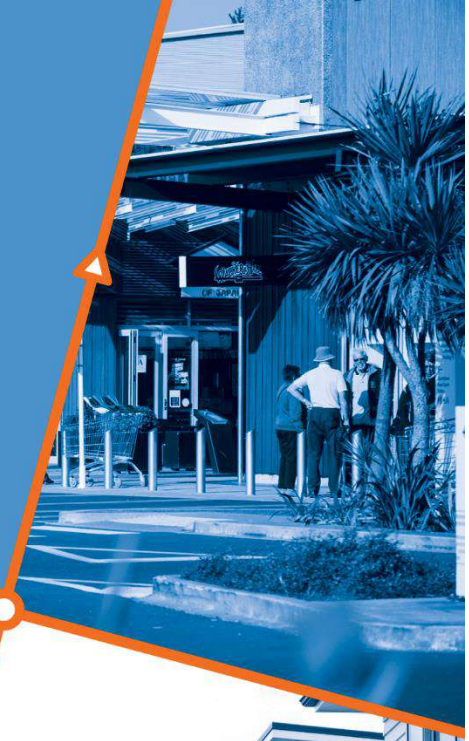
Supporting Growth

SILVERDALE WEST DAIRY FLAT INDUSTRIAL AREA

INTEGRATED TRANSPORT ASSESSMENT (ITA) FOR STRUCTURE PLAN

13 March 2019



TE TUPU NGĀTAHI Supporting Growth

NZ TRANSPORT AGENCY WAKA KOTAHI

Document Status

Responsibility	Name
Author	Craig Richards, Te Tupu Ngātahi
Reviewer	Andrew Murray/Andy Lightowler, Te Tupu Ngātahi
Approver	Andrew Murray, Te Tupu Ngātahi

Revision Status

Version	Date	Status
0.1	05.10.18	Draft
0.2	08.10.18	Revised Draft
0.3	05.11.2018	Revised Draft
0.4	13.02.2019	Revised Draft
0.5	27.02.2019	Revised Draft
1	01.03.2019	Draft for Release

Disclaimer:

At the time of production of this ITA, the Supporting Growth Programme's draft business case for the north future urban growth areas has been approved by the Auckland Transport board but not the NZ Transport Agency board (due by mid-2019). Projects identified in this ITA are therefore indicative only and are subject to change. Projects are also yet to be prioritised for funding and delivery over the next 30 years and will require further technical investigations and consultation to confirm detailed location and land requirements. They may also require statutory approvals, which will be subject to the Resource Management Act and Land Transport Management Act.

Contents

Tables

Figures

Appendices

Appendix A: Structure Plan Map

Appendix B: Detailed Intersection Modelling

Acronyms

Acronym	Description
AC	Auckland Council
Alliance (SGA)	Te Tupu Ngātahi (Supporting Growth Alliance)
AT	Auckland Transport
ATAP	Auckland Transport Alignment Project
AUP-OP	Auckland Unitary Plan – Operative in Part
BC	Business Case
Development Ready	Has Bulk Infrastructure in place
FULSS	Future Urban Land Supply Strategy
FUZ	Future Urban Zone
GPS	Government Policy Statement on Land Transport
HCV	Heavy Commercial Vehicle
IBC	Indicative Business Case
ITA	Integrated Transport Assessment
MSM	Macro Strategic Model
NOP	Non-Owner Participant (AECOM, Beca, Bell Gully, Buddle Findlay)
NoR	Notice of Requirement
PT	Public Transport
RTN	Rapid Transit Network
Silverdale West	Silverdale West Dairy Flat Business Area
SH	State Highway
TDM	Traffic Demand Management
TfUG	Transport for Urban Growth
the Transport Agency	The NZ Transport Agency
VPD	Vehicles Per Day

Executive Summary

This Integrated Transport Assessment (ITA) has been prepared by Te Tupu Ngātahi, the Supporting Growth Alliance (SGA), on behalf of Auckland Transport (AT), as a technical supporting input to Auckland Council's (AC) proposed structure plan for the Silverdale West Dairy Flat Business Area (Silverdale West).

ITA Scope

At the structure plan stage, an ITA provides a high level assessment of the proposed land use and transport networks required to support the planned activities. This ITA is based on:

- The land uses proposed in the draft Silverdale West Dairy Flat Industrial Area Structure Plan
- The draft strategic transport network plans as at January 2019 being developed by Te Tupu Ngātahi as part of the Supporting Growth Programme's North indicative business case*
- Additional assumptions by Te Tupu Ngātahi on likely corresponding future collector network-level roading, public transport and walking and cycling facilities. These future roads and other facilities are not identified in the Supporting Growth Programme, which is focused on the strategic level transport network. Collector roads and other transport provisions have been included after meeting with various AT departments, and in line with the network principals agreed by AT and Te Tupu Ngātahi.

**Disclaimer: At the time of production of this ITA, the Supporting Growth Programme's draft business case for north Auckland has been approved by the Auckland Transport board but not by the NZ Transport Agency board (due by mid-2019). Projects identified in this ITA are therefore indicative only and subject to change. Projects are also yet to be prioritised for funding and delivery over the next 30 years and will require further technical investigations and consultation to confirm detailed location and land requirements. They may also require statutory approvals, which will be subject to the Resource Management Act and Land Transport Management Act.*

The purpose of this ITA was agreed with a project steering group consisting of representatives from AT, the New Zealand Transport Agency (the Transport Agency) and Te Tupu Ngātahi as to cover the following key matters:

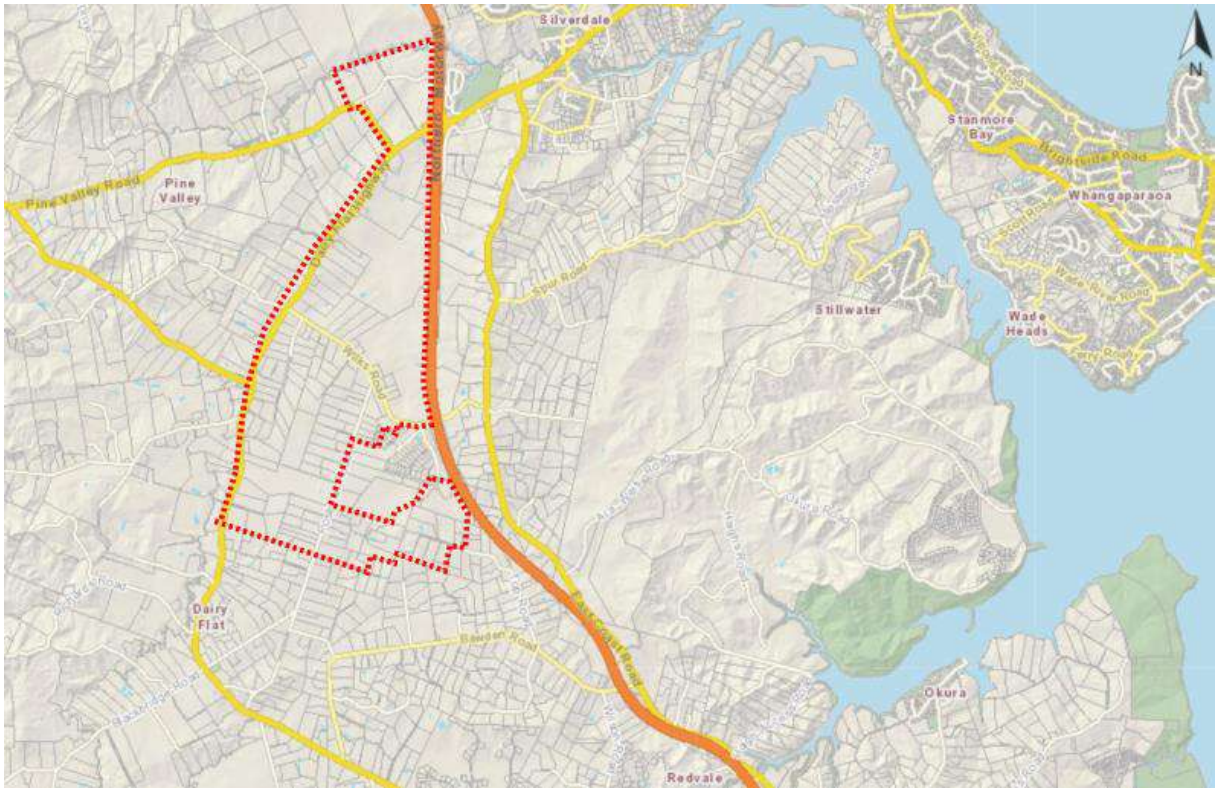
a. To understand the transport effects associated with the urbanisation of the Silverdale West Dairy Flat area (as per the land use scenario provided by AC) within the context of the growth envisaged for all northern greenfield areas over the next 30 years
b. To identify a list of transport infrastructure and services on Arterials, Collectors and key links within and immediately adjacent to the Structure Plan area necessary to both support urbanisation of the Structure Plan area and integrate with the wider transport network
c. To define at a high level possible infrastructure staging scenarios, considering AC's intended staging of land release within the Structure Plan area, and any co-dependencies between transport and water infrastructure etc
d. To identify how integration across modes, and resilience within the transport network, can and should be achieved given the land use in the Structure Plan.

ITA's required at subsequent stages of the planning process, e.g. plan change and resource consent, will build upon the assessment in this ITA as more detailed planning and infrastructure proposals are known.

Site Location

The Silverdale West / Dairy Flat Structure Plan area is situated directly south-west and north-west of the Silverdale SH1 Interchange. Dairy Flat Highway forms most of the western boundary. The Structure Plan excludes the North Shore Airport.

Figure 0-1: Structure Plan Boundary (red dotted line)



Structure Plan

The National Policy Statement on Urban Development Capacity (2016) states that local authorities shall ensure that at any one time there is sufficient housing and business land development capacity within their region[1]. A report by Market Economics[2] made the following conclusion in regard to the need for business zoned land in Silverdale West Dairy Flat (SWDF):

"*There will be demand for a significant amount of new business land given both projected population growth and SWDF's proximity to North Shore, where vacant land is very limited. By 2048 this demand will amount to between 160 and 427ha of LIZ [light industrial zone] and HIZ [heavy industrial zone] (net of roads)*".

[1] National Policy Statement on Urban Development Capacity, MfE, 2016

[2] Silverdale Business Land Assessment, Market Economics, 2018

Provision of Industrial land in the north of Auckland has strategic benefit for the transport system by reducing the distance that people need to travel to work through locating business land close to areas of residential growth.

The structure plan covers around 600 hectares of predominately greenfield land. The area is currently zoned as Future Urban in the Auckland Unitary Plan Operative in Part (AUP-OP). AC propose to rezone the area for Industrial use. Excluding protected areas and estimated road requirements the net developable area is approximately 350 hectares. The proposed land use breakdown is summarised below.

Table 0-1: Structure Plan Proposed Land Use

	Gross Area (ha)	Protection Areas Deduction	Net Area	~ Roads (30%)	~ Other Uses (15%)	Total Roads/ Other (ha)	**Net developable area (ha)**	No. jobs
Light Industry	604	104	420	126	0	126	**294**	12,704
Heavy Industry			80	24	0	24	**56**	

The AC structure plan map is provided as **Appendix A**.

Transport Planning Context and Background

In the Auckland Plan 'Transport and Access' is one of the six desired outcomes to achieve Auckland's strategy to 2050. To achieve the 'Transport and Access' outcome, there are three directions:

- **Direction 1** – Better connect people, places, goods and services
- **Direction 2** – Increase genuine travel choices for a healthy, vibrant and equitable Auckland
- **Direction 3** – Maximise safety and environmental protection.

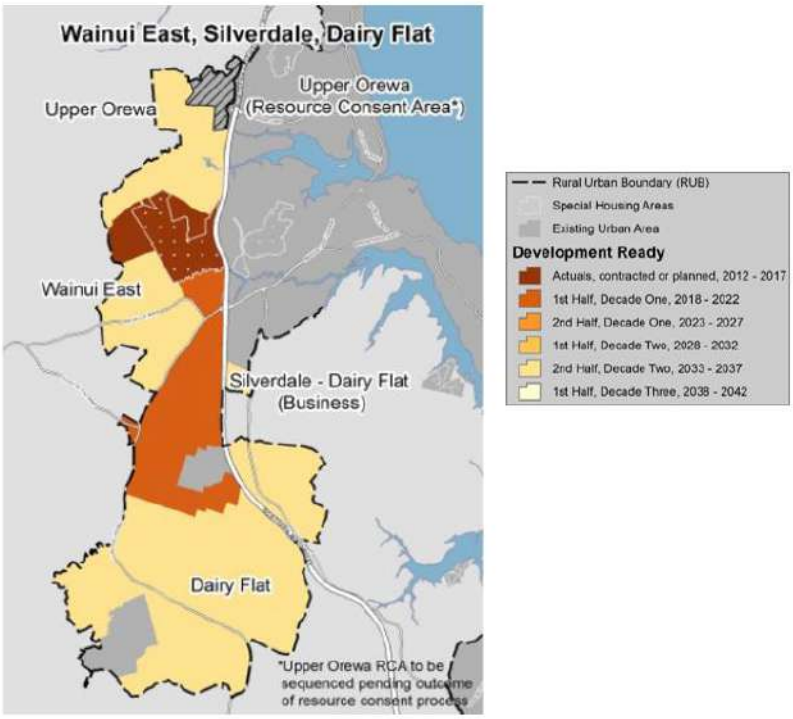
These directions are supplemented by several focus areas including:

- Target new transport investment to the most significant challenges
- Make walking, cycling and public transport preferred choices for many more Aucklanders
- Better integrate land-use and transport
- Develop a sustainable and resilient transport system.

