TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Whenuapai Assessment of Transport Effects

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Version 1.0

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

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Appendices

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Abbreviations

Acronym/Term	Description
AEE	Assessment of Effects on the Environment
AC	Auckland Council
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
AUP:OP	Auckland Unitary Plan Operative in Part
CC2W	City Centre to Westgate
CTMP	Construction Traffic Management Plan
DSI	Death and Serious Injury
FTN	Frequent Transit Network
FUZ	Future Urban Zone
LOS	Level of service
NoR	Notice of Requirement (under the Resource Management Act 1991)
PT	Public transport
RASF	Auckland Transport Roads and Streets Framework
RMA	Resource Management Act 1991
SH16	State Highway 16
SH18	State Highway 18
SSTMP	Site-Specific Traffic Management Plans
Te Tupu Ngātahi	Te Tupu Ngātahi Supporting Growth Programme
Waka Kotahi	Waka Kotahi NZ Transport Agency

Glossary of Acronyms / Terms

Acronym/Term	Description
Auckland Council	Means the unitary authority that replaced eight councils in the Auckland Region as of 1 November 2010.
Whenuapai Assessment Package	Four Notices of Requirement and one alteration to an existing designation for the Whenuapai Arterial Transport Network for Auckland Transport.

1 Executive Summary

1.1 Overview

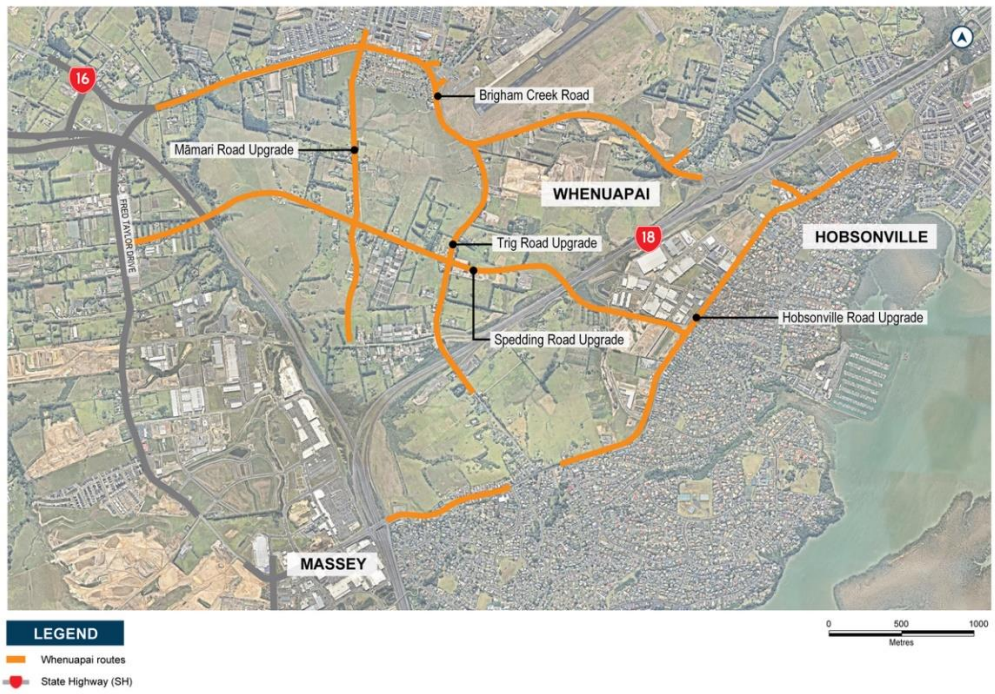
This Transport assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West. This report is for the Whenuapai area of Auckland and is referred to as the Whenuapai Assessment Package.

The Whenuapai Assessment Package comprises five separate projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport. Table 1-1 and Figure 1-1 summarise these projects.

Table 1-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Notice	Project
NoR W1	Trig Road North
NoR W2	Māmari Road
NoR W3	Brigham Creek Road
NoR W4	Spedding Road
NoR W5	Hobsonville Road (alteration to existing designation 1437)

Figure 1-1: North West Whenuapai Assessment Package



1.2 Methodology

1.2.1 Approach to Assessment of Operational Transport Effects

Potential operational transport effects are assessed using: ·

- Transport planning assessment of expected outcomes and effects
- Transport modelling to inform demands and network performance
- Alignment with various policy documents

In respect to each individual NoR, a separate assessment has been undertaken, and the assessment criteria and methodology is summarised in Table 1-2 below.

Table 1-2: Summary of Assessment Methodology

Network Component	Information Source	Assessment Method
Safety	Crash Analysis (CAS) Database Project design drawings	Assessment to determine alignment with Vision Zero standards and design compliance with Transport Design Manual
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) Supporting Growth Indicative Future Public Transport Network (Remix)[1]	Assessment to determine alignment with future network provisions and design compliance with the Transport Design Manual
General Traffic	Transport Model tools (MSM, SATURN and SIDRA) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Access	Engineering Standards	Assessment identifying where there is a potential effect on access in the existing environment
Wider Network Effects	Transport Model tools (MSM, SATURN and SIDRA)	Assessment to consider how the corridor interacts with the surrounding road network
Note: A Road Safety and Audit and Safe System assessment with be done as part of the implementation business case/detailed design stage prior to implementation.		

[1] SGA Remix file provided by Auckland Transport on the draft plan of the bus network to be implemented by 2048

1.2.2 Approach to Assessment of Construction Effects

Based on the indicative construction methodology an assessment of construction effects has been completed for the package sufficient to support each Notice of Requirement. This assessment considers:

- An overview of key considerations including speed, potential impacts to pedestrians and cyclists and property access
- Identification of any works that should not occur at the same time
- Assessment of potential conflict areas with vulnerable road users that will need specific mitigation within a Construction Traffic Management Plan (CTMP).

The impact of any temporary traffic management measures implemented to undertake the projects will be re-assessed in the future, prior to construction, when a greater level of detail is available in terms of the specific construction methodology and traffic environment.

1.3 NoR W1: Trig Road North Upgrade

1.3.1 Road Environment Overview

The project proposes that the function of Trig Road will change from an existing rural two-lane road to a lower-speed (50kph) urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side only. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling on both sides as shown in Figure 1-2.

Figure 1-2: Indicative future Trig Road corridor design

1.3.2 Overall Conclusion

Overall, the NoR W1: Trig Road Upgrade project provides positive transport effects, and there are no identified adverse effects. The project provides positive operational effects, in particular improved safety and walking and cycling effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to the Ministry of Education at 13 - 15 Trig Road (situated to the south of NoR W1) should be specifically considered within the CTMP prior to construction and implementation of the Project.

1.4 NoR W2: Māmari Road Upgrade

1.4.1 Road Environment Overview

The project proposes that the function of Māmari Road will change from an existing rural two-lane road to an urban four-lane arterial.

The existing corridor includes two vehicle lanes, one per direction and does don't provide for through movements. The indicative proposed design includes the same number of general traffic lanes (two), with two bus lanes, and new facilities for walking and cycling as shown in Figure 1-3. The proposed corridor connects Brigham Creek Road to Northside Drive.

Figure 1-3: Indicative future Māmari Road corridor design

1.4.2 Overall Conclusion

Overall, the NoR W2: Māmari Road Upgrade project provides positive transport effects, in particular improved safety, walking, cycling and public transport effects and there are no identified adverse operational effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Timitanga Community School at 9 Māmari Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

1.5 NoR W3: Brigham Creek Road Upgrade

1.5.1 Road Environment Overview

The project proposes that the function of Brigham Creek Road will change from an existing rural two-lane road to an urban four-lane arterial. The existing corridor includes two vehicle lanes, one per direction, with sections of widening at key intersections. The indicative proposed design includes four traffic lanes, as well as new facilities for walking and cycling as shown in Figure 1-4 and Figure 1-5.

The form and function of Brigham Creek Road will change slightly through various segments of the corridor, with the western and eastern segments being adjacent to residential development, and the central segment adjacent to the commercial centre. As such, the designation provides flexibility for the cross section to change along the length of the Brigham Creek Road corridor, reallocating the 30m corridor to best accommodate vehicles, public transport, active modes and freight in relation to the adjacent land use.

Figure 1-4: Indicative Cross Section Brigham Creek Road – State Highway 16 to Totara Road and Tamatea Road to State Highway 18

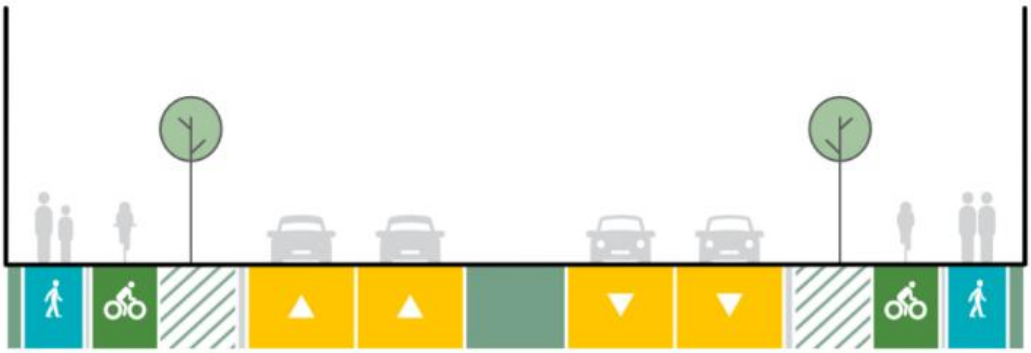


Figure 1-5: Indicative Cross Section Brigham Creek Road between Totara Road and Tamatea Road

1.5.2 Overall Conclusion

Overall, the NoR W3: Brigham Creek Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Whenuapai School at 14 Airport Road, Whenuapai Kindergarten at 16 Airport Road, and the Whenuapai town centre should be specifically considered within the CTMP prior to implementation.

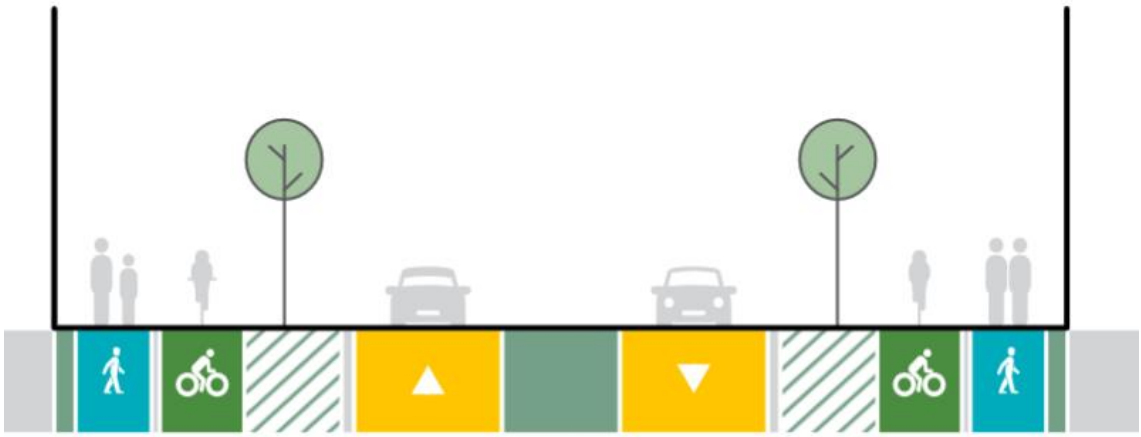
1.6 NoR W4: Spedding Road

1.6.1 Road Environment Overview

The project proposes that the function of Spedding Road will change from an existing rural two-lane road to an urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling as shown in Figure 1-6.

Figure 1-6: Indicative future Spedding Road corridor design



1.6.2 Overall Conclusion

Overall, the NoR W4: Spedding Road project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects for one property has been identified, and access relocation is recommended for this property.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

1.7 NoR W5: Hobsonville Road FTN Upgrade

1.7.1 Road Environment Overview

The Project proposes that the function of Hobsonville Road will change from an existing two lane road to an urban two to four lane arterial with mixed components for vehicles, public transport, active modes, and freight.

The existing corridor generally provides two vehicle lanes and provides intermittent facilities for walking and cycling. The indicative proposed design includes three types of cross sections specifically:

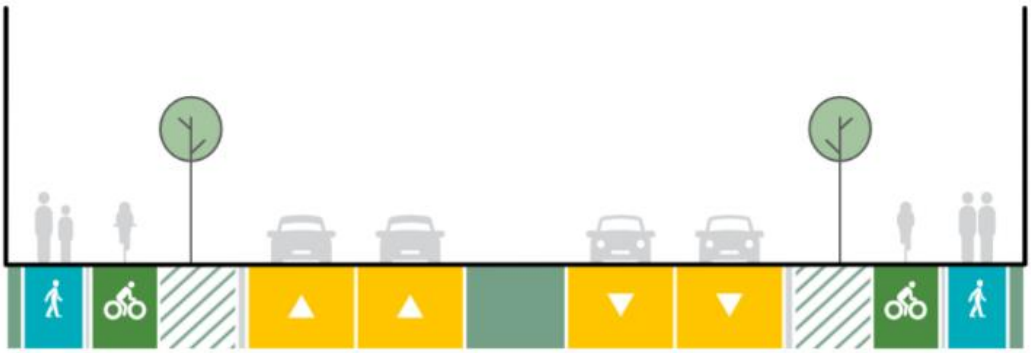
- A generally 30m corridor that provides two vehicle lanes, two public transport lanes, and improved walking and cycling facilities.
- A generally 24m corridor that provides two vehicle lanes and new facilities for walking and cycling.
- A generally 30m corridor that provides four vehicle lanes, as well as new facilities for walking and cycling.

These cross sections are shown below.

Figure 1-7: Indicative future Hobsonville Road corridor FTN Upgrade between SH16 interchange and Luckens Road

Figure 1-8: Indicative future Hobsonville Road corridor between Luckens Road and Brigham Creek Road

Figure 1-9: Indicative future Hobsonville Road corridor between Brigham Creek Road and Hobsonville Point Road



1.7.2 Overall Conclusion

Overall, the NoR W5: Hobsonville Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Hobsonville School and the Hobsonville town centre should be specifically considered within the CTMP prior to implementation.

2 Introduction

This Transport assessment has been prepared for the North West Local Arterial Network Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "Whenuapai Assessment Package"). The NoRs are to designate land for future local arterial transport corridors as part of Te Tupu Ngātahi Supporting Growth Programme (**Te Tupu Ngātahi**) to enable the construction, operation and maintenance of transport infrastructure in the North West Whenuapai area of Auckland.

The North West growth area is approximatively 30 kilometres north west of Auckland's central city. It makes a significant contribution to the future growth of Auckland's population by providing for approximately 42,355 new dwellings and employment activities that will contribute 13,000 new jobs across the North West. Whenuapai is one of these growth areas, located between State Highway 16 (**SH16**) and State Highway 18 (**SH18**) and at present is largely rural (but Future Urban Zoned) with an existing community consisting of new and more established residential, business and local centre land uses. This growth area is expected to be development ready by 2018-2022 with approximately 400 hectares to accommodate 6,000 dwellings. Furthermore, the Whenuapai Structure Plan was adopted by Auckland Council (**AC**) in 2016 and sets out the framework for transforming Whenuapai from a semi-rural environment to an urbanised community over the next 10 to 20 years.

The Whenuapai Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport linkages needed to support the expected growth in Whenuapai.

This report assesses the transport effects of the North West Whenuapai Assessment Package identified in Figure 2-1 and Table 2-1 below.

Figure 2-1: North West Whenuapai Assessment Package

The Whenuapai Assessment Package comprises five separate Projects which together form the North West Whenuapai Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport

Refer to the AEE for a more detailed Project description.

Table 2-1: North West Whenuapai Assessment Package – Notices of Requirement and Projects

Notice	Project
NoR W1	Trig Road North
NoR W2	Māmari Road
NoR W3	Brigham Creek Road
NoR W4	Spedding Road
NoR W5	Hobsonville Road (alteration to existing designation 1437)

2.1 Purpose and Scope of this Report

This assessment forms part of a suite of technical reports prepared to support the assessment of effects within the Whenuapai Assessment Package. Its purpose is to inform the AEE that accompanies the four NoRs and one alteration to an existing designation for the Whenuapai Assessment Package sought by AT.

This report considers the actual and potential effects associated with the construction, operation and maintenance of the Whenuapai Assessment Package on the existing and likely future environment as it relates to transport effects and recommends measures that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this report are as follows:

a) Identify and describe the transport context of the Whenuapai Assessment Package area;
b) Identify and describe the actual and potential transport effects of each Project corridor within the Whenuapai Assessment Package;
c) Recommend measures as appropriate to avoid, remedy or mitigate actual and potential transport effects (including any conditions/management plan required) for each Project corridor within the Whenuapai Assessment Package; and
d) Present an overall conclusion of the level of actual and potential effects for each Project corridor within the Whenuapai Assessment Package after recommended measures are implemented.

This report should be read alongside the AEE, which contains further details on the history and context of each Project. The AEE also contains a detailed description of works to be authorised for each Project, likely staging and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of transport effects. As such, they are not repeated here, unless a description of an activity is necessary to understand the potential effects, then it has been included in this report for clarity.

2.2 Preparation for this Report

In preparation for this report, several resources were used to support the assessment of transport effects. A Construction Method Statement has been provided by construction specialists for each NoR (summarised in the AEE), which was used to assess the actual and potential transport effects of the construction of each Project. In terms of operational effects, the inputs used for modelling purposes are discussed in greater detail in the Assessment Methodology.

A series of Business Cases and public engagement exercises have been undertaken over the past four years as part of a wider programme of transport initiatives needed to support the growth in this north-western part of Auckland. These include:

- Transport for Future Urban Growth Programme Business Case (2016)
- North West Indicative Business Case (IBC) (2018)
- North West Detailed Business Case (DBC) (2020)

3 Assessment Methodology

Given the long-term nature of the designations being sought by the NoRs, this assessment does not assess the interim staging of individual Projects and development staged over the next three decades but instead places a greater focus on the 'full build out' of the future urban area in 2048+ to support future communities. Therefore, this assessment focusses on the likely future environment (full build out 2048+) and wider infrastructure upgrades.

To ascertain the long-term effects of the Projects, this assessment assesses the transport effects arising from each of the Projects that comprise the Whenuapai Package in a future context.

The methodology for the operational and construction transport effects are applicable for each NoR specified within this document. Any nuances are specified throughout the assessment.

The Assessment of Transport Effects has two elements:

- Assessment of operational effects on the transport system
- Assessment of construction effects on the transport network

The assessment is targeted at route protection, rather than imminent implementation. As such, it:

- Makes greater use of generic cross-sections and design standards ·
- Focuses more on desired outcomes and footprints
- Takes a longer-term view, with its inherent uncertainties
- Assumes more use of recommended management plans and planning processes rather than specific design details to manage potential effects

A key element of the assessment is the definition of the 'existing/likely future environment', against which the effects are assessed. This is a complex issue as the proposed works are planned to support urban development and will be unlikely to occur without such development. Additionally, the source of the potential effects (such as people and vehicle movement), is generally from that urban development itself, rather than from the planned infrastructure.

To isolate the effects of the planned works, the 'Existing Environment' includes the likely future urban development but does not include the planned Projects for which designations are sought. The effects of the Projects are then assessed using the same land use assumptions. Given the long-term perspective of the assessment, the analysis is based on the estimated 'full build out' for the future urban area. This is based on development yield estimates provided by Auckland Council through the Whenuapai Structure Plan[2] process.

3.1 Approach to Assessment of Operational Transport Effects

Potential operational transport effects are assessed using: ·

- Transport planning assessment of expected outcomes and effects
- Transport modelling to inform demands and network performance
- Alignment with various policy documents

[2] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/place-based-plans/Documents/whenuapai-structure-plan-september-2016.pdf

In respect to each individual NoR, a separate assessment has been undertaken that provides an assessment of:

- Each mode of transport, and
- Access for existing properties
- Wider network effects

This section will outline the methodology for these assessments.

3.1.1 Transport Modelling

Throughout the transport network analysis process, a range of different transport modelling tools have been used to undertake quantitative assessments of the transport system. These then inform decisions about planning the transport network, corridors, and intersections.

The impacts of the Projects on the future transport environment are assessed using forecasting transport models, owned by the Auckland Forecasting Centre (AFC). The models include:

- The regional multi-modal model (MSM). This model creates estimates of car, truck and public transport movements at a regional level based on land use, network and policy inputs. This model is the primary tool to estimate future PT usage. Generally, this model is run using regional assumptions as per recent ATAP planning, but with scenario-specific inputs in the growth areas.
- A local traffic model (SATURN). This uses the traffic demands from MSM on a more detailed representation of the road network.
- A strategic active model (walk/cycling) model (SAMM). This tool gives strategic-level estimates of walking and cycling demands.

The assessment of operational effects will therefore be informed by modelled estimates of travel and network performance for a future full-build-out scenario.

A SATURN (North West Area) and MSM (Regional) model with forecast year of '2048+' for the wider network was used. The '2048+' forecast includes the regional growth estimated for the year 2048 but with the addition of full build-out in the greenfield growth areas. The SATURN model uses the demand outputs from MSM, which includes inputs of the latest land use assumptions (in this instance, referred to as land use scenario i11.5). The modelling includes an overall network of infrastructure identified to support growth in the North West area. This means that the assessment assumes that all other North West Supporting Growth Programme Projects are implemented and the growth up to 2048+ will progress as planned. All transport Projects assumed in the modelling are outlined in Appendix 1.

