TE TUPU NGĀTAHI
SUPPORTING GROWTH

North West Redhills and Riverhead Assessment of Transport Effects

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Version 1

WAKA KOTAHI
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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
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
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.
Redhills Riverhead Assessment Package	Two Notices of Requirement (for Don Buck Road and Coatesville-Riverhead Road) and one alteration to an existing designation (Fred Taylor Drive) for the Redhills Riverhead Package of Projects for Auckland Transport.

1 Executive Summary

1.1 Overview

This Transport assessment has been prepared for the North West Redhills and Riverhead Local Arterials Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "**Redhills Riverhead Assessment Package**"). The NoRs are to designate land for future strategic and 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 Redhills and Riverhead areas of Auckland and is referred to as the Redhills Riverhead Assessment Package.

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

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

Notice	Project
NoR RE1	Don Buck Road FTN Upgrade
NoR RE2	Fred Taylor Drive (alteration to existing designation 1433)
NoR R1	Coatesville-Riverhead Highway Upgrade

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

Network Component	Information Source	Assessment Method
		compliance with Transport Design Manual
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) SGA Remix File[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.		

1.2.2 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 CTMP and / or SSTMP

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.

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

1.3 NoR RE1: Don Buck Road FTN Upgrade

1.3.1 Road Environment Overview

The project proposes that the function of Don Buck Road will change from an existing two-lane urban arterial to a four-lane urban arterial.

The existing corridor includes two vehicle lanes, one per direction, as well as footpaths and on-street bicycle lanes on both sides. The indicative proposed design includes two additional vehicle lanes, as well as new and improved facilities for walking and cycling as shown in Figure 1-1.

Figure 1-1: Indicative future Don Buck Road corridor design

1.3.2 Overall Conclusion

Overall, the NoR RE1: Don Buck Road FTN Upgrade project has 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 St Paul's Primary School and Massey Leisure Centre should be specifically considered within the CTMP prior to construction and implementation of the Project.

1.4 NoR RE2: Fred Taylor Drive FTD Upgrade

1.4.1 Road Environment Overview

The Project proposes that the function of Fred Taylor Drive will change from an existing two-lane road to a low-speed urban four-lane arterial.

The existing corridor includes two vehicle lanes, one per direction, as well as discontinuous segments of footpaths on both sides of the corridor. The indicative proposed design includes two additional public transport lanes, as well as new facilities for walking and cycling as shown in Figure 1-2.

Figure 1-2: Indicative future Fred Taylor Drive corridor design

1.4.2 Overall Conclusion

Overall, the NoR RE2: Fred Taylor Drive FTN Upgrade project has considerable positive transport effects, in particular improved safety, walking and cycling, and public transport effects. Access effects on two properties have been identified, with one property recommended to be included within the designation boundary and the second access recommended to be relocated.

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.

1.5 NoR R1: Coatesville Riverhead Highway Upgrade

1.5.1 Road Environment Overview

The Project proposes that the function of Coatesville Riverhead Highway will change from an existing rural two-lane road to a low-speed urban two-lane arterial in the urban section and an upgraded rural arterial in the rural section.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side adjacent to the Riverhead residential subdivision. There are no footpath facilities in the rural section of the corridor. The indicative proposed design includes two vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 1-3 and Figure 1-4.

The form and function of Coatesville Riverhead Highway will change slightly through various segments of the corridor, with the eastern segments being adjacent to residential development, and the western segment adjacent to greenfield land. As such, the cross section will change along the length of the Coatesville Riverhead Highway, to best accommodate vehicles, active modes and freight in relation to the adjacent land use.

Figure 1-3: Indicative future Coatesville Riverhead Highway corridor design between SH16 and Short Road

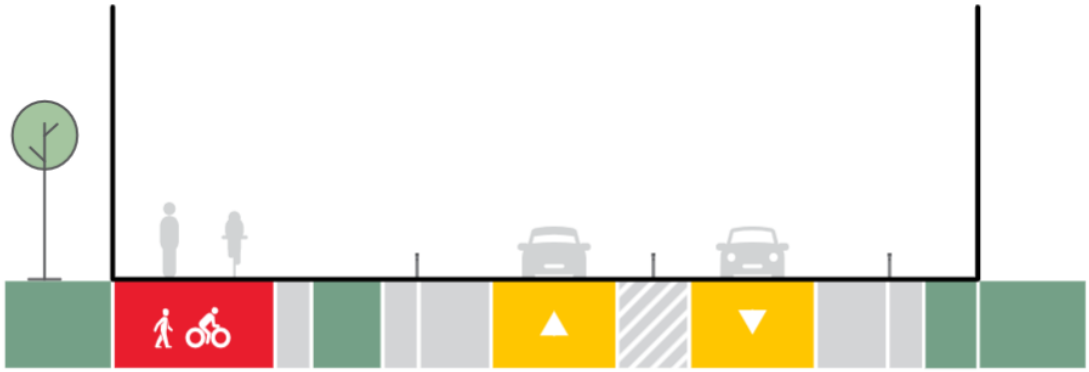


Figure 1-4: Indicative future Coatesville Riverhead Highway corridor design between Short Road and Riverhead Road

1.5.2 Overall Conclusion

Overall, the NoR R1: Coatesville Riverhead Highway Upgrade project provides considerable positive transport 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.

2 Introduction

This Transport assessment has been prepared for the North West Redhills and Riverhead Local Arterials Notices of Requirement (**NoRs**) for Auckland Transport (**AT**) (the "**Redhills Riverhead Assessment Package**"). The NoRs are to designate land for future strategic and 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 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.

The Redhills Riverhead Assessment Package will provide route protection for the local arterials, which include walking, cycling and public transport (including the Frequent Transit Network (**FTN**)), needed to support the expected growth in Redhills and Riverhead.

This report assesses the transport effects of the North West Redhills Riverhead Assessment Package identified in Table 2-1 below.

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

Notice	Project
NoR R1	Don Buck Road FTN Upgrade
NoR RE2	Fred Taylor Drive (alteration to existing designation 1433)
NoR R1	Coatesville-Riverhead Highway Upgrade

The Redhills Riverhead Assessment Package comprises three separate projects which together form the North West Redhills and Riverhead Arterial Network. The network includes provision for general traffic, walking and cycling, and frequent public transport.

Refer to the main AEE for a more detailed project description.

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 Redhills Riverhead Assessment Package. Its purpose is to inform the AEE that accompanies the four NoRs and one alteration to an existing designation for the Redhills Riverhead Assessment Package sought by AT.

This report considers the actual and potential effects associated with the construction, operation and maintenance of the Redhills Riverhead 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 Redhills Riverhead Assessment Package area;

b) Identify and describe the actual and potential transport effects of each Project corridor within the Redhills Riverhead 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 Redhills Riverhead Assessment Package; and
d) Present an overall conclusion of the level of actual and potential effects for each Project corridor within the Redhills Riverhead Assessment Package after recommended measures are implemented.