This ITA seeks to apply the focus areas to the structure plan so that land use and transport decision making and investment is integrated and supports the outcomes sought in the Auckland Plan.

The Future Urban Land Supply Strategy (FULSS) refresh indicated a staged release of future urban land including 32,300 dwellings and 11,500 new jobs in the Northern growth area of Auckland by 2042, as depicted in the following figure. Silverdale West is indicated as being 'development ready' in the first half of decade one.

Figure 0-2: FULSS Future Urban Area Sequencing



Auckland Transport Alignment Project (ATAP) recommends transport investment priorities for the 2018-2028 decade to reflect the Government's and Auckland Council's shared directions for transport in Auckland. The ATAP 2018 direction is set out in the Government Policy Statement (GPS) 2018 and the Auckland Plan. More weighting has been given to PT, walking and cycling, improving safety, and realising environmental, health and growth outcomes.

The ATAP Update April 2018[3] recommends a package of improvements for funding between 2018-28. It is based on planned and assumed funding of $28 billion. The ATAP Package includes:

- Penlink - a new connection between the Northern Motorway and the Whangaparāoa Peninsula, bypassing the constrained Silverdale interchange
- Potential funding for bus shoulder lanes from Albany to Silverdale, subject to further investigations.

Existing Land Use and Transport Environment

The AUP-OP has zoned much of the current Silverdale West / Dairy Flat area as a FUZ. The only other zone within the structure plan area is the Special Purpose – Airports and Airfields Zone.

The Auckland Northern Motorway (SH1) forms the eastern boundary of the structure plan area. There is an existing motorway interchange at Silverdale: Dairy Flat Highway, which has ramps in both directions. There is one non-interchange connection across the motorway corridor on Wilks Road.

[3] Auckland Transport Alignment Project April 2018

Dairy Flat Highway routes along the western boundary of the structure plan area and is a Primary arterial. Kahikatea Flat Road to the west of the site is also an arterial. To the north the proposed extension of Argent Lane to Dairy Flat Highway as part of the Milldale development will provide an arterial connection.

The Hibiscus Coast is served by connector, local and express bus services connecting to the Northern Busway at Albany Station. There is one service into the city centre. There is one service operating through the FULSS area in Silverdale/ Dairy Flat, connecting Hibiscus Station with the Albany Station via Dairy Flat.

There are limited pedestrian facilities in the area as the existing road network consists of rural roads with no footpaths. The extent of the cycle network in Orewa-Silverdale is limited to the existing urbanised areas on the east of the SH. In the FUZ areas, the consented Hall Farm subdivision in Orewa West is required to provide a cycling and walking shared path connection over SH1. The Precinct Plan for the live-zoned Wainui East area shows segregated cycle ways on Wainui Road, Argent Lane and Curley Ave Extension, as well as on a supporting network of collector roads.

The following relevant transport projects are planned or committed:

- Northern Corridor Improvements
- Penlink Toll Road
- Committed projects as part of the Milldale / Wainui development including extending Argent Lane via Pine Valley Road to connect with Dairy Flat Highway
- Dairy Flat Highway safety improvements.

Proposed Transport Networks

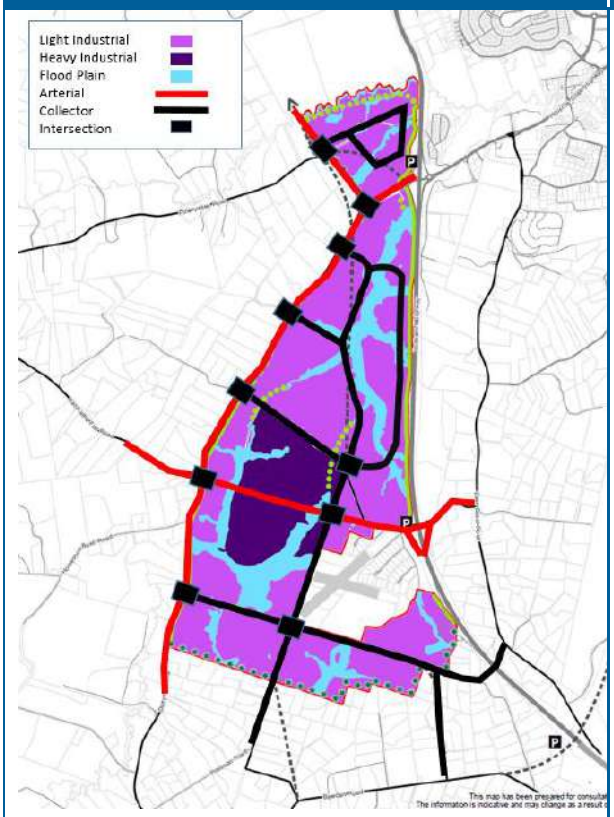
A network of arterial and collector roads within the structure plan area has been identified in this ITA by applying design principles (e.g. respect existing topography, support ecological corridors, etc) to develop the network and criteria (e.g. function and traffic volumes) for road classification (arterial / collector roads). The proposed road network has been developed with assumptions of anticipated outcomes from the wider draft strategic transport network being developed in the draft IBC.

A proposed Public Transport (PT) network serving the structure plan and connecting to the wider area has been identified in this ITA. At the time of writing, a Rapid Transit Network (RTN) routing through the structure plan area is proposed in the draft IBC. This ITA has included this strategic infrastructure within the PT network planning and considered the benefits and opportunities this presents to the structure plan, but specification and design of the RTN and stations will be undertaken in subsequent business case work.

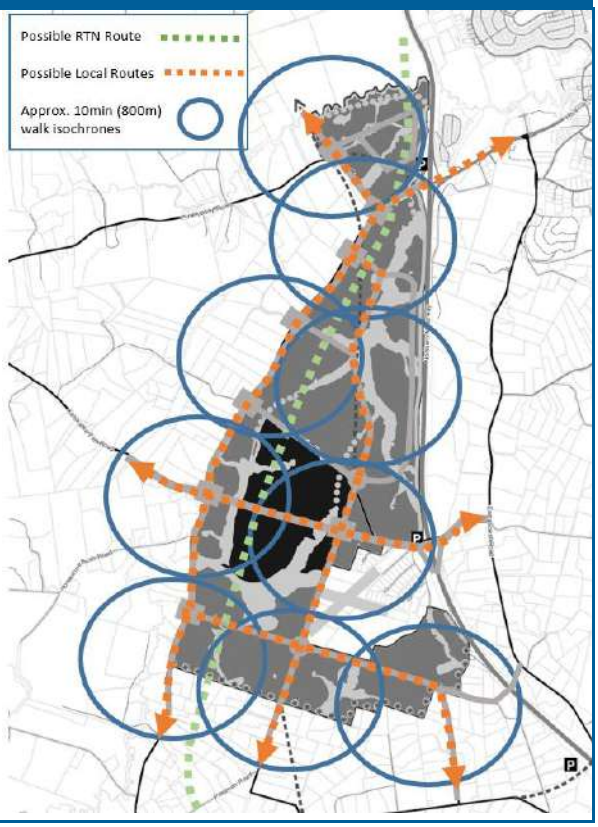
A walking and cycling network has been identified to create a connected and legible network for active modes that can include physically separated on road and off road cycle lanes and footpaths. Design of the routes and facilities, such as intersections and crossings, physical separation for cycleways to achieve a safe outcome for all users and provision for electric modes such as e-scooters, will be considered as part of subsequent ITA's.

Figure 0-3: Proposed ITA Transport Networks

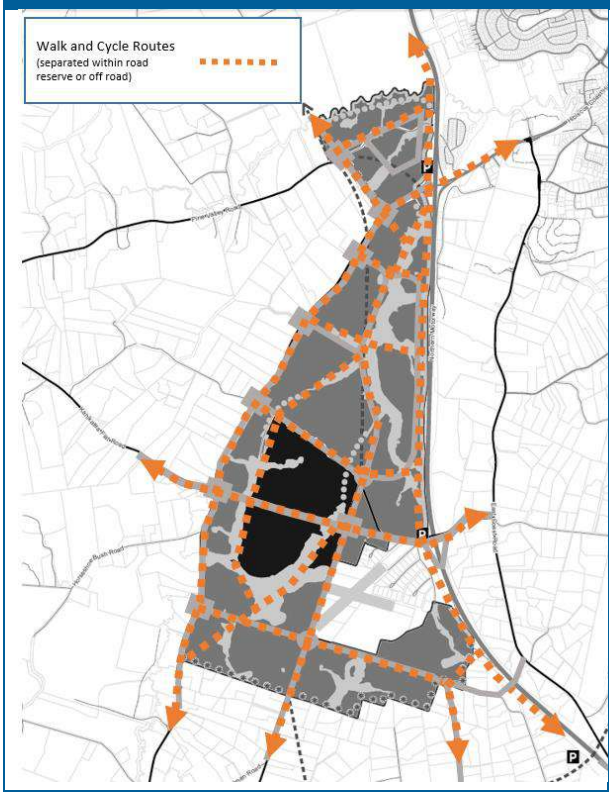
Proposed Road Network



Proposed Public Transport Routes



Proposed Walking and Cycling Network



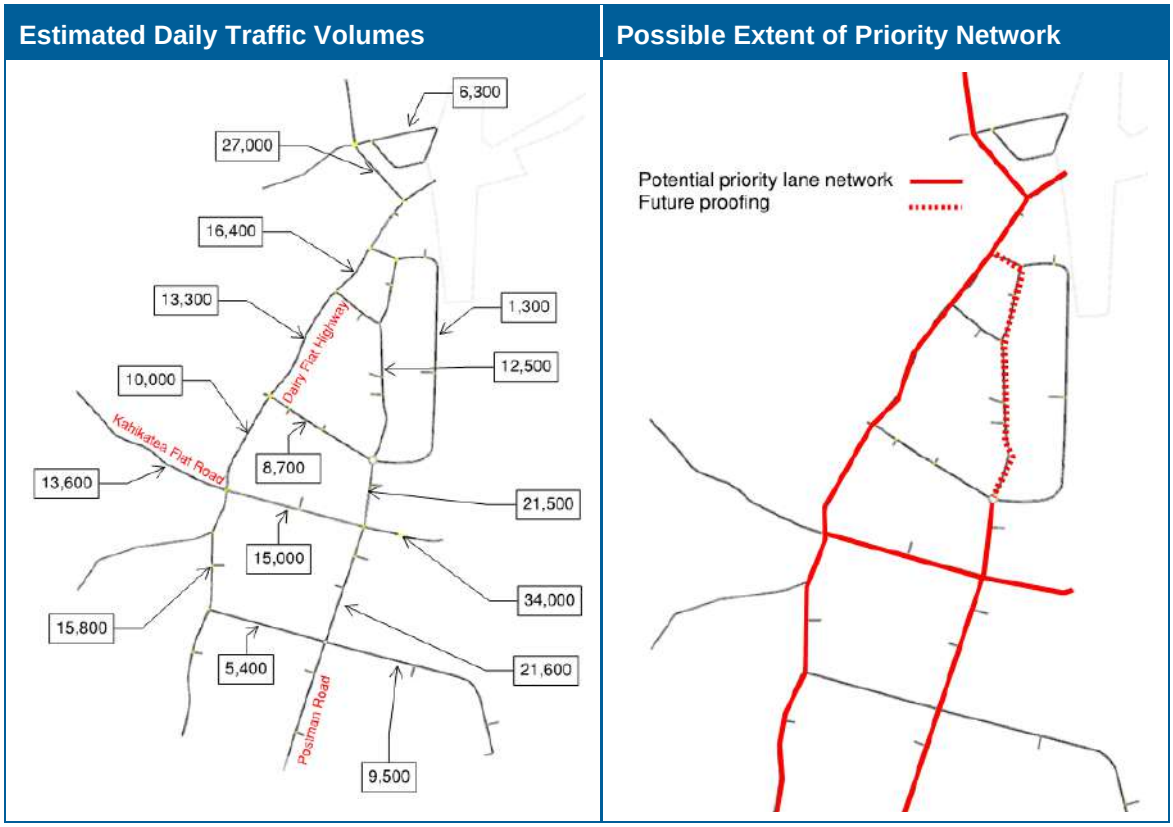
Trip Generation and Mode Share

The transport demand modelling undertaken for this ITA is common with the Te Tupu Ngātahi modelling for the draft IBC. The structure plan area was not assessed in isolation, due to significant future growth planned to the north in Wainui East and to the south in Dairy Flat.