In addition to the SATURN modelling, SIDRA[3] modelling has been undertaken to assess the operational outputs of key intersections along the project corridors. The regional model (MSM) was used to inform assessment of the public transport network components.

In regard to traffic modelling analysis used in this report, a Level of Service (LOS) metric has been used. This refers to a qualitative measure used to assess the quality of motor vehicle traffic service. LOS is used to analyse road corridors and intersections by categorising traffic flow and assigning quality levels of traffic based on a performance measure ranging from A to F and can be summarised as follows:

[3] SIDRA modelling enables an assessment of individual intersections using inputs from regional models.

- **LOS A: free flow**. Traffic flows at or above the posted speed limit and motorists have complete mobility between lanes.
- **LOS B: reasonably free flow**. LOS A speeds are maintained, manoeuvrability within the traffic stream is slightly restricted.
- **LOS C: stable flow, at or near free flow**. Ability to manoeuvre through lanes is noticeably restricted and lane changes require more driver awareness.
- **LOS D: approaching unstable flow**. Speeds slightly decrease as traffic volume slightly increase. Freedom to manoeuvre within the traffic stream is much more limited and driver comfort levels decrease.
- **LOS E: unstable flow, operating at capacity**. Flow becomes irregular and speed varies rapidly because there are virtually no usable gaps to manoeuvre in the traffic stream and speeds rarely reach the posted limit.
- **LOS F: forced or breakdown flow.** Every vehicle moves in lockstep with the vehicle in front of it, with frequent slowing required. Travel time cannot be predicted, with generally more demand than capacity

3.1.2 Transport Guidance and Documents

Within this report, the Projects have also been considered against the outcomes and objectives of applicable transport design guidance and policy directives including:

- AT's Transport Design Manual, which sets out outcomes, engineering design and construction requirements for the Projects
- AT's Vision Zero, which adopts a "Safe System" approach to focus on road safety for all road users
- AT's Roads and Streets Framework (**RASF**)[4] was also used to qualitatively assesses the typology (movement and place value) and modal priority for each corridor. A 'mandate' for each road corridor is developed and approved by the Auckland Transport RASF Committee, comprising of senior officers from AT and AC.

3.1.3 Assessment Methodology - Transport Mode

Table 3-1 summarises how each mode/element of transport has been assessed in terms of operational effects as a result of the Projects.

Table 3-1: Summary of Assessment Methodology

Network Component	Information Source	Assessment Method
Safety	Crash Analysis (CAS) Database Project design drawings	Assessment to determine alignment with Vision Zero standards and design compliance with Transport Design Manual
Walking and Cycling	Walking and Cycling Network Plans Proposed Cross Sections	Assessment to determine alignment with walking and cycling strategic documents and design compliance with Transport Design Manual

[4] https://at.govt.nz/about-us/transport-plans-strategies/roads-and-streets-framework/

Network Component	Information Source	Assessment Method
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) SGA Remix File[5]	Assessment to determine alignment with future network provisions and design compliance with the Transport Design Manual
General Traffic	Transport Model tools (MSM, SATURN and SIDRA) Project design drawings	Assessment using key model outputs including traffic volumes, levels of service for corridor midblock performance and intersection performance. Assessment of surrounding network connections
Access	Engineering Standards	Assessment identifying where there is a potential effect on access in the existing environment
Wider Network Effects	Transport Model tools (MSM, SATURN and SIDRA)	Assessment to consider how the corridor interacts with the surrounding road network
Note: A Road Safety and Audit and Safe System assessment with be done as part of the implementation business case/detailed design stage prior to implementation.		

3.1.4 Assessment of Project Objectives

Each Project included in the Whenuapai Assessment Package has an identified set of Project objectives. From a transport perspective, these objectives are focused predominantly on the themes of supporting growth, safety, urban form, mode shift/choice and connectivity. The assessment of these, and how they align with the Project Objectives are included in the AEE.

3.2 Approach to Assessment of Construction Effects

3.2.1 Construction Traffic Effects

In order to assess the potential construction traffic effects, an indicative construction methodology has prepared. This can be found in the AEE.

Based on the indicative construction methodology an assessment of construction effects has been completed for the package sufficient to support each Notice of Requirement. This assessment will consider:

- An overview of key considerations including speed, potential impacts to pedestrians and cyclists and property access
- Identification of any works that should not occur at the same time
- Assessment of potential conflict areas with vulnerable road users that will need specific mitigation within a Construction Traffic Management Plan (**CTMP**) and / or Site-Specific Traffic Management Plans (**SSTMP**).

[5] SGA Remix file provided by Auckland Transport on the draft plan of the bus network to be implemented by 2048

The Project specific construction effects will be managed via a CTMP and/or SSTMP which will be developed immediately prior to implementation when the greatest certainty is available.

3.2.2 Temporary Traffic Management

The impact of any temporary traffic management measures implemented to undertake the Projects will be confirmed as part of the CTMP prior to the construction phase of each project.

It is noted that there may be some nuances between projects delivered 'online' as they are existing roads and those delivered 'offline' as new greenfield roads. There are also corridors that are both existing and new roads such as NoR W2 Māmari Road. Therefore, the CTMP should consider potential road closures, any capacity reductions on key corridors through lane closures, and any other ancillary effects such as shoulder closures.

4 Whenuapai Assessment Package Overview

An overview of the Whenuapai Assessment Package is provided in Figure 4-1 below, with a brief summary of the Whenuapai Assessment Package projects provided in Table 4-1 below.

Figure 4-1: North West Whenuapai Assessment Package – Overview of NoRs for Assessment

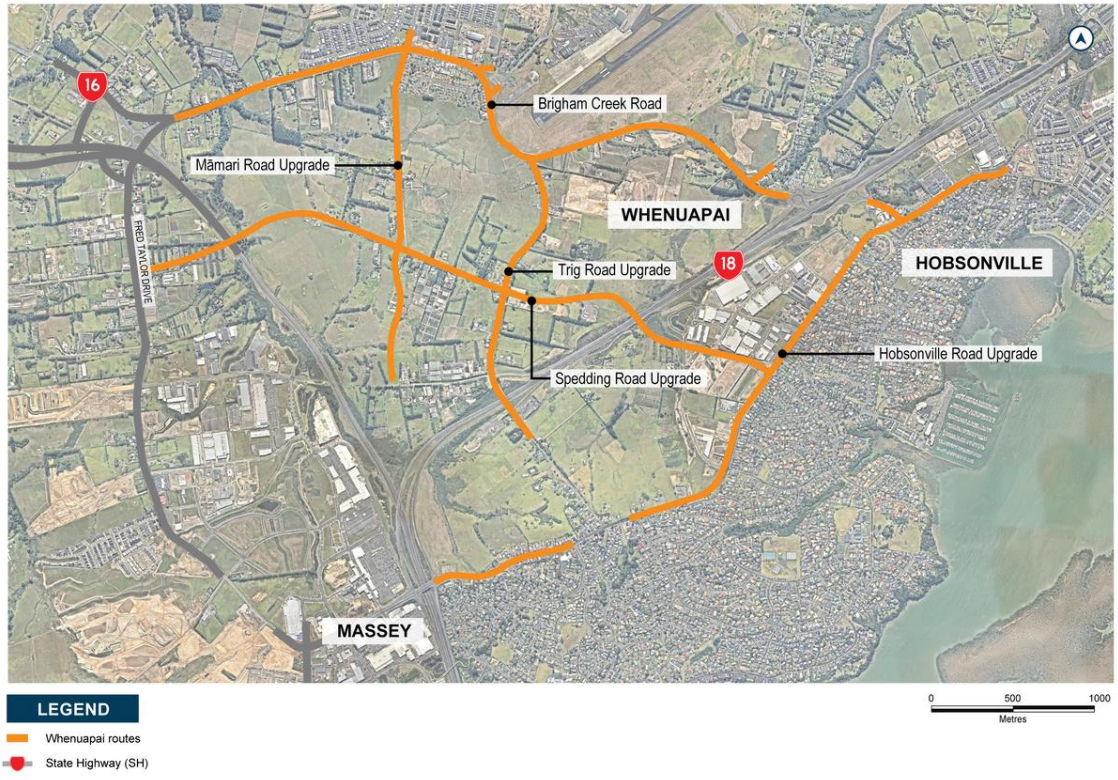


Table 4-1: Whenuapai Assessment Package Project Summary

Corridor	NOR	Description	Requiring Authority
Trig Road North	NoR W1	Upgrade of Trig Road corridor to a 24m wide two-lane urban arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Māmari Road	NoR W2	Extension and upgrade of Māmari Road corridor to a 30m wide four-lane urban arterial cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Brigham Creek Road	NoR W3	Upgrade of Brigham Creek Road corridor to a 30m wide four-lane arterial cross-section with separated active mode facilities on both sides of the corridor.	Auckland Transport
Spedding Road	NoR W4	Upgrade of the existing Spedding Road corridor and new east and west extensions to form a 24m wide two-lane arterial with separated active mode facilities on both sides of the corridor.	Auckland Transport

Corridor	NOR	Description	Requiring Authority
Hobsonville Road (alteration to existing designation 1437)	NoR W5	Alteration of the existing Hobsonville Road designation 1437 to provide for the widening of the Hobsonville Road corridor between Oriel Avenue and Memorial Park Lane. Upgrade of sections of Hobsonville Road corridor to a 30m wide four-lane cross section with separated active mode facilities on both sides of the corridor Upgrade of sections of Hobsonville Road corridor to a 24m wide two-lane cross section with separated active mode facilities on both sides of the corridor.	Auckland Transport

Please refer to the AEE for further information on these projects, including a Project description, key Project features and the planning context.

5 Whenuapai Package Construction Effects

5.1.1 Construction Traffic Effects Assessment

It is anticipated that the larger part of works required for this package of projects will likely be adjacent to or in the live carriageway, which means that temporary traffic management will be required. The scale of temporary traffic management to delineate live traffic away from the construction zones is largely dependent on the various stages and requirements of the construction activities. It is expected that short term temporary road closure for nights or weekends may be required for some specific activities, such as road surfacing, traffic switches and gas relocation. Other activities may require stop/go or contraflow traffic management, such as drainage, utility relocation, survey and investigation work.

Final temporary traffic management methods should be confirmed in the future as part of the CTMP for each project on the basis of the traffic environment. This will take into account the level of growth and activities that has occurred in Whenuapai, the availability of the alternative routes, and any additional sensitive land use activities.

The construction of the Projects will each likely require significant earthworks. Final cut and fill volumes will be confirmed following detailed design prior to construction. The construction traffic movements to accommodate the earthworks will likely result in the increase of traffic volume on construction routes used during the construction period of each of the Projects.

Given the construction timing and staging of the package has yet to be determined, there is a degree of uncertainty associated with any predicted construction methodology and associated traffic routes. This means:

- The routes that will be used by construction vehicles will depend on the location of quarries and disposal sites which are not yet certain
- The exact location and extent of compound sites/lay down areas has yet to be determined
- The timing of construction of other projects could impact on likely construction vehicle routes, for example, if Spedding Road is constructed prior or after to the upgrade of Brigham Creek Road, or Hobsonville Road

Notwithstanding this, it is considered that with available connectivity to the strategic network and available capacity in the network, construction traffic will be able to be readily accommodated.

It is noted that the access to compound sites/laydown areas and construction zone for construction vehicles, plant and materials will be via site access points identified as part of future CTMPs.

Details of the routes and time restrictions will need to be updated and refined as part of the CTMP process. It is anticipated that the routes for construction traffic will likely be limited to arterial corridors and intersections with the provision of adequate vehicle tracking. With Brigham Creek as a Level 1B freight route, it is recommended that this corridor is used where practicable.

Speed Limits

In order to maintain the safety of all road users, it is recommended to implement a safe and appropriate temporary speed limit during the construction period on the network within the extent of works, and along the construction routes if needed. This should be in accordance with the latest traffic management standards at the time of construction. These recommended measures and other

measures highlighted in the CTMP are expected to reduce the potential safety risks that may be associated with construction traffic.

Pedestrians and cyclists

The existing provision for pedestrian and cyclists is variable across the network. It is likely that the demand for these modes will increase if urbanisation occurs prior to construction, but future parallel collectors could also be used as alternative routes. Therefore, effects should be assessed again when a greater level of detail is available about surrounding facilities and land use activities prior to construction. However, it is recommended that residents and stakeholders be kept informed of construction times and progress, and general observations of pedestrian and cyclist activity be used to inform appropriate traffic management measures in the CTMP.

Property access for residents and businesses

During the time of construction, there will be temporary traffic management controls such as temporary concrete or steel barriers. Existing driveways that remain during construction will be required to have temporary access provision. It is anticipated that the contractor should undertake a property specific assessment of any affected driveways and provide temporary access arrangements if required. The temporary access should ensure the ability for residents to safely access and exit the property. These requirements should be captured in the CTMP or SSTMP, if required. It is noted that significant land use change is expected along these key arterials, for example the Whenuapai town centre on Brigham Creek Road. As such, confirmation of traffic management controls will be required immediately prior to works to reflect the land use considerations at that time.

Land use activities that will need further consideration in the CTMP

The following table provides a summary of the key land use or activities that are located adjacent to the corridors and will need consideration during the development of the CTMP. This could include restricted truck movements during school pick up and drop off, or additional controls at key access locations. The below is not a final or complete list, with land use changes likely, this list will change over time.

Table 5-1: Sites for Consideration within future CTMP

Corridor	NoR	Sites for Consideration
Trig Road North	NoR W1	• Proposed Ministry of Education site at 13 -15 Trig Road
Māmari Road	NoR W2	• Timatanga Community School
Brigham Creek Road	NoR W3	• Whenuapai School • Whenuapai Kindergarten • Whenuapai town centre
Spedding Road	NoR W4	• No specific sites
Hobsonville Road (alteration to existing designation 1437)	NoR W5	• Hobsonville School • Hobsonville town centre

5.1.2 Temporary Traffic Management Effects Assessment

It is considered that temporary effects from the construction activities on network can be adequately managed through the implementation of a CTMP during the construction phase of each Project. The purpose of the CTMP is to ensure the construction of each Project is managed in such a way that enables safe and efficient movement of local traffic throughout the construction period and to minimise disruption to road users, particularly the adjacent residential properties and local activities. If required, SSTMP should be developed to manage constraints on access to affected properties.

5.1.3 Recommended Measures to Avoid, Remedy or Mitigate Construction Effects

It is considered that the potential construction traffic effects can be accommodated and managed appropriately via a CTMP. Based on the assessment of transport construction effects, it is recommended:

1) A CTMP shall be prepared prior to the Start of Construction for a Stage of Work. Any potential construction traffic effects shall be reassessed prior to construction taking into account the specific construction methodology and traffic environment at the time of construction.
2) The objective of the CTMP is to avoid, remedy or mitigate, as far as practicable, adverse construction traffic effects. To achieve this objective, the CTMP shall include:
    a) Methods to manage the effects of temporary traffic management activities on traffic;
    b) Measures to ensure the safety of all transport users;
    c) The estimated numbers, frequencies, routes and timing of traffic movements, including any specific non-working or non-movement hours to manage vehicular and pedestrian traffic near schools or to manage traffic congestion;
    d) Size access routes and access points for all construction vehicles, the size and location of parking areas for plant, construction vehicles, and the vehicles of workers and visitors;
    e) Identification of detour routes and other methods to ensure the safe management and maintenance of traffic flows, including pedestrians and cyclists, on existing roads;
    f) Methods to maintain vehicle access to property and/or private roads where practicable, or to provide alternative access arrangements when it will not be;
    g) The management approach to loads on heavy construction vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any material deposited or spilled on public roads;
    h) Method that will be undertaken to communicate traffic management measures to affected road users (e.g. residents/public/stakeholders/emergency services);
3) Auditing, monitoring and reporting requirements relating to traffic management activities shall be undertaken in accordance with Waka Kotahi's Code of Practice for Temporary Traffic Management.
4) Any CTMP prepared for a Stage of Work shall be submitted to Council for information ten (10) working days prior to the Start of Construction for a Stage of Work.

6 NoR W1: Trig Road North Upgrade

6.1 Project Corridor Features

6.1.1 Project Overview

Trig Road is an existing rural arterial road extending from Brigham Creek Road in the north to Hobsonville Road in the south, providing an important connection between Whenuapai and West Harbour as well as the connection to SH18 and Hobsonville Road though east facing ramps.

The Trig Road Upgrade extends from the intersection with Brigham Creek Road to south of the SH18 off-ramp. It is proposed to upgrade the Trig Road corridor from its current width of 20m to accommodate a 24m arterial cross section with separated cycle lanes and footpaths on both sides of the corridor. It includes the upgrade of intersections with Spedding Road West and tie-ins with the SH18 On Ramps.

An overview of the indicative proposed design is provided in Figure 6-1.

Figure 6-1: Overview of the Trig Road Upgrade

6.1.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by Council. The wider networks were developed through the Te Tupu Ngātahi Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Trig Road will change from a rural two-lane road to a lower-speed (50kph) urban two-lane arterial.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side only. The indicative proposed design includes the same number of general traffic lanes (two), with new facilities for walking and cycling as shown in Figure 6-2.

Figure 6-2: Indicative future Trig Road corridor design

The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of RASF framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

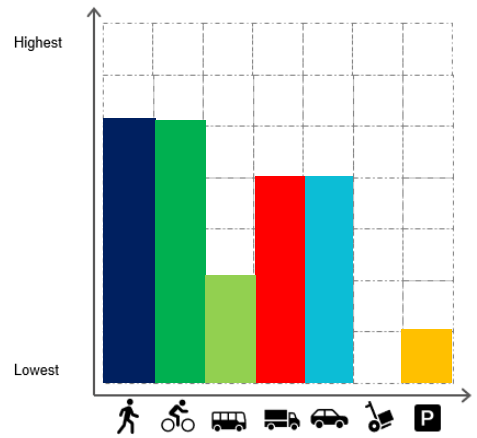
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function – M2 (medium strategic significant) in the short term and longer term.

The following Figure 6-3 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic and freight. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

Figure 6-3: Future modal priority in 2048+ for Trig Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

The RASF is a tool that also acknowledges surrounding land use and integrates movement and place. As a future urban area, there remains a degree of uncertainty in regard to the future modal priority, and it is expected that the RASF assessment will be routinely reviewed to ensure that there is ongoing alignment with the transitional and final land use activities.

6.2 Existing and Likely Future Environment

6.2.1 Planning context

The Trig Road corridor runs through an existing rural environment, with the land either side of the corridor currently zoned FUZ under the AUP: OP.

The Whenuapai Structure Plan identifies the land adjacent to Trig Road as business and a potential Sports Park at the corner of Trig Road and Spedding Road.

The NZDF Air Base (Special Purpose - Airports and Airfields Zone) is located to the north of Trig Road on Brigham Creek Road. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence.

Table 6-1 below provides a summary of the Trig Road North existing and likely future environment.

Table 6-1: Trig Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[6]	Likely Future Environment[7]
Undeveloped greenfield areas	Future Urban Zone	High	Urban

[6] Based on AUP:OP zoning/policy direction
[7] Based on AUP:OP zoning/policy direction

Environment today	Zoning	Likelihood of Change for the environment[6]	Likely Future Environment[7]
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

6.2.2 Transport Environment

6.2.2.1 Existing

The existing corridor is predominantly surrounded by rural land. It is comprised of one vehicle lane in each direction, with a footpath on the western side.

Table 6-2 summarises the existing transport features of the Trig Road corridor.

Table 6-2: Trig Road: Existing Transport Features

Element	Existing Trig Road Transport Features
Corridor Characteristics	• 80kph speed limit north of Ryans Road. • Rural character with two vehicle lanes (one in each direction). • Corridor form is relatively consistent, with no kerb and channel on either side of the corridor and a footpath on the western side. A flush median is also provided where the corridor bridges SH18 and the motorway ramps connect.
Key Connections to the Wider Network	• Connects to Brigham Creek Road in the north • Connects to Hobsonville Road in the south • Connects to SH18 via east facing ramps
Traffic Volume	Recent traffic data for Trig Road was obtained from Auckland Transport[8]. The data was recorded in March 2018 and shows Trig Road (between Ryans Road and the Motorway Overbridge) carried a 5 Day Average Daily Traffic of approximately 7,300 vehicles per day (vpd), and 800 vehicles per hour (vph) during both morning and afternoon peak hours.
Road Network / General Traffic	• Trig Road / Spedding Road give-way. • Trig Road / Brigham Creek Road give-way with right turn bays. • Trig Road / SH18 On-Ramp (Northside Drive) give-way control with right turns queuing in the median. • Trig Road / SH18 Off-Ramp stop control with separated minor approach lanes
Walking and Cycling	A narrow footpath which is approximately 1.5 m wide on the western side of the corridor.
Public Transport	The 114 bus service currently operates on Trig Road and connects Hobsonville Point, Whenuapai and Westgate. This service operates at least every 60 minutes 7 days a week during core travel times (excluding mornings and evenings).

[8] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

6.2.2.2 Likely Future

The importance of Trig Road as a central north-south arterial is highlighted in the Whenuapai Structure Plan. It connects the suburbs of Whenuapai and West Harbour and provides connections to the east facing ramps for SH18, as well as Hobsonville Road, as shown in Figure 6-4.