2.2 Report Structure

The report is structured as follows:

a) Overview of the Assessment Methodology used to undertake the assessment
b) An assessment of the positive effects related to the Redhills Riverhead projects as a network
c) An assessment of actual and potential adverse construction effects for the Redhills Riverhead projects
d) An assessment of operational transport effects for each project including:
    a. Description of each Project corridor and project features as it relates to transport;
    b. Identification and description of the existing and likely future transport environment;
    c. Description of the actual and potential adverse transport effects of operation of the Project;
    d. Recommended measures to avoid, remedy or mitigate potential adverse transport effects; and
    e. Overall conclusion of the level of potential adverse transport effects of the Project 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.

2.3 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 Redhills Riverhead 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 proposed 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, including the already zoned Redhills area.

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

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 strategic model (MSM). This model creates estimates of car, truck and PT 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 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 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 roadways 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:

- **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

Assessment of the Projects against the relevant objectives and policies of the AUP:OP is contained in the AEE. 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) 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 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
Public Transport	Transport Model tools (MSM, SATURN and SIDRA) SGA 2048 Future Public Transport Network File[2]	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)	Assessment using key model outputs including traffic volumes, levels of service for corridor

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

Network Component	Information Source	Assessment Method
	Project design drawings	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 Redhills Riverhead 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 main 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.

Based on the indicative construction methodology an assessment of construction effects has been completed for the package sufficient to support each NoR. 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)

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 as existing roads these Projects may need to be delivered ‘online’. 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 Redhills Riverhead Assessment Package Overview

A brief summary of the Redhills Riverhead Assessment Package projects is provided in Table 4-1 below.

Table 4-1: Redhills Riverhead Assessment Package Project Summary

Corridor	NOR	Description	Requiring Authority
Don Buck Road FTN Upgrade	RE1	Upgrade of Don Buck Road corridor to a 30m wide four-lane cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Fred Taylor Drive FTN Upgrade	RE2	Upgrade of Fred Taylor Drive corridor to a 30m wide four-lane cross-section providing bus priority lanes and separated active mode facilities on both sides of the corridor.	Auckland Transport
Coatesville-Riverhead Highway Upgrade	R1	Upgrading the southern section of the corridor to a 33m two-lane low speed rural arterial cross-section with active mode facilities on the western side; and Upgrading the northern section of the corridor to a 24m two-lane urban arterial cross-section with 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 Redhills Riverhead 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 on 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 Redhills and Riverhead, 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

Notwithstanding this, it is considered that given that connectivity to the strategic network and the available capacity in the network that 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 Fred Taylor Drive and Brigham Creek Road as a Level 1B freight routes, it is recommended that these corridors are 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 an alternative route. 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 (such as Bike Auckland and cycling clubs) be kept informed of construction times and progress, and general observations of pedestrian and cyclist activity will 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 SSCTMP, if required.

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
Don Buck Road FTN Upgrade	NoR RE1	• St Paul's Primary School • Massey Leisure Centre
Fred Taylor Drive FTN Upgrade	NoR RE2	• No specific sites
Coatesville-Riverhead Highway Upgrade	NoR R1	• 1229 Coatesville Riverhead Highway

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 RE1: Don Buck Road FTN Upgrade

6.1 Project Corridor Features

6.1.1 Project Overview

Don Buck Road is an existing two-lane arterial extending from Fred Taylor Drive in the north to Swanson Road and Universal Drive in the south. The extent of the indicative proposed upgrade is from Fred Taylor Drive in the north and Royal Road to the south. The corridor currently functions as a north-south arterial road running parallel to SH16 and is anticipated to facilitate future growth in Redhills, whilst also connecting people to rapid transit stations, regional active mode corridors and the SH16 motorway interchanges. The corridor is also intended to support active modes, freight, and public transport priority for the future FTN network.

This section of Don Buck Road is indicatively proposed to be upgraded from a corridor width of 27-35m to a 30m wide four-lane local arterial with buses priority lanes and separated cycle lanes and footpaths on both sides of the corridor. Intersections located along the corridor are indicatively proposed to be signalised.

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

Figure 6-1: Overview of the Indicative Don Buck Road FTN Upgrade

6.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area. 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 North West.

The Project proposes that the function of Don Buck Road will change from an existing two-lane road to an urban four-lane arterial (using AT Transport Design Manual standards).

The existing corridor includes two vehicle lanes, one per direction, plus on-street bicycle lanes and footpaths on both sides. The indicative proposed design includes two additional vehicle lanes, as well as new and improved facilities for walking and cycling as shown in Figure 6-2.

Figure 6-2: Indicative future Don Buck Road corridor design (Fred Taylor Drive to Royal 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 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.

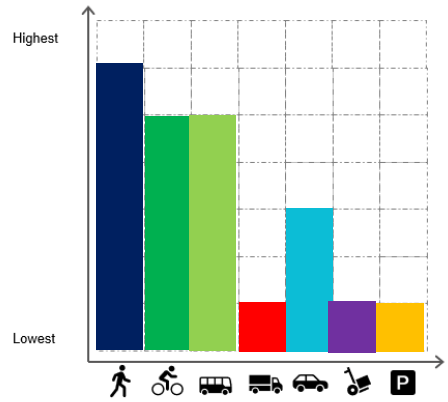
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land 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 (low/local) to P2 (medium) long term
- Movement function - transitioning from M2 (medium) to M3 (high/regional) long 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. 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 Don Buck Road between Fred Taylor Drive and Royal 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 the 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.

6.3 Existing and Likely Future Environment

6.3.1 Planning context

The land adjacent to Don Buck Road is comprised of various business, residential and open space zoning. The following outlines the key elements of the planning context for the Don Buck Road FTN Upgrade:

- The eastern side of Don Buck Road above Westgate Drive is zoned under the AUP:OP as Business – Light Industry. To the south of Westgate Drive, the eastern side of Don Buck Road contains an Open Space – Community Zone (occupied by Massey Leisure Centre), with the remaining land zoned as Residential – Mixed Housing Zone.
- The western side of Don Buck Road is within the I610 Redhills Precinct and is predominantly zoned Residential – Mixed Housing Urban, with a portion of land in the northern section of the corridor zoned Residential – Terraced Housing and Apartment Buildings Zone (**THAB**). Land further to the west of Don Buck Road forms part of the Redhills Precinct.

Table 6-1 below provides a summary of the existing and likely future environment as it relates to the Don Buck Road FTN Upgrade.

Table 6-1: Don Buck Road FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[3]	Likely Future Environment[4]
Business	Business (Industrial)	Low	Business
Residential	Residential – Mixed Housing Urban Zone Residential – Terraced Housing and Apartment Zone	Low	Residential
Open Space	Open Space – Community Zone	Low	Open Space

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

6.3.2 Transport Environment

6.3.2.1 Existing

The existing corridor is predominantly surrounded by mixed-use residential and commercial retail, with rural land to the west of the corridor. It is comprised of one vehicle lane in each direction, with footpaths and on-street bicycle lanes on both sides. **Error! Reference source not found.** shows the section of Don Buck Road that is included in this study, under existing conditions.