Aimsun modelling indicates peak period traffic volumes of around 5,900 movements per hour in the morning (AM) peak, 6,000 in the Interpeak and 7,800 movements in the evening (PM) peak associated with the Structure Plan area. These modelled volumes align relatively closely to the targeted range of 6,000-7,000 peak hour trips based on analysis of trip rates from existing industrial sites.

The estimated daily traffic volumes within the structure plan area are shown below. The second map shows where additional capacity (e.g. priority lanes for buses, high occupancy vehicles or other priority modes) may be required beyond one lane for general traffic in each direction. The exact form of the cross sections will vary and need to be refined as part of subsequent ITA's and/or business cases.

Figure 0-4: Estimated Traffic Volumes and Potential Extent of Priority Network (red lines)



The number of PT trips generated by zones including the structure plan area have been obtained directly via the MSM model. There is expected to be around 900 PT trips in the morning peak hour and around 700 in the afternoon peak hour (note these are on top of the private vehicle trips). This may be a low estimate as the MSM model scenario used had the RTN alongside the motorway rather than more centrally through the site as now recommended in the draft IBC. With a more central RTN

route the public transport usage may be higher depending on the specific location and surrounding activities for RTN stations.

Active mode travel to industrial land uses is typically low (around 4%) which may be an outcome of the design of industrial areas that has not typically prioritised walking and cycling facilities, that these areas typically have a low population density and that these areas don't include land uses that attract higher active mode travel such as Schools. Considering the proposed land use and the proposed provision for active mode connections to and within the area, a target mode share of 10% for active modes is considered appropriate. This mode share is not as high as targeted by the draft IBC for the wider area (15%), but still much higher than has been achieved in the past for Industrial land uses.

Transport Network Assessment and Findings

Influencing Travel Demand

Influencing travel demand is necessary to achieve desired outcomes around reducing the need to travel and mode shift. This requires a wide ranging approach including strategic elements (land use integration, infrastructure prioritisation and staging), network and system design and operational interventions (TDM, technologies). Some of these are inherent in the structure plan such as the integration of land use with strategic network design, however some will need to be further developed and managed as part of subsequent land use and infrastructure planning.

Network Level of Service

In general, the modelled road network was found to operate with an acceptable level of service based on expected travel speed in peak periods with relatively low levels of delay and vehicle queues at most intersections.

Wilks Road Interchange

Detailed analysis of the proposed south facing (only) motorway interchange at Wilks Road shows that of all trips using the interchange a high proportion originate/terminate from within the structure plan area, 45% in the AM peak and 50% in the PM peak. This shows that the interchange will support the proposed land use by providing a facility that will be highly utilised, and also that it will reduce demands at other nearby interchanges, thus supporting the wider network operation in this area.

Interchange Staging

Transport modelling indicates that the existing Silverdale Interchange should accommodate roughly 70 hectares of development (net) or 20% of the structure plan area within the expected future capacity (including upgrades proposed as part of other projects). Therefore, this ITA estimates that additional motorway access capacity may be necessary beyond this anticipated level of development. This could be in the form of improvements to existing interchanges or new interchanges (e.g. Wilks Road or Penlink). Staging will need to be subject to further analysis and confirmation in subsequent ITA's when more detailed information on land use activities and staging of strategic infrastructure is known.

Public Transport

Analysis of modelled PT trips indicates there could be up to 1,500 people trips to/from the area encompassing the structure plan in the peak periods (over two hour peak periods). Light Industrial

zoning allows for more commercial activities that would suit PT if located appropriately. In this regard there is an opportunity to consider ways to influence the type of light industrial activities that occur within the structure plan area in future so that activities that best support and benefit from PT access are located close to PT connections. The proposed network of local bus routes and in future a potential RTN as proposed in the draft IBC are considered adequate to accommodate the expected demands and to provide suitable connections to the wider network.

Walking and Cycling

This predicted level of walking and cycling demand is expected to be accommodated by the proposed ITA network as it provides good coverage and opportunities to provide separated facilities within road reserves and off-road pathways. Further planning and design into facilities to safely accommodate these modes, including modes such as ebikes and escooters, will be necessary throughout the subsequent and more detailed planning and design stages.

Cross Sections

Indicative cross sections have been prepared (in this ITA) to show the anticipated road components and off-road walking and cycling corridor components. These will also need to be refined and developed as site specific proposals are developed in future ITAs.

Airport Expansion Scenario

This ITA has considered a scenario in which the North Shore Airport runway extends on its current alignment to accommodate larger planes. The key impact is a realignment of Postman Road and the relocation of the east-west collector road south of the Airport to make way for a runway expansion. This will need to be considered further in subsequent ITAs if it is considered warranted.

Requirements for Next Stage Transport Assessments

A number of matters are identified in this ITA as requiring further design or assessment as part of future ITAs. This is either due to the level of detail being beyond the structure planning stage or the need to manage the ongoing integration of land use and transport. These are identified in the conclusions below.

Staging

The following table provides a list of the transport components considered necessary to support the structure plan area at this stage. Indicative sequencing is provided based on development preceding from north to south to provide efficiencies with delivery of proposed water infrastructure. This is dependent on land owner / developer intentions and is considered an indicative approach at this stage. The ITA staging is broadly as follows:

- Stage 1: to 2028
- Stage 2: 2028 to 2038
- Stage 3: 2038 to 2048.

Table 0-2: ITA Sequencing

Roads and Intersections	Indicative Sequencing
Internal collector road north of DFH (old Pine Valley Road upgrade)	Stage 1
Pine Valley Road four lane arterial upgrade and DFH intersection (delivered as part of Milldale subdivision)	
Dairy Flat Highway (DFH) four lane arterial upgrade	Stage 2
Wilks Road SH1 Interchange (with south facing ramps only)	Stage 2
Kahikatea Flat Road (KFR) to Wilks Road Interchange new arterial	Stage 2
Postman Road north of KFR to DFH new collector road	Stage 2
Internal new collector roads north of KFR	Stage 2
Internal new east-west collector road south of KFR	Stage 3
Postman Road south of KFR to DFH collector road upgrade	Stage 3
Walking and Cycling	
North-south walking and cycle route following Postman Road / flood plain area	Stage 1 and 2
Off road walking and cycle route alongside SH1	Stage 2
Cycle route following DFH	Stage 2
Cycle route following KFR	Stage 2
Secondary east-west cycle route connections	Stage 2
Public Transport	
Feeder buses / local services and bus stop infrastructure	Stage 1 and 2
Bus priority on arterial roads and collector roads part of frequent network	When necessary
Bus stops and interchange stations with the RTN	To be defined in subsequent business cases
RTN via the FUZ area (as proposed in the draft IBC)	To be defined in subsequent business cases

Consultation

Public feedback was sought on the Structure Plan Background Report and associated topic reports by AC during December 2017 through until February 2018. With regard to transport the following opportunities were identified by the public:

- Access by public transport, cycle ways
- Off road bike/walking tracks
- Part of a connecting cycleway to others in the Rodney district
- Northern part of the Structure Plan area should be developed first because of the existing access to the interchange.

Conclusions and Recommendations

This ITA has identified transport networks and services for a range of travel modes suitable to encourage and accommodate multimodal travel to and from the structure plan area. With progressive delivery of these networks and services alongside land development the transport system is expected

to enable the structure plan area to be developed over time and as intended by AC. The ITA has identified the following key recommendations to be addressed in next stage transport assessments:

- Advance the design and assessment of the proposed bus services and facilities identified in this ITA to support the identified mode share and urban form outcomes
- Detailed cycling and pedestrian facility design to deliver the wider network strategy and support the identified mode share outcomes
- Continued refinement of transport modelling as more knowledge around specific land use activities and strategic infrastructure design and timing becomes available
- Detailed design of roads and intersections to provide an appropriate level of service for all modes and support the identified mode share outcomes. This should include identifying where it may be possible to reduce private vehicle capacity at intersections if this means priority can be enhanced for other modes and / or the scale of the infrastructure can be downsized
- Consideration of business activities that support and benefit from the RTN once route and station locations are confirmed. There is an opportunity for transitioning to higher intensity business activity around strategic public transport infrastructure and future station locations. This opportunity needs to be carefully targeted in regard to the number of RTN stations and weighed against the travel time objectives for the overall RTN system
- Design of local transport components around RTN stations and facilities at stations for all modes so stations have high accessibility levels
- Further development and identification of Travel Demand Management activities that reduce the need to travel and support mode share outcomes
- Further review of transport network and implications should an Airport expansion scenario be identified as a possibility in future
- Refinement to proposed staging and triggers for supporting infrastructure once more detail is available on the specific sequencing of land release
- Review of transport components following public consultation on the structure plan.

1. Introduction

1.1. Purpose of the Silverdale West Dairy Flat Industrial Area ITA

AC's strategic direction for growth in Auckland includes the urbanisation of areas identified as Future Urban zones (FUZ) in Silverdale West / Dairy Flat.

The FULSS identifies Silverdale West as a priority area to be 'development ready' between 2018 and 2022. The proposed industrial area in Silverdale West / Dairy Flat is sequenced early to provide local employment opportunities and address demand on transport infrastructure.

The first step toward this urbanisation is to prepare a structure plan, and by doing so, establish the desired pattern of land use and core transport and services network[4] in the area. In order to support any structure plan various technical reports are required, one of which is an ITA.

Te Tupu Ngātahi has been engaged by AT to prepare an ITA for the Silverdale West Dairy Flat Industrial Area (Silverdale West ITA) on behalf of AC.

The structure planning guidelines outlined in Appendix 1 of the AUP-OP[5] requires that a structure plan (and the ITA), should identify, investigate and assess the following:

1. *Integration of land use and development with the local and strategic transport networks*
2. *Lay out the transport network and facilities in a manner that is safe, attractive, efficient, and resilient to hazards, well connected to local facilities and integrated with land uses, the surrounding area and the wider transport network*
3. *Support for transport and accessibility that is multi-modal and interconnected with an appropriate number and location of access points*
4. *Transport effects on land uses and the management of these effects.*

The Silverdale West / Dairy Flat ITA has been prepared in accordance with the AUP-OP guidelines and undertaken in accordance with AT guidelines[6]. As noted in the AT guidelines, the primary objective of an ITA is to:

> *"ensure that the transportation effects of a new development proposal are well considered, that there is an emphasis on efficiency, safety and accessibility to and from the development by all transport modes where practical; and that the adverse transport effects of the development have been effectively avoided, remedied or mitigated. The preparation of an ITA seeks to ensure that appropriate thought is given to the zoning or land use proposed so that integrated transport and landuse outcomes occur.*
>
> *A proposal that is achieving this integration will ensure consistency with the "four R's" being the* ***right type of activity, in the right place, at the right intensity, and occurring at the right time****".*

[4] AUP-OP

[5] AUP-OP

[6] Integrated Transport Assessment Guidelines, AT, January 2015

1.2. Scope of this ITA

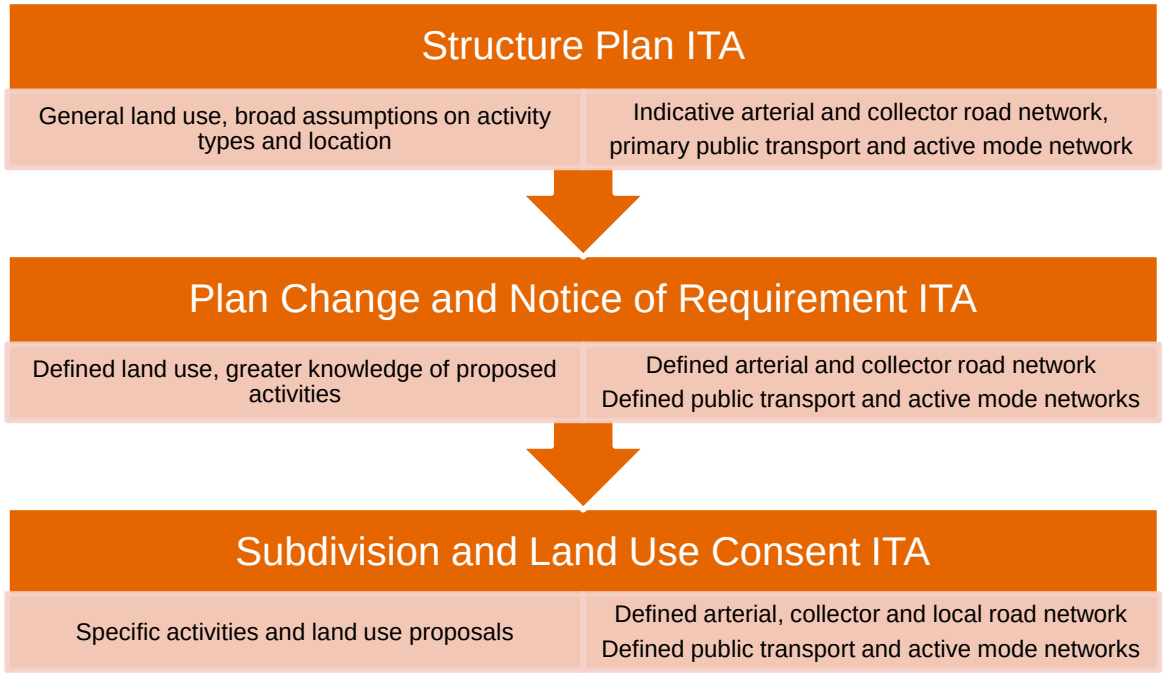
The scope of the ITA has been approved by a Project Steering Group (PSG) comprising Te Tupu Ngātahi, AT and the Transport Agency.