Figure 6-4: Whenuapai Structure Plan – Trig Road

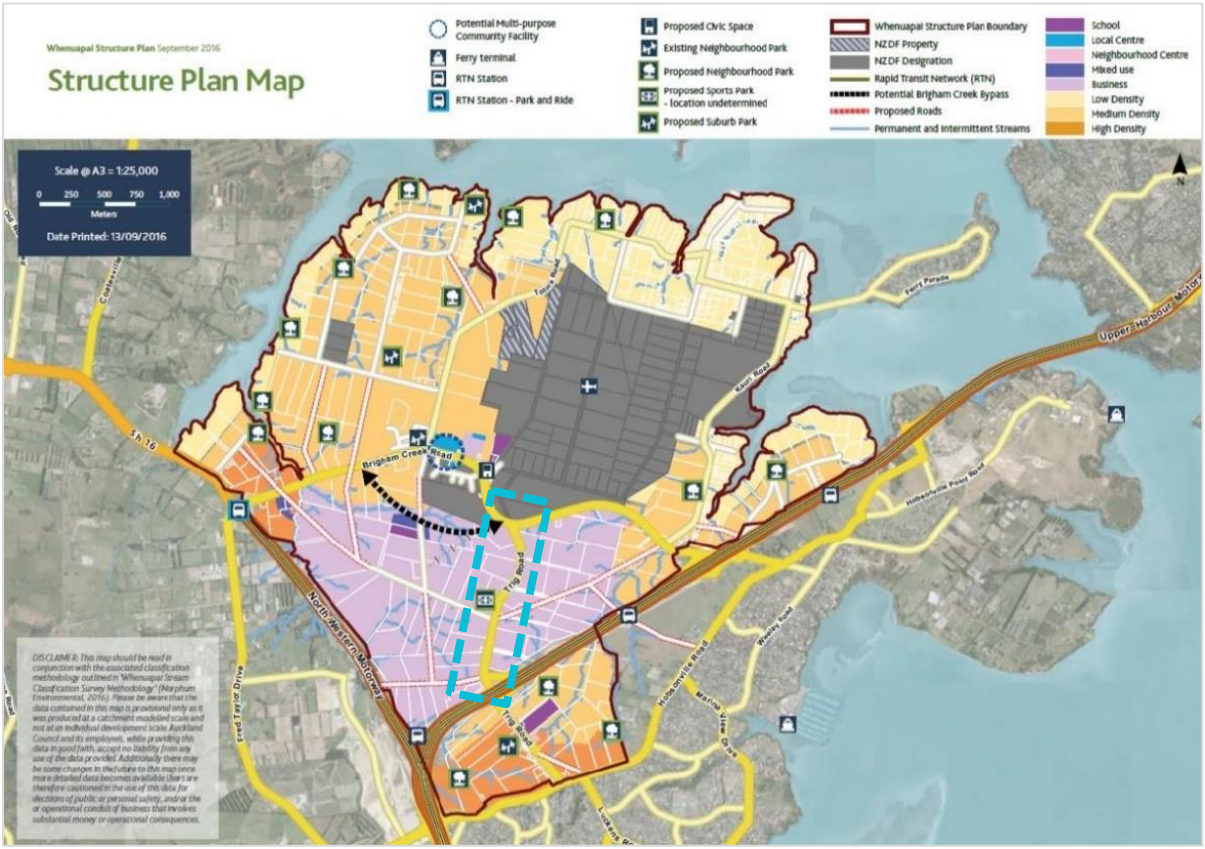


Table 6-3 summarises the likely future transport features of the Trig Road corridor.

Table 6-3: Trig Road: Likely Future Transport Features

Transport Features	Likely Future Trig Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two vehicle lanes (one in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic two-lane arterial with a 24m designation.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Trig Road in 2048 is 13,800 vehicles.
Road Network / General Traffic	• Trig Road / Spedding Road single lane roundabout. • Trig Road / Brigham Creek Road dual lane roundabout. • Trig Road / SH18/ Northside Drive On-Ramp signals. • Trig Road / SH18 Off-Ramp signals.

Transport Features	Likely Future Trig Road Transport Features
Walking and Cycling	Separated cycle lanes and footpaths on both sides.
Public Transport	Increased frequency from hourly to every 15 minutes under the indicative 2048 AT bus network.

Key features of the proposed new corridor include the following:

- Widening of Trig Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Brigham Creek Road, and Spedding Road to accommodate proposed roundabouts, as well as localised widening around the intersections with the SH18 ramps to accommodate a signalised intersection.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- The addition of an active mode bridge to the existing bridge across SH18.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

6.3 Assessment of Operational Transport Effects

6.3.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Trig Road is expected to result in positive effects on safety when compared to the existing corridor, specifically:

- Significantly improved walking and cycling facilities along Trig Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Trig Road) at Brigham Creek Road and Spedding Road, resulting in a significantly safer environment for all road users.
- An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Trig Road is developed. The traffic volume on Trig Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to a 50km/h speed environment and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will support a reduced number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

6.3.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Trig Road. It also includes sufficient space to provide dedicated pedestrian and cycle crossing facilities at Brigham Creek Road (NoR W3), Spedding Road (NoR W4), which connect with the expected future adjacent facilities. The specific design of these crossing facilities will be developed further at detailed design prior to implementation.

The proposed walking and cycling facilities along the corridor have been designed in accordance with relevant AT standards and policies as summarised in Table 6-4.

Table 6-4: Trig Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[9]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Trig Road are proposed to be 50km/hr, therefore the indicative proposed

[9] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf

Policy/Standard	Network Component	Assessment
		design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[10]	Footpaths: 1.8m minimum	A 1.8m footpath and a 2.0m cycle path has been allowed for within the proposed cross section. The total width of 6.8m is proposed from carriageway to road boundary. This is to provide for all TDM requirements.

Connecting to the facilities along the Trig Road North corridor is an active mode bridge, linking to the southern section of Trig Road. As the facility will be on one side of the bridge, crossing facilities will be provided at the intersection of Trig Road and SH18.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance and the Transport Design Manual.

The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Trig Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south walking and cycling connectivity.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and alongside SH18 in the longer term. (See Appendix 1 for further future network assumptions)
- Support growth adjacent to Trig Road and significantly improve safety and access to employment and social amenities.

6.3.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools, for example.

For future public transport services, there is one proposed bus route that will use Trig Road, the 113 (Wisely Road) service between Northside Drive and Hobsonville Road. This service is forecast to operate four times an hour in both directions, and therefore operate at a 15-minute frequency.

The Project's potential operational effects on public transport are:

- Improved integration with the future public transport network and improved east-west and north-south connectivity, as well as improved access to employment and social amenities.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.

[10] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

- It will serve as a key enabler for greater use of public transport by providing a frequent connector route between urban areas and Westgate Metropolitan Centre.

6.3.4 General Traffic

As identified above, the 2048 ADT for Trig Road is 13,800 vehicles. Given that the peak hour volume is approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,380 vehicles. A two-lane corridor can efficiently accommodate 13,800 vehicles and therefore the proposed corridor design meets the forecasted needs. It is noted that the proposed traffic volumes as reported here are projections based on the implementation of the full network in Whenuapai. In terms of Trig Road, this assumes that Māmari Road, a parallel route, is also in place. Notwithstanding this, there is sufficient capacity within the corridor to accommodate a level growth prior to the implementation of Māmari Road.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 6-5.

Table 6-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Trig Road / Spedding Road (Single Lane Roundabout)	Morning Peak	A	0.659	55.9
	Evening Peak	A	0.615	45.8
Trig Road / Brigham Creek Road (Dual Lane Roundabout)	Morning Peak	A	0.311	17.6
	Evening Peak	A	0.226	9.5
Trig Road / SH18 On Ramp (Signals)	Morning Peak	C	0.878	99.5
	Evening Peak	C	0.840	98.1
Trig Road / SH18 Off Ramp (Signals)	Morning Peak	C	0.865	168.8
	Evening Peak	C	0.883	198.7

The overall LOS for all intersections is LOS C or below, with none of the intersection experiencing significant capacity constraints by 2048 (all intersections have degree of saturations below 0.9). Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

6.3.5 Access

As a future arterial corridor, the corridor is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the east and west of Trig Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however it is expected that this network will be subject to change as developers progress these connections through the plan change process. These will be assessed by standard planning and approval processes through Council.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

No change to access for any existing properties has been identified and no operational effects on egress and access to retained driveways has been identified.

As noted in Section 3.2, 13 – 15 Trig Road has an existing designation for a school. No specific design has been approved for this site, and as such access to the site will need to be further considered during the development of the CTMP should the school be present at the time of construction.

6.3.6 Freight

As an existing two-lane corridor, there is limited effects to freight movements. Proposed intersection upgrades will improve connections for turning movements and will improve reliability for the freight network.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and further land use certainty in the future. It is noted that Trig Road is not currently identified by Auckland Transport as a freight route[11].

6.3.7 Wider Network Effects

As an existing two-lane corridor, the upgrade of Trig Road to an urban standard is considered to have no wider network effects in terms of traffic or freight. The provision of walking and cycling facilities will have a positive network effect on the walking and cycling connections, providing a strong north south corridor through the Whenuapai growth area.

6.4 Project Interdependencies

The Trig Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

[11] https://mahere.at.govt.nz/portal/apps/webappviewer/index.html?id=53d7df8746c049a1a4f7872312190001

6.4.1 Northside Drive

There is an existing designation for the Northside Drive connection from Trig Road through to SH16. This existing designation assumes a two-lane road that linked through to Westgate. There is currently no funding to implement the Northside Drive link.

The Northside Drive project has been further investigated as part of the State Highway 16 to 18 Connections project undertaken by Waka Kotahi. This project considered Northside Drive in further detail and proposed to provide additional capacity on this corridor and provide south facing ramps to State Highway 16. These proposed improvements have been included within the 2048+ modelling assessments, determining the intersection footprint.

This project currently is awaiting approval to proceed to the subsequent stage following investigations. Should implementation of the Trig Road corridor be undertaken prior to Northside Drive, further consideration should be given to interim intersection arrangements that support the final network.

6.4.2 Trig Road South

The Trig Road South project was initially identified as part of the Housing Infrastructure Fund programme of works. This identified an urbanised corridor with two traffic lanes and a two-way cycle facility on the eastern side of the corridor. NoR W1: Trig Road North Upgrade allows for a connection to these facilities, and ideally these two NoRs would be implemented concurrently. However, if this is not achievable, then consideration will need to be given during the subsequent design phase on how walking and cycling facilities in particular are integrated into the existing road corridor in a safe manner.

6.5 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects and there are no operational adverse effects to mitigate.

6.6 Summary of Operational Transport Effects (NoR W1)

The operational transport effects are all positive and there are no adverse operational transport effects resulting from the Project. The assessment of transport effects for the Project is summarised in Table 6-6.

Table 6-6: Assessment of Operational Effects Summary for NoR W1 (Trig Road)

Operational Transport Effects	
Safety	In summary, the positive effects of the Project on safety are: • An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.

Operational Transport Effects	
Walking and Cycling	In summary, the positive effects of the Project on walking and cycling are: • Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Trig Road. • Improve integration with the future walking and cycling network, resulting in improved north-south walking and cycling connectivity. • Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and alongside SH18 in the longer term. • Support growth adjacent to Trig Road and significantly improve safety and access to employment and social amenities. • Improved connectivity to Trig Road South reducing existing severance as a result of SH18.
Public Transport	In summary, the positive effects of the Project on public transport are: • Good integration with the future public transport network and significantly improved north-south connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the positive effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth.
Access	In summary, there are no operational access effects identified for the project.
Freight	In summary, there are positive freight effects as a result of intersection upgrades improving access to the proposed commercial areas.
Wider Network Effects	In summary, there are no wider network effects identified for general traffic and freight movements. In terms of walking and cycling, there are positive network benefits through the provision of dedicated facilities on this key north-south spine.

6.7 Conclusions

Overall, the NoR W1: Trig Road Upgrade project provides positive transport effects, and there are no identified adverse effects. The project provides positive operational effects, in particular improved safety, walking and cycling effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to the Ministry of Education at 13 - 15 Trig Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

7 NoR W2: Māmari Road Upgrade

7.1 Project Corridor Features

7.1.1 Project Overview

Māmari Road is an existing semi-rural road (noting that a section of the corridor is a paper road[12]) that extends from the intersection of Brigham Creek Road and Totara Road in the north to the intersection with Spedding Road in the south. The proposed Māmari Road Upgrade will extend the existing corridor south to connect with Northside Drive. This will provide a north-south connection between the northern parts of Whenuapai and the proposed employment/industrial zoned land in the south.

It is proposed to create a new Māmari Road corridor and widen the existing Māmari Road corridor from a 20m wide rural corridor to a 30m wide four-lane urban arterial with separated cycle lanes and footpaths on both sides of the corridor. Between Brigham Creek Road and Spedding Road, this involves the upgrade of the existing two-lane local road on the northern portion, a new corridor through a greenfield portion in the middle and the upgrade of a gravel road on the southern portion. Between Spedding Road and a future four-arm intersection with Northside Drive Extension, this involves a new greenfield corridor.

The Māmari Road Upgrade will provide an important Frequent Transit Network (**FTN**) bus link with public transport priority lanes to connect commuters from Whenuapai to the future City Centre to Westgate (**CC2W**) rapid transit station at Westgate. The intersection of Māmari Road and Brigham Creek Road is proposed to remain as a signalised intersection, and the intersection of Māmari Road and Spedding Road is proposed to be a roundabout. An overview of the indicative proposed design is provided in Figure 7-1.

[12] An unformed legal road (or 'paper road') is a legally recognised road that is undeveloped or partly formed but provides public access to a particular area or feature. Auckland Transport, 2021.

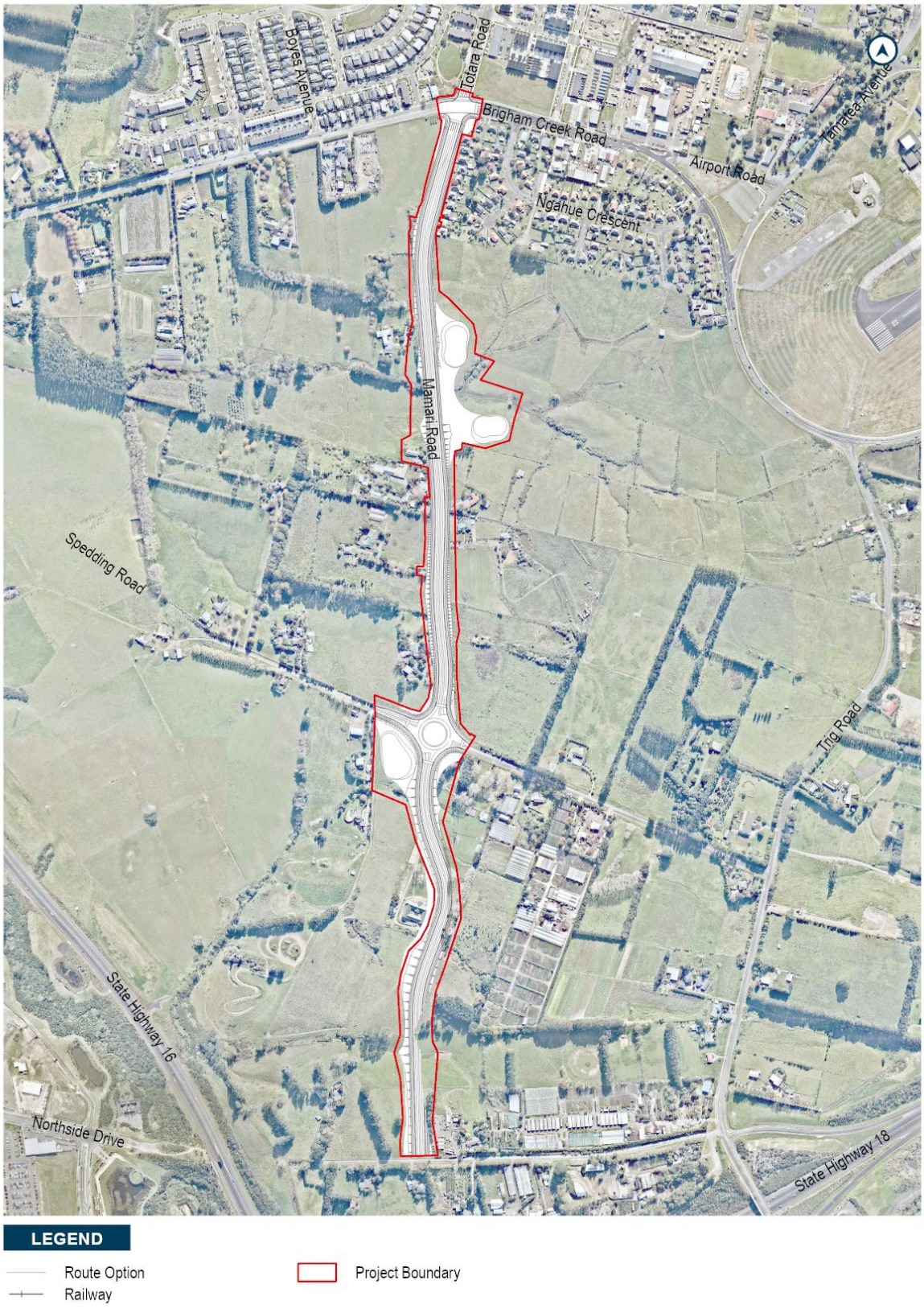


Figure 7-1: Overview of the Māmari Road Upgrade

7.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Māmari Road will change from an existing rural two-lane road to a low-speed urban four-lane arterial (using AT standards) with mixed components for vehicles, PT, and active modes.

The existing corridor is narrow and includes two general vehicle lanes, one per direction. The indicative proposed design also includes two additional public transport lanes, as well as new facilities for walking and cycling as shown in Figure 7-2.

Figure 7-2: Indicative future Māmari Road corridor design

The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

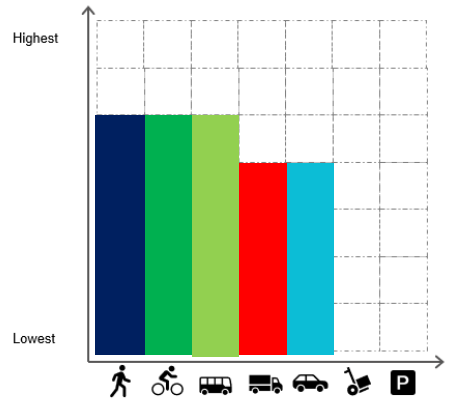
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (mixed urban) long term
- Movement function - transitioning from M1 (low strategic movement) to M2 (medium strategic network function) long term

The following Figure 7-3 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to active modes and public transport.

Figure 7-3: Future modal priority in 2048+ for Māmari Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access

7.3 Existing and Likely Future Environment

7.3.1 Planning context

The northern section of Māmari Road to Spedding Road is an existing road corridor (although a section of the road is a 'paper road'). The eastern side is predominantly zoned under the AUP:OP as FUZ, with a portion of Residential – Single House Zone. The Single House Zone forms part of the NZDF Air Base designation (Designation 4310, Minister of Defence). The western side is also predominantly FUZ. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned medium residential to the north (east side of Māmari only) and business to the south.

The southern extension to Māmari Road extends across land which is zoned FUZ and is currently undeveloped and in rural use. The Whenuapai Structure Plan indicates that the FUZ land will be re-zoned for business.

Table 7-1 below provides a summary of the Māmari Road existing and likely future environment.

Table 7-1: Māmari Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[13]	Likely Future Environment[14]
Residential	Residential	Low	Residential
Undeveloped greenfield areas	Future Urban	High	Urban
Timatanga Community School	Special Purpose - School Zone	Low	Urban

Please refer to the AEE for further information on the planning context.

[13] Based on AUP:OP zoning/policy direction
[14] Based on AUP:OP zoning/policy direction

7.3.2 Transport Environment

7.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfield land.

Table 7-2 summarises the existing transport features of the Māmari Road corridor between Brigham Creek Road and Spedding Road. There are no existing features for the extension between Spedding Road and Northside Drive

Table 7-2: Māmari Road: Existing Transport Features

	Existing Māmari Road Transport Features

Corridor Characteristics	• Northern segment
	  • Has a 50kph speed limit.
	  • Semi-urban character with two vehicle lanes (one in each direction).
	  • Corridor form is inconsistent with formal kerb and channel near the intersection with Brigham Creek Road.
	  • Continuous footpath on the eastern side.
	• Southern segment
	  • Has an 80kph speed limit/
	  • Rural character with two unmarked unsealed vehicle lanes (one in each direction).
	  • Corridor form is consistent, with no kerb and channel on either side of the corridor and no footpaths.

Key connections to the wider network	• Connects to Brigham Creek in the north, and Spedding Road in the soth. • The current road is not a through road, with parts of the corridor being a paper road.
Traffic Volume	The latest traffic data for Māmari Road was obtained from Auckland Transport[15]. The data was recorded in February 2020 and shows Māmari Road (between Spedding Road and the end) carried a 5 Day Average Daily Traffic of approximately 130 vehicles per day (vpd), and 20-40 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Māmari Road / Brigham Creek Road signals. • Māmari Road / Spedding Road give-way. • Māmari Road / Northside Drive no existing intersection.
Walking and Cycling	A narrow footpath which is approximately 1.5 m wide is provided on the eastern side of the northern segment of the corridor.
Public Transport	There are no existing bus services on Māmari Road.