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

Table 6-2: Don Buck Road: Existing Transport Features

	Existing Don Buck Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Semi-urban character with two vehicle lanes (one in each direction). • Corridor form is relatively consistent with kerb and channels on both sides of the corridor, a flush median, and footpaths plus on-street cycle lanes on both sides. In some locations the on-street cycle lane converts to a separated shared path.
Key connections to the wider network	• Connects to Fred Taylor Drive in the north, linking to SH16 ramps at Hobsonville Road • Connects to Triangle Road and Royal Road which connect on to SH16
Traffic Volume	Recent traffic data for Don Buck Road was obtained from Auckland Transport[5]. The data was recorded in October 2020 and shows Don Buck Road (between Triangle Road and Royal Road) carried a 5 Day Average Daily Traffic of approximately 25,300 vehicles per day (vpd), and 2,100 vehicles per hour (vph) during both morning and afternoon peak hours.

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

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

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

	Existing Don Buck Road Transport Features
Road Network / General Traffic	• Don Buck Road / Westgate Drive roundabout • Don Buck Road / Rush Creek Drive give-way with right turns queuing in the median • Don Buck Road / Beauchamp Drive give-way control with right turn bay • Don Buck Road / Royal Road roundabout • Don Buck Road / Triangle Road roundabout • Don Buck Road / Redhills Road roundabout
Walking and Cycling	Generally narrow footpaths which are approximately 1.5 m wide, with the exception of the sections that have shared paths which are 3.0 m wide.
Public Transport	Current bus services on Don Buck Road: • Bus service 14W between Westgate, Lincoln Rd, Henderson, New Lynn. Operates as a Frequent Service (at least every 15 minutes, 7am – 7pm, 7 days a week). • Bus service 120 between Constellation Station, Greenhithe, Hobsonville Rd, Westgate, Don Buck Rd, Henderson. Operates as a Connector Service (At least every 30 minutes, 7am – 7pm, 7 days a week). • Bus service 129 between Westgate, Don Buck Rd, Universal Dr, Northwestern Motorway, Great North Road, City. Operates as a peak service (predominantly offered during commuter periods).

6.3.2.2 Likely Future

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

Table 6-3: Don Buck Road: Likely Future Transport Features

Transport Features	Likely Future Don Buck Road Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes (two in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and continuous footpaths and cycle facilities. • Generic four-lane arterial with a 30m designation.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Don Buck Road in 2048 is 25,500 - 27,000 vehicles.
Road Network / General Traffic	• Don Buck Road / Westgate Drive signals • Don Buck Road / Rush Creek Drive signals • Don Buck Road / Beauchamp Drive signals • Don Buck Road / Royal Road signals • Don Buck Road / Triangle Road signals • Don Buck Road / Redhills Road signals
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides.

Transport Features	Likely Future Don Buck Road Transport Features
Public Transport	12-18 buses per hour under the indicative 2048 AT bus network, or approximately 1 bus every 5 minutes.

Key features of the proposed new corridor include the following:

- Widening of Don Buck Road to a 30m wide four-lane local arterial with buses priority lanes and separated cycle lanes and footpaths on both sides of the corridor.
- The upgrade to the intersections with Fred Taylor Drive, Westgate Drive, Rush Creek Drive and Beauchamp Road.
- The proposed upgrade is expected to remain within the existing corridor to the extent possible with localised widening occurring near intersections.
- Tie-ins with existing roads, stormwater dry ponds, wetlands and culverts..
- Likely posted speed of 50kph, design speed of 60 kph
- 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.

6.4 Assessment of Operational Transport Effects

6.4.1 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 Don Buck Road is expected to result in positive effects on safety when compared to the existing corridor, specifically

- Significantly improved walking and cycling facilities along Don Buck Road (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities (crossing Don Buck Road) at Fred Taylor Drive, Westgate Drive, Rush Creek Drive and Beauchamp Road, resulting in a safer environment for all road users.

It is anticipated that the number of pedestrians and cyclists will increase significantly as the area surrounding Don Buck Road is developed. The traffic volume on Don Buck 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 proposed design of the Project is well aligned with the transport safety principles from AT. It will provide a much safer transport system which will support a reduced number of deaths or serious injuries (DSI) 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.

6.4.2 Walking and Cycling

The Project proposes separated walking and cycling facilities on both sides of Don Buck Road. It also includes sufficient space to provide dedicated pedestrian and cycle crossing facilities which connects with the expected future adjacent facilities on Fred Taylor Drive (NoR RE2). 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: Don Buck Road upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[6]	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 proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Don Buck Road are proposed to be 50km/hr, therefore the proposed design of the walking and cycling facilities is considered to be appropriate for these standards.

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

Policy/Standard	Network Component	Assessment
AT Transport Design Manual[7]	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 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 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 Don Buck Road.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south 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 Redhills and the future RTN at Westgate and alongside SH18 in the longer term. For more detail on future assumptions see Appendix 1.
- Support growth adjacent to Don Buck Road and significantly improve safety and access to employment and social amenities.

6.4.3 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.

The future public transport network has been developed by Auckland Transport. This proposed network will include between 8 to 12 buses an hour. These services combined will provide a bus every five to ten minutes. These services will connect commuters to Henderson, Westgate and the future RTN station via Westgate and an indicative station Royal Road.

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.
- 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.

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

6.4.4 General Traffic

As identified above, the 2048 ADT for Don Buck Road is 25,500 - 27,000 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 2,550-2,700 vehicles. No additional mid-block capacity is proposed in the project for private vehicles, and capacity will remain as is existing. By providing bus lanes, buses travelling in this corridor will avoid any resulting congestion due to private vehicles. It is noted that the proposed traffic volumes as reported here are projections based on the implementation of the full network in Redhills.

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)
Don Buck Road / Westgate Drive (Signals)	Morning Peak	E	0.962	291.8
	Evening Peak	D	0.888	285.6
Don Buck Road/ Fred Taylor Drive	Morning Peak	D	0.858	204.1
	Evening Peak	D	0.917	201.2

The overall level of service at these two main intersections is expected to be near capacity by 2048. It is noted that while there are delays at this intersection, this is not unexpected for private vehicles in the peak period in close proximity to a town centre and a State Highway interchange. Given the proximity to the town centre it is considered that the provision of additional lanes for vehicle capacity would be detrimental to walking and cycling connectivity, as this would increase crossing times for pedestrians.

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

6.4.5 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 area to be urbanised to the east Don Buck Road.

In terms of existing properties, the overarching design philosophy for the project has been to maintain driveway access where practicable and minimise impacting land other than where necessary. 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 implement with project in place, primarily due to changes to road levels and 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:

- 453,455 and 457 Don Buck Road.