The Silverdale West / Dairy Flat ITA specifically addresses the following:

- The extent of the Silverdale West / Dairy Flat study area, zoning and land use provided by AC
- Existing transport networks, known constraints and committed transport projects
- Relevant transport plans and strategies
- Known private developments and relevant background documents
- The proposed zoning (including employment projections) and how, and when, urban land is proposed to be released in Silverdale West / Dairy Flat provided by AC
- The proposed strategic transport network plan being developed in the corresponding Supporting Growth Programme's north Auckland IBC
- An additional proposed local network-level transport network (collector road, public transport services and walking and cycling network)
- The mode split and trip generation that will be generated by the structure plan activities
- Accessibility of proposed activities to various transport modes (private vehicle, PT and active modes)
- Traffic modelling outputs, recommended intersection treatments and road cross-sections
- Transport network staging
- The ITA also discusses the potential staging of land urbanisation and the consequent considerations for staging of transport networks to serve it. Given the uncertainty at this time about the exact sequencing of plan changes and development, this should only be seen as a foundation for further transport assessments at later Plan Change, Notice of Requirement (NOR) and consenting stages if required.

The relationship between the Structure Plan ITA and further assessments is summarised in **Figure 1-1.**

Figure 1-1: ITA Level of Detail

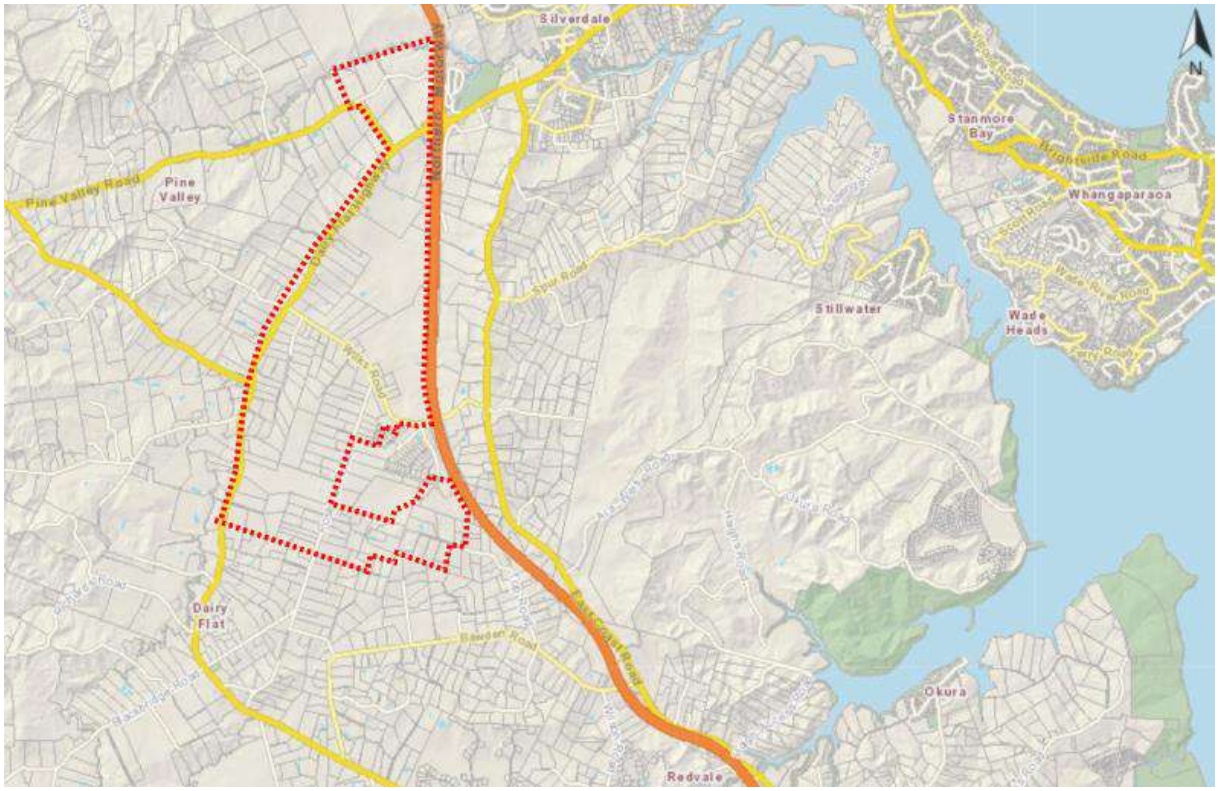


2. Site Description

2.1. Site Location

The Silverdale West / Dairy Flat Structure Plan area is situated directly south-west and north-west of the Silverdale SH1 Interchange. Dairy Flat Highway forms most of the western boundary. The Structure Plan excludes the North Shore Airport. The following figure shows the approximate boundary of the Structure Plan area.

Figure 2-1: Structure Plan Boundary (red dotted line)



The structure plan area is approximately five kilometres long north to south and less than two kilometres wide at the widest extent through the southern portion.

2.2. Surrounding Areas

The Orewa-Silverdale area is located north of Auckland's North Shore. To the east of the Orewa-Silverdale, area lays Whangaparaoa Peninsula, which includes the established townships and suburbs such as Gulf Harbour and Manly. The Orewa-Silverdale area acts as a gateway for residents of the Whangaparaoa Peninsula to be able to travel to other parts of the Auckland region, through the connection that SH1 gives to the North Shore and the CBD.

3. Proposed Structure Plan

The National Policy Statement on Urban Development Capacity (2016) states that Local Authorities shall ensure that at any one time there is sufficient housing and business land development capacity within their region[7]. A report by Market Economics[8] made the following conclusion in regard to the need for business zoned land in Silverdale West Dairy Flat (SWDF):

"*There will be demand for a significant amount of new business land given both projected population growth and SWDF's proximity to North Shore, where vacant land is very limited. By 2048 this demand will amount to between 160 and 427ha of LIZ [light industrial zone] and HIZ [heavy industrial zone] (net of roads)*".

Provision of Industrial land in the north of Auckland also has strategic benefit for the transport system by reducing the distance that people need to travel to work by locating business land close to areas of residential growth.

The Structure Plan covers a total area of approximately 600 hectares. Removing floodplains, protected areas and roads results in a net developable area of around 350 hectares. This falls within the range identified as required by Market Economics.

AC propose approximately up to 294 hectares of light industry and 56 hectares of heavy industrial land use within this area as described in the following table.

Table 3-1: Proposed Land Use

	Gross Area (ha)	Protection Areas Deduction	Net Area	~ Roads (30%)	~ Other Uses (15%)	Total Roads/ Other (ha)	**Net developable area (ha)**	TOTAL Dwellings	No. jobs	Pop
Light Industry	604	104	420	126	0	126	**294**	0	12,704	0
Heavy Industry			80	24	0	24	**56**	0		0

The Structure Plan location and proposed zonings are shown in the Figures 3-1 and 3-2. The structure plan map is also provided at a larger scale in **Appendix A** to this report. In the structure plan zoning map light purple represents light industrial zoning and dark purple represents heavy industrial zoning.

[7] National Policy Statement on Urban Development Capacity, MfE, 2016

[8] Silverdale Business Land Assessment, Market Economics, 2018

Figure 3-1: Auckland Council Structure Plan Location Map

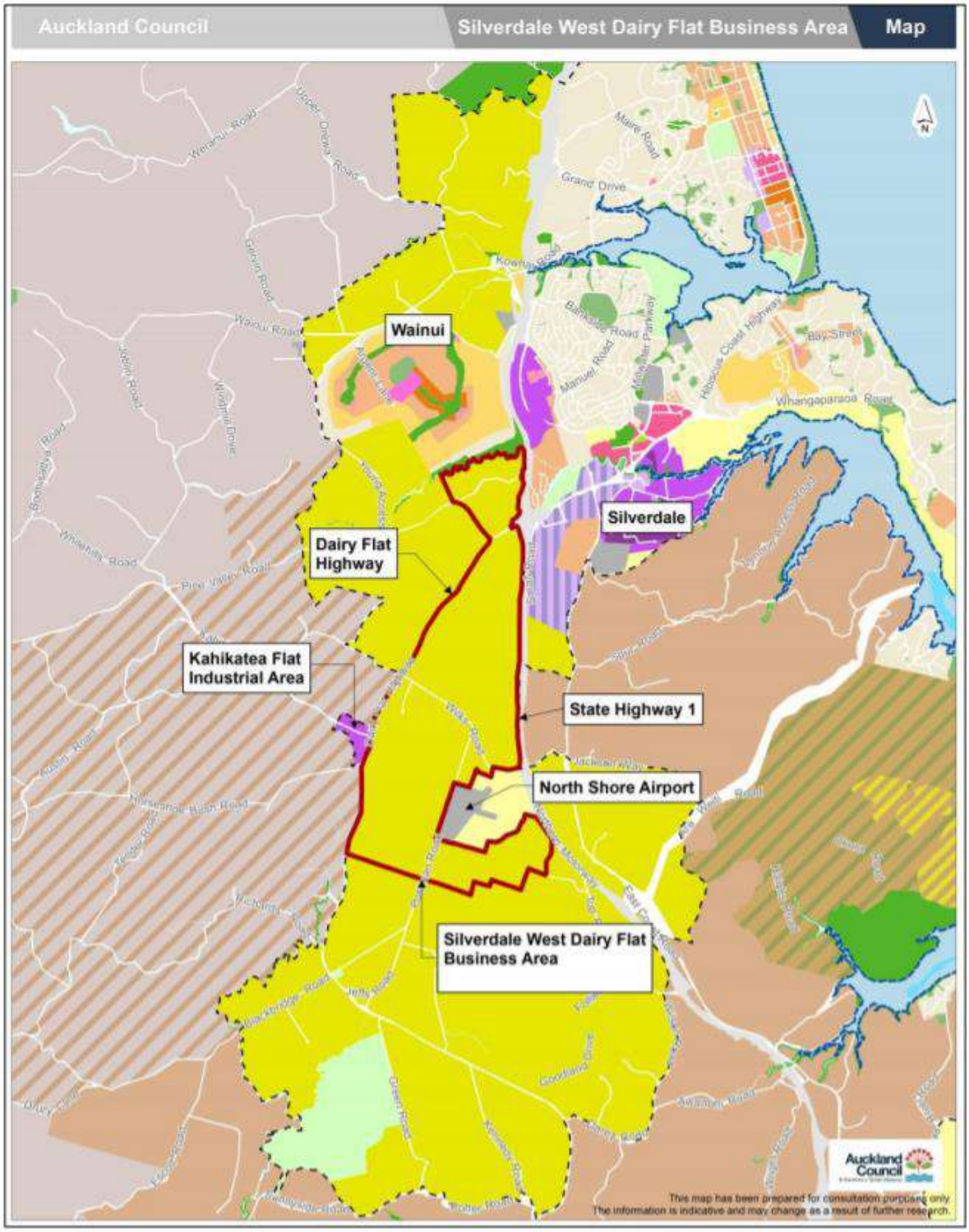
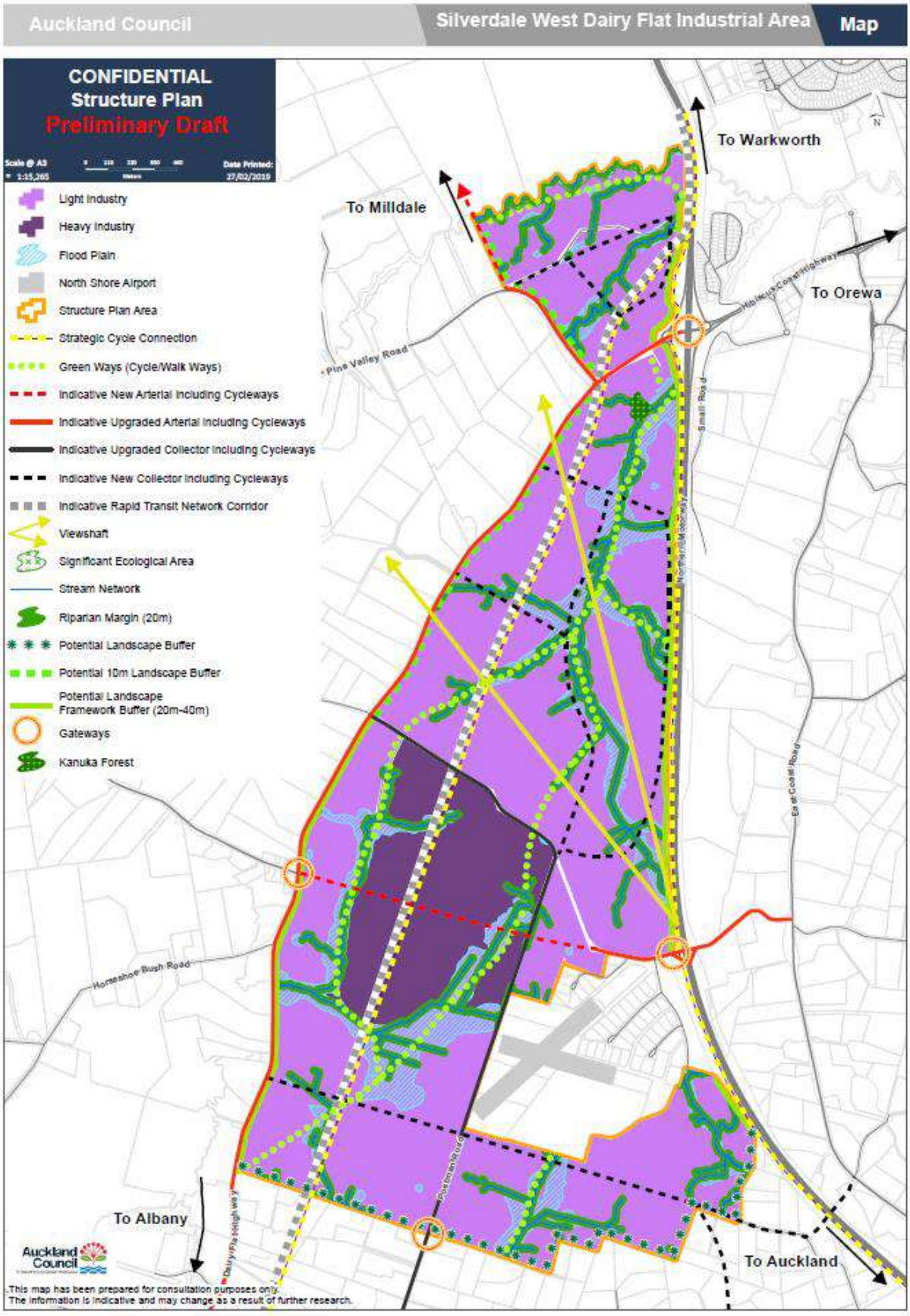