[15] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

7.3.2.2 Likely Future

The importance of Māmari Road as a north-south arterial is highlighted in the Whenuapai Structure Plan. It is proposed to connect the centre of Whenuapai at Brigham Creek Road and to Northside Drive in the south as shown in Figure 7-4.

Figure 7-4: Whenuapai Structure Plan – Māmari Road

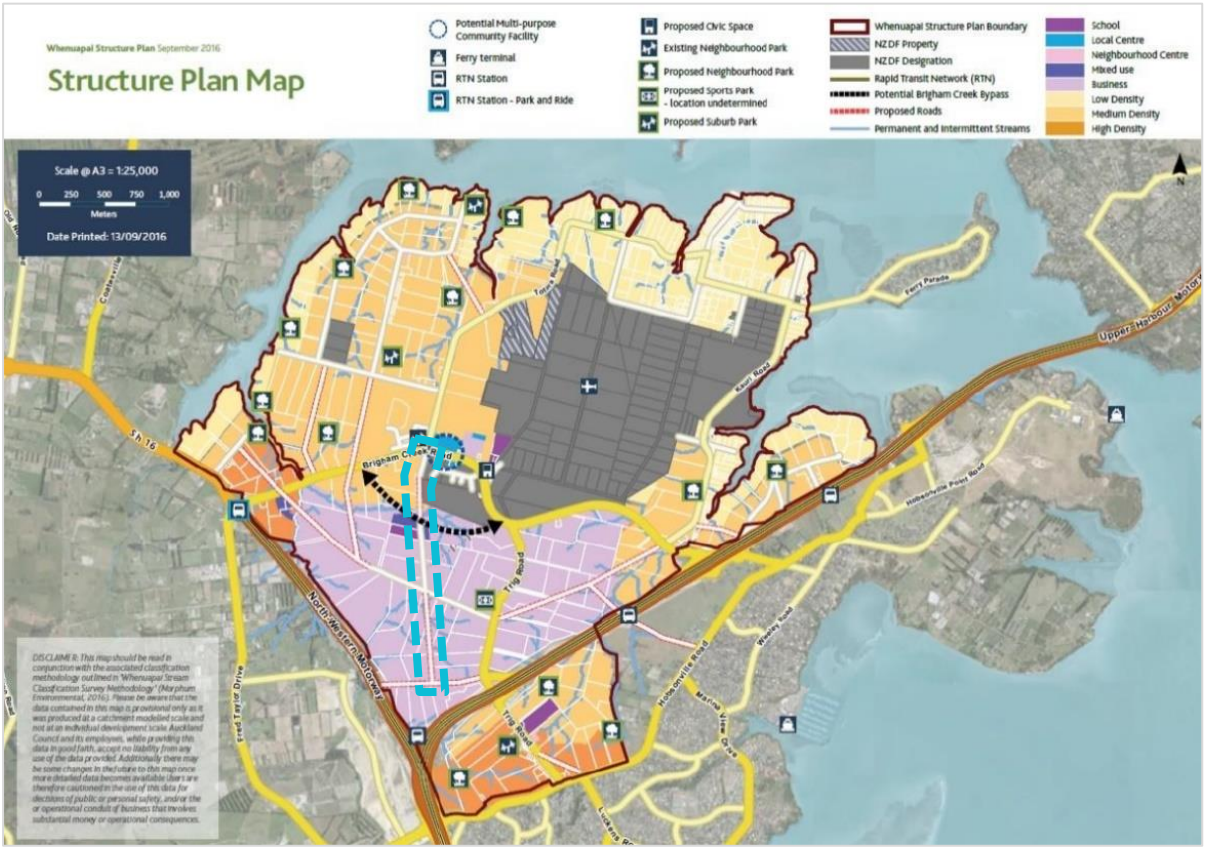


Table 7-3 summarises the likely future transport features of the Māmari Road corridor.

Table 7-3: Māmari Road: Likely Future Transport Features

	Likely Future Māmari Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes, two of which are dedicated for buses (two in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities.
Key Network Connections	• Connect to Brigham Creek Road in the north. • Connect to Spedding Road to the south. • Connect to Northside Drive in the south
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Māmari Road in 2048 is 15,800 to 16,900 vehicles.

	Likely Future Māmari Road Transport Features
Road Network / General Traffic	• Māmari Road / Brigham Creek Road signals. • Māmari Road / Spedding Road dual lane roundabout. • Māmari Road / Northside Drive signals.
Walking and Cycling	Separated cycle lanes and footpaths on both sides.
Public Transport	The indicative 2048 AT bus network forecasts 16 buses per hour on Māmari Road, or approximately a bus every 5 minutes.

Key features of the proposed new corridor include the following:

- Widening of Māmari Road from its current general width of 20m to a 30m wide four-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Spedding Road to accommodate proposed roundabout, and localised widening around the intersection of Māmari Road with Northside Drive to accommodate a signalised intersection.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

7.4 Assessment of Operational Transport Effects

7.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Māmari Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved, and new, walking and cycling facilities along Māmari Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved, and new, walking and cycling crossing facilities (crossing Māmari Road) at Brigham Creek Road and Spedding Road intersection, resulting in a significantly safer environment for all road users.
- An improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (**DSIs**).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Māmari Road is developed. The traffic volumes on Māmari Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to 50km/h and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed

design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

7.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Māmari Road. It also includes dedicated pedestrian and cycle crossing facilities at Brigham Creek Road (NoR W3), Spedding Road (NoR W4), and Northside Drive, which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 7-4.

Table 7-4: Māmari Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[16]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Māmari Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[17]	Footpaths: 1.8m minimum	A 1.8m footpath is has been allowed for on all corridors and a 2.0m cycle path. The total width of 6.8m is provided from carriageway to road boundary. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by vision zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Māmari Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south walking and cycling connectivity.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate.
- Support growth surrounding Māmari Road and significantly improve safety and access to employment and social amenities.

7.4.3 Public Transport

The Māmari Road corridor will provide for dedicated bus lanes that connect Whenuapai town centre with Northside Drive – connecting on to Westgate centre and the future SH18 RTN.

[16] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[17] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

For future public transport services, there is one core proposed frequent bus service which will use Māmari Road. This service is forecast to operate every five minutes in the peak commute hours, and every 10 minutes outside of the peak. With this level of frequency, dedicated bus lanes will enable reliable and consistent travel times for buses.

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools for example.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future frequent public transport network on Māmari Road and the wider network.
- Improved integration with the future public transport network and improved north-south connectivity, as well as improved access to employment and social amenities.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.

7.4.4 General Traffic

As identified above, the 2048 ADT for Māmari Road is between 15,800 and 16,900 vehicles per day. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,600 vehicles. A two-lane corridor can efficiently accommodate 16,900 vehicles and therefore the proposed corridor design meets the forecasted needs, with the additional lane provision to accommodate greater bus priority.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 7-5.

Table 7-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Māmari Road / Brigham Creek Road (Signalised Intersection with Bus Priority measures)	Morning Peak	E	0.905	345.8
	Evening Peak	D	0.884	228.8
Māmari Road / Spedding Road (Roundabout)	Morning Peak	B	0.723	61.3
	Evening Peak	B	0.938	154.3

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Māmari Road / Northside Drive (Signals)	Morning Peak	C	0.805	111.4
	Evening Peak	C	0.807	102.6

The overall level of service for the intersection of Brigham Creek and Māmari Road performs the worst of the intersections on the corridor. It is noted that this while there are delays at the intersection, this is not considered to be unexpected for private vehicles in the peak period, and bus priority movements for the through travelling buses will be facilitated from the curb side lane. It is also noted that the regional modelling completed doesn't not allow for all future alternative routes, resulting in higher traffic volumes. This can therefore be considered a conservative assessment of the overall level of service.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048+ scenario.

7.4.5 Access

As a future arterial corridor, Māmari Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the east and west of Māmari Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however it is expected that these will be subject to change as developers progress these connections through the plan change process. These will be assessed by standard planning and approval processes through Council.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways. There are no specific properties that have been included within the designation for this purpose and all existing driveways are expected to be able to be reinstated.

As noted in Section 3.2, Timitanga Community School has been identified as a potential sensitive receiver. Access to the school can be maintained and has been provided for with the designation. It is noted that particular consideration to access during construction will need to be provided prior to construction as part of the recommended CTMP in Section 5.1.3.

7.4.6 Freight

The provision of a new north south corridor, connecting from Brigham Creek Road to Northside Drive will provide improved network resilience for freight movements in Whenuapai.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and

further land use certainty in the future. It is noted that Māmari Road is not currently identified by Auckland Transport as a freight route.[18]

7.4.7 Wider Network Effects

The Māmari Road project provides a strong north-south public transport corridor connecting Brigham Creek through the future Northside Drive connection. This contributes to improved public transport network effect by providing a reliable public transport corridor connecting central Whenuapai to the Westgate metropolitan centre in the longer term. In addition to this, in the longer term there remains an opportunity to connect this corridor to the future SH18 RTC (this is a non-SGA project).

In terms of walking and cycling the project provides improved network options for active modes, through the provision of dedicated facilities.

General traffic and freight will also benefit in terms of improved network resilience, with the connection to Northside providing alternative connectivity to the State Highway network, in particular to SH16 where the current connections are at Hobsonville Road and Brigham Creek Road.

Overall, the wider network effects of the project are considered positive, providing improved north south movements for all modes and supporting improved overall resilience in the network.

7.5 Project Interdependencies

The Māmari Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

7.5.1 Northside Drive

The Māmari Road corridor connects in the south to the Northside Drive corridor. This Northside Drive connection through to an overbridge with SH16 has been allowed for within the 2048+ assessments, determining the intersection footprint. There is an existing designation in place for Northside Drive (Designation 1473) which enables a two lane road corridor.

The Northside Drive project has been investigated as part of the State Highway 16 to 18 Connections project undertaken by Waka Kotahi. This project considered Northside Drive and the provision of south facing ramps to State Highway 16. These proposed improvements have been included within the full 2048+ network.

This project currently is awaiting approval to proceed to the subsequent stage following investigations.

While the majority of the Māmari Road corridor – including connections with Spedding Road - could be implemented prior to the delivery of Northside Road with no adverse effect, the full benefits particularly from a public transport perspective will not be realised until the Northside Drive connection is completed.

[18] https://mahere.at.govt.nz/portal/apps/webappviewer/index.html?id=53d7df8746c049a1a4f7872312190001

7.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects. The one adverse effect identified is related to access at 18 Māmari Road, and this property is recommended for inclusion within the designation boundary.

7.7 Summary of Operational Transport Effects (NoR W2)

The assessment of transport effects for the Project is summarised in Table 7-6: Assessment of Operational Effects Summary for NoR W2 (Māmari Road).

Table 7-6: Assessment of Operational Effects Summary for NoR W2 (Māmari Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by providing speed limits appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Māmari Road. • Improve integration with the future walking and cycling network, resulting in improved north-south walking and cycling connectivity. • Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate • Support growth adjacent to Māmari Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services. • Excellent integration with the future public transport network and significantly improved north-south connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth
Access	In summary, access on the Māmari Road corridor can generally be maintained. No other operational access effects have been identified.
Freight	In summary, the provision of a new north south corridor, connecting from Brigham Creek Road to Northside Drive will provide improved network resilience for freight

Operational Transport Effects	
	movements in Whenuapai. The corridor will also provide a direct link to the SH16 to SH18 connections provide freight efficient connectivity to the strategic network.
Wider Network Effects	In summary there are positive wider network effects for all modes. In particular there are positive effects for public transport, freight and vehicle movements through the provision of a new north south connections through the Whenuapai growth area.

7.8 Conclusions

Overall, the NoR W2: Māmari Road Upgrade project provides positive transport effects, particular improved safety, walking and cycling and public transport effects and there are no identified adverse operational effects.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Timitanga Community School at 9 Māmari Road should be specifically considered within the CTMP prior to construction and implementation of the Project.

8 NoR W3: Brigham Creek Road Upgrade

8.1 Project Corridor Features

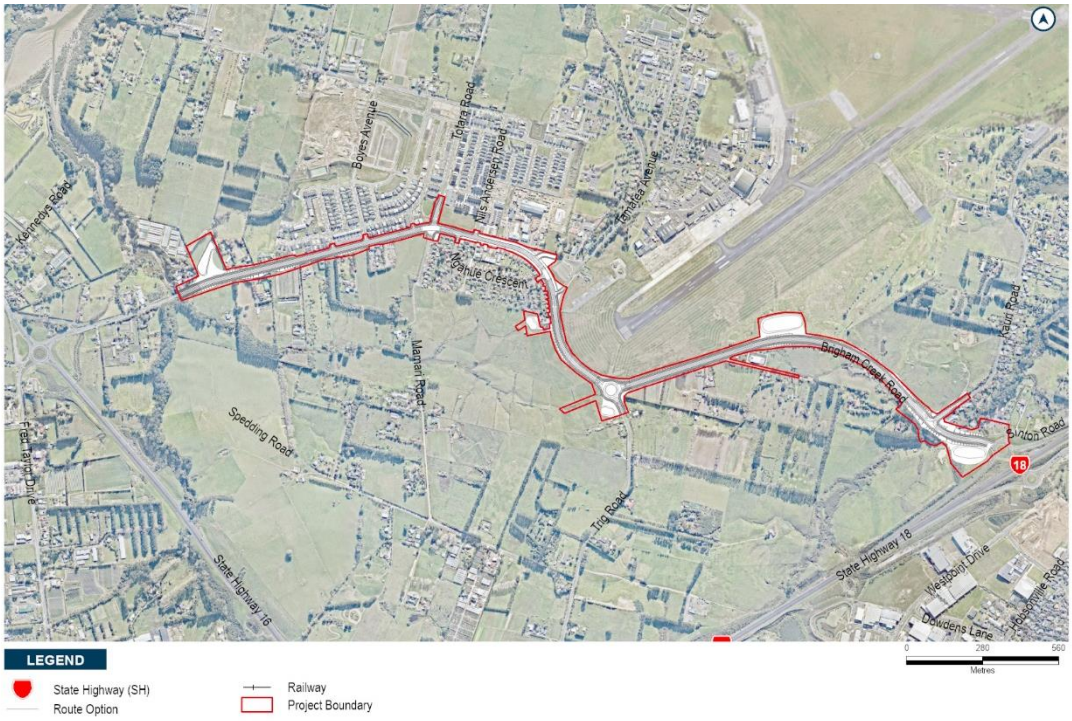
8.1.1 Project Overview

Brigham Creek Road is an existing arterial road that extends from the intersection with the SH16 in the west to the intersection with Hobsonville Road to the east. The proposed upgrade extends from the eastern side of the existing Totara Creek bridge in the west, to Kauri Road near the existing SH18 Brigham Creek Interchange in the east. This proposed upgrade runs through an existing rural environment on each end, with the middle section being a mix of town centre, industrial and residential environments. The proposed corridor upgrade will provide an east-west connection for all modes within Whenuapai and access SH16, SH18 and local destinations such as Hobsonville and Kumeū-Huapai.

It is proposed to widen the existing two-lane arterial from an approximately 20m width to a 30m wide four-lane arterial cross-section with walking and cycling facilities on both sides. This includes upgrades to the intersections with Totara Road/Māmari Road, Trig Road and Kauri Road.

An overview of the indicative proposed design is provided in Figure 8-1 below.

Figure 8-1: Overview of the Brigham Creek Upgrade



8.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to

address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Brigham Creek Road will change from an existing two-lane road to a low-speed urban four-lane arterial (using AT standards). The form and function of Brigham Creek Road will change slightly through various segments of the corridor, with the western and eastern segments being adjacent to residential and the central segment adjacent to the commercial centre. As such, the designation provides flexibility for the cross section to change along the length of the Brigham Creek Road corridor, reallocating the 30m corridor to best accommodate vehicles, public transport, active modes and freight.

The indicative proposed design includes two additional vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 8-2, Figure 8-3, and Figure 8-4. Through the central portion of Brigham Creek Road (between Totara Road and Tamatea Avenue) the median allowance will be removed, with the space reallocated to allow for activated frontages within the town centre.

Figure 8-2: Indicative future Brigham Creek corridor between the Interchange and Totara Road

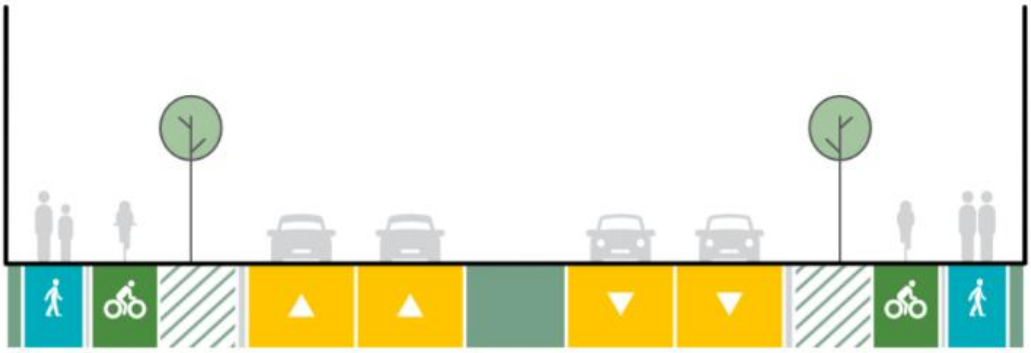
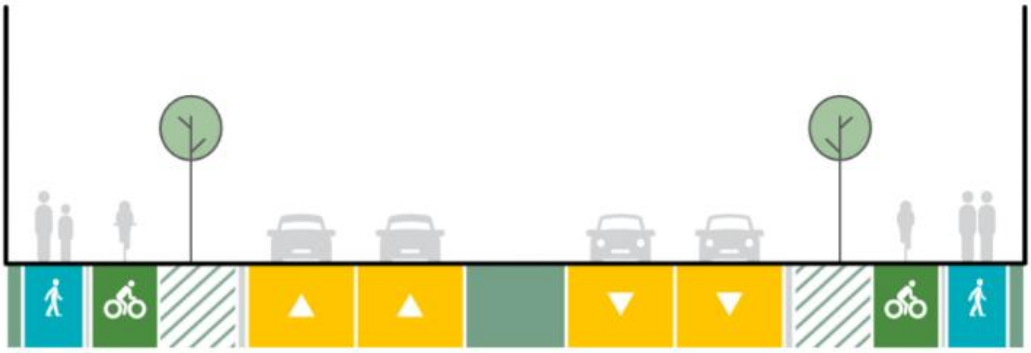


Figure 8-3: Indicative future Brigham Creek corridor between Totara Road and Tamatea Avenue

Figure 8-4: Indicative future Brigham Creek corridor between Tamatea Avenue and SH18 Interchange



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

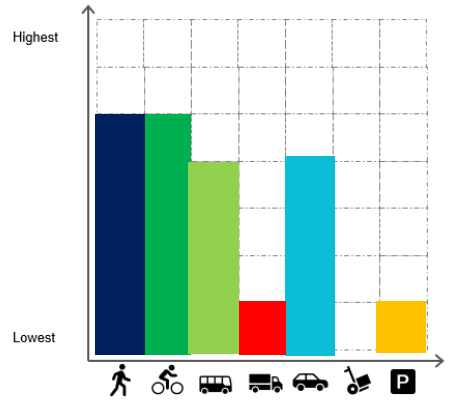
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function - transitioning from M2 (medium strategic movement) to M3 (high strategic movement) long term

The following figures indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to active modes and public transport.

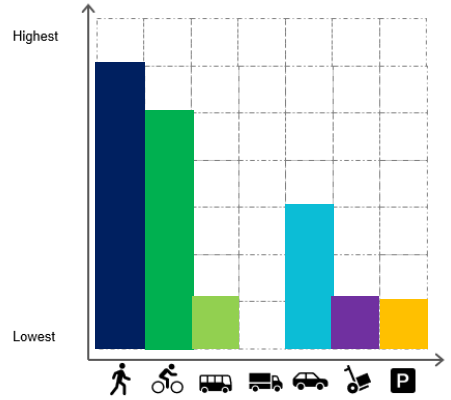
Figure 8-5: Future modal priority in 2048+ for Brigham Creek Road between the Interchange and Totara Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

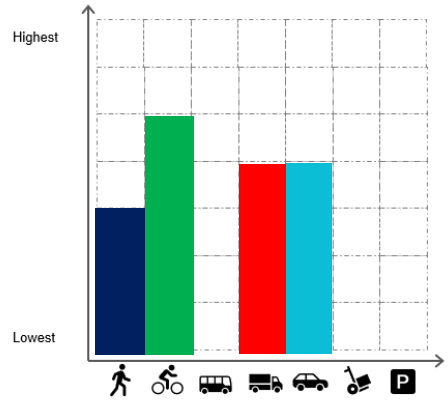
Figure 8-6: Future modal priority in 2048+ for Brigham Creek Road between Totara Road and Tamatea Avenue



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 8-7: Future modal priority in 2048+ for Brigham Creek Road between Tamatea Avenue and SH18 Interchange



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access

8.3 Existing and Likely Future Environment

8.3.1 Planning context

The land adjacent to Brigham Creek Road is zoned under the AUP:OP as FUZ, except within the existing Whenuapai Centre (which is zoned under the AUP:OP for a range of residential and business zones) and the Whenuapai NZDF airbase. The airbase is designated (Designation 4310) for defence purposes by the Minister of Defence. The designation also includes the Residential – Single House Zone within the Whenuapai Centre.

