therefore, a representative location has been used – Church Street, to the east of Hugo Johnston Drive. The benefit to traffic on this route is that congestion is removed from the Church Street corridor with the Project in place and therefore 42,000 daily vehicles in 2026 and 45,000 in 2036 will potentially benefit from the time savings.

5.3 Predicted Changes in Travel Times between the Industrial Hub and the Wider Area

Analysis has been undertaken looking at the changes in travel time in the wider area as a result of the Project. A number of origin and destination points were chosen as presented on Figure 5-7.

Figure 5-7: Wider area travel time locations

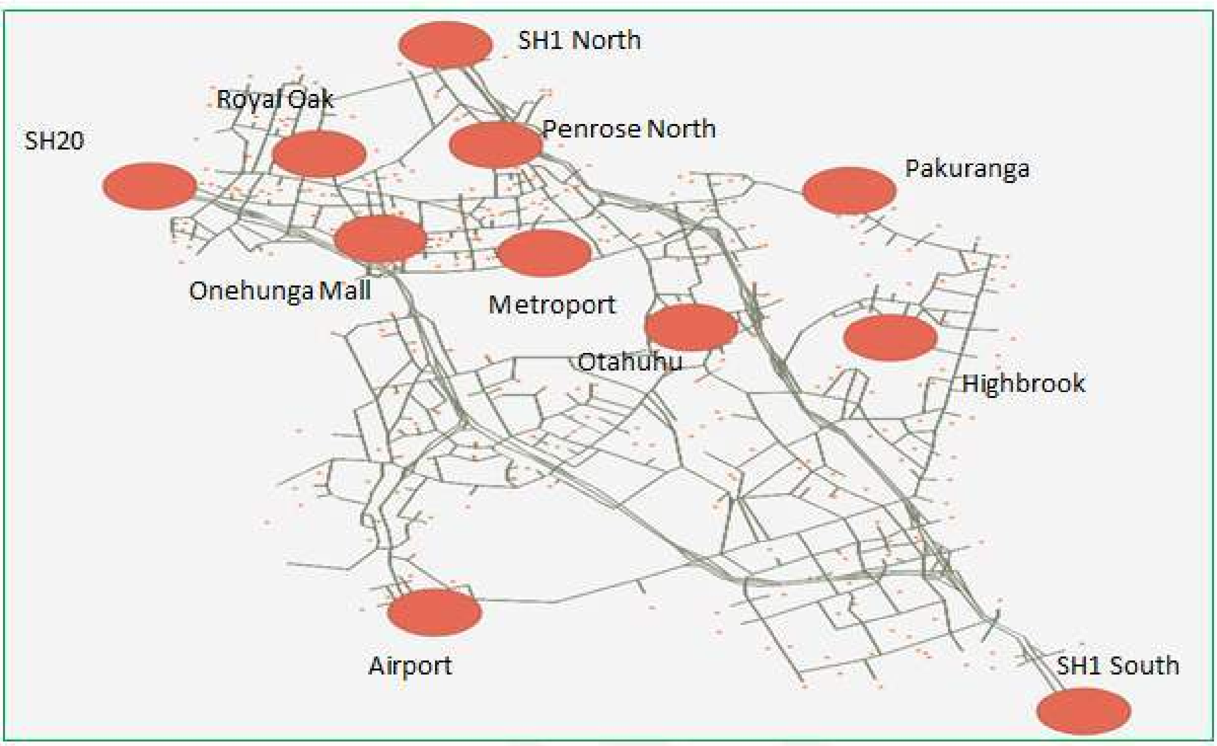


Table 5-3 presents the predicted travel times between these destinations, while Figure 5-8 displays the predicted savings due to the Project.

From Table 5-3 the following can be determined:

- Almost all movements have savings, which range up to 14 minutes. The movements with the biggest savings relate to those to or from MetroPort, the Airport and Highbrook;
- A good level of savings are also predicted to other locations, including to or from Royal Oak, Pakuranga and Ōtāhuhu;
- The few forecast increases in travel time are predicted to be small (2.5 minutes, <11%); and
- There is a slight increase in travel times predicted from Highbrook to the airport (12% in the PM peak). This may be due to the increase in southbound traffic on SH1 and the downstream constraints.

Overall, this shows that the Project is also expected to improve journeys between a much wider area than just Onehunga-Penrose.

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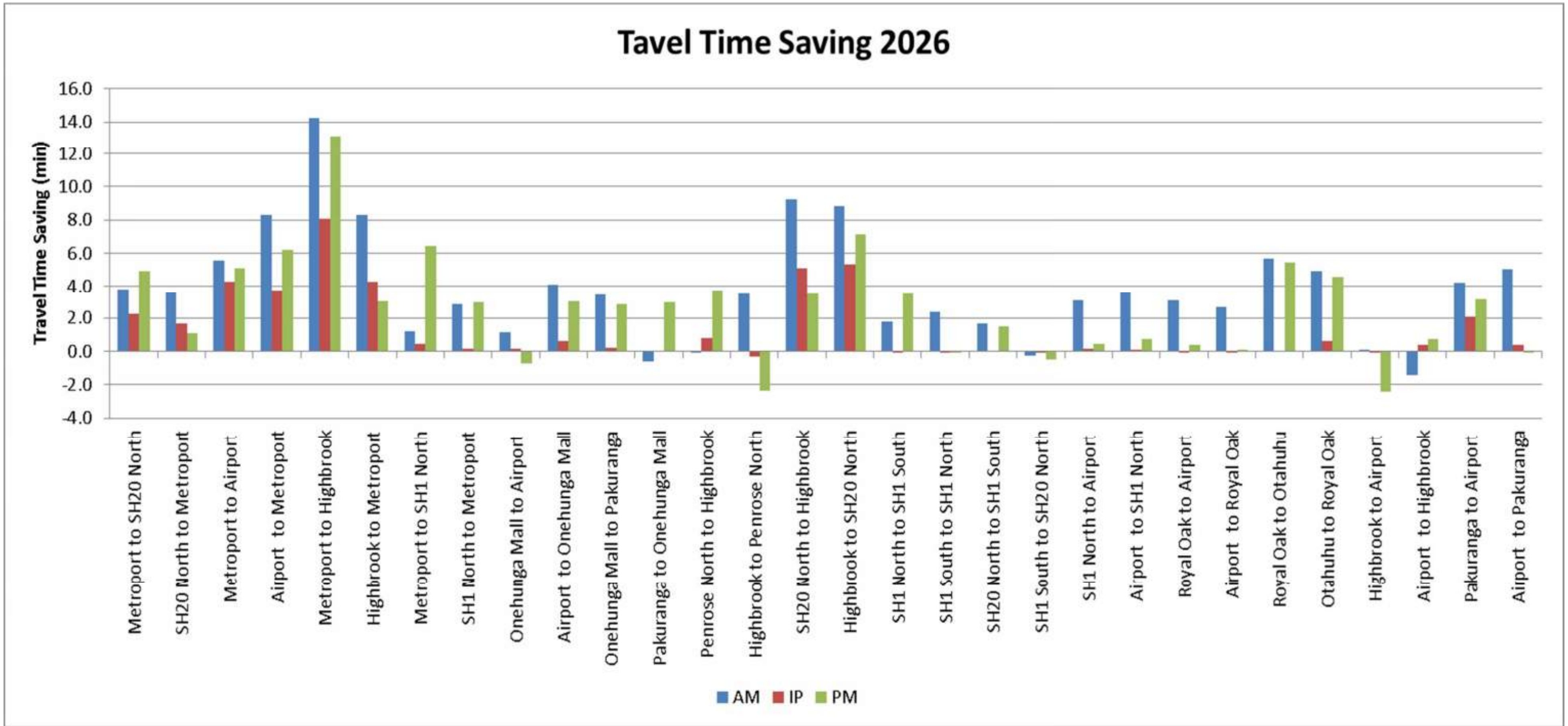
Table 5-3: Wider area changes in travel times (2026)

From	To	AM Peak (minutes)				Inter-peak (minutes)				PM Peak (minutes)			
		No Project	With Project	Diff	% Diff	No Project	With Project	Diff	% Diff	No Project	With Project	Diff	% Diff
MetroPort	SH20 North	10.8	7.0	-3.8	-35%	9.3	7.0	-2.2	-24%	16.8	11.9	-4.9	-29%
SH20 North	MetroPort	15.2	11.6	-3.6	-23%	8.7	7.0	-1.7	-19%	8.4	7.4	-1.1	-13%
MetroPort	Airport	23.0	17.5	-5.6	-24%	17.8	13.5	-4.3	-24%	20.5	15.4	-5.1	-25%
Airport	MetroPort	22.7	14.4	-8.3	-37%	17.6	13.8	-3.8	-21%	30.5	24.3	-6.2	-20%
MetroPort	Highbrook	28.8	14.5	-14.2	-50%	19.3	11.3	-8.0	-42%	30.6	17.5	-13.1	-43%
Highbrook	MetroPort	22.7	14.4	-8.3	-37%	16.0	11.7	-4.3	-27%	21.9	18.9	-3.0	-14%
MetroPort	SH1 North	16.2	15.0	-1.2	-7%	9.7	9.3	-0.4	-5%	16.4	10.0	-6.4	-39%
SH1 North	MetroPort	17.0	14.2	-2.8	-17%	10.2	10.1	-0.1	-1%	17.8	14.8	-2.9	-17%
Onehunga Mall	Airport	18.5	17.3	-1.2	-6%	11.0	10.9	-0.1	-1%	12.5	13.2	0.7	6%
Airport	Onehunga Mall	17.8	13.7	-4.1	-23%	13.6	13.0	-0.6	-5%	26.6	23.6	-3.0	-11%
Onehunga Mall	Pakuranga	17.6	14.2	-3.4	-19%	13.5	13.3	-0.2	-2%	26.0	23.1	-2.8	-11%
Pakuranga	Onehunga Mall	19.7	20.4	0.6	3%	13.4	13.4	0.0	0%	18.7	15.8	-2.9	-16%
Penrose North	Highbrook	16.8	16.9	0.1	1%	13.1	12.3	-0.8	-6%	26.7	22.9	-3.8	-14%
Highbrook	Penrose North	22.7	19.2	-3.5	-15%	11.5	11.8	0.3	3%	17.9	20.3	2.4	13%
SH20 North	Highbrook	34.4	25.1	-9.3	-27%	22.4	17.3	-5.1	-23%	27.3	23.8	-3.5	-13%
Highbrook	SH20 North	28.2	19.4	-8.8	-31%	22.3	17.0	-5.3	-24%	36.4	29.2	-7.2	-20%
SH1 North	SH1 South	20.6	18.8	-1.8	-9%	13.9	14.1	0.1	1%	25.6	22.1	-3.5	-14%