Figure 3-2: Auckland Council Structure Plan Map



Plan change processes will follow the structure plan development to formally rezone land within the structure plan area as proposed. A separate ITA, building on and providing more detail than known at the time this ITA was prepared, will need to be prepared to support any plan change processes.

4. Transport Planning Context and Background

4.1. Auckland Plan 2050

Auckland Council has developed the Auckland Plan 2050[9]. It is a long-term spatial plan to ensure Auckland grows in a way that will meet the opportunities and challenges of the future. It is required by legislation to contribute to Auckland's social, economic, environmental and cultural well-being. The plan outlines the big issues facing Auckland and recommends the way in which Aucklanders and others involved in the future of Auckland can best respond to them.

There are six desired outcomes to achieve Auckland's strategy to 2050. These outcomes are:

- Belonging and Participation
- Māori Identity and Wellbeing
- Homes and Places
- Transport and Access
- Environment and Cultural Heritage
- Opportunity and Prosperity.

To achieve the 'Transport and Access' outcome, there are three directions and listed as follows:

- **Direction 1** – Better connect people, places, goods and services
- **Direction 2** – Increase genuine travel choices for a healthy, vibrant and equitable Auckland
- **Direction 3** – Maximise safety and environmental protection.

These directions are supplemented by seven focus areas:

- **Focus Area 1** – Make better use of existing transport networks
- **Focus Area 2** – Target new transport investment to the most significant challenges
- **Focus Area 3** – Maximise the benefits from transport technology
- **Focus Area 4** – Make walking, cycling and public transport preferred choices for many more Aucklanders
- **Focus Area 5** – Better integrate land-use and transport
- **Focus Area 6** – Move to a safe transport network, free from death and serious injury
- **Focus Area 7** – Develop a sustainable and resilient transport system.

4.2. Future Urban Land Supply Strategy (FULSS)

Of importance to the timing of growth in Orewa-Silverdale is the 2017 FULSS refresh, which indicates a staged release of future urban land involving delivery of 40,500 dwellings and 11,500 new jobs in the Northern growth area of Auckland by 2042.

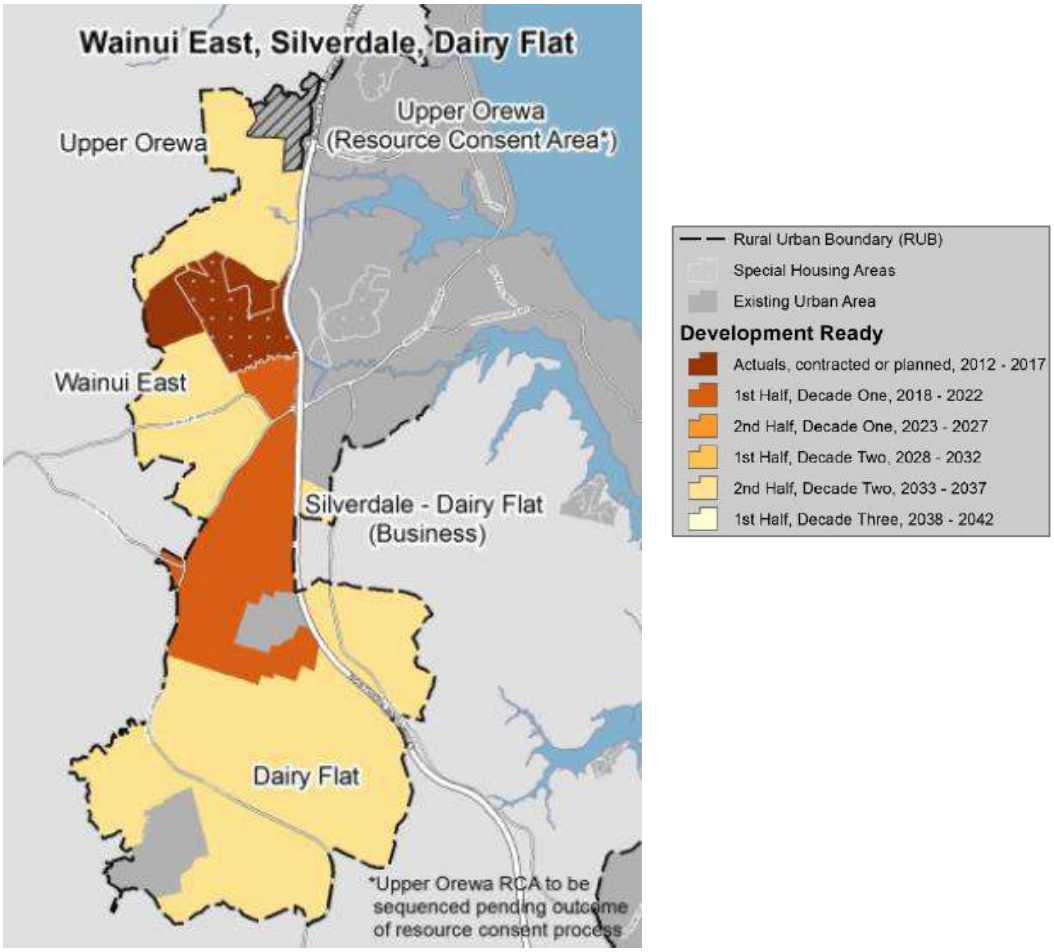
The area is proposed to be released in the following three stages (see Figure 4-1):

- Wainui East is currently 'development ready' (i.e. live zoned)

[9] Auckland Plan 2050, Auckland Council, June 2018

- Hall Farm West are preparing for development and earthworks at the time this ITA was prepared
- Silverdale West / Dairy Flat Structure Plan (industrial land) is to be 'development ready' by 2018 – 2022
- Remaining FULSS land in the North (excluding Warkworth) to be 'development ready' by 2033 – 2037
- Sequencing of Upper Orewa, Wainui East and Dairy Flat in Decade Two reflects the need for significant new bulk water and wastewater infrastructure, including a new water main from Albany and additional wastewater conveyance and treatment capacity at Army Bay
- The proposed business area in Silverdale West / Dairy Flat is sequenced early to provide local employment opportunities and address demand on transport infrastructure.

Figure 4-1: FULSS Future Urban Area Sequencing



Note that 'development ready' does not imply that development will actually start at that time, and certainly not that development will be completed at that time. Instead the dates indicate when development in the area could begin, and the approximate intended date of Council initiating Plan Change processes to live zone land to enable urbanisation. In practice it will be many years before each of the areas is fully developed, with the development rate influenced by market attractiveness, the owners/developers' willingness to develop, land ownership patterns, and underlying regional growth trends.

4.3. Auckland Transport Alignment Project

Auckland Transport Alignment Project (ATAP) is a joint project involving AC and the Government to determine an aligned strategic approach on transport. The ATAP Package recommends transport investment priorities for the 2018-2028 decade to reflect the Government's and Auckland Council's shared directions for transport in Auckland. The most recent ATAP Package was released in April 2018.

The ATAP Package provides guidance to statutory planning processes including the Regional Land Transport Plan (RLTP) and the National Land Transport Programme (NLTP).

The ATAP 2018 direction is set out in the Government Policy Statement (GPS) 2018 and the Auckland Plan. More weighting has been given to PT, walking and cycling, improving safety, and realising environmental, health and growth outcomes. This is a shift in direction from the previous GPS, which placed a high focus on efficient travel by motorised modes.

ATAP identifies the following transport challenges:

- Poor travel choice beyond private vehicles, especially in lower income areas
- A near doubling of deaths and serious injuries on roads since 2012
- Growing recognition of the need to reduce the transport system's environmental impact
- Enabling and supporting a rapid acceleration in the rate of housing construction
- The need for streets to play a growing role in creating vibrant and inclusive places.

The 2018 ATAP package ensures transport investment priorities reflect the aligned transport vision of both the Government and Auckland Council. The ATAP Terms of Reference identify the following priorities:

- Accelerating the development of Auckland's rapid transit network, particularly to unlock housing and urban development opportunities
- Encouraging walking and cycling and making these active modes safer for Aucklanders
- Delivering improvements in health, safety, the environment and access, including disability access
- Ensuring the indicative package delivers the best possible value for money, including broader non-monetary costs and benefits.

The ATAP Update April 2018[10] recommends a package of improvements for funding between 2018-28. It is based on planned and assumed funding of $28 billion. The ATAP Package includes:

- The Transport Agency Northern Corridor Improvements (NCI) project – includes extending the segregated busway from Constellation Station north to Albany. The busway alignment is on the eastern side of SH1 and a connection provided at the Oteha Valley SH1 interchange to connect to/ from the existing Albany Bus Station. The project website notes that completion is expected in 2021/22.

[10] Auckland Transport Alignment Project April 2018

- Penlink - a new connection between the Northern Motorway and the Whangaparāoa Peninsula, bypassing the constrained Silverdale interchange.
- Potential funding for bus shoulder lanes from Albany to Silverdale, subject to further investigations by the Supporting Growth Programme draft IBC, this initiative to improve bus priority was previously identified through the ATAP Refresh in 2017.