6.4.6 Freight

Don Buck is an existing corridor with two lane capacity for general vehicles and freight. The project proposes to provide walking and cycling facilities and dedicated bus lanes. Therefore it is considered that there will generally be no adverse effects on freight movements.

Over-dimension and overweight routes are expected to be further reviewed by AT/ Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future. It is noted that Don Buck Road is not currently identified by Auckland Transport as a freight route.[8]

6.4.7 Wider Network Effects

The provision of dedicated and continuous bus lanes, footpaths and cycle paths on the Don Buck Road corridor will improve the network significantly for these modes. The ability to connect to the Westgate Metropolitan centre and the planned public transport facilities at this location will support a shift from private vehicles to other transport modes.

6.5 Project Interdependencies

The Don Buck Road project has been designed to integrate with Fred Taylor Drive. The key interface for the Don Buck Road project is the intersection with Fred Taylor Drive.

6.6 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 6.4.5 that have been identified for inclusion within the designation boundary in response to access effects.

6.7 Summary of Operational Transport Effects (NoR RE1)

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

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

Table 6-6: Assessment of Operational Effects Summary for NoR RE1 (Don Buck 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. This includes upgraded cycle facilities and continuous walking and cycling linkages
Walking and Cycling	In summary, the effects of the Project on walking and cycling are: • A significantly reduced likelihood and exposure to potential crashes as it will enable safe movement for vulnerable road users along and across Don Buck 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 a safe connector route between Redhills and the future RTN at Westgate and alongside SH18 in the longer term. • Support growth adjacent to Don Buck 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: • 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 public transport facilities to operate within separated travel lanes. • 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, there are a number of properties that have been identified as adversely effected by the project. This is largely due to the inability to provide access to the properties following the implementation of the project. These properties include: • 453,455 and 457 Don Buck Road.
Freight	In summary, the project has no adverse effects on freight movements.
Wider Network Effects	In summary, the project improves the wider networks for public transport, walking and cycling in the surrounding area.

6.8 Conclusions

Overall, the NoR RE1: Don Buck Road FTN Upgrade project provides positive transport effects. There are several properties where the reinstatement of a driveway will not be possible, and the

inclusion of the properties with the designation is recommended. The project provides positive operational effects, in particular improved safety, public transport, 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 St Paul's Primary School and the Massey Leisure Centre should be specifically considered within the CTMP prior to construction and implementation of the Project.

7 NoR RE2: Fred Taylor Drive FTN Upgrade

7.1 Project Corridor Features

7.1.1 Project Overview

Fred Taylor Drive is an existing two-lane arterial corridor which extends from the existing Brigham Creek Interchange in the north to SH16 in the south (via an intersection with Don Buck Road). This corridor runs through a mix of residential and industrial land uses and forms an important connection as the spine of the Redhills network

It is proposed to upgrade the corridor between Hailes Road and Dunlop Road to accommodate a 30m wide four-lane FTN arterial with separated walking and cycling facilities[9]. The existing corridor designation is approximately 30m wide on average, with the proposed upgrade expected to remain within the existing designation 1433 to the extent possible with localised widening occurring at intersections. The Fred Taylor Drive FTN Upgrade also includes the upgrade of the intersections with Kakano Road and Northside Drive to signals.

The upgraded Fred Taylor Drive corridor will have multiple purposes. These are to provide access from Redhills to both a future rapid transit station and the strategic highway network; and the FTN facilities will provide a multimodal corridor into Westgate metropolitan centre. The proposed corridor will also support an active mode shift with separated cycle lanes and footpath on both side and public transport priority lanes.

An overview of the indicative proposed design is provided in Figure 7-1.

[9] The Fred Taylor Drive FTN Upgrade has an interdependency with the North West Strategic Transport Network, therefore the portion of Fred Taylor Drive north of Hailes Road forms part of the upgrade to Brigham Creek Interchange.

Figure 7-1: Overview of the Fred Taylor Road Upgrade

7.2 Network and Corridor Design

The Project was developed as part of network planning for the wider area. 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 Fred Taylor Drive will change from an existing 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 includes two vehicle lanes, one per direction, as well as discontinuous segments of footpaths on both sides of the corridor. The indicative proposed design 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 Fred Taylor Drive 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.

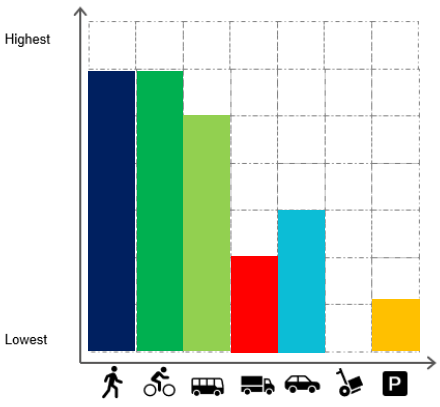
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land 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 (local/low) to P2 (medium/mixed urban) long term
- Movement function - transitioning from M2 (medium movement) to M3 (regional movement) long term

The following Figure 7-3 and Table 7-4 indicate 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 sustainable modes of travel.

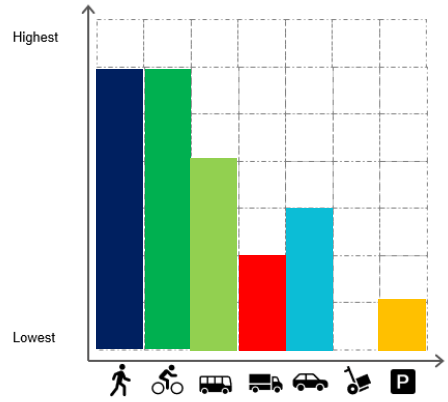
Figure 7-3: Future modal priority in 2048+ for Fred Taylor Drive between Brigham Creek and Northside



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 7-4: Future modal priority in 2048+ for Fred Taylor Drive between Northside and Don Buck 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.

7.3 Existing and Likely Future Environment

7.3.1 Planning context

The existing Fred Taylor Drive corridor runs through a mix of residential and industrial land uses.

The northern section of Fred Taylor Drive is within the Redhills North FUZ, with an area of land zoned under the AUP:OP as Open Space – Sport and Active Recreation Zone (Fred Taylor Park) adjacent the road corridor. The southern section of Fred Taylor Drive is zoned under the AUP:OP as THAB zone on the western side, and forms part of the I610 Redhills Precinct. The eastern side is zoned Business – Light Industry Zone and Business – Mixed Use Zone and forms part of the I615 Westgate Precinct.

Table 7-1 below provides a summary of the existing and likely future environment as it relates to the Fred Taylor Drive FTN Upgrade.