From	To	AM Peak (minutes)				Inter-peak (minutes)				PM Peak (minutes)			
		No Project	With Project	Diff	% Diff	No Project	With Project	Diff	% Diff	No Project	With Project	Diff	% Diff
SH1 South	SH1 North	28.8	26.5	-2.3	-8%	14.3	14.3	0.0	0%	14.9	15.0	0.1	0%
SH20 North	SH1 South	23.4	21.7	-1.7	-7%	13.6	13.6	-0.1	0%	18.8	17.3	-1.5	-8%
SH1 South	SH20 North	16.5	16.8	0.3	2%	13.9	14.0	0.0	0%	24.8	25.3	0.5	2%
SH1 North	Airport	32.8	29.7	-3.1	-9%	20.4	20.2	-0.2	-1%	24.4	23.9	-0.4	-2%
Airport	SH1 North	27.8	24.3	-3.5	-13%	21.8	21.7	-0.1	0%	23.9	23.1	-0.7	-3%
Royal Oak	Airport	25.8	22.7	-3.0	-12%	14.0	14.0	0.0	0%	16.5	16.2	-0.4	-2%
Airport	Royal Oak	20.0	17.4	-2.7	-13%	14.8	14.9	0.0	0%	28.8	28.7	-0.1	0%
Royal Oak	Ōtāhuhu	24.4	18.7	-5.7	-23%	15.1	15.0	0.0	0%	22.1	16.6	-5.4	-25%
Ōtāhuhu	Royal Oak	20.6	15.7	-4.9	-24%	15.1	14.5	-0.6	-4%	21.5	16.9	-4.6	-21%
Highbrook	Airport	19.7	19.6	-0.1	0%	17.2	17.3	0.1	1%	20.7	23.2	2.4	12%
Airport	Highbrook	20.8	22.3	1.4	7%	18.6	18.2	-0.4	-2%	22.7	22.0	-0.7	-3%
Pakuranga	Airport	35.2	31.0	-4.2	-12%	25.5	23.4	-2.1	-8%	30.5	27.4	-3.1	-10%
Airport	Pakuranga	30.2	25.1	-5.0	-17%	24.5	24.1	-0.4	-2%	32.2	32.3	0.1	0%

Figure 5-8: Change in wider area travel times (2026)



5.4 Consistency of Travel Times between the Industrial Hub and the Strategic Network (SH1 and SH20)

As discussed in the Methodology section, the consistency of travel is used as a measure of journey time reliability accessing this area. These figures are calculated from the predicted average travel times to the ‘four corners’, considering the consistency between the three peak periods and the two directions of travel (inbound/outbound).

Table 5-4 and Table 5-5 show the travel time consistency to/from the strategic network for 2026 and 2036 respectively. Table 5-4 and Table 5-5 show how the travel times consistency change With and Without the Project.

This data shows not only reductions in the average (medium) travel time, but also significant reductions in the range and standard deviation of the times. For example, the range of times for trips accessing SH1 south reduces from over 12 minutes without the Project, to under two minutes with the Project.

It is important to note that these are only the range in average travel times, as predicted by the traffic models. There will still be day-to-day variability as well as variability throughout the peak periods. However, with many of the key sources of the current-day variability removed (such as the congested access to both SH1 and SH20), that variability is also expected to improve.

These results demonstrate that significant improvements in the consistency and reliability of journey time accessing the strategic network from this area are expected. The significantly improved consistency across the movements, directions and times of day are expected to allow improved and more flexible journey and logistics planning for business in this area. This is expected to assist increased economic efficiency for this area.

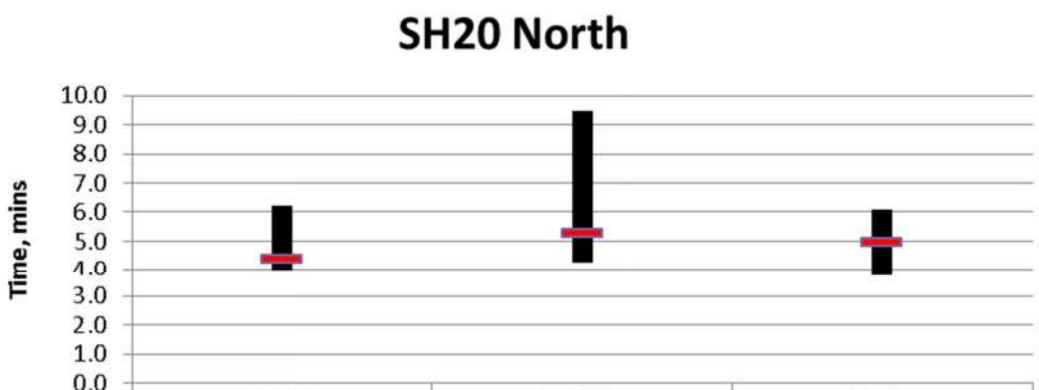
Table 5-4: 2026 Travel Time Consistency

	SH20 North (minutes)			SH20 South (minutes)			SH1 North (minutes)			SH1 South (minutes)		
	2013	2026 without Project	2026 with Project	2013	2026 without Project	2026 with Project	2013	2026 without Project	2026 with Project	2013	2026 without Project	2026 with Project
St Dev	0.81	2.28	0.83	2.30	2.26	1.25	2.02	2.53	1.25	3.92	5.32	0.46
Max	6.2	9.5	6.1	10.8	12.4	7.8	11.8	13.0	10.1	19.9	23.3	8.5
Min	4.0	4.3	3.7	4.4	7.0	4.7	6.2	6.5	6.5	10.2	10.7	7.5
Median	4.4	5.3	5.0	5.9	10.5	6.3	7.6	8.6	7.4	14.4	16.3	7.9
Range	2.23	5.19	2.35	6.40	5.38	3.12	5.65	6.51	3.57	9.76	12.63	1.08

Table 5-5 : 2036 Travel Time Consistency

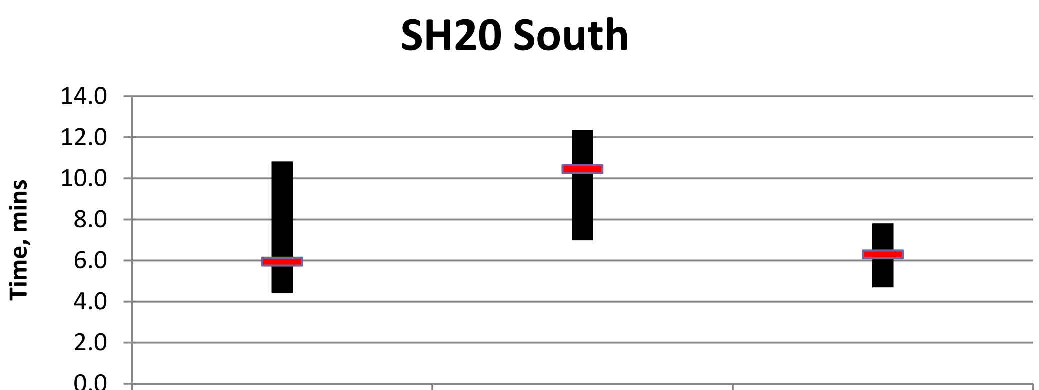
	SH20 North (minutes)			SH20 South (minutes)			SH1 North (minutes)			SH1 South (minutes)		
	2013	2036 no Project	2036 with Project	2013	2036 no Project	2036 with Project	2013	2036 no Project	2036 with Project	2013	2036 no Project	2036 with Project
St Dev	0.81	2.06	1.63	2.30	3.71	2.04	2.02	3.85	1.42	3.92	6.02	0.68
Max	6.2	9.3	8.5	10.8	15.5	10.0	11.8	17.0	10.8	19.9	26.7	9.1
Min	4.0	4.7	4.0	4.4	5.7	5.3	6.2	7.3	6.9	10.2	11.2	7.3
Median	4.4	5.1	5.0	5.9	10.3	6.7	7.6	9.1	7.5	14.4	16.2	8.1
Range	2.23	4.64	4.53	6.40	9.84	4.69	5.65	9.72	3.89	9.76	15.57	1.84

Figure 5-9: Travel Time Consistency for SH20 North (2026)



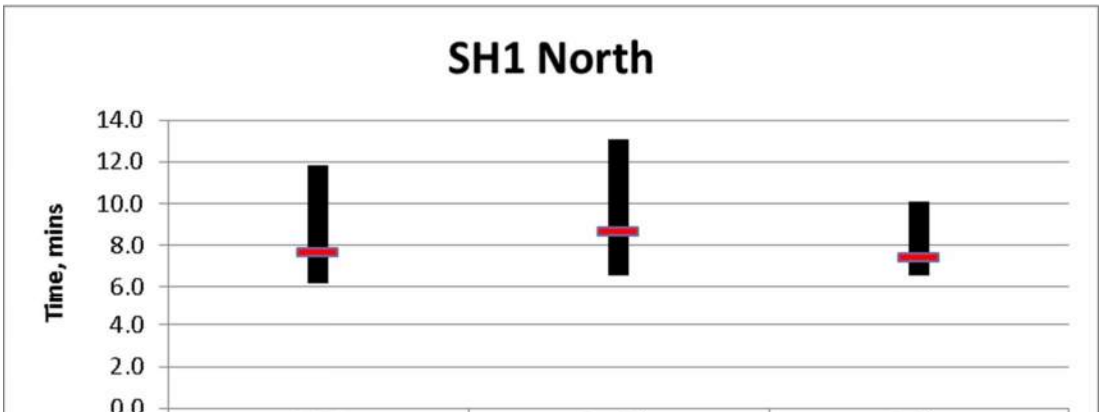
	2013	Do Min	Option
max	6.2	9.5	6.1
min	4.0	4.3	3.7
median	4.4	5.3	5.0

Figure 5-10: Travel Time Consistency for SH20 South (2026)