4.4. Supporting Growth Programme

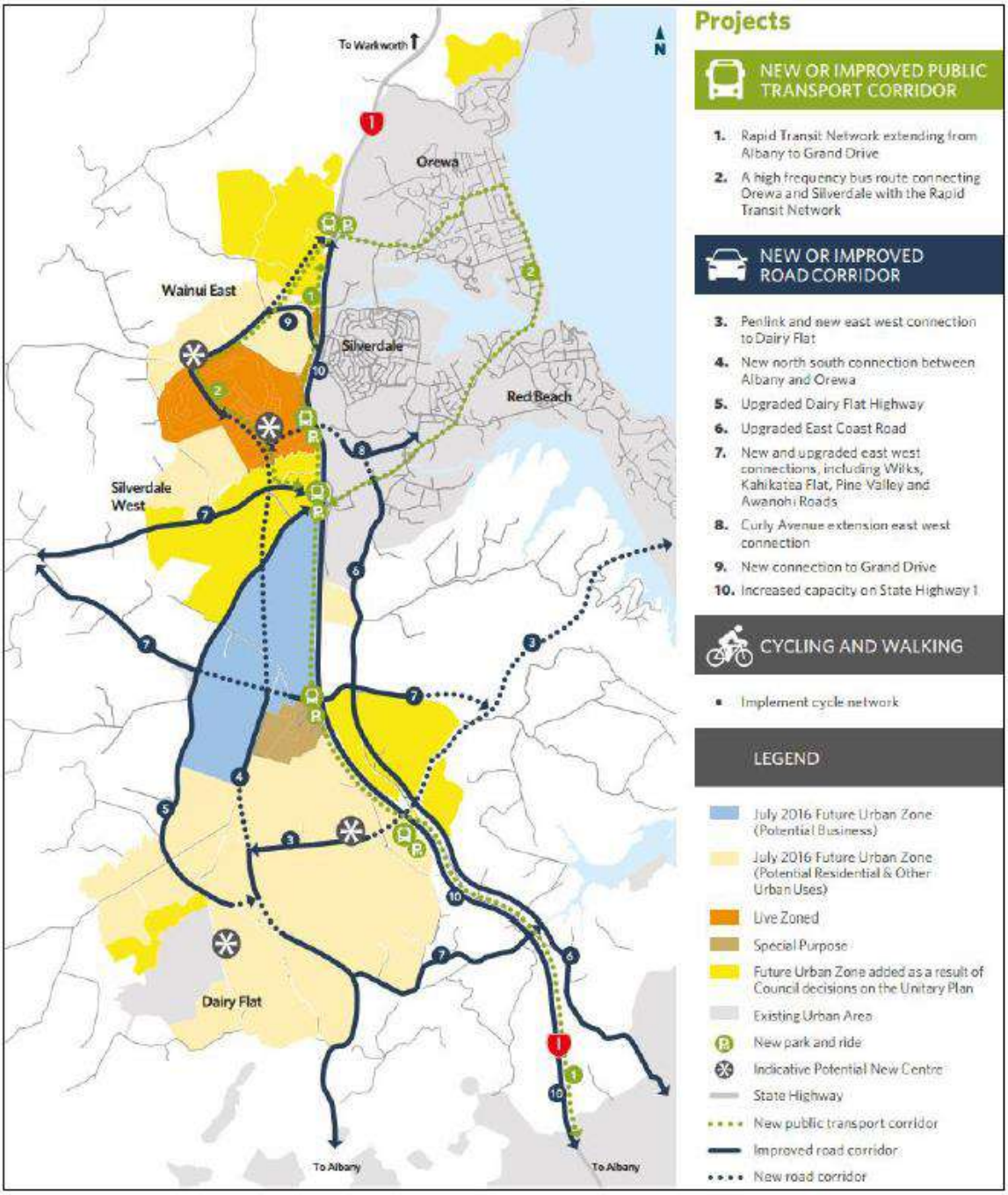
During 2015-16, the Supporting Growth Programme (formerly known as the Transport for Future Urban Growth (TFUG)) was created by the Transport Agency, AC and AT in order to plan the future transport networks and require urban infrastructure for four main growth areas of Auckland identified over the next 30 years.

Four areas selected for future urbanisation:

- North Auckland (Dairy Flat, Silverdale and Wainui)
- North Auckland (Warkworth)
- Northwest Auckland (Whenuapai, Kumeu & Huapai)
- South Auckland (Drury, Paerata & Pukekohe).

The TFUG proposed network for North Auckland is shown in the following figure. This network is reconsidered in the draft IBC.

Figure 4-2: TFUG Transport Concept for the North (Dairy Flat, Silverdale and Wainui)



Further information on the Supporting Growth programme can be found at: www.supportinggrowth.govt.nz .

5. Existing Land Use and Transport Environment

5.1. Existing Unitary Plan Zoning

The AUP-OP has zoned much of the current Silverdale West / Dairy Flat area as a FUZ. The only other zone within the structure plan area is the Special Purpose – Airports and Airfields Zone.

There is a large area of FUZ surrounding the Structure Plan area including Upper Orewa, and Dairy Flat. Additionally, Wainui East now known as Milldale development located immediately to the north of the structure plan area has live urban zones and is subject to the Wainui Precinct under the AUP-OP. The potential full land use capacity of this area is in the region of 40,500 new dwellings and 11,500 new jobs[11].

5.2. Existing Road Network

The Auckland Northern Motorway (SH1) forms the eastern boundary of the structure plan area providing a nationally strategic route for general vehicles and freight. The Northern Motorway is classified as a 'High Volume Strategic' route in the Transport Agency's One Network Road classification system.

There is an existing motorway interchange within the study area at Silverdale: Dairy Flat Highway, which has ramps in both directions. There is also one non-interchange connection across the motorway corridor on Wilks Road.

SH1 carries around 30,000 vehicles per day (VPD) in the vicinity of the Silverdale Interchange with around 3% heavy goods vehicles[12] .

Dairy Flat Highway is a Primary arterial road and carries around 8,000 VPD with 10% heavy goods vehicles[13]. Kahikatea Flat Road is also an arterial road and carries around 4,500vpd also with around 10% heavy vehicles[14]. East Coast Road, on the eastern side of the Motorway, is also an arterial road and carries around 10,000 VPD with around 6% heavy goods vehicles[13]. Other roads in the area are local roads.

Most of the non-state highway roads in the area are constructed to a rural standard with no walking or cycling facilities and no or narrow shoulders in places. Planned upgrades to Dairy Flat Highway are described in the following section.

Figure 5-1 shows the existing road network classification in the area.

[11] Orewa-Silverdale Single Stage Business Case, Te Tupu Ngātahi, June 2018.

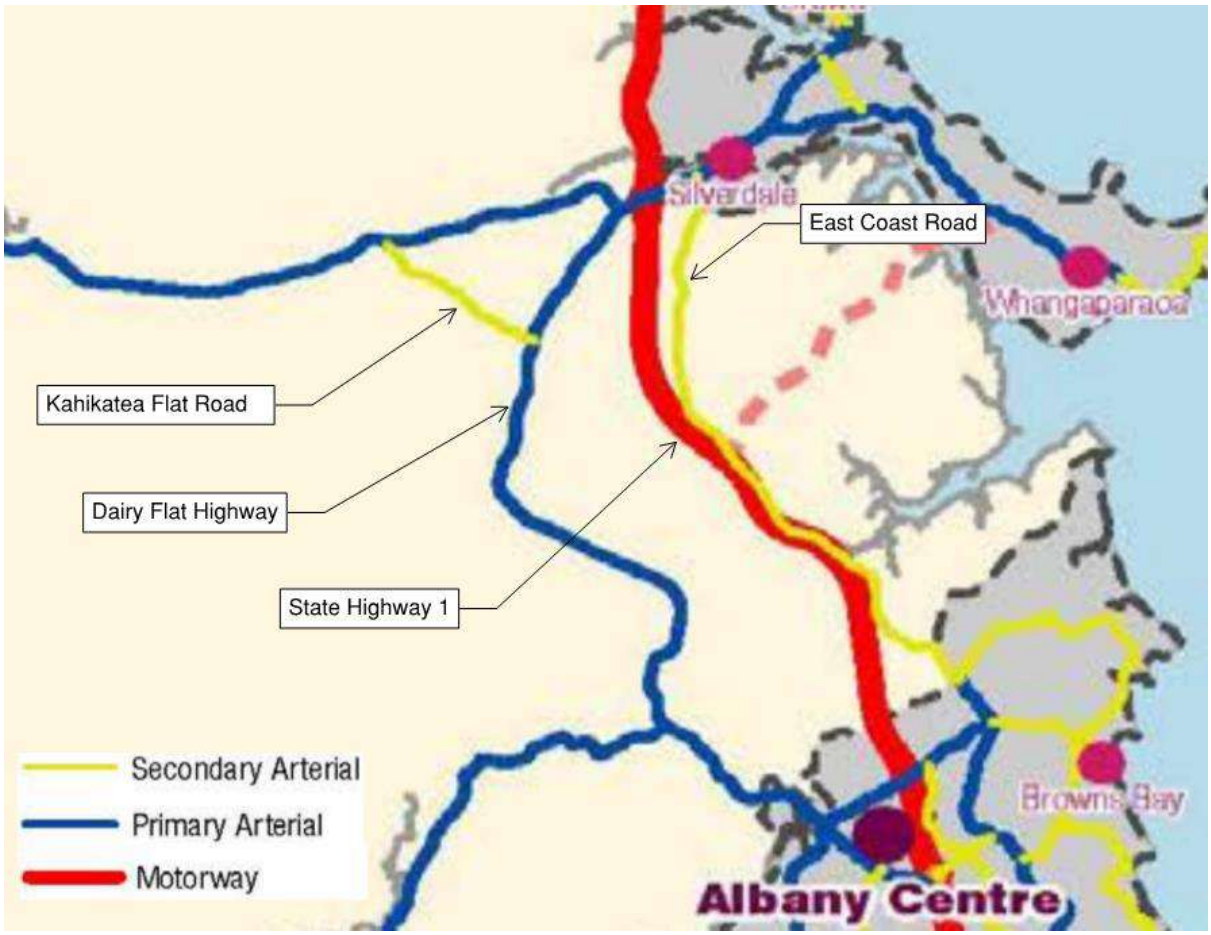
[12] Silverdale West Structure Plan Ecological Constrains Analysis, 2009, Golder Associates

[12] Transport Agency AADT by region spreadsheet

[13] Auckland Transport Traffic Count Database

[14] Auckland Transport Traffic Count Database

Figure 5-1: Road Classification (source AT)



5.3. Committed Transport Projects

5.3.1. Northern Corridor Improvements

The Northern Corridor Improvements (NCI) will provide a motorway-motorway connection, additional general traffic capacity, new walking/cycling infrastructure, an extension of the Northern Busway with new/upgraded stations. It will provide an overbridge from Albany Station to the eastern side of SH1 to facilitate bus access to the north and south of the station on SH1. The NCI project spans between SH1 and SH18 within the Albany area from Albany Highway to Oteha Valley Road. Completion is expected in 2021-22[15].

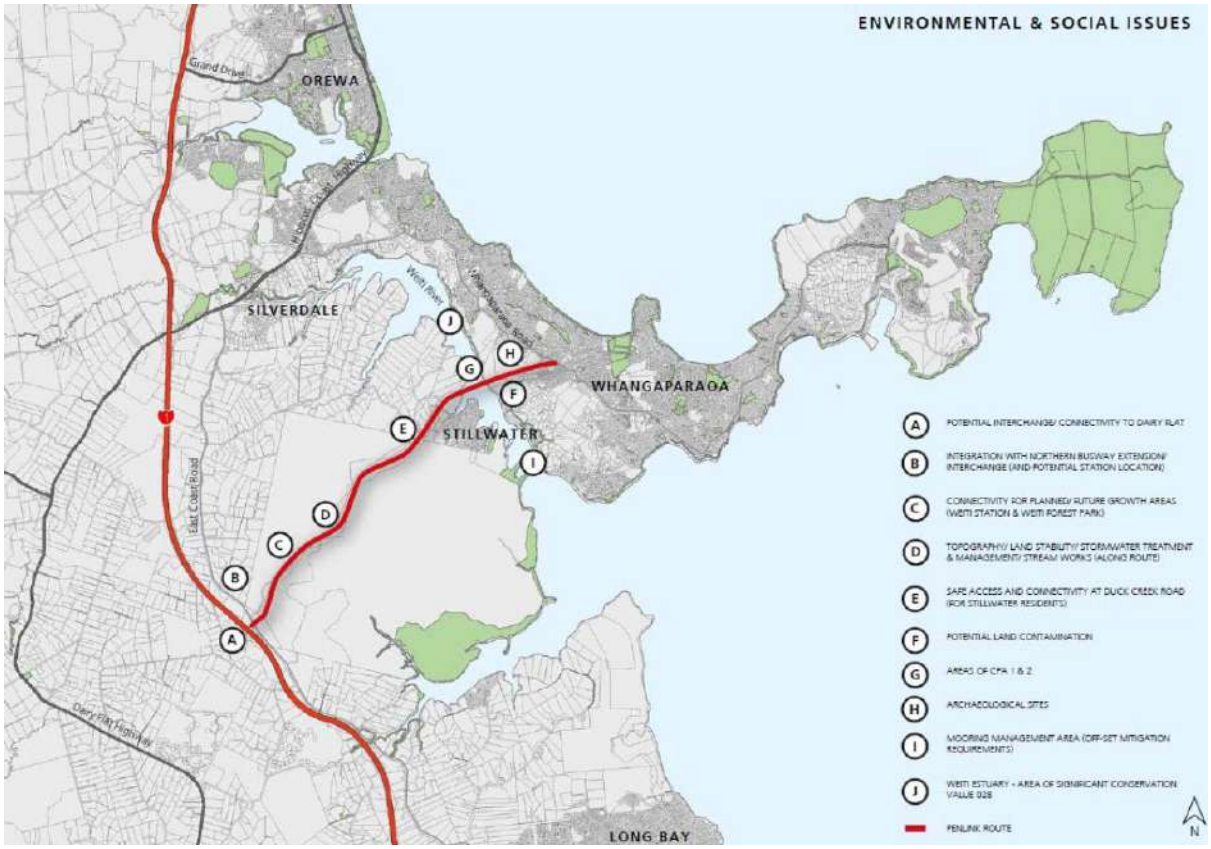
5.3.2. Penlink

Penlink Toll Road will be a tolled two-lane road future-proofed for four lanes. The Penlink Toll Road will provide a direct connection from the Whangaparaoa Peninsula to SH1 at Redvale, bypassing the congested Hibiscus Coast Highway and constrained Silverdale interchange.