Table 7-1: Fred Taylor Drive FTN Upgrade Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[10]	Likely Future Environment[11]
Business	Business (Light Industrial)	Low	Business
	Business (Mixed Use)	Low	

[10] Based on AUP:OP zoning/policy direction
[11] Based on AUP:OP zoning/policy direction

Environment today	Zoning	Likelihood of Change for the environment[10]	Likely Future Environment[11]
Residential	Residential – Terraced Housing and Apartment Zone	Low	Residential
Open Space	Open Space – Sport and Active Recreation	Low	Open Space
Undeveloped greenfield areas	Future Urban	**High**	Urban

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

7.3.2 Transport Environment

7.3.2.1 Existing

The existing corridor is surrounded by a mix of greenfield land, as well as residential and industrial land uses. Table 7-2 summarises the existing transport features of the Fred Taylor Drive corridor.

Table 7-2: Fred Taylor Drive: Existing Transport Features

	Existing Fred Taylor Drive Transport Features
Corridor Characteristics	• Has an 80kph speed limit. • Semi-urban character with two vehicle lanes (one in each direction). • Corridor form is inconsistent with formal kerb and channel and footpaths in sections adjacent to recent development or recently upgraded intersections.
Traffic Volume	The latest traffic data for Fred Taylor Drive was obtained from Auckland Transport[12]. The data was recorded in October 2020 and shows Fred Taylor Drive (between Spring Garden Road and Matakohe Road) carried a 5 Day Average Daily Traffic of approximately 1,300 vehicles per day (vpd), and 930-1,140 vehicles per hour (vph) during the morning and afternoon peak hours.
Road Network / General Traffic	• Fred Taylor Drive / Kakano Road signal. • Fred Taylor Drive / Northside Drive signal. • Fred Taylor Drive / Hailes (/ Spedding Road) stop control.
Walking and Cycling	A footpath which is approximately 2.5 m wide is provided in limited sections on both sides of corridor. A mix of on road cycle lanes, cycle paths, shared paths and no facilities are provided for cyclists.
Public Transport	The following services operate on the northern section of Fred Taylor Drive (north of Northside Drive): • Bus service 122 between Huapai, Kumeu, and Westgate. This service operates every 2 hours 7 days a week.

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

	Existing Fred Taylor Drive Transport Features
	• Bus service 125 between Helensville, Waimauku, Huapai, Kumeu, and Westgate. This service operates every 2 hours 7 days a week. • Bus service 125X between Helensville, Waimauku, Huapai, Kumeu, Westgate, Northwest Motorway, and City. • Bus service 126 between Westgate, Riverhead, Coatesville, and Albany Station. This service operates at least every 60 minutes 7 days a week. Lower frequencies early morning and evenings.

7.3.2.2 Likely Future

Table 7-3 summarises the likely future transport features of the Fred Taylor Drive corridor.

Table 7-3: Fred Taylor Drive: Likely Future Transport Features

	Likely Future Fred Taylor Drive Transport Features
Corridor Characteristics	• 50kph speed limit. • Urban character with four vehicle lanes (two 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 30m designation.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) on Fred Taylor Drive in 2048 is 15,000 to 22,000 vehicles.
Road Network / General Traffic	• Fred Taylor Drive / Kakano Road signal. • Fred Taylor Drive / Northside Drive signal. • Fred Taylor Drive/Spedding Road
Walking and Cycling	Separated 2.0m cycle lanes and 1.8m footpaths on both sides.
Public Transport	The indicative 2048 AT bus network forecasts 16 buses per hour on Fred Taylor Drive, or approximately 1 bus every 5 minutes.

Key features of the proposed new corridor include the following:

- The upgrade of the existing corridor to a 30m wide four-lane FTN arterial with separated walking and cycling. This widening is expected to remain in the existing designation 1433 to the extent possible.
- Localised widening outside the existing designation 1433 occurring at intersections.
- The upgrade of the intersections with Kakano Road and Northside Drive to signalised intersections.
- Additional land for tie-ins with side streets and stormwater wetlands.
- Likely posted speed of 50kph, design speed of 60 kph.
- Batter slopes to enable widening of the corridor, and associated cut and fill activities.
- 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 Fred Taylor Drive 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 Fred Taylor Drive (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved, and new, walking and cycling crossing facilities (crossing Fred Taylor Drive) at Kakano Road intersection, 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 Fred Taylor Drive is developed. The traffic volumes on Fred Taylor Drive 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 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 proposed design of the project is well aligned with the transport safety principles from AT. It will provide a much safer transport system which will likely reduce the number of deaths and serious injury crashes 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 Fred Taylor Drive. It also includes sufficient space to provide dedicated pedestrian and cycle crossing facilities at Don Buck Road (NoR RE1) and with the upgraded Brigham Creek Interchange which connects 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 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[13]	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 proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Fred Taylor Drive are proposed to be 50km/hr, therefore the proposed design of the

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

Policy/Standard	Network Component	Assessment
		walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[14]	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 Fred Taylor Drive.
- Improve integration with the future walking and cycling network, resulting in improved east-west and north-south 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 Redhills and the future RTN at Westgate.
- Support growth surrounding Fred Taylor Drive and significantly improve safety and access to employment and social amenities.

7.4.3 Public Transport

The Fred Taylor Drive corridor will provide for dedicated bus lanes that connect to Westgate centre

For future public transport services, there is one core proposed frequent transport service which will use Fred Taylor Drive. This service is forecast to operate every five minutes in the peak commuter 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 positive, and are:

- Reduced delays and improved reliability for future frequent public transport network on Fred Taylor Drive 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.

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

7.4.4 General Traffic

As identified above, the 2048 ADT for Fred Taylor Drive is between 15,000 and 22,000 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 1,500 to 2,200 vehicles. A four-lane corridor can efficiently accommodate 2,200 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)
Fred Taylor Drive / Kakano Road (Signal)	Morning Peak	C	0.856	240.3
	Evening Peak	C	0.871	162.7
Fred Taylor Drive / Northside Drive (Signal)	Morning Peak	D	0.917	394.1
	Evening Peak	C	0.853	176.6
Fred Taylor Drive/Spedding Road	Morning Peak	B	0.956	161.8
	Evening Peak	B	0.639	44.0

The overall level of service for the intersections Fred Taylor Drive is LoS D or better. Bus priority movements for the through travelling buses will be facilitated from the kerb side lane during these periods. It is noted that there is some degree of queuing experienced on Fred Taylor Drive in the peak period for private vehicles, however this is not unexpected for a peak period.

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, Fred Taylor Drive 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 Fred Taylor Drive.

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

The intersection of Spedding Road and Fred Taylor Road as proposed impacts on the current location of the driveway of 121 Fred Taylor. It is proposed to relocate this access away from the intersection to the southern edge of the property.

7.4.6 Freight

Don Buck is an existing corridor with two lane capacity for general vehicles and freight. The project proposes to provide walking and cycling facilities and dedicated bus lanes. Therefore it is considered that there will generally be no effect on freight movements. There may be some benefit to freight movements should these lanes be available for freight movements in the interpeak periods.