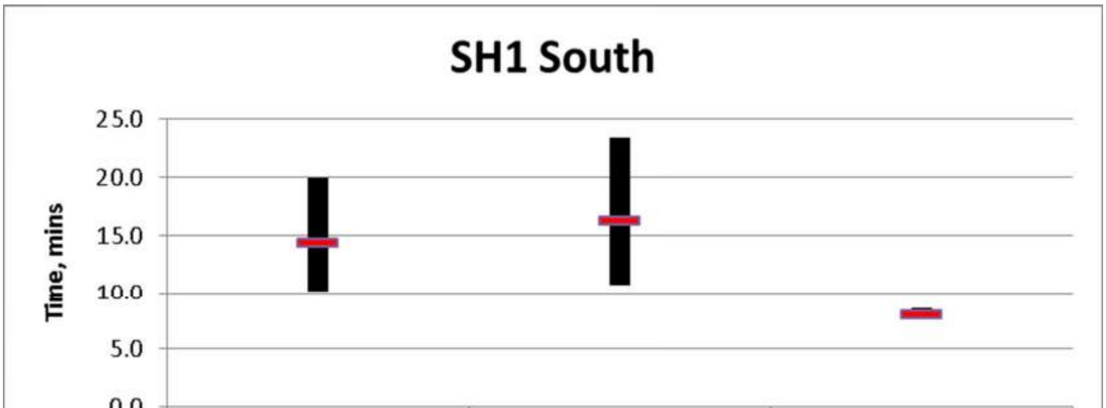
	2013	Do Min	Option
Max	10.8	12.4	7.8
Min	4.4	7.0	4.7
median	5.9	10.5	6.3

Figure 5-11: Travel Time Consistency for SH1 North (2026)



	2013	Do Min	Option
Max	11.8	13.0	10.1
Min	6.2	6.5	6.5
median	7.6	8.6	7.4

Figure 5-12: Travel Time Consistency for SH1 South (2026)



	2013	Do Min	Option
Max	19.9	23.3	8.5
Min	10.2	10.7	7.5
median	14.4	16.3	7.9

5.5 Predicted Changes in Daily Traffic Flow

This section looks at the predicted flows on the EWL and predicted changes in daily traffic flows on the adjacent corridor between the With and Without Project scenarios. The following tables and figures show the changes in daily flow in the adjacent corridor. For ease, this has been divided into the west, central and eastern sections of the route, followed by changes across the wider network.

5.5.1 Traffic Flows on the EWL

Table 5-6 shows the predicted daily traffic flows on the EWL and connecting links. These are generally new links so only flows with the Project in place are presented here.

Table 5-6: Traffic Flows on the EWL

Section	2026 Daily Flow	2036 Daily Flow
Onehunga Harbour Road /EWL	41,900	48,500
Foreshore Galway to Captain Springs	34,200	39,700
Foreshore Captain Springs to MetroPort	23,300	30,400
Foreshore MetroPort to Hugo Johnston Drive	28,400	33,700
Foreshore Hugo Johnston to Great South Road (excluding viaduct)	21,200	24,400
Great South Road Viaduct	12,500	15,200
Sylvia Park Road west end (excluding viaduct)	21,600	23,900
EWL SH1 ramps	17,400	20,300

This shows that the flows expected on the main EWL section range from 33,700 - 48,500vpd. This level of flow would require a general configuration of four lanes. This range of flows is similar to the flows in the existing Neilson Street/Church Street corridor, but on a higher-capacity facility without direct property access.

With the Project in place, the daily flows on Neilson Street (east of Galway Street), will reduce to some 17,300-19,700vpd. When combined with the flows on the EWL this would result in up to 60,000vpd travelling along the corridor in this location. Similarly further east in the corridor, combining the EWL flows of up to 33,000vpd with those remaining on Church Street (45,000vpd) means combined corridor flows approaching 80,000vpd.

5.5.2 Local Area Changes – Western End

Figure 5-13 displays the predicted 2026 changes in daily flow within the adjacent network at the western end of the Project. This identifies the general pattern and location of change, with the flows on specific roads presented in the subsequent table. In the figures, the width of the bars is proportional to the scale of change, with increases coloured Red and decreases Green.

Figure 5-13: Changes in Daily Flow in the Adjacent Corridor (west) 2026

Table 5-7: Predicted Daily Traffic Flows in the adjacent corridor (west)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
West End							
Gloucester Park Road south of Neilson Street	17,800	21,900	17,800	-4,100 (-19%)	23,800	18,700	-5,100 (-21%)
Gloucester Park Road north of Neilson Street	3,700	5,700	-	-	5,700	-	-
Selwyn Street north of Neilson Street	9,200	13,300	15,100	1,800 (14%)	12,200	15,300	3,100 (25%)
Onehunga Mall north of Neilson Street	8,900	8,100	6,500	-1,600 (-20%)	9,800	7,800	-2,000 (-20%)
Onehunga Mall South of Neilson Street	20,400	22,900	3,700	-19,200 (84%)	23,400	4,400	-19,000 (-81%)
Onehunga Harbour Road /EWL	18,600	21,300	41,900	20,600 (97%)	21,600	48,500	26,900 (125%)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
Onehunga Harbour Road	18,800	21,500	300	-21,200 (99%)	21,800	600	-21,200 (-97%)
Galway Street South of Neilson Street	2,200	2,100	7,300	5,200 (248%)	2,300	9,200	6,900 (300%)
Galway Street Rail Crossing	3,000	3,000	3,000	(0%)	4,000	3,800	-200 (-5%)
Victoria Street north of Church Street	4,900	4,900	5,800	900 (18%)	4,700	6,300	1,600 (34%)
Neilson Street: Selwyn - Onehunga Mall	20,600	20,400	12,200	-8,200 (-40%)	21,200	13,200	-8,000 (-38%)
Neilson Street: Onehunga Mall to Galway Street	28,800	32,300	13,300	-19,000 (59%)	33,100	14,400	-18,700 (-56%)
Neilson Street - east of Galway Street	30,000	33,900	17,300	-16,600 (49%)	35,500	19,700	-15,800 (-45%)
Galway Street link north of EWL	-	-	8,900	-	-	11,000	-
Onehunga Mall to Galway Link	-	-	3,200	-	-	4,100	-
Victoria Street Rail Crossing	3,700	3,400	5,400	2,000 (59%)	3,400	6,300	2,900 (85%)

Key changes identified include:

- Significant reductions (19-21%) on Gloucester Park Road south due to the provision of the new on-ramp to SH20 from the EWL;
- An increase on Selwyn Street (14-25%) due to the closure of the Gloucester Park Road (north) access to Neilson Street. Selwyn Street is a 4-lane road so can accommodate this level of flow. It is also a major north—south route connecting SH20 to areas further north, such as Greenlane and Royal Oak;
- Onehunga Mall north of Neilson Street is predicted to have a reasonable reduction in traffic (20%), which would reduce congestion and improve access for cyclists and buses;
- South of Neilson Street, Onehunga Mall is expected to reduce significantly (81-84%). This would substantially improve the accessibility into adjacent properties, improve the amenity for pedestrians and cyclists and allow some road space to be reallocated to improved walking/cycling facilities;
- The flows on Neilson Street (Selwyn to Onehunga Mall) are expected to reduce significantly (38-40%), thereby reducing the traffic severance effect between the town centre and the foreshore areas to the south;

- The flows on Onehunga Harbour Road reduce by nearly 100%, as this road becomes solely for access to the Onehunga Wharf and Orpheus Drive, rather than a key route to/from SH20. This would therefore become a local access road only, with improved facilities and amenity for pedestrians and cyclists. This would enhance the connectivity between the Foreshore (including the Old Māngere Bridge) and the Onehunga Town Centre;
- Galway Street (south) is expected to have a significant increase in flows as it becomes a through route rather than its current cul-de-sac. The road would be upgraded to four lanes with traffic signals at Neilson Street to accommodate this altered function and expected flow;
- An increase in traffic is expected on Victoria Street (north of Neilson Street), however the increase of some 2,000vpd should not create a material adverse impact. Motorists are however likely to avoid this route more than suggested by the models due to the rail level-crossing. Although the model includes a delay for that crossing, it is an average for the hour, where motorists are likely to be influenced by the intermittent, but higher delays (2-4 minutes), when trains actually cross. More detailed analysis of this route is provided in Chapter 6; and
- East of Galway Street, the flows on Neilson Street reduce substantially, both below the Without Project scenario (49%) and below the 2013 (34%) levels. This is expected to noticeably improve access to/from Neilson Street from business properties and side roads.

5.5.3 Local Area Changes – Central Section

Figure 5-14 below shows the predicted pattern of changes in traffic flows due to the Project, with daily flows at key points presented in Table 5-8.