[15] https://www.nzta.govt.nz/projects/the-western-ring-route/auckland-northern-corridor

The ATAP Update[16] report notes that faster than expected growth and major planned development around the Silverdale interchange has accelerated the need to progress Penlink. Transport modelling suggests that with a toll in place, Penlink has sufficient capacity as a two-lane road to meet foreseeable future demand. The ATAP report recommends that the project should be complemented by PT improvements (for example planned bus shoulder lanes between Albany and Orewa) to encourage mode shift in the area and avoid adding more vehicles to congested parts of the Northern Motorway.

Figure 5-2: Penlink Preferred Option[17]



5.3.3. Milldale/Wainui

Committed projects included as part of this development with the Crown Infrastructure Partners including:

- Proposed bridge over SH1 connecting Milldale and Millwater
- New / upgrade arterial road including extending Argent Lane via Pine Valley Road to connect with Dairy Flat Highway including a signalised intersection at Dairy Flat Highway
- Upgrade to Silverdale Motorway Interchange.

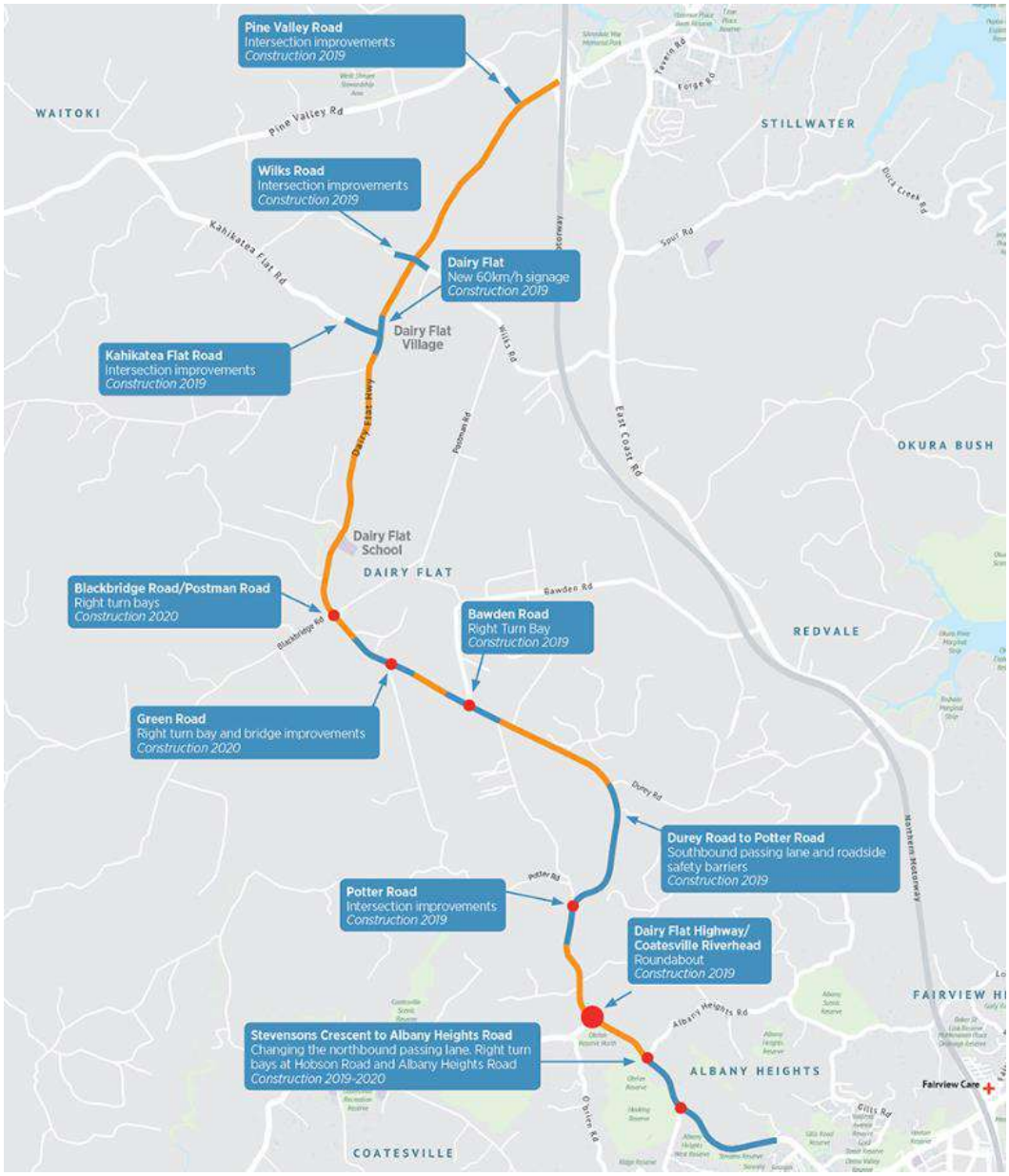
[16] Auckland Transport Alignment Project, April 2018

[17] Penlink Draft Detailed Business Case 2013

5.3.4. Dairy Flat Highway Safety Improvements

AT has identified a range of safety improvements for Dairy Flat Highway as part of a recent road safety review. The scope extends from Pine Valley Road to Stevensons Crescent. The following figure shows the committed improvements[18]:

Figure 5-3: Dairy Flat Highway Safety Improvements



[18] See https://at.govt.nz/projects-roadworks/dairy-flat-highway-safety-improvements/#details

5.4. Public Transport

The Hibiscus Coast is served by connector, local and express bus services connecting to the Northern Busway at Albany Station. There is one service into the city centre, the NX1 route, which operates all day every five minutes during peak periods and every 30 minutes at other times. There is currently one service operating through the FULSS area in Silverdale/ Dairy Flat, connecting Hibiscus Station with the Albany Station via Dairy Flat (Route 986). The following figure shows the local services and strategic busway connections.

There are currently no bus lanes or transit lanes within the structure plan area.

Figure 5-4: Bus Routes Servicing the Hibiscus Coast (New Network as of September 2018)

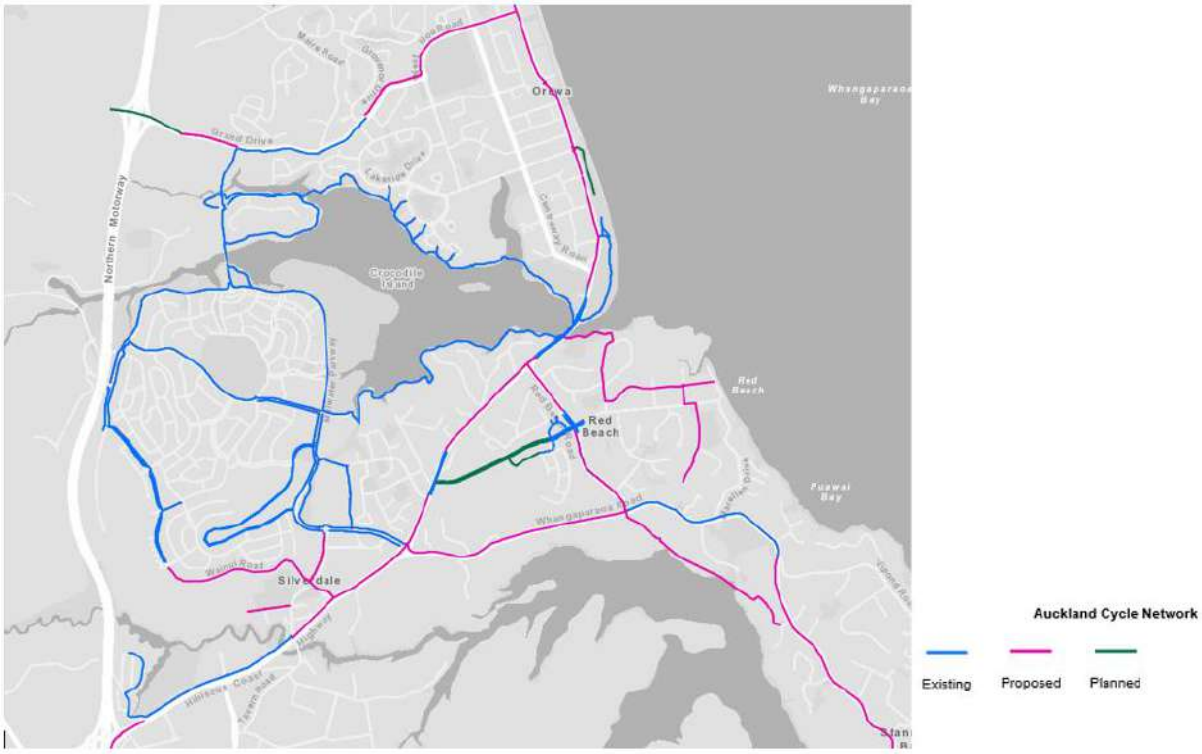
Due to a limited number of feeder bus services, there is a high reliance on park and ride stations within the area. Currently available facilities for these users are Albany Station or the Hibiscus Coast Station in Silverdale. Parking at both park and ride sites often reaches capacity during peaks. At the Hibiscus Coast Station, 481 car parks are currently provided and there is a consent to add 127

additional car parks. Work is currently underway by AT to construct a station building with waiting areas, cycle parking and other station facilities.

5.5. Cycling Infrastructure

The existing and proposed cycleway connections on arterial roads in the Orewa-Silverdale area are shown in the following figure. The proposed network in this area is considered indicative of a possible future outcome as these routes are not currently funded.

Figure 5-5: Existing, Planned and Proposed Cycleways in Orewa-Silverdale



The extent of the cycle network in Orewa-Silverdale is limited to the existing urbanised areas on the east of the SH. The existing cycling infrastructure includes some sections of on-road cycle lanes (painted) and shared path facilities. A popular recreational route is the Te Ara Tahuna Estuary Shared Path on the Orewa River.

In the FUZ areas, the consented Hall Farm subdivision in Orewa West is required to provide a cycling and walking shared path connection over SH1 to connect to the existing shared path at Arran Drive, however the actual alignment and timing of this facility is uncertain at this stage.

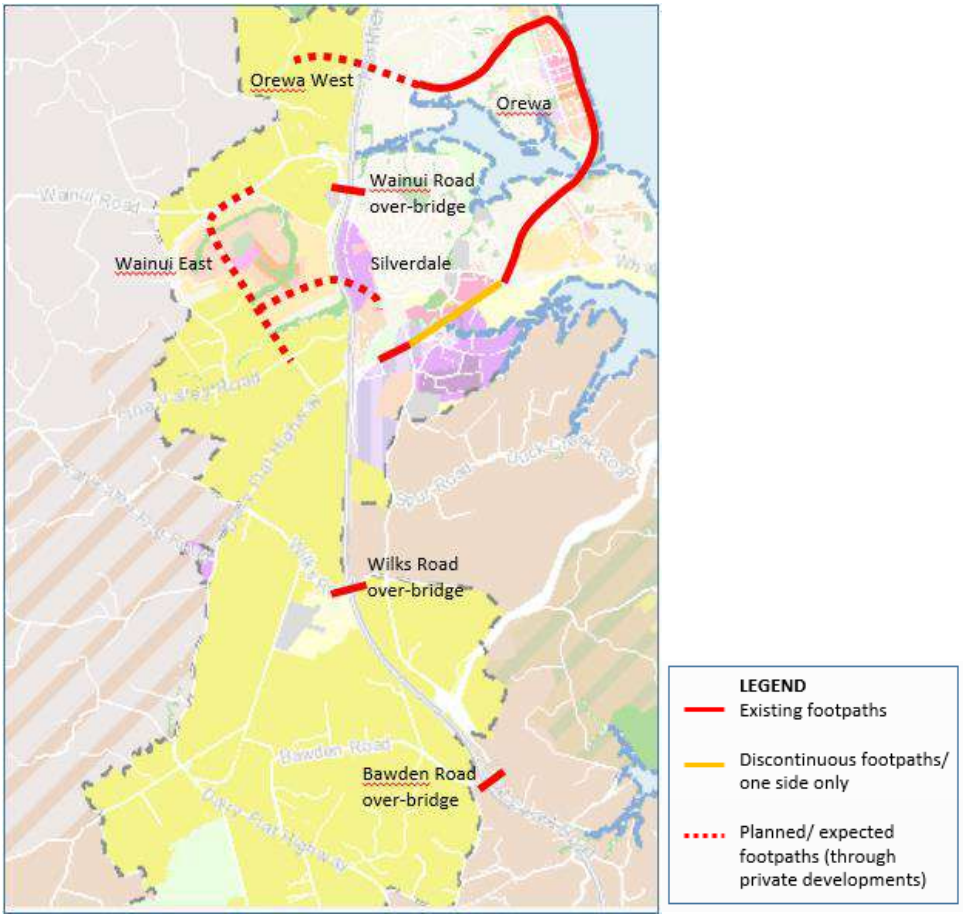
The Precinct Plan for the live-zoned Wainui East area shows segregated cycle ways on Wainui Road, Argent Lane and Curley Ave Extension, as well as on a supporting network of collector roads.