Over-dimension and overweight routes are expected to be further reviewed by AT/ Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future. It is noted that Fred Taylor Drive is currently identified by Auckland Transport as a Level 1B freight route.[15]

7.4.7 Wider Network Effects

The upgrade of Fred Taylor Drive to include dedicated bus priority lanes and walking and cycling facilities will support the wider connectivity for these modes within the Redhills area. These will have a wider positive network for public transport in particular providing reliable connections through to the Westgate Metropolitan centre and the proposed SH16 RTN.

7.5 Project Interdependencies

7.5.1 Northside Drive

The Fred Taylor Drive corridor connects to the Northside Drive corridor. Currently Northside Drive continues to Maki Street and terminates at the Westgate centre. In longer term this will connect through to an overbridge of SH16. The remainder of the Northside Drive corridor is provided for via Designation 1473, which enables a 2-lane corridor connection to Trig Road. 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.

The Fred Taylor Drive corridor can be implemented prior to the delivery of the Northside Drive connection.

7.5.2 Spedding Road

The new Spedding Road connection as proposed in the Whenuapai network includes a strategic crossing from Whenuapai over SH16 to connect to Fred Taylor Drive. The Spedding Road project is a two-lane urban arterial with dedicated walking and cycling facilities. The corridor is expected to enable local trips from Whenuapai to Westgate without interfacing with the SH16 corridor.

As shown above, the intersection of Spedding Road and Fred Taylor Drive is provided for via a roundabout.

[15] 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 relocation of the driveway at 121 Spedding Road is recommended to provide safe access to the property, sufficiently distanced from the proposed roundabout.

7.7 Summary of Operational Transport Effects (NoR RE2)

The assessment of transport effects for the Project is summarised in Table 7-6.

Table 7-6: Assessment of Operational Effects Summary for NoR RE2 (Fred Taylor Drive)

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 Fred Taylor Drive. • 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 Redhills and the future RTN at Westgate • Support growth adjacent to Fred Taylor Drive 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, there are limited access effects related to the project. • There is one property at 121 Fred Taylor Drive where a driveway is recommended to be relocated.

Operational Transport Effects	
Freight	In summary, it is considered that there will generally be no effect on freight movements
Wider Network Effects	In summary, there are considered to be positive effects for the wider public transport and walking cycling benefits. No wider network effects for freight and private vehicle

7.8 Conclusions

Overall, the NoR RE2: Fred Taylor Drive FTN Upgrade project provides positive transport effects, and there is one access relocation identified to address access effects. The project provides positive operational effects, in particular improved safety, public transport, 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.

8 NoR R1: Coatesville Riverhead Highway Upgrade

8.1 Project Corridor Features

8.1.1 Project Overview

The Coatesville-Riverhead Highway is an existing arterial extending from SH16 in the south to its intersection with Dairy Flat Highway in the north east, with the extents of the proposed upgrade from SH16 in the south to its intersection with Riverhead Road in the north. The southern section of the alignment from SH16 to Short Road runs through rural land uses which are expected to remain. The northern section (close to and within the Riverhead township) runs through low-medium density residential land uses on the east and future urban zoned land on the west.

The Coatesville-Riverhead Highway Upgrade Project involves:

- Upgrading the southern section of the corridor to a 33m two-lane low speed rural arterial with active mode space on the western side; and
- Upgrading the northern section of the corridor to a 24m two-lane urban arterial with walking and cycling facilities on both sides of the corridor.

The project includes upgrades to the intersections with Old Railway Road and Riverhead Road and is expected to tie in with a future roundabout at SH16 as part of the Waka Kotahi SH16 Safety Improvements Project.

The proposed upgrade will provide a key north-south connection from Riverhead to the strategic road network and proposed Rapid Transit Corridor[16] and City Centre to Westgate rapid transit services[17] at Westgate. Furthermore, the upgrades will support active mode use and reduce safety risks on the corridor.

An overview of the proposed design for the Coatesville Riverhead Highway Upgrade is provided in Figure 8-1 below.