Whenuapai Structure Plan identifies medium density residential and business land uses to the south of Brigham Creek Road, with medium density residential land uses identified to the north.

Table 8-1 below provides a summary of the Brigham Creek Road existing and likely future environment

Table 8-1: Brigham Creek Road Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[19]	Likely Future Environment[20]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Open Space	Open Space –Informal Recreation Zone	Low	Open Space

[19] Based on AUP:OP zoning/policy direction
[20] Based on AUP:OP zoning/policy direction

Environment today	Zoning	Likelihood of Change for the environment[19]	Likely Future Environment[20]
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban
New Zealand Defence Force Air Base	Special Purpose - Airports and Airfields Zone	Low	Special Purpose – Airports and Airfields Zone

Please refer to the AEE for further information on the planning context.

8.3.2 Transport Environment

8.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfields land, with the exception of the central portion of the corridor which is adjacent to the Whenuapai Airbase and a pocket of residential density.

Table 8-2 summarises the existing transport features of the Brigham Creek Road corridor.

Table 8-2: Brigham Creek Road: Existing Transport Features

	SH16 to Totara Rd	Totara Rd to Tamatea Ave	Tamatea Ave and SH18
Corridor Characteristics	• Has an 80kph speed limit • Semi-rural character with two vehicle lanes (one in each direction) • Corridor form is inconsistent with formal kerb and channel, footpath, bicycle lane, and indented parking adjacent to the recent development • Arterial classification in the Auckland Unitary Plan	• Has a 50kph speed limit • Semi-urban character with two vehicle lanes (one in each direction) • Corridor form is consistent with formal kerb and channel and footpaths • Continuous bicycle path on the northern side • On street parking provided within town centre on southern side adjacent to shops	• Has an 80kph speed limit • Semi-rural character with two vehicle lanes (one in each direction) • Corridor form is inconsistent with formal kerb and channel in some locations • Continuous shared path/footpath on the northern side, discontinuous footpath on the southern side
Key connections to the wider network	• Brigham Creek Road is a critical connection in the existing network. The corridor connects State Highway 16 to State Highway 18, providing a key strategic link currently not provided by the strategic network. • The corridor is also the main spine route through the Whenuapai area and provides access to the Whenuapai Airbase.		
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[21]. The	The latest traffic data for was obtained from Auckland Transport[22]. The	The latest traffic data for was obtained from Auckland Transport[23]. The

[21] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[22] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/
[23] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

	SH16 to Totara Rd	Totara Rd to Tamatea Ave	Tamatea Ave and SH18
	data was recorded in September 2019 and shows Brigham Creek Road (between SH16 and Joseph McDonald Drive) carried a 5 Day Average Daily Traffic of approximately 14,400 vehicles per day (vpd), and 1,200-1,300 vehicles per hour (vph) during the morning and afternoon peak hours.	data was recorded in September 2019 and shows Brigham Creek Road (between Airport Road and the Speed Derestriction) carried a 5 Day Average Daily Traffic of approximately 15,000 vehicles per day (vpd), and 1,300-1,400 vehicles per hour (vph) during the morning and afternoon peak hours.	data was recorded in September 2019 and shows Brigham Creek Road (between SH16 and Joseph McDonald Drive) carried a 5 Day Average Daily Traffic of approximately 14,400 vehicles per day (vpd), and 1,300-1,600 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Brigham Creek Road / Joseph MacDonald Drive priority controlled • Brigham Creek Road / Boyes Avenue priority controlled • Brigham Creek Road / Totara Road / Māmari Road signals	• Brigham Creek Road / Ngahue Crescent priority controlled • Brigham Creek Road / Nils Anderson Road priority controlled • Brigham Creek Road / Tamatea Road priority controlled	• Brigham Creek Road / Trig Road priority controlled • Brigham Creek Road / Kauri Road priority controlled • Brigham Creek Road / SH18 connections roundabouts
Walking and Cycling	A 1.8 m wide footpath and protected cycle lanes are provided adjacent to the recent development.	A narrow footpath which is approximately 1.5 m wide is provided on both sides, and a 1.8 m bicycle path is provided on the northern side.	A 3.0 m shared path is provided for majority of this section on the northern side. A narrow footpath which is approximately 1.5 m wide is provided in some sections on the southern side.
Public Transport	The 114 bus service currently operates on sections of Brigham Creek Road and connects Hobsonville Point, Whenuapai and Westgate. This service operates at least every 60 minutes 7 days a week during core travel times (excluding mornings and evenings).		

8.3.2.2 Likely Future

The importance of Brigham Creek Road as an east-west arterial is highlighted in the Whenuapai Structure Plan. It connects SH16 to SH18, via Whenuapai Centre, as shown in Figure 8-8. This function will continue in the longer term, however, will be less critical following the provision of SH16 to SH18 connections as detailed in Section 8.5.1.

Figure 8-8: Whenuapai Structure Plan – Brigham Creek Road

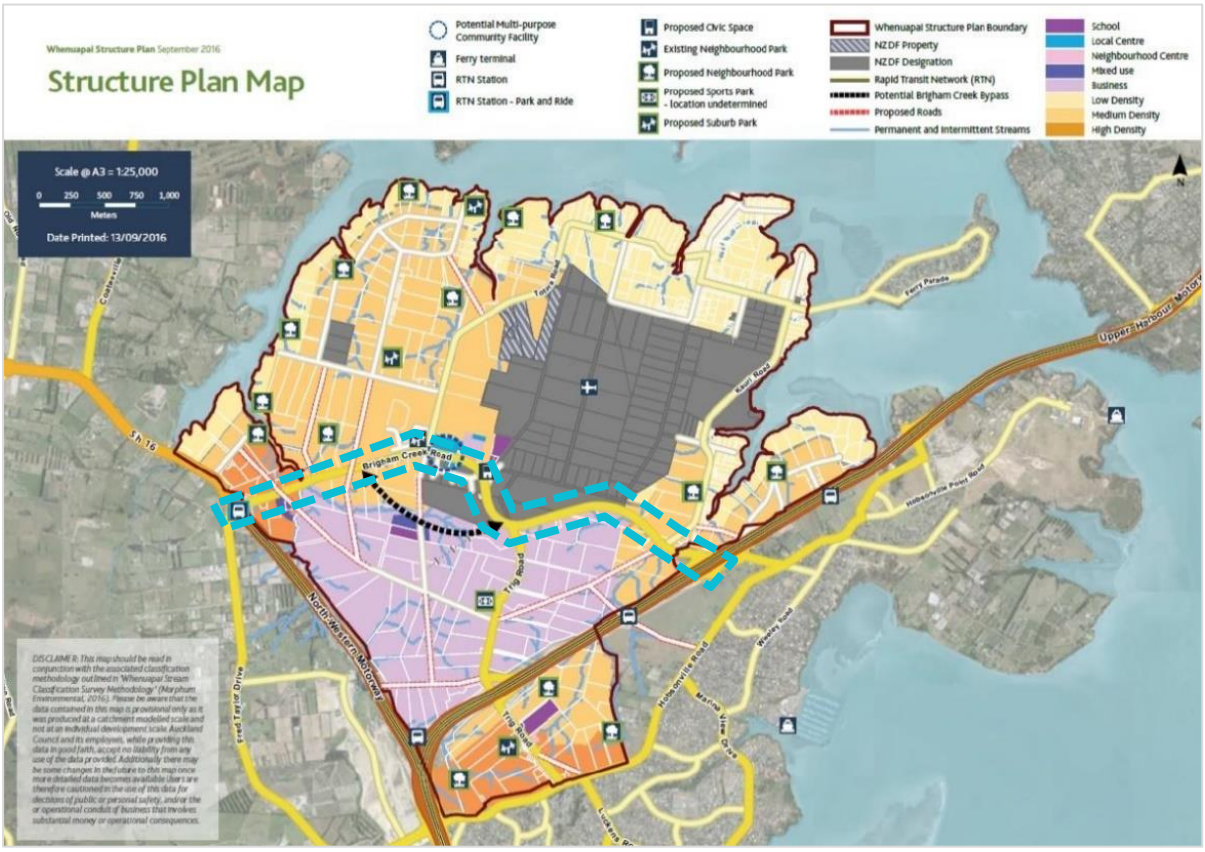


Table 8-3 summarises the likely future transport features of the Brigham Creek Road corridor.

Table 8-3: Brigham Creek Road: Likely Future Transport Features

	Likely Future Brigham Creek Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes (two in each direction) and a central median outside of the town centre. Within the town centre there is no median with this space redistributed to active travel modes. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic four-lane arterial with a 30m designation. • Access and parking likely to be limited in the future reflective of the movement function of the corridor. • Access, parking and loading shown in the future RASF modal priority as low but present reflective of existing access that will be retained and loading and parking functions that will be assessed iteratively in conjunction with land use changes.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Brigham Creed Road in 2048 is: • 22,900 vehicles between SH16 and Totara Road • 12,500 vehicles between Totara Road and Tamatea Avenue • 26,600 vehicles between Tamatea Avenue and SH18

	Likely Future Brigham Creek Road Transport Features
Road Network / General Traffic	• Brigham Creek Road / Ngahue Road signals • Brigham Creek Road / Trig Road dual lane roundabout • Brigham Creek Road / Kauri Road signalised intersection
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides.
Public Transport	The indicative 2048 AT bus network forecasts every 7 mins in the peak and every 20mins outside of peak periods.

Key features of the proposed new corridor include the following:

- Widening of Brigham Creek Road from its current general width of 20m to a 30m wide four-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections with Trig Road to accommodate proposed roundabout, and localised widening around the intersection of Māmari Road.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

8.4 Assessment of Operational Transport Effects

8.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Brigham Creek Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Brigham Creek Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Brigham Creek Road) at Māmari Road and Spedding Road intersections, resulting in a significantly safer environment for all road users.
- A significantly improved speed environment by reducing speed limits to more appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Brigham Creek Road is developed. The traffic volume on Brigham Creek Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project propose to lower the speed limit to 50km/h and provide segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely

reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

8.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Brigham Creek Road. It also includes dedicated pedestrian and cycle crossing facilities at Trig Road (NoR W1), and Māmari Road (NoR W2), which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 8-4.

Table 8-4: Brigham Creek Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[24]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Brigham Creek Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[25]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. The total width of 6.8m is proposed from carriageway to road boundary. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by vision zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Brigham Creek Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity.
- Lead to significant environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate[26].
- Support growth surrounding Brigham Creek Road and significantly improve safety and access to employment and social amenities.

[24] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[25] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/
[26] See Appendix 1 for further information

8.4.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops through the Brigham Creek centre. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e., around centres and schools for example.

For future public transport services, there is one proposed bus route which will use Brigham Creek Road, between Whenuapai and Westgate. This service will operate every 7 minutes in the peak and every 20mins outside of the peak. It is noted that the public transport network has been developed under the long-term scenario which includes several significant infrastructure elements including the SH18 RTN. It is likely there will be variations in the public transport network within Whenuapai that responds to availability of such infrastructure and supplementary road network such as Spedding Road and internal collector networks. As such the role of Brigham Creek Road in the public transport is likely to change over time, however the proposed cross section is well suited to respond to these changes.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future public transport services on Brigham Creek Road and the wider network.
- Improved integration with the future public transport network and improved east-west and north-south connectivity, as well as improved access to employment and social amenities.
- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

8.4.4 General Traffic

As identified above, the 2048 ADT for Brigham Creek Road is 12,500-26,600 vehicles. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,250-2,600 vehicles. A four-lane corridor can efficiently accommodate 26,600 vehicles and therefore the proposed corridor design meets the forecasted needs.

It is noted that there are sections that are forecast to have lower traffic volumes. This is predominantly due to the supporting role of collector networks within the future models. It is considered that a 30m cross will better provide for a continuous legible corridor that also enables intersections along the corridor.

Within the central section of Brigham Creek Road, traffic volumes are forecast to decrease to around 12,500 vehicles per day in the long term. A 30m corridor is recommended for this section to enable turning movements at the Māmari Road intersection in particular and also the future signalised intersection with Ngahue Crescent. This will also provide additional flexibility to provide for public transport priority and other facilities within the town centre when there is greater land use certainty.

The other key consideration is the role of other supporting infrastructure in the long term. The State Highway 16 to State Highway 18 connections project enables a motorway to motorway to connection between these two highways. This function is currently being undertaken by Brigham Creek Road. The forecast traffic volumes for Brigham Creek Road in 2048 assume that this strategic connection is in place, and the volumes still indicate that traffic volumes at the eastern and western end of the corridor in particular will require four traffic lanes. Should the SH16 to SH18 Connections project not be implemented alongside growth in Whenuapai, this would result in higher traffic volumes than currently forecasted and create additional transport pressure on Brigham Creek Road. This confirms that a four-lane 30m corridor is the most appropriate width for the corridor, suitable for the interim and longer-term outcomes on the corridor.

On Street Parking

The proposed 30m cross section within the existing Whenuapai town centre does not currently show on street parking. Currently there are 12 marked on street parking spaces provided within the town centre. From a transport perspective, the removal of these parking spaces is not considered to be significant. The longer-term provision of significantly improved walking, cycling and public transport connections is consistent with the policy direction from the Government Policy Statement on Transport and the Auckland Unitary Plan where there is a strong direction to encourage travel by modes other than private vehicles.

It is however noted that there may also be opportunities for the provision of parking within the 30m road corridor, should demonstrable demand be identified at the time of implementation of the corridor. This is consistent with Auckland Transport's approach to assessing these situations on a case-by-case basis[27].

Airport Road and Tamatea Road Realignment

As part of this NoR, the Airport Road and Tamatea Road connections have been realigned to meet Brigham Creek Road in a location that encourages a slower speeds. By providing tighter radius on these intersections, vehicles will enter the corridors at a slower speed. This will provide a lower speed environment on this corridor – particularly in proximity to Whenuapai Primary School.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 8-5.

Table 8-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Brigham Creek Road / Totara Road signals	Morning Peak	E	0.905	345.8
	Evening Peak	D	0.884	228.8

[27] AT Parking Policy https://at.govt.nz/about-us/transport-plans-strategies/parking-strategy/parking-strategy-policies/

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Brigham Creek Road / Ngahue Crescent signals	As Ngahue Crescent is a low volume local road, traffic volumes could not be extracted from the SATURN model for subsequent SIDRA Modelling, Given the expected traffic volumes from Ngahue Crescent, the intersection is expected to perform at a suitable level in the future.			
Brigham Creek Road / Trig Road dual lane roundabout	Morning Peak	A	0.311	17.6
	Evening Peak	A	0.226	9.5
Brigham Creek Road / Kauri Road signals	Morning Peak	D	0.902	226.4
	Evening Peak	D	0.892	169.3

The overall LOS for most of intersections along Brigham Creek Road is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048. The one exception is the intersection of Brigham Creek Road/Totara Road. It is noted that this while there are delays at the intersection, this is not considered to be unexpected for private vehicles in the peak period, and bus priority movements for the through travelling buses will be facilitated from the kerb side lane.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

8.4.5 Access

As a future arterial corridor, Brigham Creek Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north and south of Brigham Creek Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; however, it is expected that these will be subject to change as developers progress these connections through the plan change process.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

There are no specific properties that have been included within the designation for this purpose and all existing driveways are expected to be able to be reinstated.

8.4.6 Freight

Similar to general traffic, the improved corridor capacity as a result of the Project will result in improved journey times and reliability for existing and future freight. The corridor will be able to accommodate freight movements along the mid-block and through the intersections.

Brigham Creek Road is currently classed as Level 1B. This is defined as a road of the highest strategic value to freight movement where efficient freight movements must be actively supported to maintain Levels of Service, and where competing modes and land uses require active management.[28] This corridor will continue to play a strategic freight role in the short to medium term, until the implementation of the State Highway 16 to State Highway 18 connections project is in place. Beyond this, the corridor will continue to play a role for freight, particularly given the proposed industrial activities as part of the Structure Plan. As such it is considered that the proposed 30m footprint provides a flexible corridor width to enable resilient and reliable freight movements in both the interim and the long term.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the implementation of individual corridor upgrades and further land use certainty in the future.

8.4.7 Wider Network Effects

The Brigham Creek Road project will provide a four-lane corridor connecting from SH16 to SH18. The additional capacity provided in this corridor will support the significant growth expected in the Whenuapai area. The project will result in positive wider network effects, providing an alternative connection to the State Highway 16 to 18 connections in the short term, and in the longer term a resilient corridor in the case of network events or disruptions. In terms of walking and cycling, the upgrade to this corridor provides a dedicated walking and cycling spine travelling east to west through the Whenuapai growth area, enabling wider connections to link through to this corridor, providing an integrated walking and cycling network.

8.5 Project Interdependencies

The Brigham Creek Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

8.5.1 State Highway 16 to 18 Connections

As identified above there is a clear relationship between Brigham Creek Road and State Highway 16 to State Highway 18 connections. This project is a Waka Kotahi[29] project that is currently unfunded. The current Brigham Creek Road corridor provides connectivity between the two motorway corridors for vehicles travelling to/from Kumeū and further north. With forecast growth in Whenuapai and in Kumeū this connection is expected to come under increasing capacity pressure and implications on the urban form of the corridor as the adjacent land urbanises. Current forecast traffic volumes indicate that a 30m corridor is required for Brigham Creek Road even with the implementation of the SH16/18 connections.

The State Highway 16 to State Highway 18 Connections project is included within the full network in 2048 both as part of the Supporting Growth analysis and the Whenuapai Structure Plan assessments. The provision of this connection will relieve pressure on the Brigham Creek Road corridor and enable the 30m corridor to operate as a key arterial rather than a strategic connection. This longer-term

[28] Auckland Transport Strategic Freight Plan

[29] https://nzta.govt.nz/project s/sh16-18-connections

network will still require a 30m corridor to implement additional capacity at key interchange locations and/or public transport priority.

Freight

As detailed above, Brigham Creek Road is currently a Level 1B freight route and supports the strategic freight network. It is expected to continue in this role, with slightly less importance in the longer term. The corridor will continue to be important for freight movements, supporting the industrial and commercial activities indicated for Whenuapai in the Structure Plan.

SH18 Interchange Upgrade

The State Highway 16 to State Highway 18 connections project has identified that the Brigham Creek interchange with State Highway will require upgrading in the future to a grade separated interchange. The proposed designation for Brigham Creek Road has been developed in such a way that enables the corridor to connect into the existing interchange and also does not preclude the delivery of an upgraded interchange at this location.

8.5.2 Brigham Creek Interchange (SH16)

At the western extent of Brigham Creek Road the corridor will interface with the Brigham Creek interchange with SH16. This interchange is included with a separate package of designations, progressed as part of the Alternative State Highway and the extension to the rapid transit network through to Kumeū.

The indicative proposed design for Brigham Creek Road is appropriate in the case that the Brigham creek interchange is implemented before or after the Brigham Creek Road upgrade.

8.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

The Project provides significant positive effects. Adverse effects identified related to access have been identified at 55, 57, 59 and 119 Brigham Creek Road, and these properties are recommended for inclusion within the designation boundary.

8.7 Summary of Operational Transport Effects (NoR W3)

The assessment of transport effects for the Project is summarised in Table 8-6.

Table 8-6: Assessment of Operational Effects Summary for NoR W3 (Brigham Creek Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by providing speed limits appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.

Operational Transport Effects	
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduced the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Brigham Creek Road. • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. • Support growth adjacent to Brigham Creek Road and significantly improve safety and access to employment and social amenities. In particular the proposed cross section enables an activated frontage within the Whenuapai town centre.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services. • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities. • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability.
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth. • On street parking within this corridor is expected to be rationalised. With the provision of alternative transport choices and expected land use changes the effect of the removal of this parking from a transport perspective is considered minimal. There may also be opportunities for the provision of parking within the 30m road corridor, should demonstrable demand be identified at the time of implementation of the corridor, consistent with Auckland Transport's approach to assessing these situations on a case-by-case basis. • Airport Road and Tamatea Road will be realigned, providing a safer, slower intersection with Brigham Creek Road
Access	• In summary, access on the Brigham Creek Road corridor can generally be maintained. No other operational access effects have been identified.
Freight	In summary, the effects on the Project on freight will be neutral. • Brigham Creek Road is currently a Level 1B freight route and supports the strategic freight network. It is expected to continue in this role, with slightly reduced importance in the longer term.
Wider Network Effects	In summary, the project will result in positive wider network effects, specifically • Providing an alternative connection to the State Highway 16 to 18 connections in the short term, and in the longer term a resilient corridor in the case of network events or disruptions. • Providing a dedicated walking and cycling spine travelling east to west through the Whenuapai growth area, enabling wider connections to link through to this corridor

8.8 Conclusions

Overall, the NoR W3: Brigham Creek Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects..

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Whenuapai School at 14 Airport Road, Whenuapai Kindergarten at 16 Airport Road, and the Whenuapai town centre should be specifically considered within the CTMP prior to implementation.