Figure 5-14: Changes in Daily Flow in the Adjacent Corridor (central) 2026

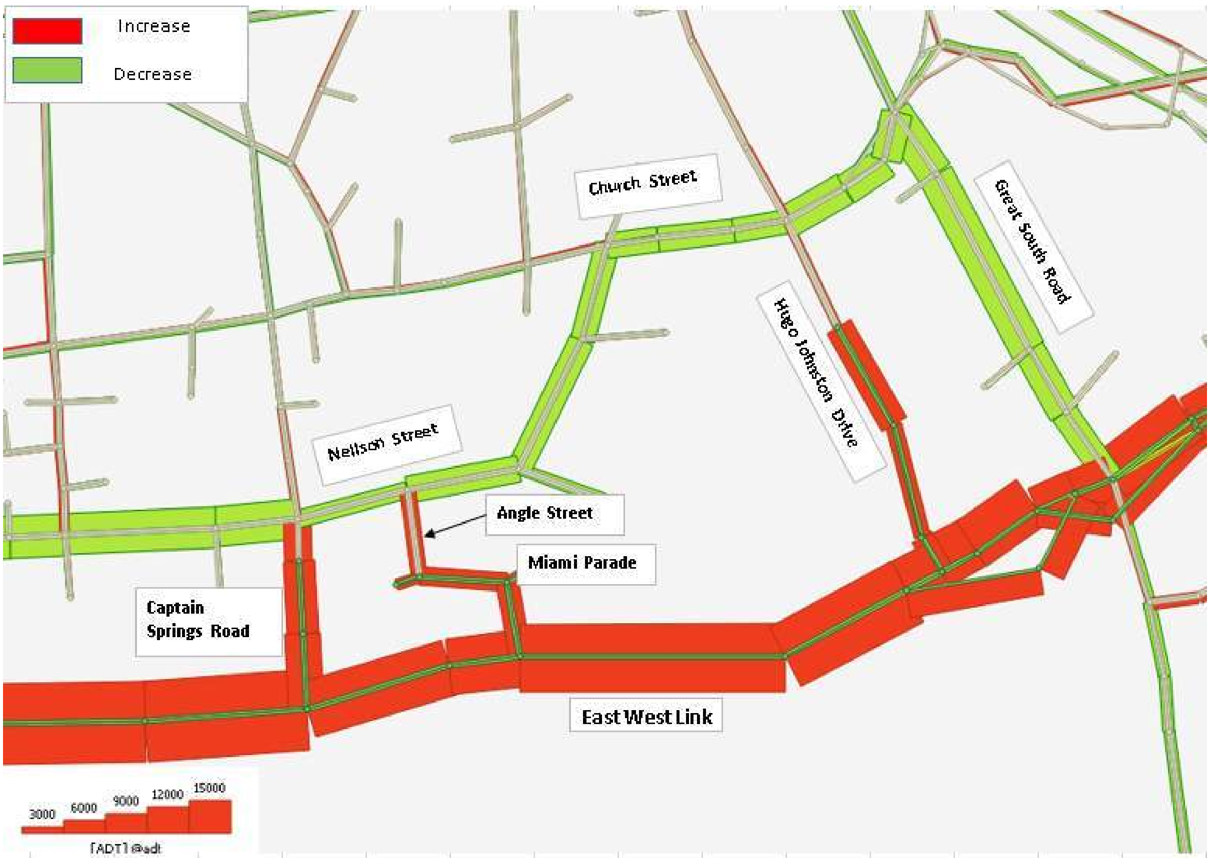


Table 5-8: Predicted Daily Traffic Flows in the adjacent corridor (central)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Withou t Project	With Project	Difference
Central							
Captain Springs Road south of Neilson Street	4,100	3,700	14,200	10,500 (284%)	3,800	17,900	14,100 (371%)
Captains Springs North of Neilson Street	6,600	6,300	7,500	1,200 (19%)	6,800	8,000	1,200 (18%)
Miami Parade, east of Angle Street[5]	-	-	6,000	-	-	4,400	-
Neilson Street East of Neilson/Victoria	27,700	31,400	15,500	-15,900(51%)	33,000	17,300	-15,700 (-48%)
Neilson Street East of MetroPort	24,300	28,500	19,500	-9,000 (-32%)	29,800	22,100	-7,700 (-26%)
Church Street Rail Crossing	11,500	12,500	11,800	-700 (-6%)	13,800	12,500	-1,300 (-9%)
Church Street east of Neilson Street	43,300	48,400	39,700	-8,700 (-18%)	51,200	42,900	-8,300(-16%)
Hugo Johnston Drive North end	8,400	8,700	10,400	1,700 (20%)	9,100	11,300	2,200(24%)
Hugo Johnston Drive south end	-	-	7,600	-	-	8,300	-
Great South Road at Southdown Lane	31,900	32,900	20,800	-12,100(37%)	34,800	22,200	-12,600 (-36%)
Great South Road, North of Portage	25,800	28,100	25,100	-3,000 (-11%)	30,200	27,800	-2,400 (-8%)
Angle Street south of Neilson Street	3,600	3,100	7,500	4,400 (142%)	3,300	5,900	2,600 (79%)
MetroPort Entry - north of EWL	-	-	7,700	-	-	6,300	-

Key changes identified include:

- A significant increase (371%) on Captain Springs Road south of Neilson Street. This becomes the major connection between the EWL and Neilson Street, taking on an arterial road function. It would be widened to four lanes to accommodate this change in function and traffic flow;

[5] Miami Parade is not included in the 2013 or Without-project models as it is a cul-de-sac, and therefore flows for these scenarios have not been included. It has been added into the With-project model as it provides a connection from the EWL to Angle Street

- Further north on Captain Springs Road, only minor increase in traffic flow (18-19%) are expected. This indicates that the majority of traffic accessing the EWL from Captain Springs Road turn to/from Neilson Street. As such, the northern sections of Captain Springs Road are not expected to take on a major north-south function or resulting through traffic;
- The flows on Neilson Street (near MetroPort) are expected to reduce significantly both below the Without Project scenario (26-32%) and below 2013 flows (9%), thereby easing the ability to access Neilson Street from properties and side roads;
- An increase in flow is expected on Miami Parade and Angle Street, as some traffic is expected to use this route to access the EWL rather than Captain Springs Road. The resulting flows on Angle Street (7,500vpd in 2026, reducing to 5,900 in 2036) are expected to be able to be accommodated on this industrial street;
- The flows on the Metroport Entry from EWL are predicted to drop slightly between 2026 and 2036, however, this is due to a reduction in through traffic using Miami Parade offsetting the increase in vehicles into MetroPort itself.
- There is an increase in flow predicted at the northern end of Hugo Johnston Drive, as it provides an additional connection between the EWL and Church Street and O'Rorke Road. The extra through traffic attracted to the route is partially offset by a proportion of the traffic from activities on Hugo Johnston Drive now being able to exit south to the EWL, rather than all having to exit to the north. This means that there will be a small increase at the northern end, but the southern end will get more noticeably busier with the introduction of through traffic. This is discussed in Chapter 6;
- The flows on the residential section of Church Street (west of Mays Road) are expected to reduce marginally (6-9%), which would provide benefits to the residents as well as cyclists and buses using that route;
- The eastern (industrial) section of Church Street is expected to have traffic flows reduce by 16-18%, bringing them back to below or similar to 2013 flows; and
- The flows on Great South Road are expected to reduce, including:
  - 36-37% reduced at Southdown Lane; and
  - 11% reduced north of Portage Road.

5.5.4 Local Area Changes – Eastern Section

Figure 5-15 below shows the predicted pattern of changes in traffic flows due to the Project, with daily flows at key points presented in Table 5-9.

Figure 5-15 Changes in 2026 Daily Flow in the Adjacent Corridor (east) 2026

Table 5-9: Predicted Daily Traffic Flows in the adjacent corridor (east)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
West							
Sylvia Park Road west end (excluding viaduct)	12,100	16,700	21,600	4,900 (29%)	17,800	23,900	6,100 (34%)
Sylvia Park Road east end	12,600	17,200	17,400	200 (1%)	18,300	19,300	1,000 (5%)
Carbine Road north of Panama: Road	9,400	6,800	6,400	-400 (-6%)	7,300	7,000	-300 (-4%)
Panama Road Overbridge	9,800	7,100	8,200	1,100 (15%)	7,100	7,700	600 (8%)
SH1 Panama	123,600	137,900	151,100	13,200 (10%)	145,900	162,600	16,700 (11%)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
Great South Road, north of Portage Road	25,800	28,100	25,100	-3,000(-11%)	30,200	27,800	-2,400 (-8%)
Mount Wellington Highway, south of Panama Road	20,300	22,700	20,300	-2,400 (-11%)	23,600	22,000	-1,600 (-7%)
Princes Street west of Luke Street	11,200	12,000	10,700	-1,300 (-11%)	12,300	11,200	-1,100 (-9%)
Avenue Road west of Water Street	6,900	7,100	3,800	-3,300 (-46%)	7,700	4,100	-3,600 (-47%)
High Street west of Water Street	5,800	6,400	7,000	600 (9%)	6,700	7,000	300 (4%)
Trenwith Street underpass	9,100	9,600	7,400	-2,200 (-23%)	10,300	7,400	-2,900 (-28%)
Frank Grey Place north of Trenwith Street	9,700	10,300	8,300	-2,000 (-19%)	11,100	8,400	-2,700 (-24%)
Frank Grey Place north of Princes Street	7,400	7,900	13,400	5,500 (70%)	8,400	13,800	5,400 (64%)
Vestey Drive (western end)	6,900	7,600	10,700	3,100 (41%)	8,700	12,100	3,400 (39%)
Vestey Drive (eastern end)	2,600	2,800	3,900	1,100 (39%)	3,300	4,300	1,000 (30%)

Key changes identified include:

- The flows on Sylvia Park Road are expected to increase significantly (29-34%) west of the new motorway ramps, but only marginally at the eastern end (1-5%). This road is proposed to be widened to four lanes to accommodate these increased flows and to integrate the new ramps;
- The flows on the western end of Vestey Drive are expected to increase significantly (41%) by approximately 3,000 vehicles per day in 2026. The flows on the eastern end of Vestey Drive are also expected to increase, however not as significantly, approximately 1,000 vehicles per day in 2026 and 2036. This is discussed further in Section 6.
- A marginal increase is predicted on Panama Road due to the improved access to the EWL. A minor reduction is predicted on the connected section of Carbine Road, which suggests that the changes on Panama Road are mostly due to local traffic changing their access route, rather than additional through traffic;
- Reductions are expected on the arterial north-south routes of Great South Road (8-11% reduction) and Mount Wellington Highway (7-11% reduction), as traffic is diverted to SH1 (an 10-11% increase). The reductions on Mount Wellington Highway will assist the development of the improved bus and cycling route being planned there by Auckland Transport (upgrade to frequent Network Route 32);
- In Ōtāhuhu, the improved capacity and access to SH1 is expected to reduce vehicles currently diverting through the local network. This can be seen by the predicted significant reductions in traffic on Avenue Road (46-47%) and Princes Street (9-11%). Together over 4,700vpd are expected to be removed from these two roads;

- Significant reductions in traffic are expected on the Trenwith Street (which passes under SH1), due to the improved access provided at the Princes Street interchange. This is indicative of the substantially improved accessibility provided to the community east of SH1 by the upgraded interchange; and
- The flows on Frank Grey Place are predicted to reduce on the section south of Princes Street (19-24%). However, the flows on the section immediately north of Princes Street would increase substantially (64-70%) due to the relocated southbound on-ramp. That section is being widened to four lanes with new property access points to accommodate those changes.