[16] Other North West Strategic Package Project

[17] Other proposed transport project not being delivered by Te Tupu Ngatahi

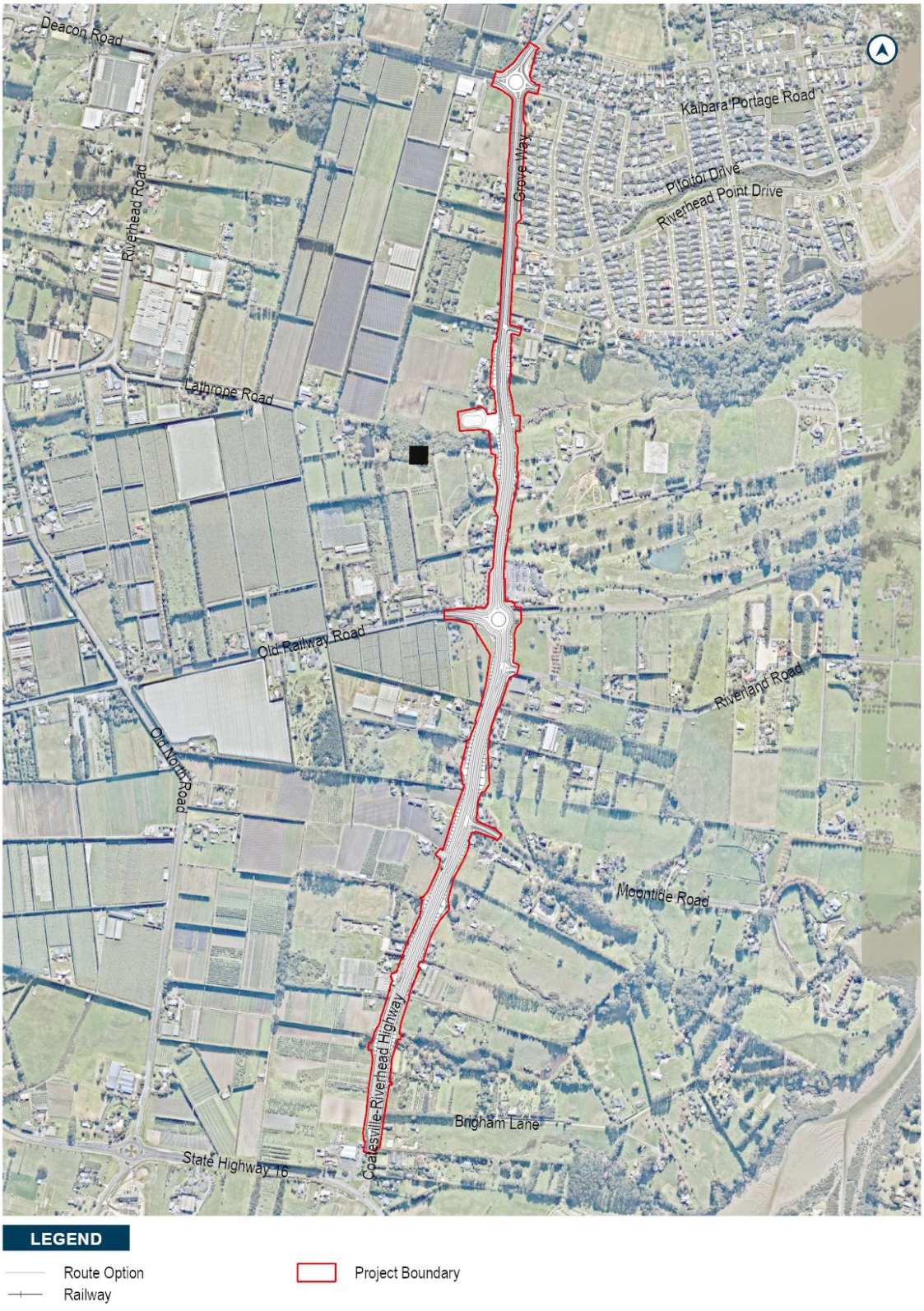


Figure 8-1: Overview of the Extension of Coatesville Riverhead Highway Upgrade

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 Coatesville Riverhead Highway will change from an existing rural two-lane road to a low-speed urban two-lane arterial (using AT Transport Design Manual standards) with mixed components for vehicles, and active modes.

The existing corridor includes two vehicle lanes, one per direction, and a footpath on the western side adjacent to the Riverhead residential subdivision. There is no footpath in the rural section. The indicative proposed design includes two vehicle traffic lanes, as well as new facilities for walking and cycling as shown in Figure 8-2 and Figure 8-3.

Figure 8-2: Indicative future Coatesville Riverhead Highway corridor design between SH16 and Short Road

Figure 8-3: Indicative future Coatesville Riverhead Highway corridor design between Short Road and Riverhead 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.

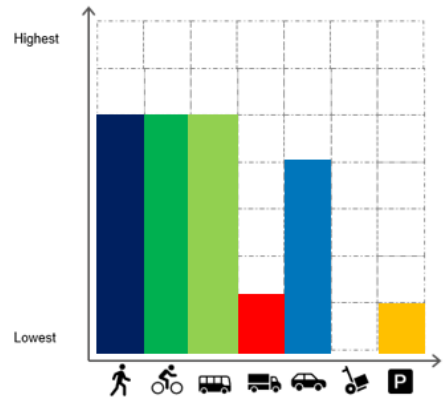
The framework itself does not directly dictate a specific corridor design but provides context and guidance regarding the intended function of the corridor, that will be used to inform future development and operation of the corridor. For integrated land use and transport classification purposes, land 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 (low/rural)
- Movement function - retain M2 (medium)

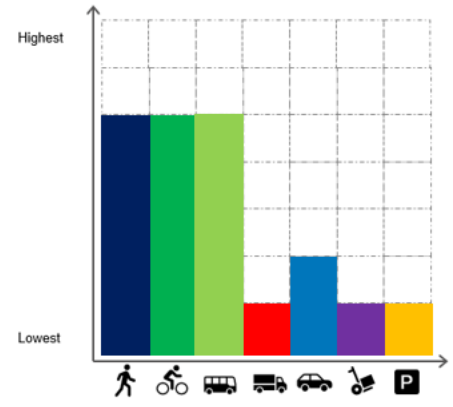
The following Figure 8-4 and Figure 8-5 indicates the likely long-term modal priorities for the corridor. Currently the mode split is heavily weighted to general traffic. As the corridor is upgraded and the area is developed, the mode split is anticipated to shift to more sustainable modes of travel.

Figure 8-4: Future modal priority in 2048+ for Coatesville Riverhead Highway between SH16 and Short Road



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

Figure 8-5: Future modal priority in 2048+ for Coatesville Riverhead Highway between Short Road and Riverhead Road



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 southern section of Coatesville-Riverhead Highway from SH16 to Short Road runs through rural land uses predominantly zoned under the AUP:OP as Rural – Mixed Rural Zone on both sides of the existing corridor. The northern section (close to and within the Riverhead township) runs through land zoned as Residential – Single House Zone and to the east and future urban zoned land on the west.

Table 8-1 below provides a summary of the North West existing and likely future environment as it relates to the Coatesville-Riverhead Highway Upgrade.

Table 8-1: Coatesville-Riverhead Highway Existing and Likely Future Environment

Environment today	Zoning	Likelihood of Change for the environment[18]	Likely Future Environment[19]
Rural	Rural	Low	Rural
Residential	Residential	Low	Residential
Future Urban Zone / Undeveloped greenfield areas	Future Urban	**High**	Urban

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 to the south of Short Road, and residential on the north eastern side of Short Road. It is comprised of one vehicle lane in each direction as shown in Figure 8-6.

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

Figure 8-6: Aerial of Existing Coatesville Riverhead Highway Corridor

Table 8-2 summarises the existing transport features of the Coatesville Riverhead Highway corridor.

Table 8-2: Coatesville Riverhead Highway: Existing Transport Features

	Existing Coatesville Riverhead Highway Transport Features
Corridor Characteristics	• Has an 60kph speed limit south of Short Road and a 50kph speed limit to the north • Rural character with two vehicle lanes (one in each direction) • Corridor form is inconsistent, with kerb and channel and a footpath on the eastern side of the corridor north of Short Road
Traffic Volume	The latest traffic data for Coatesville Riverhead Highway was obtained from Auckland Transport[20]. The data was recorded in March 2021 and shows Coatesville Riverhead Highway (near SH16) carried a 5 Day Average Daily Traffic of approximately 9,900 vehicles per day (vpd), and 890-1,040 vehicles per hour (vph) during the morning and afternoon peak hours.

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

	Existing Coatesville Riverhead Highway Transport Features
Road Network / General Traffic	• Coatesville Riverhead Highway / SH16 stop control • Coatesville Riverhead Highway / Moontide Road stop control • Coatesville Riverhead Highway / Riverland Road stop control • Coatesville Riverhead Highway / Old Railway Road stop control • Coatesville Riverhead Highway / Riverhead Point Drive give-way • Coatesville Riverhead Highway / Riverhead Road roundabout
Walking and Cycling	There is a 1.8m footpath on the eastern side of the corridor between Short Road and Riverhead Road. There are no footpaths through the rest of the corridor.
Public Transport	Bus service 126 operates on Coatesville Riverhead Highway and connects Westgate, Riverhead, Coatesville, and Albany Station. This service operates at least every 60 minutes 7 days a week.

8.3.2.2 Likely Future

Table 8-3 summarises the likely future transport features of the Coatesville Riverhead Highway corridor.