9 NoR W4: Spedding Road

9.1 Project Corridor Features

9.1.1 Project Overview

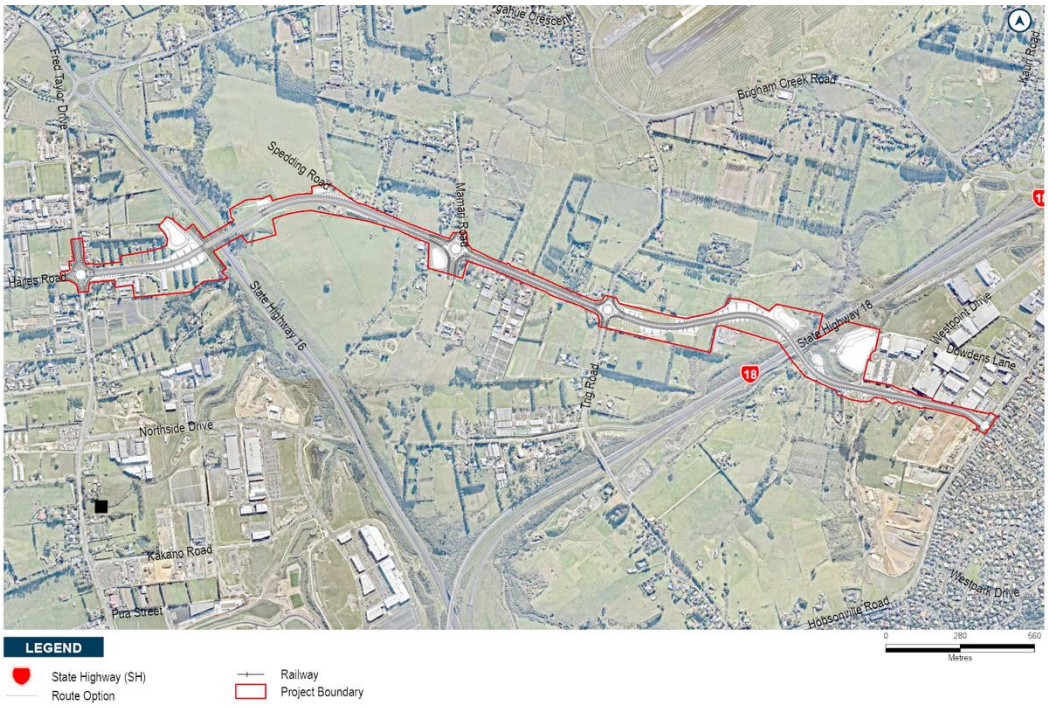
Spedding Road is currently a primary rural collector providing access to several rural lots as well as to Timitanga Community School along Māmari Road. There are two sections to the project, the New Spedding Road West section traveling over SH16 to the west, and the New Spedding Road East section, travelling over SH18 to Hobsonville Road.

The New Spedding Road West extends the existing Spedding Road from its intersection with Māmari Road to the Redhills North area over SH16 to connect with Hailes Road and Fred Taylor Drive. The New Spedding Road West will upgrade the existing 14m width corridor to a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides.

This new east-west connection will support active mode and public transport connectivity between residential land use in Redhills, employment land use in Whenuapai and the proposed CC2W rapid transit station (a non-Te Tupu Ngātahi project). Furthermore, given the high degree of urbanisation expected in this FUZ area, this connection will reduce severance already created by the State Highway network and will provide a non-interchange SH16 crossing location to support local movements for all modes.

An overview of the indicative proposed design for the western extension is provided in Figure 9-1 below.

Figure 9-1: Overview of New Spedding Road West (west of Māmari Road)

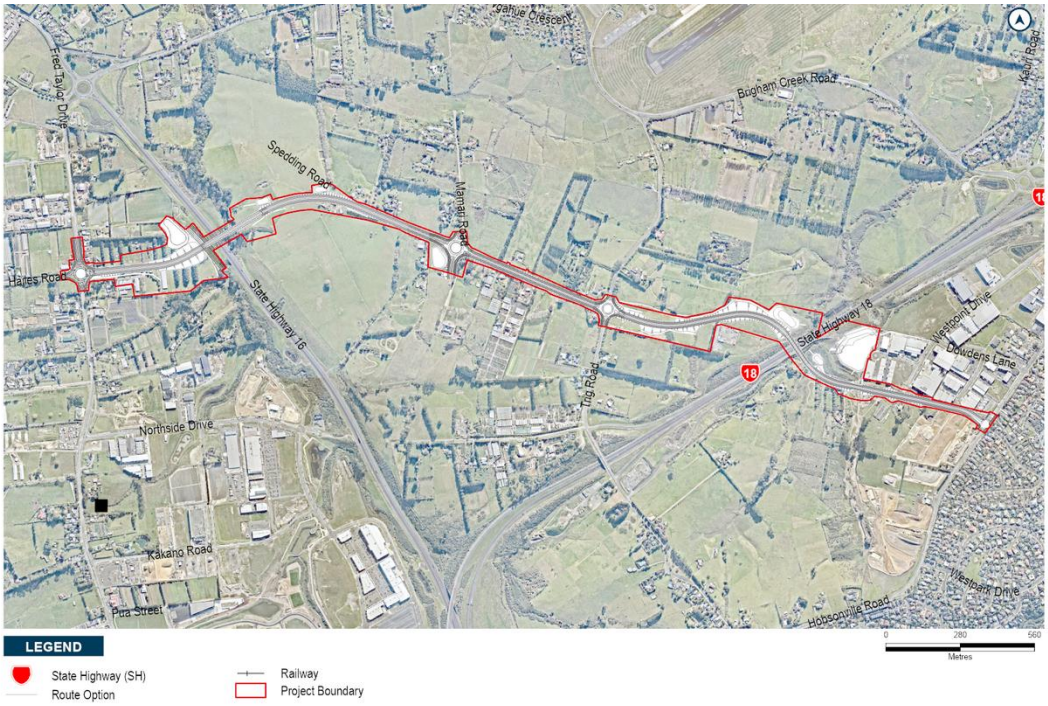


The New Spedding Road East will also consist of a 24m wide two-lane arterial cross section with separated cycle lanes and footpaths on both sides of the corridor. The intersections of Spedding

Road with Trig Road and Māmari Road are proposed to be roundabouts. Similar to the proposed extension of Spedding Road (West), the proposed extension of Spedding Road (East) will provide an east-west connection that supports active mode and public transport connectivity between the areas of Whenuapai and Hobsonville.

An overview of the proposed design for the eastern upgrade and extension is provided in Figure 9-2 below.

Figure 9-2: Overview of New Spedding Road East Upgrade (east of Mamari Road)



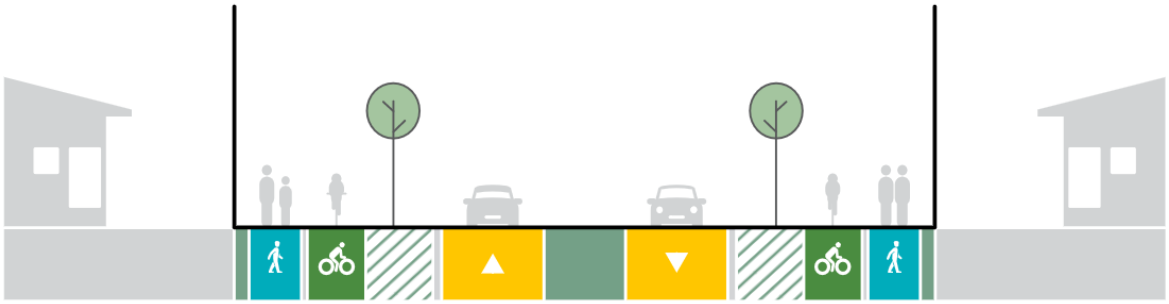
9.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes, and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Speeding Road will change from an existing rural unsealed two-lane road to a low-speed urban two-lane arterial (using AT standards) with mixed components for vehicles, public transport, and active modes.

The existing corridor is narrow and includes two vehicle lanes, one per direction, only. The indicative proposed design includes two vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 9-3.

Figure 9-3: Indicative future Spedding Road corridor design



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

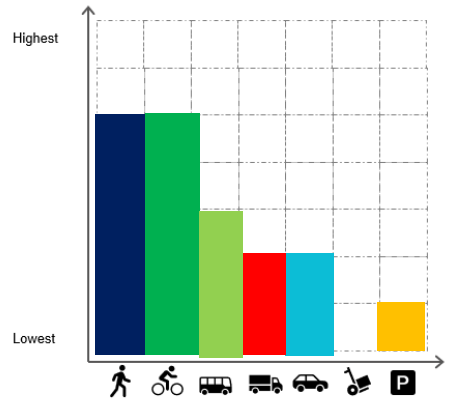
The corridor is assessed to have the following RASF typology:

- Place function - transitioning from P1 (rural) to P1 (local) long term
- Movement function - transitioning from M1 (low strategic movement) to M2 (medium strategic movement) long term

The following Figure 9-4 and * While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 9-5 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

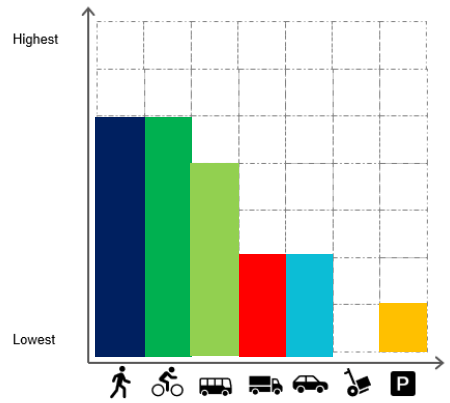
Figure 9-4: Future modal priority in 2048+ for Spedding Road (west)



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 9-5: Future modal priority in 2048+ for Spedding Road (east)



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

9.3 Existing and Likely Future Environment

9.3.1 Planning context

The land on either side of Spedding Road is zoned under the AUP: OP as FUZ, with the exception being the Business – Light Industry Zone within the Hobsonville Corridor Precinct.

The Whenuapai Structure Plan identifies the land surrounding the existing central section and proposed western end of the corridor for business.

The western section of the proposed corridor extends across SH16 and the eastern section across SH18, both SH16 and SH18 are designated by Waka Kotahi for State Highway purposes (Designation 6741).

Table 9-1 below provides a summary of the North West existing and likely future environment.

Table 9-1: Spedding Road Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[30]	Likely Future Environment[31]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

9.3.2 Transport Environment

9.3.2.1 Existing

To the north of SH18, the existing corridor is predominantly surrounded by greenfield land and to the south of SH18, the corridor is generally adjacent to land currently being developed for light industrial purposes. Table 9-2 summarises the existing transport features of the Spedding Road corridor.

Table 9-2: Trig Road: Existing Transport Features

	Existing Speeding Road Transport Features
Corridor Characteristics	• Has an 80kph speed limit • Rural character with two unmarked unsealed vehicle lanes (one in each direction) • Corridor form is consistent, with no kerb and channel on either side of the corridor and no footpaths
Key connections to the wider network	• Connects to Trig Road • Provides access to Māmari Road
Traffic Volume	The latest traffic data for Spedding Road was obtained from Auckland Transport[32]. The data was recorded in February 2018 and shows Spedding Road (between Trig Road and Māmari Road) carried a 5 Day Average Daily Traffic of approximately 290 vehicles per day (vpd), and 30-50 vehicles per hour (vph) during the morning and afternoon peak hours.

[30] Based on AUP:OP zoning/policy direction

[31] Based on AUP:OP zoning/policy direction

[32] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

	Existing Speeding Road Transport Features
Road Network / General Traffic	• Spedding Road West / Māmari Road give-way • Spedding Road West / Trig Road give-way • Spedding Road West / Hobsonville Road existing consent for signals
Walking and Cycling	There is no footpath on either side.
Public Transport	There are no existing bus services on Spedding Road.

9.3.2.2 Likely Future

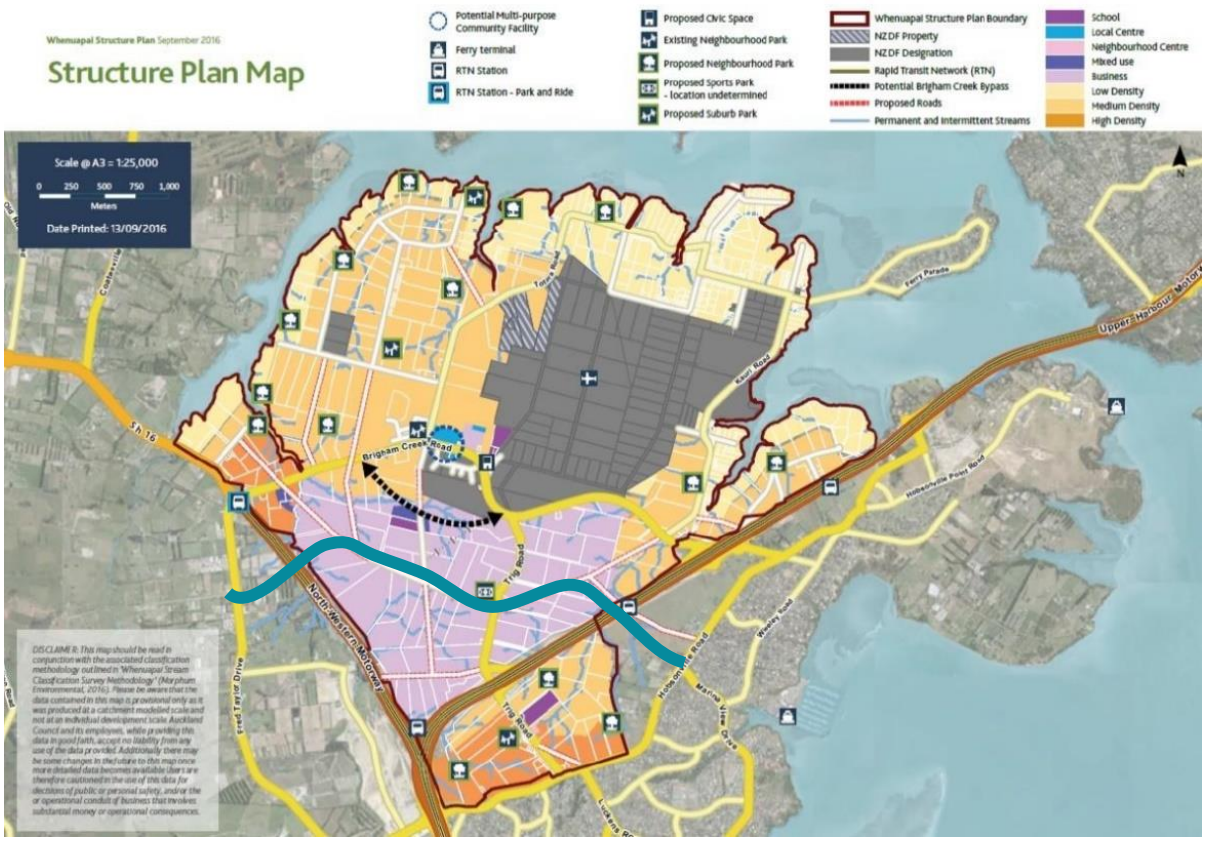
The importance of Spedding Road as an east-west arterial is highlighted in the Whenuapai Structure Plan. The Spedding Road connection is shown crossing SH18 and connecting in to Hobsonville Road in the south and Brigham Creek Road in the north.

This connection differs from the proposed Spedding Road connection within this NoR. The key difference is that the Spedding Road connection in this Project travels to the west, over SH16, connecting on to Fred Taylor Drive. The key reason for this difference is to provide increased access and connectivity for the Whenuapai growth area, in particular for walking, cycling and public transport. Further details are provided in Section 9.3.2.3.

It is also noted that the alignment for Spedding Road East, also has a different connection point, with this Project proposing to connect with Hobsonville Road and Marina View Drive via a four-way intersection.

The Structure Plan is shown Figure 9-6, with an indicative proposed Spedding Road alignment as is proposed in this NoR shown in blue.

Figure 9-6: Whenuapai Structure Plan – Spedding Road



9.3.2.3 Proposed Alignment

As noted, the Spedding Road alignment deviates from that shown in the Whenuapai Structure Plan. In particular, the alignment of Spedding Road West in the Whenuapai Structure Plan travels to the north and crosses Brigham Creek Road. The North West IBC and DBC considered the alignments for this corridor and found that the proposed alignment which crosses State Highway 16 provided the following transport benefits:

- The connection over the State Highway reduces the existing severance resulting from the State Highway 16 corridor.
- The connection as shown without interchanges to the State Highway provided a connection that would be attractive to buses, walking and cycling as would enable a peak period connection unhindered by likely motorway congestion.
- The provision of this connection provided additional network resilience in particular to State highway interchanges such as SH16 Brigham Creek.

An additional consideration was that the connection from Spedding Road to Brigham Creek was not precluded via a collector road connection, and it is considered that this collector would be more appropriate to facilitate access within the proposed growth area.

Table 9-3 summarises the likely future transport features of the Speeding Road corridor.

Table 9-3: Spedding Road: Likely Future Transport Features

	Likely Future Spedding Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two vehicle lanes (one in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic two-lane arterial with a 24m cross section.
Key Connections to the wider network	• Connects to Fred Taylor Drive • Connects to Trig Road • Connects to Māmari Road • Connects to Hobsonville Road
Traffic Volume	The forecast Average Daily Traffic (**ADT**) in 2048 on Spedding Road West is 18,400 vehicles, and on Spedding Road East is 15,100 vehicles.
Road Network / General Traffic	• Spedding Road West / Fred Taylor Drive dual lane roundabout • Spedding Road West / Māmari Road dual lane roundabout • Spedding Road West / Trig Road single lane roundabout
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides
Public Transport	The indicative 2048 AT bus network forecasts 9 buses per hour on Speeding Road, or approximately 1 bus every 5-10 minutes.

Key features of the proposed new corridor include the following:

- Widening of Spedding Road from its current general width of 20m to a 24m wide two-lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the intersections with Fred Taylor Drive, Trig Road and Māmari Road to accommodate proposed roundabouts.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

9.4 Assessment of Operational Transport Effects

9.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Spedding Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Spedding Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Spedding Road) at Trig Road intersection, resulting in a significantly safer environment for all road users.
- A significantly improved speed environment by designing to lower speed limits that are more appropriate for urban environment (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs).

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Spedding Road is developed. The traffic volumes on Spedding Road will also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project has been designed to a lower speed limit of 50km/h and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

9.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Spedding Road. It also provides sufficient space to provide dedicated pedestrian and cycle crossing facilities at Trig Road (NoR W1) and Māmari Road (NoR W2) which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 9-4.

Table 9-4: Spedding Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[33]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Spedding Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[34]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. The total width of 6.8m is proposed from carriageway to road boundary. This is in accordance with the AT TDM requirements.

[33] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[34] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Spedding Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity. It is noted in particular that walking and cycling connectivity will be improved by the provision of a connection over the existing State Highway 16 and 18 corridors. This will improve walkable distances to employment opportunities in both Hobsonville and Westgate for future Whenuapai residents.
- Lead to environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Whenuapai and the future RTN at Westgate and the RTN stations for the longer term RTN adjacent to SH18[35].
- Support growth surrounding Spedding Road and significantly improve safety and access to employment and social amenities.

9.4.3 Public Transport

The cross-section will provide adequate space to facilitate public transport and associated bus stops. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined, i.e. around centres and schools for example.

For future public transport services, there is one proposed bus routes which will use Spedding Road. This service is forecast to operate every 12minutes in the peak periods and every 30 minutes outside of the peak.

This service will link in to the proposed Brigham Creek station for the future RTN connection to Auckland CBD via State Highway 16 and will connect to Hobsonville Town Centre in the east.

The Project's potential operational effects on public transport are:

- Excellent integration with the future public transport network and improved east-west connectivity, as well as improved access to employment and social amenities.
- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

9.4.4 Access

As a future arterial corridor, Spedding Road is expected to be a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north and south of Spedding Road.

[35] See Appendix 1 for further information on future network assumptions

The collector network has been indicatively identified by the Whenuapai Structure Plan; however, it is expected that these will be subject to change as developers progress these connections through future plan change processes.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways.

When considering access to existing properties, the intersection of Spedding Road and Fred Taylor impacts on the access to several properties within proximity to the intersection.

The access for 121 Fred Taylor Drive is relatively close to the likely roundabout and will require relocation to ensure a safe access. At 121 Fred Taylor Drive this will require relocation further south on Fred Taylor Drive. The relocation of this driveway can be accommodated within the proposed designation boundary.

9.4.5 General Traffic

As identified above, the 2048 ADT for Spedding Road is 15,100-18,400 vehicles. Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,510-1,840 vehicles. A two-lane corridor with limited access can efficiently accommodate 18,400 vehicles and therefore the proposed corridor design meets the forecasted needs.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 9-5.

Table 9-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Spedding Road and Fred Taylor Drive – roundabout	Morning Peak	B	0.956	161.8
	Evening Peak	B	0.639	44.0
Spedding Road and Māmari Road – Roundabout	Morning Peak	B	0.723	61.3
	Evening Peak	B	0.938	154.3
Spedding Road and Trig Road – Roundabout	Morning Peak	A	0.659	55.9
	Evening Peak	A	0.615	45.8
	Morning Peak	D	0.774	75.7

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Spedding Road and Hobsonville Road – Signals	Evening Peak	D	0.607	82.0

The overall LOS for all intersections is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048.

Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

9.4.6 Freight

The provision of a key arterial through the proposed industrial/commercial land use activities in Whenuapai will support overall freight connections in this area. The provision of a corridor that connects through to Westgate and Hobsonville across the State Highway network will increase permeability for smaller freight trips. The Project will also result in improved journey times and reliability for existing and future freight.

Over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future.

9.4.7 Wider Network Effects

The Spedding Road connection provides a connection for local traffic, public transport, and walking and cycling movements to access Westgate without interfacing with the State Highway 16 or State Highway 18 interchanges.