5.5.5 Changes in Flows on the Wider Network

Figure 5-16 below indicates the pattern of change in traffic flow across the wider network, while Table 5-10 tabulates the change at key locations

Figure 5-16: Changes in Daily Flow in the Wider Network 2026

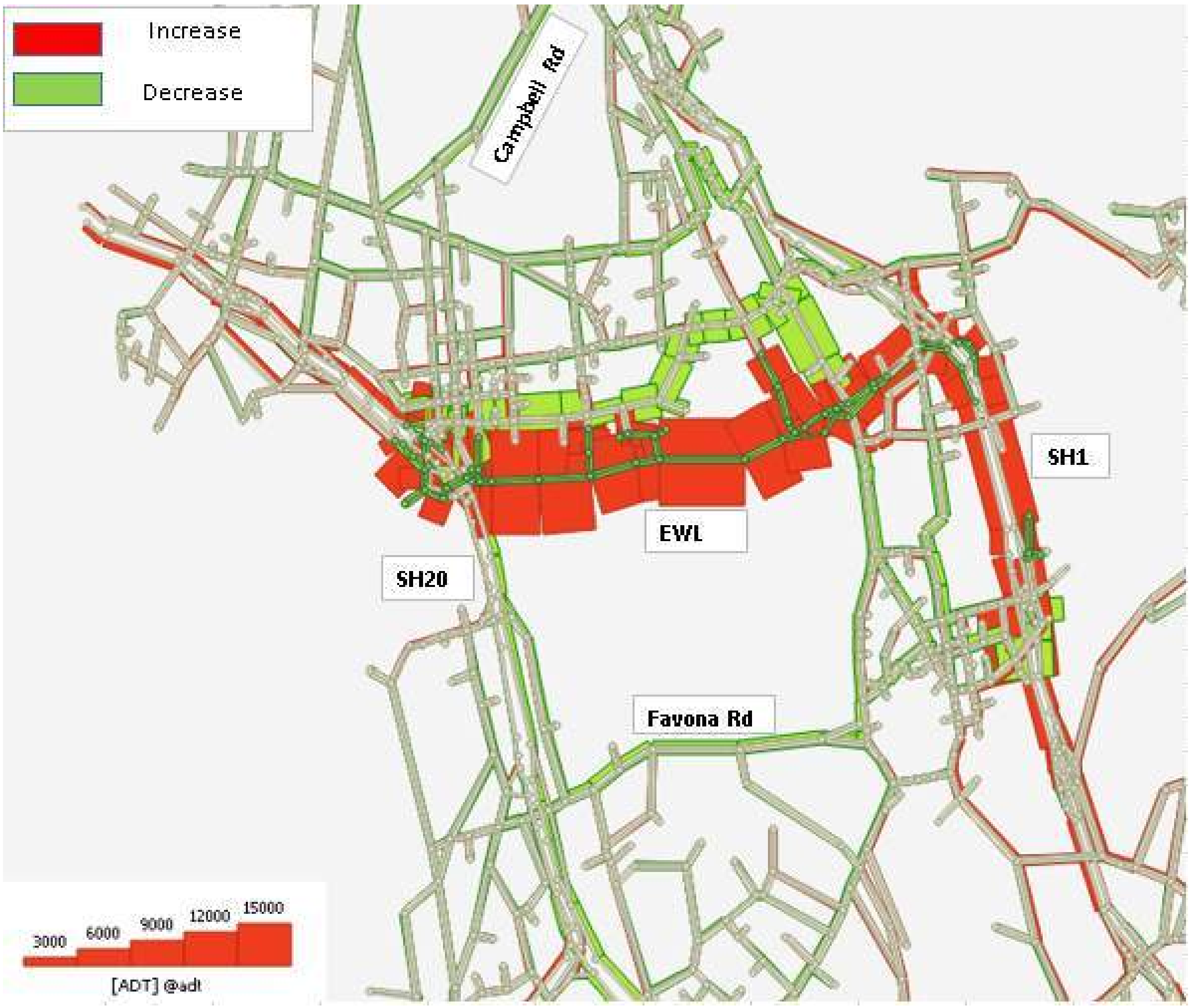


Table 5-10: Predicted Daily Traffic Flows in the wider area

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
Beachcroft Avenue: Arthur to Church Street	8,100	10,900	11,000	100 (1%)	13,100	12,200	-900 (-7%)
Selwyn Street: south of Mount Smart	2,800	2,800	2,600	-200 (-7%)	2,400	2,700	300 (13%)
Onehunga Mall south of Mount Smart	14,000	16,400	16,000	-400 (-2%)	17,400	17,600	200 (1%)
Mount Albert Road west of Royal Oak	25,200	31,700	29,900	-1,800 (-6%)	33,500	32,300	-1,200 (-4%)
Mount Smart Road north of Mays Road	19,800	23,400	22,100	-1,300 (-6%)	25,300	23,600	-1,700 (-7%)
Campbell Road south of Wheturangi Road	21,400	24,700	22,800	-1,900 (-8%)	27,600	25,100	-2,500 (-9%)
Victoria Street north of Church Street	4,900	4,900	5,800	900 (18%)	4,700	6,300	1,600 (34%)
Captain Springs Rail Crossing	3,200	3,500	2,900	-600 (-17%)	4,000	3,300	-700 (-18%)
May Road Rail Crossing	9,000	9,300	9,800	500 (5%)	9,200	10,300	1,100 (12%)
Mount Smart Road: Rockfield Road to Maurice Road	16,600	20,700	18,200	-2,500 (12%)	24,000	18,900	-5,100 (-21%)
Maurice Road Rail Crossing	5,400	5,400	5,500	100 (2%)	5,900	6,100	200 (3%)
O'Rorke Road Rail Crossing	8,700	8,900	9,700	800 (9%)	10,100	10,600	500 (5%)
Station Road, east of O'Rorke Road	19,800	23,000	19,900	-3,100 (13%)	25,200	20,700	-4,500 (-18%)
Great South Road north of Penrose Road	19,100	22,400	18,900	-3,500 (16%)	25,400	21,700	-3,700 (-15%)
Great South Road north of SEART	19,600	21,500	19,000	-2,500(-12%)	23,800	22,400	-1,400 (-6%)
SH1 SEART-Ellerslie	141,700	156,500	155,700	-800 (-1%)	166,300	163,800	-2,500 (-2%)
SH1 Princes Street to Highbrook	128,400	143,500	148,900	5,400 (4%)	151,500	161,200	9,700 (6%)
SH1 south of Highbrook	108,200	121,800	123,700	1,900 (2%)	129,800	134,200	4,400 (3%)
SH20 Neilson Street to Queenstown Road	95,900	157,400	163,700	6,300 (4%)	175,800	181,200	5,400 (3%)
SH20 Māngere Bridge	108,800	170,700	168,600	-2,100 (-1%)	188,000	189,000	1,000 (1%)
Mahunga Drive	9,400	14,800	13,800	-1,000 (-7%)	15,500	14,600	-900 (-6%)

Road	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
Massey Road, south of Hospital	31,100	34,400	33,700	-700 (-2%)	36,400	34,900	-1,500 (-4%)
Great South Road north of Bairds Road	33,300	39,400	40,800	1,400 (4%)	41,200	42,600	1,400 (3%)
Bairds Road east of Hellabys Road	23,600	24,700	26,400	1,700 (7%)	26,600	28,500	1,900 (7%)
Hellabys Road	17,900	21,500	23,800	2,300 (11%)	25,200	26,400	1,200 (5%)

Key changes identified include:

- The improved network capacity and connectivity is predicted to reduce through traffic on the residential streets north and west of Onehunga, including:
  - A 7% reduction on Beachcroft Avenue in Onehunga;
  - A 4-6% reduction on Mount Albert Road;
  - A 6-7% reduction on Mount Smart Road;
  - A 8-9% reduction on Campbell Road;
- Reductions in east-west traffic in Penrose is also expected, including a 12-21% reduction in Mount Smart Road (Rockfield to Maurice);
- Flows are also expected to reduce on Great South Road and Station Road in Penrose, thereby easing access to business in Penrose and reducing congestion on the bus routes passing through those areas;
- Only minor increases (2-9%) are predicted on north-south routes such as O'Rorke Road and Maurice Road;
- On SH20, an increase is expected north of Neilson Street, however the flows on the Māngere Bridge are not expected to materially change. This is the net effect of some increases in traffic between EWL and SH20 south and reductions in through traffic on SH20 (i.e. travelling east to SH1);
- The flows on SH1 north of SEART are not expected to materially change, while those south of the EWL are expected to increase. SH1 is being widened between the EWL ramps and Princes Street to accommodate these changes and provide consistent 4-lanes over the section from EWL to Highbrook Drive; and
- South of Highbrook the flows on SH1 are predicted to have an increase (2-3%).

5.5.6 Summary of Traffic Flow Changes

In summary, the general patterns of changes in daily traffic flow seem to suggest that:

- Traffic moves from the adjacent corridor to the new EWL, with large reductions in flow seen on Neilson Street and Church Street;
- Substantial reductions at the southern part of the Onehunga Town Centre due to the new EWL and interchange;
- There is an increase in daily flow on major routes as a result of the Project – particularly on SH1 with the new ramps and increased capacity on SH1; and
- There are reductions in traffic on many other roads, particularly in residential areas, as the extra network capacity reduces traffic diverted from the major roads.

There are some roads where changes in traffic flows are expected to increase, and which could create adverse effects, namely:

- Selwyn Street;
- Galway Street;
- Victoria Street;
- Captain Springs Road;
- Angle Street;
- Hugo Johnston Drive; and
- Vestey Drive.

These roads where traffic flows increase more significantly are discussed in detail in Section 6 of this report.

5.6 Effects on Residential Amenity

The general patterns of daily traffic flows suggest that there are reductions in traffic particularly in residential areas in both 2026 and 2036, thus improving network conditions for residents on streets such as:

- Campbell Road;
- Mount Albert Road;
- Mount Smart Road;
- Avenue Road;
- Trenwith Street; and
- Frank Grey Place (north of Trenwith Street).

5.7 Effects on Community / Town Centre Amenity

At the western end of Neilson Street traffic moves from the adjacent road corridor to the new EWL, with large reductions in flow seen on Neilson Street and Onehunga Mall. This will provide amenity benefits and improve the environment of the road, allowing for a high quality pedestrian and cycling facility to be provided for. The scale of these changes is reflected in the reduction in traffic flows at the Neilson Street/Onehunga Mall intersection, which is the key gateway to Onehunga from the south, especially for cyclists and pedestrians.

The following Table 5-11 displays the changes in flow at the Onehunga Mall/Neilson Street Intersection.