Table 8-3: Coatesville Riverhead Highway: Likely Future Transport Features

	Likely Future Coatesville Riverhead Highway Transport Features
Corridor Characteristics	Between SH16 and Short Road: • 60kph speed limit • Rural character with two vehicle lanes (one in each direction) and a central median. • Consistent corridor form with kerb and channels on both sides and a single shared path on one side of the corridor. Between Short Road and Riverhead Road: • 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.
Traffic Volume	The forecast Average Daily Traffic (**ADT**) in 2048 on Coatesville Riverhead Highway is 9,000 vehicles between SH16 and Short Road, and 7,000 vehicles between Short Road and Riverhead Road.
Road Network / General Traffic	• Coatesville Riverhead Highway / SH16 single lane roundabout • Coatesville Riverhead Highway / Moontide Road right turn bay • Coatesville Riverhead Highway / Riverland Road right turn bay • Coatesville Riverhead Highway / Old Railway Road single lane roundabout • Coatesville Riverhead Highway / Riverhead Point Drive single lane roundabout

	Likely Future Coatesville Riverhead Highway Transport Features
Walking and Cycling	A single shared path on one side between SH16 and Short Road, and separated 2.0m cycle lanes plus 1.8m footpaths on both sides between Short road and Riverhead Road.
Public Transport	The indicative 2048 AT bus network forecasts 5 buses per hour on Coatesville Riverhead Highway, or approximately 1 bus every 10-15 minutes.

Key features of the proposed new corridor include the following:

- Upgrading the southern section of the corridor to a 33m two-lane low speed rural arterial with active mode space on the western side and upgrading the northern section of the alignment to a 24m two-lane urban arterial with walking and cycling facilities on both sides of the corridor.
- The upgrade of the Coatesville-Riverhead Highway / Old Railway Road intersection from unsignalised to a roundabout.
- The upgrade of the existing Coatesville-Riverhead Highway / Riverhead Road roundabout intersection.
- Likely posted speed of 50kph, design speed of 60 kph.
- 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 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 Coatesville Riverhead Highway (including separation), resulting in improved protection for vulnerable road users.
- Significantly improved walking and cycling crossing facilities crossing Coatesville Riverhead Highway and the side streets, 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 Coatesville Riverhead Highway is developed. The Project has been designed to a 60kph speed limit in the rural area and a 50km/h speed limited in the urban section and provides segregated walking and cycling facilities to reduce the likelihood and severity in the event of a crash.

Overall, the 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 Coatesville Riverhead Highway between Short Road and Riverhead Road. For the rural section between SH16 and Short Road the project proposes a shared path for pedestrians and cyclists on one side of the road.

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: Coatesville Riverhead Highway upgrade AT standards and policy assessment for walking and cycling facilities

Policy/Standard	Network Component	Assessment
Auckland Transport Vision Zero[21]	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 proposed designs should feature separated cycling facilities for arterial corridors in excess of 30km/hr. The traffic speeds on Coatesville Riverhead Highway are proposed to be 50-60km/hr, therefore the proposed design of the walking and cycling facilities is considered to be appropriate for these standards.
AT Transport Design Manual[22]	Footpaths: 1.8m minimum	Between Short Road and Riverhead Road a 1.8m footpath is proposed, as well as 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. Between SH16 and Short Road a 4.0m shared path is proposed. 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 Coatesville Riverhead Highway.
- Improve integration with the future walking and cycling network, resulting in improved east-west 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 Riverhead and SH16.
- Support growth surrounding Coatesville Riverhead Highway and significantly improve safety and access to employment and social amenities.

8.4.3 Public Transport

The cross-section will provide 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.

[21] Auckland Transport: Vision Zero: https://at.govt.nz/media/1980910/vision-zero-for-tamaki-makaurau-compressed.pdf
[22] 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 proposed bus routes which will use Coatesville Riverhead Highway. This service is forecast to operate every 12 minutes in the peak periods.

This service will link in to the proposed Brigham Creek station for the future RTN connection[23] to Auckland CBD via State Highway 16.

While the Project is not specifically a public transport project, the provision of active mode facilities to connect to public transport supports good integration with the future public transport network and improved access to employment and social amenities in Westgate and Albany.

8.4.4 General Traffic

As identified above, the 2048 ADT for Coatesville Riverhead Highway is approximately 9,000 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 900 vehicles. A two-lane corridor with limited access can efficiently accommodate 900 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 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)
Coatesville Riverhead Highway / Old Railway Road (Roundabout)	Morning Peak	A	0.403	25.8
	Evening Peak	A	0.313	19.5
Coatesville Riverhead Highway / Riverhead Road (Roundabout)	Morning Peak	A	0.494	32.6
	Evening Peak	A	0.492	31.9

The overall LOS for all intersections is LOS A, and therefore all of the intersections operate 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.

[23] https://www.transport.govt.nz//assets/Uploads/Report/ATAP_2021-31_Publication.pdf

8.4.5 Access

As an arterial corridor, Coatesville Riverhead Highway 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 Coatesville Riverhead Highway.

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

No adverse effects have been identified.

8.4.6 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 AT/Waka Kotahi and relevant stakeholder groups in alignment with the realisation/ implementation of individual corridor upgrades in the future.

8.4.7 Wider Network Effects

As an existing two-lane corridor, the upgrade of Coatesville Riverhead Highway to an urban standard and to have a shared path 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 connection within Riverhead and through to Westgate in the longer term.

8.5 Project Interdependencies

8.5.1 SH16 Brigham Creek to Waimauku

The Coatesville Riverhead Highway project has been designed to directly link to the SH16 Brigham Creek to Waimauku project which includes a roundabout and a shared path facility at SH16. While the project can be implemented independent of SH16 works, full network benefits would be achieved in particular for walking and cycling, if this project is implemented.

8.6 Recommended Measures to Avoid, Remedy or Mitigate Operational Effects

Overall, the project provides positive benefits and there are no specific measures to avoid, remedy or mitigate operational effects identified.

8.7 Summary of Operational Transport Effects (NoR R1)

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

Table 8-6: Assessment of Operational Effects Summary for NoR R1 (Coatesville Riverhead Highway)

Operational Transport Effects	
Safety	In summary, the positive effects of the Project on safety are: • A significantly improved speed environment by designing for appropriate urban and rural speed limits (e.g. 50-60km/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 positive 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 Coatesville Riverhead Highway. • Improve integration with the future walking and cycling network, resulting in improved east-west walking and cycling connectivity. • Support growth adjacent to Coatesville Riverhead Highway and significantly improve safety and access to employment and social amenities.
Public Transport	In summary, the positive effects of the Project on public transport are: • Sufficient space to enable safe and appropriate bus stops in locations to be determined when greater land use certainty is availability • Connectivity for active modes to public transport services
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	No specific access effects have been identified.
Freight	It is considered that there will be no effect on freight movements.
Wider Network Effects	In summary, there are considered to be positive effects for the wider public transport and walking cycling benefits. No wider network effects for freight and private vehicle

8.8 Conclusions

Overall, the NoR R1: Coatesville Riverhead Highway Upgrade project provides positive transport 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 activities at 1229 Coatesville Riverhead Highway should be specifically considered within the CTMP prior to construction and implementation of the Project.

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.

- 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 Waka Kotahi and Auckland Transport 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.

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 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.