This has the additional benefit of reducing pressure on the Brigham Creek interchange, improving efficiency and operations. Without the Spedding Road connection the projected 18,400 vehicles would need to travel on Brigham Creek Road, through the Brigham Creek interchange or through the Northside Drive interchanges.

9.5 Project Interdependencies

The Spedding Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. It is noted that the Spedding Road NoR does overlap and interface with the Māmari Road NoR and the Trig Road NoR at key intersections. Additionally, there is an interface with the Hobsonville Road NoR at the eastern end. At the western end the Spedding Road NoR interfaces with Fred Taylor Drive. Te Tupu Ngātahi is proposing an upgrade to Fred Taylor Drive through a separate package of works (Redhills). Notwithstanding these interfaces, there are overlaps in the proposed designations to ensure that the intersections can be implemented irrelevant of staging or timing.

9.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

Overall, the project provides positive benefits and in terms of measures to mitigate operational effects, the relocation of driveways at 121 Fred Taylor Drive and 8 Spedding Road are recommended to facilitate safe access for these existing properties.

9.7 Summary of Operational Transport Effects (NoR W4)

The assessment of transport effects for the Project is summarised in Table 9-6.

Table 9-6: Assessment of Operational Effects Summary for NoR W4 (Spedding Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved speed environment by designing the corridor to an appropriate urban speeds (e.g. 50km/h) with enhanced place function and consequential reductions in the risk of Death or Serious Injuries (DSIs). • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. In particular the corridor enables access across SH16 and SH18 for pedestrians and cyclists via the local road network – rather than interfacing with the motorway interchanges. This reduces the existing severance and supports greater permeability for these modes. • Support growth adjacent to Spedding Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth • The provision of this corridor supports wider network outcomes, in particular by removing through traffic from key State Highway interchanges at Brigham Creek Road, Northside Drive and Trig Road. This supports these interchanges in operating more efficiently in the peak periods.
Access	In summary, the effects of the Project on access are:

Operational Transport Effects	
	• The access to 121 Fred Taylor Drive will require relocation further south on Fred Taylor Drive. • The relocation of this driveway can be accommodated within the proposed designation boundary.
Freight	In summary, the effects of the Project on freight are: • Positive overall effects for freight through Whenuapai, supporting the proposed industrial/commercial land use activities • Increased permeability for smaller freight trips via connectivity to arterial roads such as Hobsonville Road and Fred Taylor Drive • Improved journey times and reliability for existing and future freight movements with connections that are not impeded by State Highway connections.
Wider Network Effects	In summary, the wider network effects of the Project are: • The Spedding Road connection provides a connection for local traffic, public transport, and walking and cycling movements to access Westgate without interfacing with the State Highway 16 or State Highway 18 interchanges. • This has the additional benefit of reducing pressure on the Brigham Creek interchange, improving efficiency and operations. Without the Spedding Road connection the projected 18,400 vehicles would need to travel on Brigham Creek Road, through the Brigham Creek interchange or through the Northside Drive interchanges.

9.8 Conclusions

Overall, the NoR W4: Spedding Road project provides considerable positive transport effects in particular improved safety, walking and cycling, and public transport effects. Access effects for one property has been identified and relocation of the driveway is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

10 NoR W5: Hobsonville Road FTN Upgrade

10.1 Project Corridor Features

10.1.1 Project Overview

Hobsonville Road is an existing arterial corridor over 4km in length, extending from SH16 in the west to Hobsonville Point Road and Buckley Avenue / Squadron Drive in the east. The Project extends from the intersection with Oriel Avenue in the west to the intersection with Memorial Park Drive in the east and provides an important east-west connection from Westgate to Hobsonville.

The existing Hobsonville Road traverses land zoned for a range of activities under the AUP:OP (FUZ, Residential, Open Space and Business (including industrial)), therefore the recommended form and function of the corridor reflects the adjacent future land use. An overview of the indicative proposed design is provided in Figure 10-1 below.

Figure 10-1: Overview of Hobsonville Road FTN Upgrade

10.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area and concurrently with the Whenuapai structure planning undertaken by the Council. The wider networks were developed through the Business Case process that considered the key problems, benefits, outcomes and range of options to address the identified problems. As such, the Project is part of a wider integrated network planned for the area.

The Project proposes that the function of Hobsonville Road will change from an existing two lane road to an urban two to four lane arterial (using AT standards) with mixed components for vehicles, public transport, active modes, and freight.

The existing corridor is narrow and generally provides two vehicle lanes. The indicative proposed design includes three types of cross sections specifically:

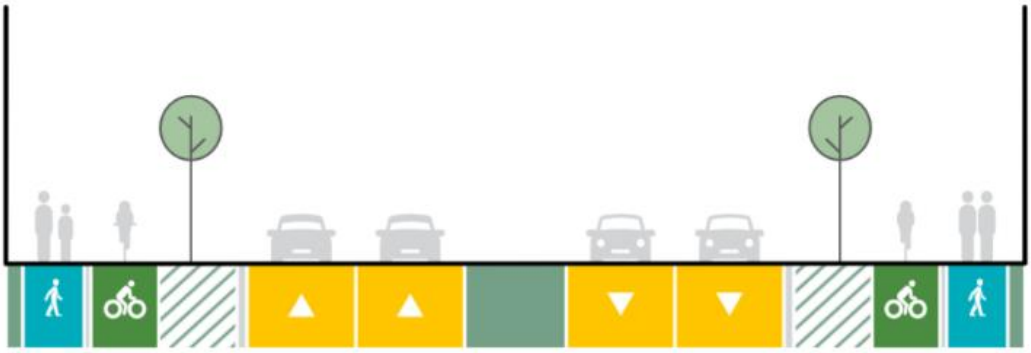
- A generally 30m corridor that provides two vehicle lanes, two public transport lanes, and improved walking and cycling facilities.
- A generally 24m corridor that provides two vehicle lanes and new facilities for walking and cycling.
- A generally 30m corridor that provides four vehicle lanes, as well as new facilities for walking and cycling.

These cross sections are shown in Figure 10-2, Figure 10-3, and Figure 10-4.

Figure 10-2: Indicative future Hobsonville Road corridor FTN Upgrade between SH16 interchange and Luckens Road

Figure 10-3: Indicative future Hobsonville Road corridor between Luckens Road and Brigham Creek Road

Figure 10-4: Indicative future Hobsonville Road corridor between Brigham Creek Road and Hobsonville Point Road



The development of the corridor design has included the use of AT's Roads and Streets Framework (RASF), which qualitatively assesses the typology (movement and place value) and modal priority. The intent of that framework is to classify the expected movement and place functions from a consistent regional context and identify the likely priority applied to each mode.

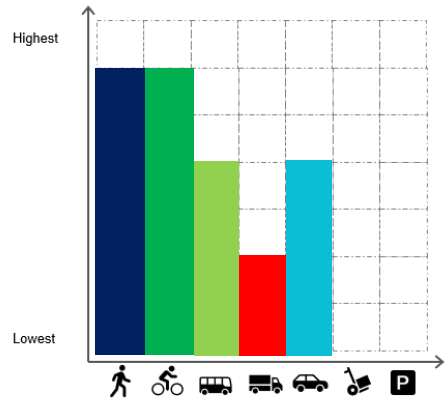
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land use context uses Place Value (ranking from P1 'low' to P3 'high' importance) and for transport context uses Movement Value (ranking from M1 'low' to M3 'high' importance).

The corridor is assessed to have the following RASF typology:

- Place function – retain P1/P2, when the western section (Segment 1 between Fred Taylor Drive and SH16) has a P2 function, and the rest of the corridor has a P1 function
- Movement function - transitioning from M2 (medium strategic movement) to M3 (high strategic movement) long term for the majority of the corridor

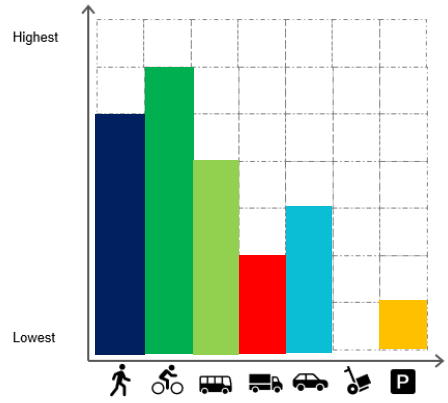
The following Figure 10-5 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more active modes of travel.

Figure 10-5: Future modal priority in 2048+ for Hobsonville Road: Fred Taylor Drive to SH16



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access

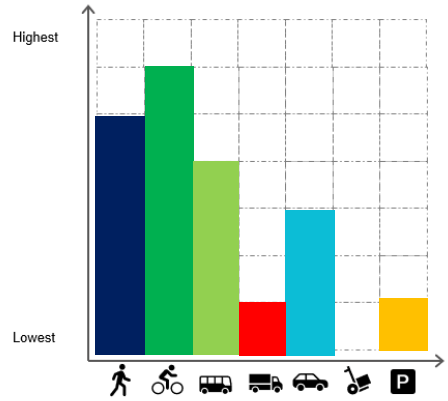
Figure 10-6: Future modal priority in 2048+ for Hobsonville Road: SH16 to Luckens Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

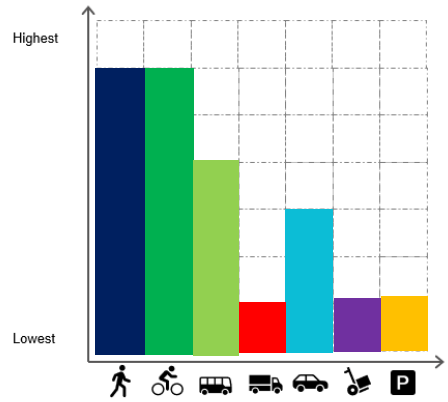
Figure 10-7: Future modal priority in 2048+ for Hobsonville Road: Luckens Road to Brigham Creek Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

Figure 10-8: Future modal priority in 2048+ for Hobsonville Road: Brigham Creek Road to Hobsonville Point Road



Legend	
	Pedestrians
	Cyclist
	Public Transport
	Freight
	Private Vehicles
	Loading
P	Parking and Access*

* While the RASF modal priority indicates a low level of parking and access on this corridor, this is reflective of existing property access which will be maintained. New vehicle access to any arterial road is limited and assessed via the Unitary Plan Standard E27.6.4.1.

10.3 Existing and Likely Future Environment

10.3.1 Planning context

Hobsonville Road is an existing urban corridor with land zoned under the AUP:OP as follows:

- The southern side of Hobsonville Road is largely zoned Residential – Mixed Housing Urban Zone, with a Business – Local Centre Zone located adjacent to the intersection of Hobsonville Road, Wiseley Road and Clark Road at the eastern end of the corridor; and
- The northern side of Hobsonville Road contains a variety of land uses. Adjacent land on the western end of the corridor is currently zoned Residential – Mixed Housing Zone between SH16 and Trig Rd. Land to the east of Trig Road to Westpark Drive is currently zoned FUZ, with land then zoned Business – Light Industrial Zone to the east of Westpark Drive.

The Hobsonville Road corridor is currently designated by AT for Transport Purposes (Designation 1437). Designation 1437 has been given effect to and it is proposed to alter this designation. Table 10-1Table 10-1 below provides a summary of the North West existing and likely future environment.

Table 10-1: Hobsonville Road FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[36]	Likely Future Environment[37]
Business	Business (Light Industrial)	Low	Business (Light Industrial)
	Business (Local centre)	Low	Business (Local centre)
Residential	Residential	Low	Residential
Undeveloped greenfield areas (Future Urban Zone)	Future Urban	High	Urban

Please refer to the AEE for further information on the planning context.

10.3.2 Transport Environment

10.3.2.1 Existing

The existing corridor is predominantly surrounded by greenfield land to the north, and residential development to the south. It is generally comprised of one vehicle lane in each direction and a central median. To the south of the corridor is predominantly existing low density residential development.

Table 10-2 summarises the existing transport features of the Hobsonville Road corridor.

[36] Based on AUP:OP zoning/policy direction
[37] Based on AUP:OP zoning/policy direction

Table 10-2: Hobsonville Road: Existing Transport Features

Existing Hobsonville Road Transport Features	
Corridor Characteristics	• Has a 50kph speed limit • Semi-urban character with two vehicle lanes (one in each direction), residential on southern side of the corridor • Corridor form is inconsistent footpath, bicycle lane, and indented parking in some locations • Arterial classification in the Auckland Unitary Plan
Key connections to the wider network	• Connects to SH16 in the east • Connects to Brigham Creek Road • SH18 interchanges at Hobsonville Road, Trig Road and Brigham Creek Road
Traffic Volume	The latest traffic data for was obtained from Auckland Transport[38]. The data was recorded in September 2019 and shows the following counts for Hobsonville Road: • Between Westpark Drive and Marina View Drive carried a 5 Day Average Daily Traffic of approximately 12,100 vehicles per day (vpd), and 1,100 vehicles per hour (vph) during the morning and afternoon peak hours. • Between Sinton Road and Wiseley Road carried a 5 Day Average Daily Traffic of approximately 18,200 vehicles per day (vpd), and 1,400-1,500 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Hobsonville Road / Oreil Avenue priority control • Hobsonville Road / Fitzherbert priority control • Hobsonville Road / Cyril Crescent priority control • Hobsonville Road / Trig Road priority control • Hobsonville Road / Luckens Road priority control • Hobsonville Road / Westpark Drive signalised • Hobsonville Road / Marina View Drive priority control (signals to be implemented) • Hobsonville Road / Dowdens Lane signal • Hobsonville Road / Brigham Creek Road priority control • Hobsonville Road / Williams Road priority control • Hobsonville Road / Wisely Road Wisely Road • Hobsonville Road / Memorial Park Lane signals • Hobsonville Road / Buckley Avenue signals • Hobsonville Road / Te Aho Matua Road priority control • Hobsonville Road / Nugget Avenue signals • Hobsonville Road / Sidney Wallingford Way priority control • Hobsonville Road / Eyton Kay Road priority control • Hobsonville Road / Squadron Avenue signals
Walking and Cycling	A continuous footpath is provided on the southern side of the road of the corridor, which is generally 1.5 m wide. A footpath is provided in segments on the northern side of the road for the rest of the corridor, with these footpaths generally being 1.5 m wide also. There are limited and intermittent cycling facilities along the corridor.

[38] Auckland Transport Traffic Counts, July 2012 to March 2020, https://at.govt.nz/about-us/reports-publications/traffic-counts/

Existing Hobsonville Road Transport Features	
Public Transport	The 120 bus service currently operates on Hobsonville Road and connects Constellation Station, Greenhithe, Hobsonville Rd, Westgate, Don Buck Rd, Henderson. This service operates at least every 30 minutes, 7am – 7pm, 7 days a week. Lower frequencies early morning and evenings.

10.3.2.2 Likely Future

The importance of Hobsonville Road as an east-west arterial can be seen in Figure 10-9. It provides a parallel corridor to SH18, with a connection to SH16 at the western end. At the eastern end there is a connection to SH18 via Brigham Creek Road.

Figure 10-9: Auckland Unitary Plan – Hobsonville Road

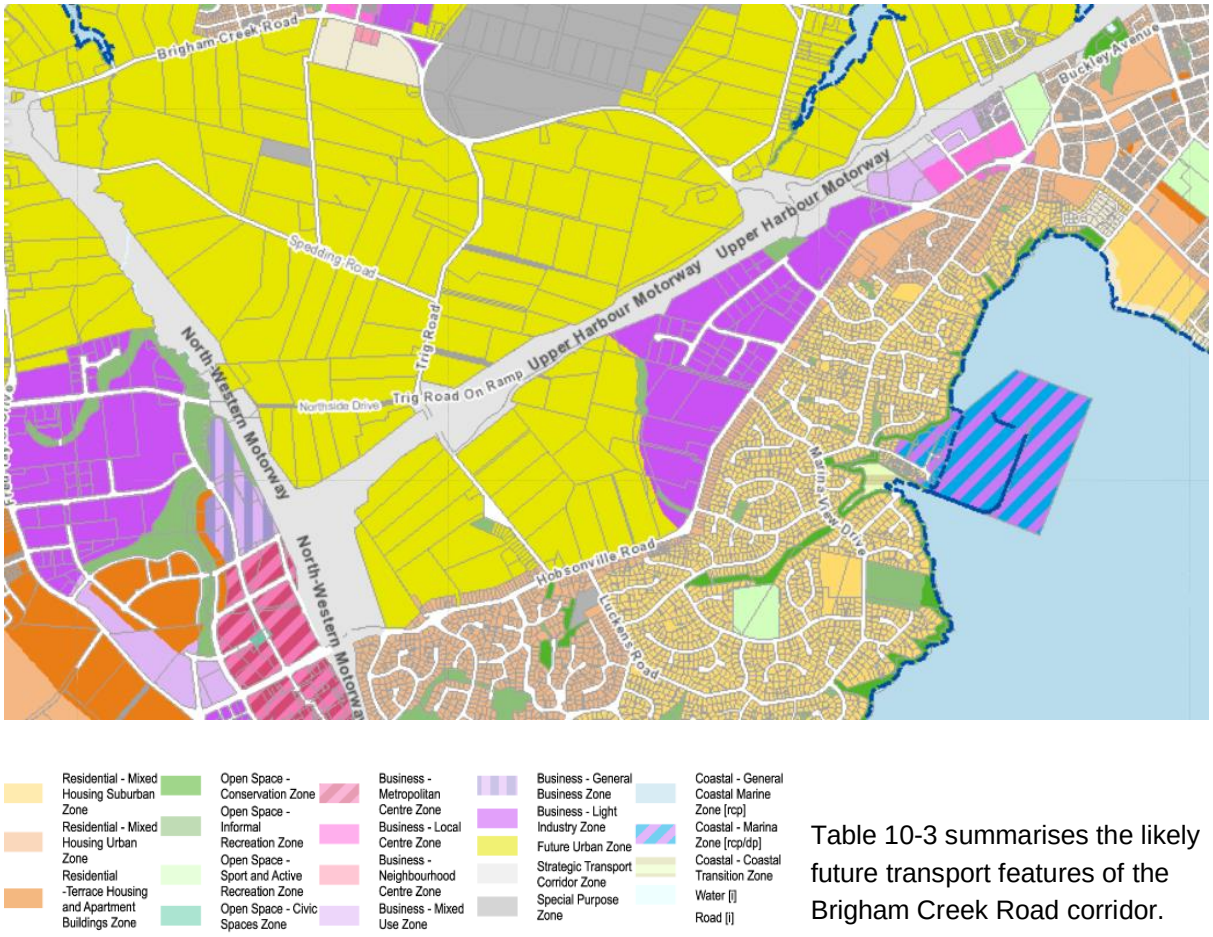


Table 10-3 summarises the likely future transport features of the Brigham Creek Road corridor.

Table 10-3: Hobsonville Road: Likely Future Transport Features

	Likely Future Hobsonville Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with two to four vehicle lanes and a central median. • Generic two to four-lane arterial with a 24-30m designation.

	Likely Future Hobsonville Road Transport Features
Wider Network Connections	• Connects to SH16 in the east • Connects to Brigham Creek Road • SH18 interchanges at Hobsonville Road, Trig Road and Brigham Creek Road
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Hobsonville Road in 2048 is: • 20,200 vehicles between SH16 and Luckens Road • 14,900 vehicles between Luckens Road and Brigham Creek Road • 23,000 vehicles between Brigham Creek Road and Hobsonville Point Road
Road Network / General Traffic	• Hobsonville Road / Trig Road signals (not included in this NoR) • Hobsonville Road / Luckens Road signals (not included in this NoR) • Hobsonville Road / Westpark Drive roundabout • Hobsonville Road / Marina View Drive signals • Hobsonville Road / Dowdens Lane signals • Hobsonville Road / Brigham Creek Road signals • Hobsonville Road / Williams Road give way • Hobsonville Road / Wisely Road give way
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides
Public Transport	The indicative 2048 AT bus network forecasts every 10 to 12 mins in the peak and every 20mins outside of peak periods.

Key features of the proposed new corridor include the following:

- Widening of Hobsonville Road from its current general width of 20m. This widening is to accommodate 30m wide four-lane cross section including bus lanes, separated cycle lanes and footpaths on both sides of the corridor, and also where there are intersections in close proximity. There is also widening to allow for 24m two lane cross section including separated cycle lanes and footpaths on both sides of the corridor.
- Localised widening around the existing intersections.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities (earthworks).
- Vegetation removal along the existing road corridor.
- Other construction related activities required outside the permanent corridor including the re-grade of driveways, construction traffic manoeuvring and construction laydown areas.

10.4 Assessment of Operational Transport Effects

10.4.1 Road Safety

The design of the Project has been undertaken with consideration of the latest safety guidance. This includes AT's Vision Zero and Waka Kotahi's Road to Zero. The upgrade of Hobsonville Road is expected to result in positive effects on safety when compared to the existing corridor, and these consist of:

- Significantly improved walking and cycling facilities along Hobsonville Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Hobsonville Road at Brigham Creek and Spedding Road/Marina View Road intersections), resulting in a significantly safer environment for all road users.

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area to the north of Hobsonville Road is developed. The traffic volume on Hobsonville Road will likely also increase over time and therefore the exposure between motorists and vulnerable road users will be higher than the existing road environment. However, the Project proposes to provide segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the indicative proposed design of the Project is well aligned with the transport safety principles from AT and Waka Kotahi. It will provide a much safer transport system which will likely reduce the number of DSIs and result in positive effects for all road users. It is noted that the detailed design will be completed in the future to further detail measures to achieve the anticipated safety outcomes.