Table 5-11: Flow changes at the Onehunga Mall/Neilson Street Intersection

Approach	2013	2026			2036		
		Without Project	With Project	Difference	Without Project	With Project	Difference
All vehicles							
Total Throughput	39,350	41,850	17,850	-24,000 (-57%)	43,750	19,900	-23,850 (-55%)
Trucks							
Total Throughput	4,100	5,880	2,125	-3,755 (-64%)	6,960	2,525	-4,435 (-64%)

As shown in Table 5-11, when the Project is in place there will be a significant decrease in the number of vehicles using Onehunga Mall/Neilson Street intersection- a reduction of over 50% in both 2026 and 2036. It is also important to highlight that a result of the EWL Project it is predicted that the number of trucks using the intersection is predicted to decrease by over 60% as they will use the EWL to access the motorways.

5.8 Effects on Accessibility for Local Businesses

Currently the flows on Neilson Street range from 20,000 – 30,000vpd. This high volume of traffic can mean it is difficult to turn out of and into local driveways and sideroads. This can lead to long waiting times to exit/enter properties, and therefore people taking risks and pulling out into very small gaps in the traffic flow, which can in turn lead to crashes. Without the Project, this volume of daily flow is predicted to become even higher, further exacerbating the problem. With the Project in place, the flows on Neilson Street are forecast to substantially reduce, even lower than 2013 levels, meaning accessibility for local businesses and property owners will be made easier.

As an example, in the 2026 Without Project scenario, it is forecast that to turn right out of Victoria Street onto Neilson Street in the AM peak will take 61 seconds (on average), whereas when the Project is in place, and the vehicle flow on Neilson Street is greatly reduced, this movement is expected to only take 13 seconds. Also, in 2026 in the PM peak Without the Project, it is forecast to take 48 seconds to turn from Alfred Street into Neilson Street, this is reduced to 19 seconds when the Project is in place.

Table 5-12:- Changes in Movement Time 2026

From	To	Direction	2026 Without Project (seconds)			2026 With Project (seconds)		
			AM	IP	PM	AM	IP	PM
Victoria Street (south)	Neilson Street	right	61	37	55	13	9	15
Victoria Street (north)	Neilson Street	right	67	36	49	15	8	15
Alfred Street (South)	Neilson Street	right	64	37	48	18	10	19
Angle Street	Neilson Street	right	76	58	176	14	9	16
MetroPort	Neilson Street	right	13	9	12	31	16	45

Table 5-13: Changes in Movement Time 2036

			2036 Without Project (seconds)			2036 With Project (seconds)		
From	To	Direction	AM	IP	PM	AM	IP	PM
Victoria Street (south)	Neilson Street	right	51	44	86	14	10	19
Victoria Street (north)	Neilson Street	right	71	40	63	36	10	18
Alfred Street (South)	Neilson Street	right	64	43	69	15	10	20
Angle Street	Neilson Street	right	77	73	504	37	22	52
MetroPort	Neilson Street	right	12	10	14	7	6	8

As Table 5-12 and Table 5-13 show, with the reduction in traffic and congestion on Neilson Street, accessibility for side street (and also driveways), become much better. It should be noted that the Angle Street times (particularly the PM peak), seem unrealistically high, and it may be the vehicles will find another route which is not shown in the model. However, it is considered representative of the issues, and it shows that with the Project accessibility is greatly improved.

5.9 Predicted Changes in Overall Network Travel

5.9.1 Change in regional demands and Travel

The ART3 regional multi-modal model has been used to assess the changes in regional demand for vehicle and public transport travel across the Auckland region. Those predicted demands for the wider study area are used in the project SATURN model, however this section summarises the overall network change. These predictions relate to the overall pattern of regional demand, due to mode shift, time-period shifting or trip redistribution (change in destination). This is distinct from the change in route taken by cars travelling through the network, which is reflected in the project SATURN model.

To provide context to the predicted impact of the Project, ART3 model predicts substantial growth between 2013 and 2026 (without the Project in place): an increase of between 15% - 17% in daily vehicle trips across the Auckland Region, with an increase of over 100% in public transport person trips. This implies a substantial mode shift to public transport between current conditions and the 2026 Without Project scenario.

Table 5-14 compares the total regional travel demands and travel for cars and public transport.

Table 5-14: ART3 Difference in demand totals

Measure	Scenario	2026	2036
Vehicle Trips	DM	3,668,056	3,947,690
	Opt	3,670,407	3,948,765
	Change	2,350	1,075
PT Trips	DM	457,979	614,048
	Opt	456,294	612,609
	Change	-1,685	-1,439
Veh-km	DM	40,464,272	44,850,598
	Opt	40,578,325	44,976,180
	Change	114,053	125,582
Pax-km	DM	5,127,790	7,079,253
	Opt	5,103,415	7,057,943
	Change	-24,375	-21,310

From the table it can be seen that across the Auckland region there is a daily increase of 2,350 car trips per day in 2026, and a reduction of 1685 public transport trips. At a regional level, these changes are very small. There is also predicted to be an increase in the amount of vehicle travel of some 114,000km, and a reduction in public transport travel of 24,000 km.

The more detailed SATURN model predicted significant savings on a number of bus routes in the study area (up to seven minutes saved), however these saving were generally not reflected in the less detailed ART3 model. For example, the ART3 model does not fully reflect the high level of current congestion for buses accessing Onehunga from SH20, and as such does not respond to the substantial improvements to these bus routes. Those substantially improved bus travel times would be expected to offset some of the predicted mode shift (away from buses), caused by the reduced vehicle travel times. As such, it is expected that the ART3 model is over-stating the reduction in bus travel.

These changes in regional trip totals do not reflect changes in distribution, where travellers may change the destination of their journey to take advantage of faster access. This effect can increase traffic in a corridor, even without increasing the total number of vehicle trips. For example, the above increase of 2,350 vehicle trips is the net effect of an increase of some 9,400 trips between some sectors, and an associated reduction of 7,000 between other sectors.

Therefore, vehicles induced into the study area (as distinct from being diverted), are estimated to be in the order of up to 10,000vpd.

5.10 Corridor Operational Analysis

This section summarises the expected performance of the new corridor. This uses the standard traffic engineering Level of Service (LoS), as defined in the Highway Capacity Manual (HCM). The LoS measures the perceived performance, with a LoS A representing completely free-flow, uninterrupted conditions, and LoS F characterised by high levels of congestion, delays and queues.

Measures for individual intersections and for an urban arterial segment are used. The definition for the urban arterial segment are[6]:

> *'The service measure for the automobile mode on an urban street is the percent of base free-flow speed. Motorists travelling along arterial streets expect to be able to travel at or near the posted speed limit between intersections and to have to stop only infrequently. As delay due to traffic control devices and to other roadway users (vehicles stopped in a travel lane waiting to turn, buses stopping to serve passengers, pedestrian crossings) increases, the lower the average speed and the lower the perceived LoS'*

The LoS thresholds for this type of road are shown in Table 5-10.

Table 5-15: LoS for Urban Arterials

Travel speed as a percentage of base free flow speed, %	LOS by Volume to capacity ratio	
	<=1.0	>1.0
>85	A	F
>67 to 85	B	F
>50 to 67	C	F
>40 to 50	D	F
>30 to 40	E	F
<=30	F	F

The LoS for urban street intersections is defined as follows[7]:

> '*The measure of service for the automobile mode at all urban street intersections including signalised intersections, all way stop controlled intersections, two way stop intersections, roundabouts and interchange ramp terminals is control delay. Control delay is a measure of discomfort, frustration, fuel consumption and increased travel time. It depends on a number of variables which are different depending on whether the intersection is signalised or un-signalised. The maximum control delay allowed for a given LoS at un-signalised intersections is lower than for signalised intersections due to differing driver expectations. The expectation of drivers is that a signalised intersection is designed to carry higher traffic volumes and experience greater delay than at un-signalised intersections*'.

The thresholds at intersections, for vehicles and pedestrians are shown in Table 5-16.

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[6] Highway Capacity Manual 2010, Volume 1, Chapter 5

[7] Highway Capacity Manual 2010, Volume 1, Chapter 5

Table 5-16: LoS for Intersections

LoS	Traffic signal control delay for vehicles (seconds)	Traffic signal control delay for pedestrians (seconds)
A	0-10	0-10
B	10-20	10-20
C	20-35	20-30
D	35-55	30-40
E	55-80	40-60
F	>80	>60

For the Project, the Transport Agency provided target minimum LoS as follows:

- Intersections: Overall average LOS D, with only a small number of non-through movements at LoS E;
- Arterial Segment (foreshore arterial from Orpheus Drive to the SH1 ramp entry on Sylvia Park Road):
  - Average LOS B (67-85% of free-speed) during interpeak periods; and
  - Average LOS C (50-67% of free-speed) during AM and PM periods.

The LoS for pedestrians using the signalised intersections on the EWL have been calculated using the definitions in the SIDRA software.

5.10.1 Predicted LoS at Key Intersections

The LoS for the key intersections for the Project in both 2026 and 2036 have been assessed by stand-alone SIDRA intersection models, using the turning flows predicted by the SATURN model. The results for vehicles and also pedestrians are shown (including average delay for pedestrians) in Table 5-17. At the Great South road/EWL intersection, the LoS for vehicles and pedestrians only relate to the movements at the signalised intersection, and do not include the grade-separated movements.

Table 5-17: LoS at key intersections

Intersection	2026			2036		
	AM	IP	PM	AM	IP	PM
Vehicles						
EWL/Galway Street	A	A	A	B	A	B
EWL/Captain Springs Road	C	B	C	C	B	C
EWL/ ports link road	B	B	B	B	B	B
EWL/Hugo Johnston Drive	B	B	B	C	C	B
EWL/Great South Road	D	C	D	D	C	D
Galway Street/Neilson Street	B	B	B	B	B	B
Captain Springs Road/Neilson Street	C	C	C	D	C	C
Pedestrians						
EWL/Galway Street*	-	-	-	-	-	-
EWL/Captain Springs Road	C (26s)	B (15s)	B(20s)	C(27s)	B (15s)	C (26s)
EWL/ports link road	D (32s)	B (19s)	D(34s)	D (37s)	C (24s)	E (42s)
EWL/Hugo Johnston Drive*	-	-	-	-	-	-
EWL/Great South Road	C (26s)	B (18s)	C (23s)	C (29s)	C (21s)	C(26s)

Intersection	2026			2036		
	AM	IP	PM	AM	IP	PM
Galway Street/Neilson Street	B (17s)	B (17s)	B (17s)	C (21s)	B (17s)	B (17s)
Captain Springs Road/Neilson Street	D (30s)	C (24s)	C (28s)	D (35s)	C (24s)	C (28s)

*Pedestrian crossing facilities have not been included in the design for these intersections as alternative facilities have been provided. At Galway Street, a pedestrian crossing is provided further to the north at the intersection with the link road to Onehunga Harbour Road, and a pedestrian/cycling bridge over the EWL is provided at Alfred Street. In respect to Hugo Johnston Drive, a pedestrian underpass is provided. These are further discussed in Chapter 7.

From Table 5-17 it can be seen that all of the intersections are meeting the suggested design targets for LoS, especially in the peak periods for both 2026 and 2036. The large 4-way junction of Great South Road/Sylvia Park Road and EWL will operate at a slightly lower LoS than the other intersections along the EWL, however the LOS for east-west movements here for both vehicles and pedestrians/cyclists will be much higher as they free-flow over the intersection.

For the pedestrians, the LoS experienced at most intersections is LoS C.

5.10.2 EWL Main Alignment

The LoS for the EWL mainline route (Orpheus Drive to SH1 ramp entry) is calculated from the SATURN model and shown in Table 5-18.

Table 5-18: LoS on the EWL mainline

Direction		Free Speed	2026			2036			
			Average Speed	Ratio	LoS	Free Speed	Average Speed	Ratio	LoS
Eastbound	AM	60 km/h	45km/h	72%	B	60 km/h	42	67%	B
	IP	60 km/h	48 km/h	76%	B	60 km/h	47	74%	B
	PM	60 km/h	46 km/h	73%	B	60 km/h	44	70%	B
Westbound	AM	60 km/h	59 km/h	93%	A	60 km/h	57	91%	A
	IP	60 km/h	57 km/h	90%	A	60 km/h	59	93%	A
	PM	60 km/h	54 km/h	86%	A	60 km/h	55	87%	A

Table 5-18 demonstrates that the mainline of the EWL is predicted to operate at LoS B in 2026 and 2036 in the Eastbound direction, and A in the westbound direction. Therefore, the EWL meets the suggested Project targets outlined previously.

5.10.3 State Highway Operation

In the forecast years, both SH1 and SH20 are predicted to be very busy. SH20 is expected to be operating at or close to capacity at key upstream locations, especially southbound in the morning peak (constrained at Hillsborough) and northbound in the evening peak (constrained at Puhinui and SH20a-Walmsley). This means that ramp signals are expected to operate on the on-ramps to SH20, with potential queuing on the on-ramps.

In the morning peak, this on-ramp queuing is expected to be heaviest on the existing southbound on-ramp (on Gloucester Park Road), with less queuing on the new loop on-ramp connection.

In the evening peak, the level of ramp signal control on the northbound on-ramp will depend on both upstream conditions (crossing the Manukau Harbour), and downstream performance (to manage potential congestion in the Waterview tunnels). The local models indicate that the upstream congestion will allow a high flow on the ramp (with limited ramp signal queuing on the EWL). However, it is likely that higher control on the ramps could be required under certain conditions, which would increase queuing on the northbound on-ramp. A T2 lane bypass of the ramp signals is proposed, similar to what exists today.

On SH1, the proposed widening of SH1 will help accommodate the extra traffic flows attracted to the EWL Project. In the northbound direction, queuing is still expected to occur in both morning and evening peaks due to downstream constraints at the SEART on-ramp. The extra northbound lane will allow traffic destined for the new EWL lane to bypass those queues. However, speed management may be required for safety reasons to avoid high speed differentials between lanes.

In the southbound direction, congestion is expected to remain in the evening peak. Upstream constraints at the Greenlane on-ramp and the Mount Wellington overbridge are expected to constrain arriving flow rates, thereby assisting the easier absorption of the new ramp flows. However, ramp signalling on both the new ramp and the existing Mount Wellington on-ramp is expected to be required to manage potential queuing further south at the Highbrook Drive interchange, where SH1 reverts from four lanes back to three. A T2 bypass of the ramp signals is proposed on the EWL ramp.

The operation of the T2 bypass lanes at the ramp signals on both SH1 and SH20 may, however, be reviewed by the Transport Agency (with potentially to be truck-only lanes), if operating conditions require.

At the Princes Street interchange, the relocated southbound on-ramp is expected to provide significantly longer queue-storage for the ramp signals, which will continue to operate especially in the evening peak. The widened bridge means that even in extreme circumstances where motorway queues blocked back onto the bridge, most local movements would be able to proceed around the queued lanes. This is expected to provide greater accessibility to the local communities, allowing them to move around with less impact from the motorway operations.

Table 5-19 display the impact of the Project on travel times northbound and southbound on SH1 and SH20.

Table 5-19: Changes in travel time on SH1 and SH20

		2026 (minutes)			2036 (minutes)		
	2013	Without Project	With Project	Difference	Without Project	With Project	Difference
AM Peak							
SH20 Southbound	4.2	9.6	6.6	-3.0 (-31%)	13.0	9.1	-3.8 (-30%)
SH20 Northbound	3.1	3.8	3.9	0.2 (5%)	3.9	4.2	0.3 (7%)
SH1 Southbound	5.3	5.6	5.3	-0.2 (-4%)	5.9	5.5	-0.4 (-7%)
SH1 Northbound	12.6	14.0	10.6	-3.4 (-24%)	18.8	13.1	-5.7 (-30%)
Inter Peak							
SH20 Southbound	3.0	3.3	3.3	0.0 (0%)	3.5	3.5	0.0 (-1%)
SH20 Northbound	2.4	2.7	2.7	0.0 (0%)	3.1	3.2	0.1 (4%)
SH1 Southbound	4.2	4.3	4.3	0.0 (0%)	4.4	4.5	0.1 (2%)
SH1 Northbound	4.2	4.5	4.5	0.0 (0%)	5.1	4.9	-0.2 (-3%)
PM Peak							
SH20 Southbound	3.8	4.1	4.1	0.0 (0%)	4.2	4.2	0.0 (-1%)
SH20 Northbound	3.6	7.4	6.7	-0.6 (-9%)	7.1	7.3	0.2 (3%)
SH1 Southbound	6.8	8.4	5.1	-3.3 (-39%)	7.8	5.3	-2.6 (-33%)
SH1 Northbound	4.3	4.9	4.9	0.0 (0%)	5.3	5.0	-0.3 (-6%)

From Table 5-19 it can be seen that over time (i.e. 2013 to 2026 and 2026 to 2036), the travel times on SH1 and SH20 get progressively worse as the volume of traffic and therefore congestion increases. What is demonstrated in the table and figures is that when the Project is in place the travel times on these routes stay the same, or in some cases experience some improvement. Those improvements are due to the motorway widening on SH1 and the EWL allowing some diversion of traffic away from the southern parts of SH20.

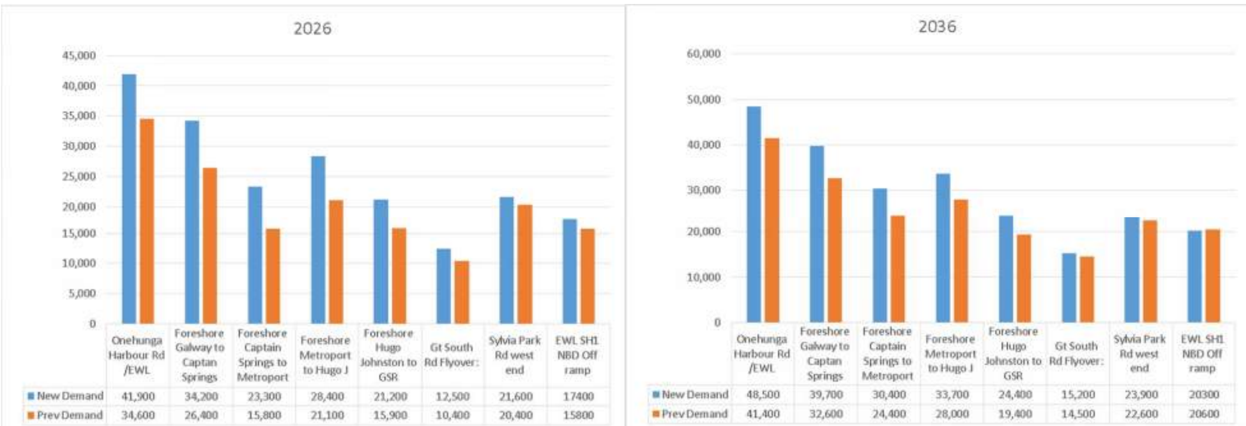
This demonstrates that the widening on SH1 will allow the new EWL ramps and associated traffic increases to be accommodated without significantly impacting on through traffic on SH1. Similarly, on SH20, the auxiliary lanes proposed between Neilson Street and Queenstown Road (now as a separate project), will mean that the extra flows from the improved Neilson Street interchange can be accommodated without adverse impact on SH20.

5.11 Sensitivity Tests

The predicted future traffic demands and resulting network performance are based on a range of inputs and assumptions, all of which are subject to a level of uncertainty. The Business Case process that developed the preferred option for this Project identified that regional land use growth was one of the most critical assumptions, followed by assumptions of adjacent or nearby changes to the transport network. However, that process identified that because this work was addressing an existing, rather than future problem, the need or general form of solution was not highly sensitive to the land use growth inputs. Rather, the rate of regional growth was found to influence the level of traffic flows in the assessment period.

A sensitivity test on the potential traffic flows on the EWL was undertaken using the regional demands obtained in 2014 for the Indicative Business Case. Those demand forecasts were from the same modelling system, but used older regional land use predictions (Scenario I-8b), different assumptions on regional projects and a different version of the Project in the regional model. The predicted daily flows on the Project are compared in the following figures. Here it can be seen that the current flow predictions in 2026 and 2036 are noticeably higher than those from the older demands.

Figure 5-17: Daily Traffic Flow under Different Regional Demands



The predicted travel time savings as a result of the Project was assessed for these sensitivity tests. This is the same assessment as reported earlier in Table 5-1, but using the alternative travel demands. The time savings under those previous demands are shown in Figure 5-18 for 2026 and Figure 5-19 for 2036.