10.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Hobsonville Road. It also includes sufficient space for dedicated pedestrian and cycle crossing facilities at Brigham Creek Road and Spedding Road), which connect with expected future adjacent facilities.

The proposed walking and cycling facilities have been designed in accordance with relevant AT standards and policies as summarised in Table 10-4.

Table 10-4: Hobsonville Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[39]	Segregated walking and cycling facilities	Segregated walking and cycling facilities are proposed to provide a safe modal choice in the future environment. Vision Zero specifies that indicative proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Hobsonville Road are proposed to be 50km/hr, therefore the indicative proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[40]	Footpaths: 1.8m minimum	A 1.8m footpath is proposed on all corridors and a 2.0m cycle path with a 2.3m berm. This is in accordance with the AT TDM requirements.

Exact provision of walking and cycling crossing facilities will be confirmed at the detailed design stage and will be guided by Vision Zero guidance. The Project will have a number of significant positive effects on walking and cycling as it will:

- Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Hobsonville Road.

[39] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[40] Auckland Transport – Transport Design Manual: https://at.govt.nz/about-us/manuals-guidelines/roads-and-streetsframework-and-the-transport-design-manual/

- Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity.
- Lead to improved environmental and health benefits as a result of increased active mode trips and reduced reliance on vehicle trips.
- Serve as a key enabler for greater use of active transport modes by providing safe connector route between Hobsonville Road and the Westgate town centre
- Support growth surrounding Hobsonville Road and significantly improve safety and access to employment and social amenities.

10.4.3 Public Transport

The cross-section will provide adequate spacing to facilitate public transport and associated bus stops along the Hobsonville Road corridor. The exact location of bus stops will be identified as part of detailed design for the Project. Once greater certainty is available on the location of key land use activities, more certainty on high demand locations for bus stops can be determined. This is particularly relevant to future land use to the north of the corridor where significant change is expected.

For future public transport services, there is one core proposed bus routes which will use Hobsonville Road, between Hobsonville and Westgate. This service will operate every 12 minutes in the peak and every 20mins outside of the peak. In addition to this there will be other supplementary services that travel over sections of Hobsonville Road. This includes:

- Whenuapai Industrial service connecting Whenuapai to Hobsonville town centre, with a 12-minute peak frequency.
- A local West Harbour service connecting West Harbour to Westgate town centre, with a 12-minute frequency.
- A Scott Point service connecting Scott Point to Hobsonville town centre, with a with a 12-minute frequency.

It is noted that the public transport network has been developed under the long-term scenario which includes several significant infrastructure elements including the SH18 RTN. It is likely that in the interim there will be variations in the public transport network within Whenuapai that responds to availability of such infrastructure and the supplementary road network such as Spedding Road and internal collector networks. As such, the role of Hobsonville Road in the public transport network is likely to change over time, however the proposed cross section is well suited to respond to these changes. In particular it is noted that Hobsonville Road will continue to provide an important east – west connection with local services even post implementation of the proposed SH18 RTN in the longer term.

In addition to the proposed bus priority lanes between the State Highway 16 interchange and Trig Road, the proposed designation provides sufficient footprint to enable bus priority at the key signalised intersections on Hobsonville Road. This will support reduced travel time for buses and provide greater reliability.

The Project's potential operational effects on public transport are:

- Reduced delays and improved reliability for future public transport services on Hobsonville Road and the wider network.
- Improved integration with the future public transport network and improved east-west connectivity, as well as improved access to employment and social amenities.

- The improvements will enable the road to be used by bus services as a diversion in the event of disruptions on other corridors, improving the resilience of the public transport network.
- Increased attractiveness and uptake of public transport trips which will reduce reliance on vehicle trips, resulting in positive environmental and health benefits.
- It will serve as a key enabler for greater use of active transport modes by providing safe connector route between urban areas and Westgate Metropolitan Centre.

10.4.4 General Traffic

As identified above, the 2048 ADT for Hobsonville Road varies along the corridor. Given the length of the corridor and the land use variations this is not unexpected. A summary of expected ADT in 2048 is provided below

- 20,200 vehicles between SH16 and Luckens Road
- 14,900 vehicles between Luckens Road and Brigham Creek Road
- 23,000 vehicles between Brigham Creek Road and Hobsonville Point Road

Given that the peak hour volume is typically approximately 10% of the daily total, it is anticipated that the vehicle volume during the peak hours will be in the order of 1,490-2,300 vehicles. The upper range of traffic volume tends to be located in close proximity to the motorway interchanges at both State Highway 16 in the west, and towards Brigham Creek interchange with State Highway 18 in the east. A two-lane corridor with limited access can efficiently accommodate 14,900 - 20,200 vehicles. Where the volumes are forecast to be approximately 23,000 vehicles per day and there are several closely space intersections, the corridor is proposed to be four lanes. It is therefore considered that the proposed corridor design meets the forecasted needs.

It is noted that there is a section that is forecast to have lower traffic volumes. This is predominantly due to the supporting role of collector networks within the future models. In particular the additional capacity provided by the collector Spine Road in the Hobsonville, which is expected to provide access to light industrial activities north of Hobsonville Road. It is considered that proposed footprint and indicative design provides an appropriate, continuously legible corridor that also enables bus priority at key locations along the corridor.

Intersection Performance

The performance of the road network within the Project has been assessed using inputs from SATURN to understand intersection performance. SIDRA enables isolated intersection models to be performed to understand the network capacity, predicted LOS and anticipated queue lengths. A summary of these key performance measures is shown below in Table 8-5.

Table 10-5: Summary of Intersection Performance 2048

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Hobsonville Road / Don Buck Road signals	Morning Peak	D	0.858	204.1
	Evening Peak	D	0.917	201.2

Intersection (Intersection Control)	Peak Period	Overall Level of Service	Degree of Saturation (worst movement)	Maximum Queue Distance (m)
Hobsonville Road / Westpark Drive roundabout	Morning Peak	D	0.871	123.6
	Evening Peak	D	0.887	154.9
Hobsonville Road / Marina View Drive signals	Morning Peak	D	0.774	75.7
	Evening Peak	D	0.607	82.0
Hobsonville Road / Dowdens Lane signals	Morning Peak	C	0.600	74.6
	Evening Peak	C	0.718	73.5
Hobsonville Road / Brigham Creek Road signals	Morning Peak	C	0.613	127.6
	Evening Peak	D	0.494	102.7
Hobsonville Road / Memorial Park Lane signals	Morning Peak	B	0.540	60.5
	Evening Peak	B	0.436	46.3

The overall LOS for all intersections is LOS D or below, and generally all of the intersections operating within acceptable capacity performance by 2048. Overall, the proposed intersections are predicted to perform at a satisfactory level during the peak periods under a 2048 scenario.

10.4.5 Access

Hobsonville Road is an existing arterial corridor and will continue to be an arterial road in the future. As such, Hobsonville Road is a limited access corridor. As the area develops, it is expected that future access to the network will be facilitated by collector road networks within the urbanised area to the north of Hobsonville Road.

The collector network has been indicatively identified by the Whenuapai Structure Plan; and also in the Hobsonville Road Precinct Plan[41] Access is expected to be concentrated on the collector corridors.

In terms of existing properties, the overarching design philosophy for the Project has been to maintain driveway access where practicable and minimise impacting land for access purposes other than where necessary to re-instate driveways. Given the current level of urban development on this corridor and existing access, berm space has been rationalized at some points to maintain access and limit property impacts.

There are several existing properties where it has been identified that a replacement driveway will not be possible to implemented with the Project in place, primarily due to changes to road levels and

[41] I603 Hobsonville Corridor Precinct.pdf (aucklandcouncil.govt.nz)

incursion of the corridor into the front of properties. These properties have been included within the proposed designation boundary.

The properties that have been included within the NoR boundary for this reason are

- 44, 46a, 48, 50, 94 and 179a Hobsonville Road.

10.4.6 Freight

Hobsonville Road is not currently classified under the Auckland Transport Freight Plan. It is however identified as an over-dimension and overweight route. This route is generally kept clear of obstructions and also generally capable of supporting overweight/vehicles or loads. The corridor therefore currently plays a key part in the overall freight story. As such it is considered that the proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.

In the longer term, over-dimension and overweight routes are expected to be further reviewed by Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future.

10.4.7 Wider Network Effects

The Hobsonville Road project provides a strong east -west public transport corridor connecting Westgate through to the Hobsonville town centre and Hobsonville Point community. In addition to this, in the longer term there remains an opportunity to connect this corridor the future SH18 RTN corridor.

In terms of walking and cycling the project provides improved network options for active modes, through the provision of dedicated facilities.

Wider network effects for general traffic and freight are considered to be neutral, with limited change from the existing network.

Overall, the wider network effects of the project are considered positive, providing improved east west public transport and active mode movements.

10.5 Project Interdependencies

The Hobsonville Road project has been designed to integrate with several other key projects. The assessment of operational effects assumes that these projects are in place. The project as proposed therefore can be considered the long-term requirement for the corridor. These are discussed below.

10.5.1 Trig Road South

Trig Road South and the intersection Trig Road and Luckens Road with Hobsonville Road have been investigated by Te Tupu Ngātahi as part of a separate workstream. These intersections are proposed to be signalised in the future and will be subject to a separate NoR process, AEE and supporting assessments.

10.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

Overall, the Project provides positive benefits, particularly for walking, cycling and public transport. In terms of measures to mitigate operational effects, there are a number of properties identified in Section 10.4.5 that have been identified for inclusion within the designation boundary in response to access effects.

10.7 Summary of Operational Transport Effects (NoR W5)

The assessment of transport effects for the Project is summarised in Table 10-6.

Table 10-6: Assessment of Operational Effects Summary for NoR W5 (Hobsonville Road)

Operational Transport Effects	
Safety	In summary, the effects of the Project on safety are: • A significantly improved environment for pedestrians and cyclists, commensurate with an urbanised environment.
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • Significantly reduce the likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Hobsonville Road • Improve integration with the future walking and cycling network, resulting in improved east - west walking and cycling connectivity. • Support growth adjacent to Hobsonville Road and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the effects of the Project on public transport are: • Improved reliability and travel time for frequent public transport services • Good integration with the future public transport network and significantly improved east west connectivity and improved access to employment and social amenities • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability
General Traffic	In summary, the effects of the Project on general transport are: • Provision of sufficient corridor and intersection capacity to cater for future growth
Access	In summary, the effects of the Project on access are: • There are several existing properties where it has been identified that a replacement driveway will not be possible to implemented with the Project in place, primarily due to changes to road levels and incursion of the corridor into the front of properties. • The properties that have been included within the NoR boundary for this reason are • 44, 46a, 48, 50, 94 and 179a Hobsonville Road.

Operational Transport Effects	
Freight	In summary, there are positive effects of the project on freight. Specifically: • Positive overall effects for freight in Hobsonville, supporting the proposed industrial/commercial land use activities • The proposed footprint provides a flexible corridor width to enable resilient and reliable freight movements.
Wider Network Effects	In summary, there are neutral wider network effects identified for general traffic and freight movements. • In terms of walking and cycling, there are positive network benefits through the provision of dedicated facilities on this key east -west spine. • There are positive network benefits for the public transport movements providing a reliable public transport spine

10.8 Conclusions

Overall, the NoR W5: Hobsonville Road Upgrade project provides considerable positive transport effects in particular improved safety, walking and cycling and public transport effects. Access effects on several properties have been identified, and the inclusion of these within the designation boundary is recommended.

In terms of construction traffic effects, it is considered that there is sufficient network capacity to enable construction traffic, and that any potential construction traffic effects can be accommodated and managed appropriately via a CTMP.

It is recommended that access and safety considerations relating to Hobsonville School and the Hobsonville town centre should be specifically considered within the CTMP prior to implementation.

1 Specific Transport Modelling Background Information

The Macro Strategic Model (MSM) is a region-wide model which analyses the forecast land use and informs trip generation, trip distribution and mode choice at regional level. The MSM model responds to the network assumptions, forecasted land use and regional economic policy inputs to predict regional traffic patterns and PT patronages. The outputs from the MSM model are used as:

- Demand inputs for the traffic simulation model SATURN, which analyses them at a mesoscopic level
- PT Patronage inputs for the MPT model, which analyses these at a strategic level
- Active mode inputs for the SAMM model, which analyses these at a mesoscopic level

The MSM is a four-step multi-modal model. This model was originally developed based on extensive data collected in 2006. Using observed data, and a full model validation exercise it was recently updated to reflect 2016 inputs and data. The MSM produces demands for five periods of the day, and separate assignment models exist for the morning (AM) and evening (PM) peak and weekday interpeak (IP) periods.

The model itself comprises of the following key modules:

- Trip generation: This is where the number of person-trips are estimated as a function of the land use data (population, employment, school roll etc.)
- Mode Choice: This is where the choice of recommended travel mode is determined, based on the relative costs of the various modes. The MSM modes for mode choice are car (driver and passenger combined) and passenger transport. Trips by car are converted into vehicle trips later in the model. The model also estimates the number of active mode trips, such as walking and cycling, although these are not fully modelled through to link flows.
- Trip Distribution: This is where the trips produced in each zone (generally by households), are matched to a recommended destination. This distribution is predicted as a function of the relative attractiveness for each destination zone and the travel costs to reach each destination.
- Time of Day: This is where the proportion of daily trip making occurring in each period is calculated. These proportions change in response to changes in travel costs to represent peak spreading.
- Trip Assignment: This is where the resulting travel demand, in the form of origin to destination trip tables, are loaded to the road and public transport networks. For the road assignment, an iterative process is used to firstly identify the lowest-cost route between each origin and destination followed by an estimation of the speeds and delays on each route between origin and destination, followed by an estimation of speeds and delays on each route associated with the predicted traffic flows on the route.

1.1.1 General Network Assumptions

The following general network assumption have been made in the MSM model:

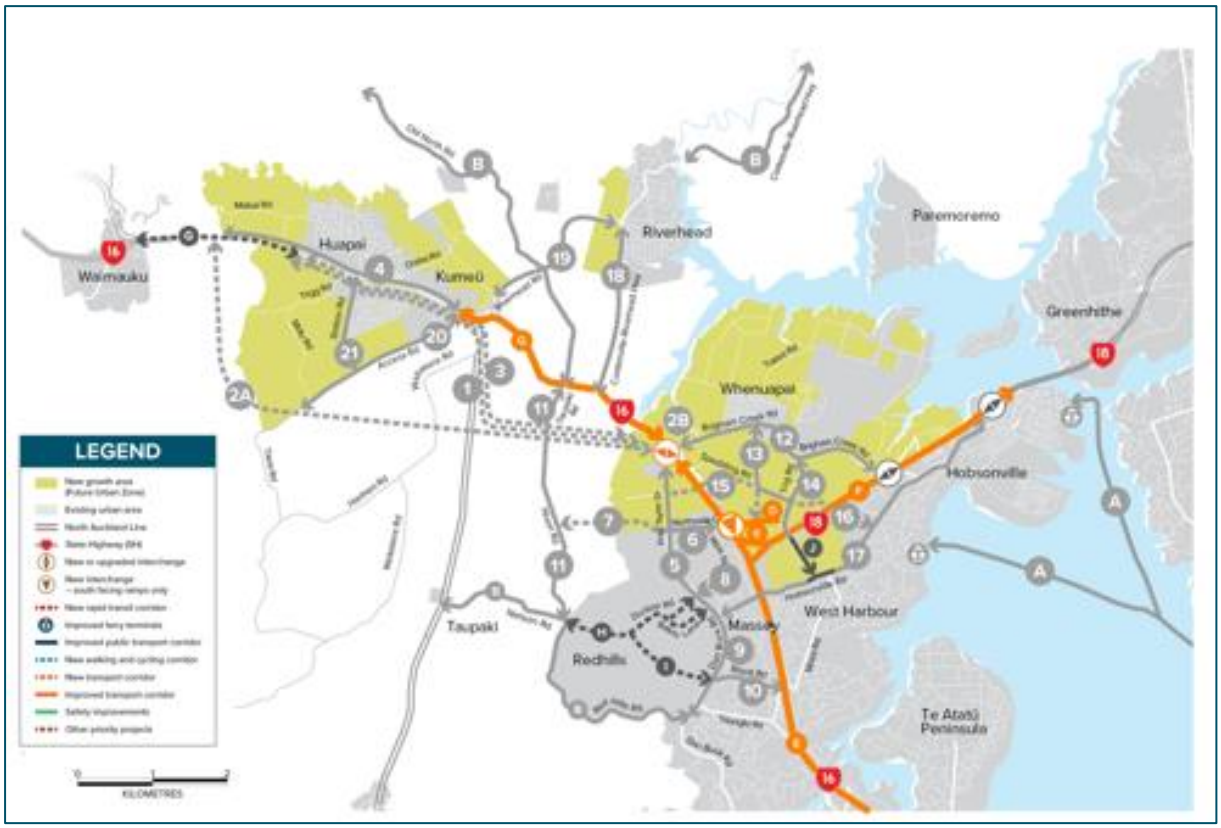
- All committed developments and respective infrastructure upgrades planned as outlined in the ATAP (Auckland Transport Alignment Project) 2.0 and RLTP (Regional Land Transport Plan) have been coded in the future MSM model

- The access points (MSM zone connectors) for each model option scenarios in the North West Detailed business case areas were reviewed and refined accordingly to reflect the future infrastructure upgrades
- The future local bus services for each model option scenarios, were updated based on inputs from the AT Metro, specifically related to routes, frequencies, bus capacities and bus speeds.

Following discussions with Waka Kotahi and Auckland Transport, the following strategic interventions have been included in the North West Do Minimum as shown in Figure A1.1.

- SH16 Brigham Creek to Waimauku project currently being delivered by Waka Kotahi.
- Full implementation of the NWRTN from the City Centre to a Brigham Creek station (City Centre to Westgate (CC2W) project). It was agreed with the owners to use the station locations identified in the North West Rapid Transit IBC.
- SH18 Rapid transit corridor between Westgate and Constellation.
- SH16 to SH18 Connections improvements.

Figure A1:1 Map showing Do Minimum projects for the North West DBC



The inclusion of these key inter-dependent strategic projects in the Do-minimum network is to account for the fact that those projects are being developed separately by Waka Kotahi/Auckland Transport, so are not included as part of the Te Tupu Ngātahi improvements package. They are however a key part of the future transport network for the North West so are part of the overall North West response. If these projects were not to occur, the likely impact is greater demands on the projects identified in this assessment. It is noted that the SH16 Brigham Creek to Waimauku project has funding and potential seed funding for the CC2W project has been included in the RLTP as part of the 10 year capital expenditure. All projects are subject to stand alone business case processes. To understand

the overall North West response, it is therefore considered appropriate to include these projects in the modelling assessment.

1.1.2 MSM Outputs

There are a number of outputs from the transport modelling, including:

- Demand patterns (Origin-Destination travel) and facility usage (flows)
- Network performance
- Travel times and costs (real and perceived) for economic analysis
- Delays, queues and Level of Service (LoS) for design and assessment
- Aggregate travel statistics on travel such as Vehicle Kilometres Travelled (VKT), Passenger Kilometres Travelled (PKT) and total travel costs
- Flow and performance for environmental analysis
- Inputs to vehicle emissions models
- Inputs to noise analysis

1.2 SATURN

SATURN is a mesoscopic traffic simulation and assignment model used to undertake a variety of area wide strategic assessments through to more detailed local area assessments. It can be used as a conventional model for the analysis of traffic-management schemes over localised networks as well as for major investment improvements at a regional level. The SATURN model ensures factual representation of vehicle flow patterns and congestion on midblock sections and intersections in the form of ‘arrival’ flows rather than ‘demand’ flows. Additionally, it is used as a high-level junction simulation model that evaluates the traffic flow behaviour on junctions. It represents ‘congested assignment’ of multiple user classes modelled separately, including bus priority and high occupancy vehicle lanes.

1.2.1 SATURN Outputs

There are a number of outputs from the SATURN model, including:

- Vehicular flow pattern -Actual flow, Demand flow, Queued flow
- Network performance- Link and Node delays, Queue Statistics, V/C Ratios
- Mid-block capacities and speeds
- Aggregate travel statistics on travel such as Total Travel Time(hrs), Distance Travelled (kms)

1.3 SIDRA

Signalised (and unsignalised) Intersection Design and Research Aid (SIDRA) is a micro-analytical tool used for evaluating intersection performance. It has a comprehensive, lane-based network modelling approach applicable to all types on intersections-signal, priority or sign control and roundabouts. SIDRA allows the modelling of various movement classes (Light vehicle, Heavy vehicle, Buses, Bicycle, Large Trucks, Light Rail/ Trams) with distinctive vehicle features to be assigned to designated lanes, segments and signal phases.

The Te Tupu Ngātahi SIDRA model is used to analyse the form and function of proposed intersections along strategic corridors. Based on the demand flow outputs from the SATURN Model, the intersection turning flows are determined.

The performance measures of the intersection in terms of capacity, delay, Level of Service (LOS), queue length on approach lanes and optimum vehicle-pedestrian signal phasing is calculated.

It is noted that the SIDRA model is reliant on outputs from the SATURN model, with traffic distribution based on the network provided in SATURN. A finer grain network that includes all collectors and local roads is not provided in SATURN, and as such it can considered that intersection modelling in SIDRA results in a conservative assumption of performance.