Figure 5-18: 2026 Comparison of Travel Time Savings

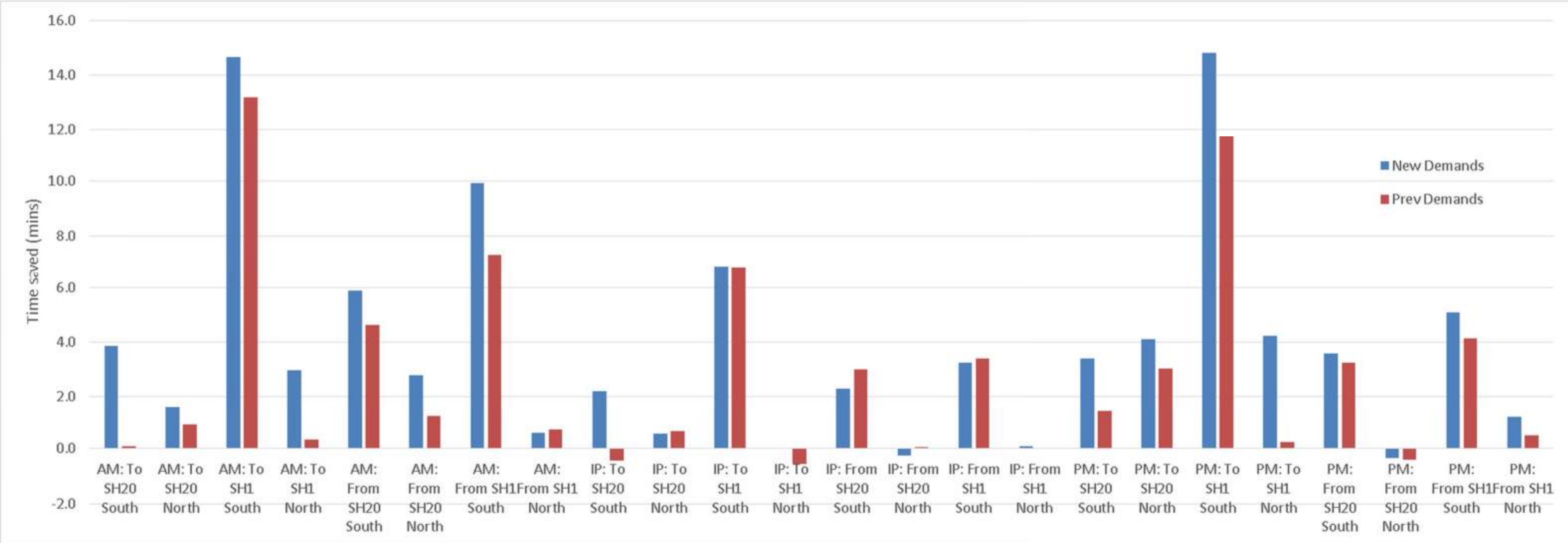
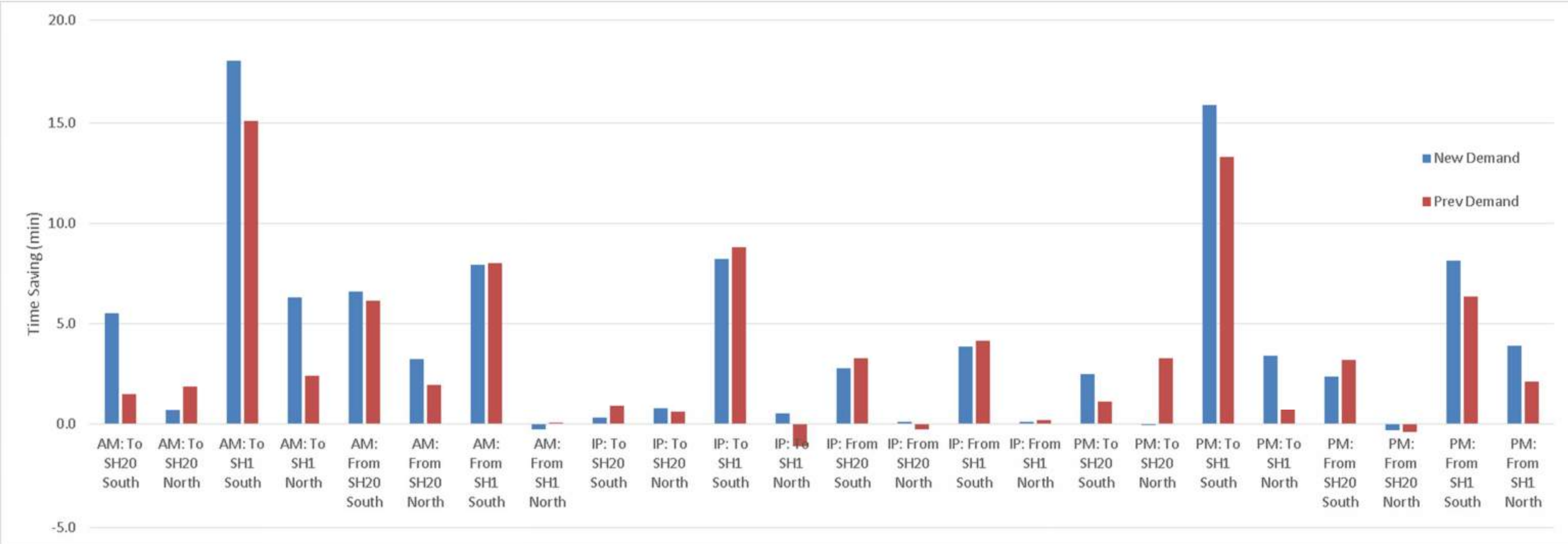


Figure 5-19: 2036 Comparison of Travel Time Savings



It can be seen from Figure 5-18 and Figure 5-19 that the pattern of travel time savings is quite similar between the new and previous demands, albeit with some movements with differing magnitude of savings.

From the 2026 models, the newer demands are generating typically higher time savings. This is because the higher level of traffic in the new demands creates more congestion in the Without-Project scenario, but with little change to the With-Project scenario. This means that the calculated savings are greater. In the 2036 models the levels of demand were more similar. Here the effect on time savings is more varied, with some increase and some decreases.

Overall, the pattern of change is considered generally consistent between the demands. The rapid growth in travel experienced in Auckland over the last 2-3 years would suggest that the new, higher predictions for 2026 are more likely.

The modelling assumed limited changes to the adjacent or nearby transport network, with the most relevant projects being AMETI and the upgrades on SH20. The assumptions about widening of SH20 south of Maioro Street are considered valid as those works are now under construction.

The AMETI project comprises a bus rapid transit system between Botany and Panmure, which is not expected to have a material impact on the demands in this area. Upgrades to the road network in Pakuranga could increase peak-period traffic flows on the Waipuna Bridge and SEART, however these are not expected to significantly change peak-hour conditions in the study area as any such increases would be moderated by the existing at-grade intersections, such as at Carbine Road.

The predicted traffic flows could be sensitive to new, currently unplanned or uncommitted projects in the adjacent areas. However, the form and timing of such projects is not known, and they would be subject to their own assessments of effects on the network.

5.12 Conclusions

This section demonstrates that the Project will deliver a number of significant positive outcomes regarding travel time and reliability accessing the Onehunga-Penrose area, as well as positive effects on the wider road network. Benefits of the Project are outlined below (It should be noted that for the purposes of this summary, the travel time savings referenced are the highest predicted across the three modelled peaks and two modelled years):

- Without the Project, the already congested travel conditions accessing Onehunga-Penrose from the motorways is expected to get significantly worse from regional and local traffic growth;
- Significant travel time savings for trucks accessing the Onehunga-Penrose industrial area to the strategic network, including:
  - Reductions accessing SH20 north of up to 4 minutes (43%);
  - Reductions accessing SH20 south of up to 6 minutes (48%);
  - Reductions accessing SH1 north of up to 6 minutes (37%); and
  - Reductions accessing SH1 south of up to 18 minutes (68%).
- When expressed in changes in average speed, these improvements include:
  - Increases from 25 to 62 km/h from SH1 south; and
  - Increases from 45 to 60 km/h from SH20 south.
- The times saved vary across the day, however the traffic expected to benefit from these access movements is estimated to include:
  - Some 32,000vpd accessing SH20 north;
  - Some 40,000vpd accessing SH20 south;

  - Some 45,000vpd benefiting from improvements on Church Street, including those accessing SH1 north; and
  - Some 20,000vpd accessing SH1 south.
- The Project is expected to improve journey times in 2026 over a much wider area than just Onehunga-Penrose, including:
  - Up to 9 minutes between SH20 and Highbrook;
  - Up to 4 minutes between Onehunga and the Airport;
  - Some 3 minutes between Royal Oak and the Airport;
  - Over 3 minutes between SH1 and the Airport;
  - 14 minutes between MetroPort and Highbrook; and
  - Over 3 minutes between Onehunga and Pakuranga.
- The modelling demonstrates significant improvements in the consistency and reliability of travel times for trips accessing the strategic network from the Onehunga-Penrose area. These include a range of travel times (across the directions and times of day) accessing SH1 south reducing from 16 minutes without the Project to 1.9 minutes with the Project. With the Project in place, the access times become much more consistent and reliable across the day, which is expected to allow improved and more flexible journey and logistics planning for businesses in the area, and result in increased freight efficiency;
- When the Project is in place, travel times on SH1 and SH20 have been shown to stay the same or experience marginal improvements. This shows that the extra capacity provided on SH1 (as part of the Project) and on SH20 (as separate works), means that the extra EWL ramp flows can be accommodated without a detrimental impact on the travel along SH1 and SH20;
- The general pattern of changes in daily flow suggest that traffic moves from the adjacent corridor to the EWL, with large reductions in flow and therefore congestion seen on Neilson Street and Church Street;
- There is a decrease in flows on other routes, particularly in residential areas, therefore improving conditions and accessibility for residents;
- Some 57% of the total traffic and 64% of the truck movements are expected to be removed from the Neilson Street/Onehunga Mall intersection. This reduction in flow allows improved pedestrian and cycling facilities and amenity, and reduced traffic severance between Onehunga and the Foreshore/Old Māngere Bridge;
- The reductions of flows and congestion, particularly on Neilson Street, is shown to significantly improve accessibility for local businesses onto those arterial roads;
- Some adjacent streets are expected to have increases in traffic flows and/or function. These are assessed in greater detail in Chapter 9; and
- The EWL is forecast to generally operate a LoS B, with the majority of intersections performing at the Project design target of LoS D or better.