There are currently no public funded projects to deliver new cycling connections in the structure plan area.

5.6. Pedestrian Infrastructure

The existing and planned pedestrian connections on arterial roads in the structure plan area are shown in the following figure.

Figure 5-6: Existing and Planned / Expected Pedestrian Facilities on the Arterial Network



In the FUZ areas in Orewa-Silverdale to the west of SH1, there are very limited pedestrian facilities as the existing road network consists of rural roads with no footpaths.

On the section of SH1 between Grand Drive to Awanohi Road (approximately 14km in length), there are only three SH1 crossings with pedestrian facilities: the Wainui Road interchange, Wilks Road over-bridge and Bawden Road over-bridge.

There are currently no public funded projects to deliver new pedestrian connections in the structure plan area.

5.7. Freight Infrastructure

The Auckland Regional Land Transport Strategy 2015 identifies the Auckland Regional Freight Network and key freight attracting and generating areas. In the Silverdale/ Dairy Flat area, SH1 is a key strategic freight route, along with the section of Hibiscus Coast Highway needed to access the Silverdale south industrial area. Dairy Flat Highway is identified as a secondary freight route. Dairy Flat and Silverdale south are minor freight attracting/ generating areas, and the Knowledge Economy Zone (Highgate Business Park) is a future freight generating area.

The following roads are identified as Over-Dimension Routes (Transport Agency, 2007) within the Silverdale-Orewa area:

- Hibiscus Coast Highway
- Kahikatea Flat Road

- Dairy Flat Highway
- Pine Valley Road
- East Coast Road.

5.8. Other (Rail, Ferry, Air) Infrastructure

Ferry services are provided on the Whangaparaoa Peninsula via the Gulf Harbour marina. Ferry services connect directly to the Downtown ferry terminal in the CBD generally sailing on 30-minute frequencies during peak periods, with limited services during non-peaks and no services on weekends. The AT ferry strategy is currently under development. No significant changes are likely to be proposed for ferry services serving the northern area. Service frequency to and from Gulf Harbour is likely to increase in response to a growing demand.

The nearest rail line is the North Auckland Line which is a freight only line from Swanson to Whangarei. The rail corridor is located on the western coast passing through Helensville and travelling north up the inside of the Kaipara Harbour. Passenger services are provided south of Swanson Station towards Auckland CBD. No stations capable of transferring rail freight are located between Whangarei and the Port of Auckland or Wiri Station.

North Shore Airport is located adjacent to the southern portion of the structure plan area but is excluded from the Structure Plan area. North Shore Airport is a regional airport providing a facility for small aircraft and helicopters. The only passenger service operating from North Short Airport is to Great Barrier Island. If the airport is ever to expand with longer runways etc this could impact on the structure plan area. This is considered further in later sections of this ITA.

5.9. Topography / Ecology

The environmental characteristics of the site have been considered to inform the ITA with regard to the creation of the proposed transport networks that seek to avoid sensitive ecological / cultural areas and respect existing topography.

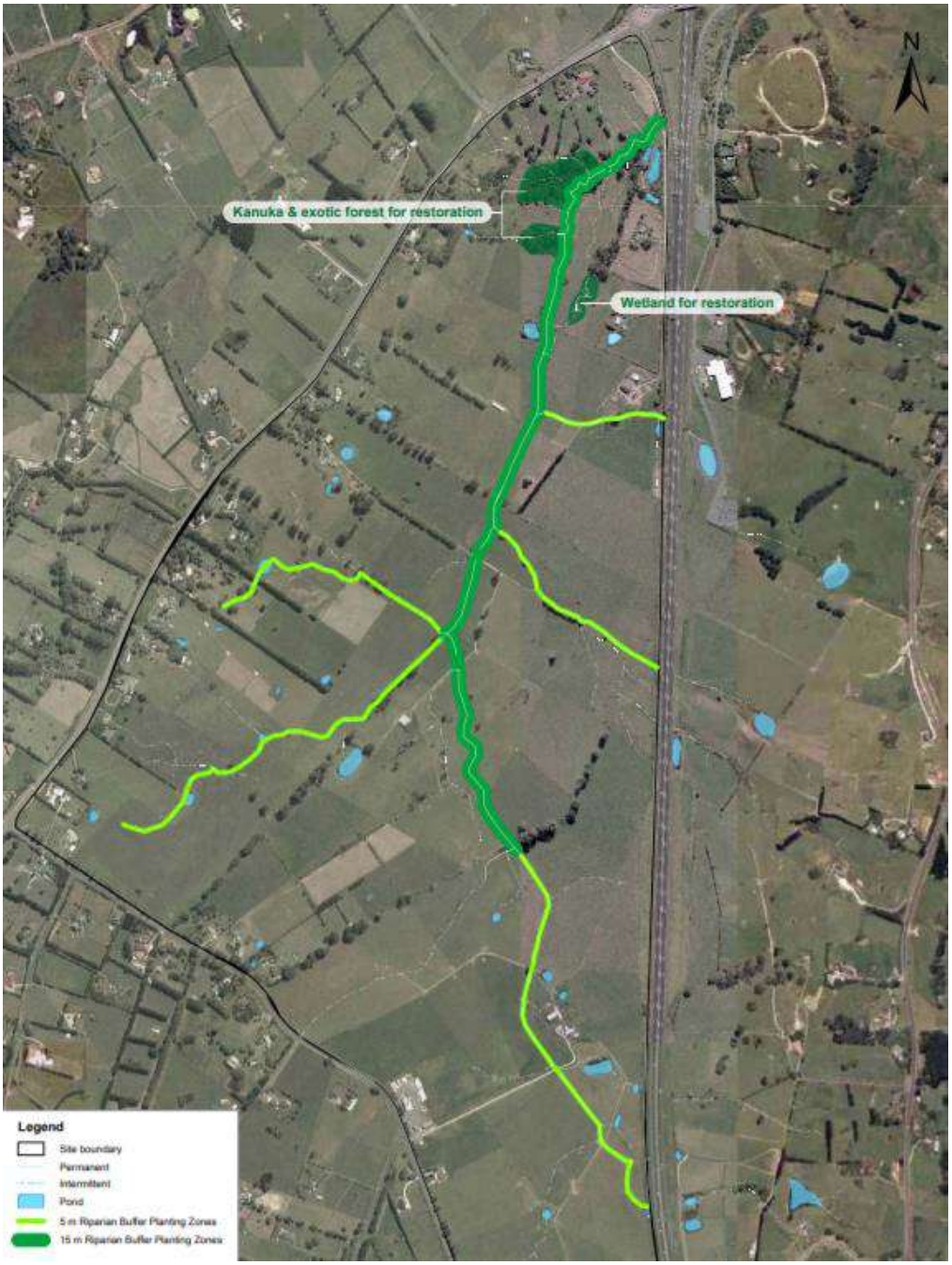
The land is generally undulating through the centre of the site rising to Dairy Flat Highway.

The structure plan area lies within the North-West Wildlink, a proposed wildlife corridor from the Waitākere Ranges to the Hauraki Gulf[19]. There are two floodplains within the site including one on a north- south alignment that follows John Creek.

There is some native vegetation in the area including riparian vegetation bordering the Weiti Stream, native Kanuka forest and some wetland vegetation in the north-east of the structure plan area. Refer to **Figure 5-7** for recommended areas for restoration.

[19] https://www.northwestwildlink.org.nz/

Figure 5-7: Recommended Areas for Restoration[20]



[20] Silverdale West Structure Plan Ecological Constrains Analysis, 2009, Golder Associates

6. Proposed Transport Network

6.1. Development Process

An objective of this ITA is to identify a list of transport infrastructure and services on arterials, collectors and key links within and immediately adjacent to the Structure Plan area necessary to support urbanisation of the Structure Plan area and to integrate with the wider transport network.

The ITA takes a two-stage approach to achieving this objective:

1. Identifies a proposed transport network (arterials, collectors and key links and services) within the structure plan area by responding to design principles and the constraints and opportunities presented and considered likely to be capable of supporting the proposed land uses and integrating with the wider transport network.
2. Assesses the proposed ITA networks (e.g. transport modelling) to check that the network components are capable of achieving the desired outcome and refining the network to an alternative preferred arrangement if necessary.

The proposed network is based on elements from the draft Strategic Transport Network being developed in the Supporting Growth Programme at the time of writing, and additional assumptions by Te Tupu Ngātahi on likely corresponding future local network-level roading, public transport and walking and cycling facilities. These future local roads and other facilities are not identified in the Supporting Growth Programme. These assumptions have been developed with inputs from AT and the Transport Agency.

6.2. Influencing Travel Demand

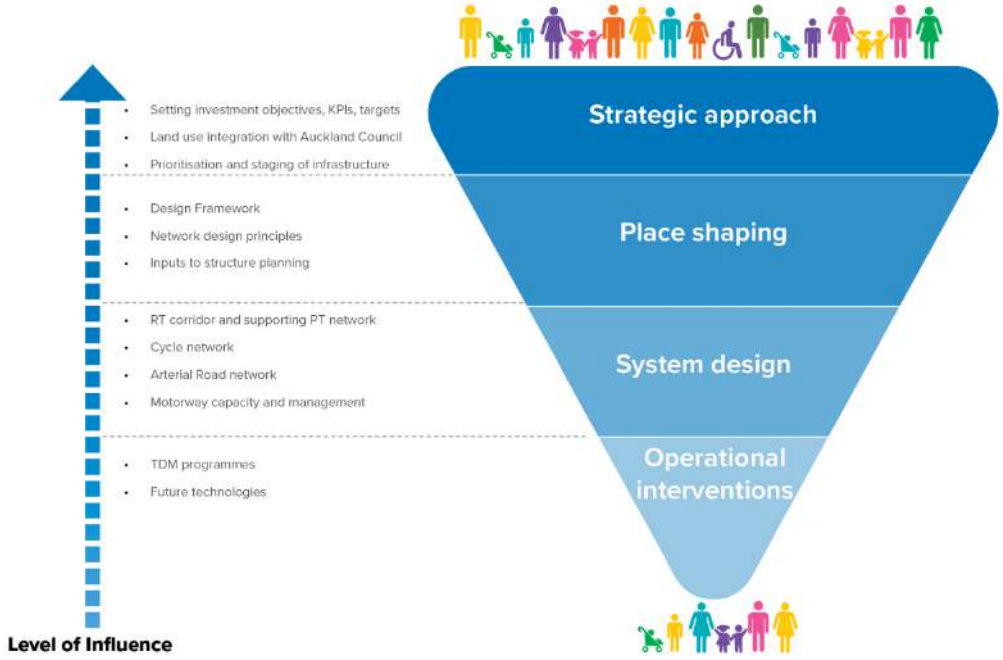
The draft IBC concluded that it is not feasible or economic to build transport infrastructure with a view to accommodating unconstrained travel demand, and that it is not possible to achieve desired mode share and other desired access and placemaking outcomes without seeking to change historic patterns of travel behaviour and choice. Accordingly, the need to proactively plan to influence travel demand is being considered as an integral part of the Supporting Growth programme, and as a starting assumption for this ITA.

Importantly, there are two complementary drivers which manifest slightly differently in terms of strategic response:

- Reducing the need to travel from an area to reduce pressure on the wider transport network – the strategic response of which is to generally increase the level of local employment/ activity, and
- Achieving a mode shift to provide transport choice/ reduce general traffic congestion exposure – the strategic response of which is to intensify land use around public transport nodes and provide high quality public transport and active mode networks.

As shown in **Figure 6-1**, the strategic transport approach and land use integration are the most significant influences on travel demand. Accordingly, the process of developing the ITA and the structure plan presents the best opportunity to embed travel demand management strategies given it is sufficiently early in the planning process to influence key decisions, and is more spatially specific than the business case process.

Figure 6-1: Demand Management Influence



The main opportunities to influence travel demand through the ITA and structure planning process are as follows:

- **Land use integration** – Demonstrating that land use sufficiently provides for local employment opportunities, centre and social infrastructure to substantiate a reduction in outbound travel demand, and mode shift for both inbound and outbound trips. Furthermore, it is important that opportunities to increase density around public transport routes are maximised to support the frequent public transport provision necessary to induce mode shift
- **Transport network design** – The transport network proposed through the ITA needs to be conducive to a reduction in travel demand and a mode shift away from single-occupant private vehicles. From a network design perspective, ensuring that the overall urban form and configuration of transport corridors are walkable, cyclable, and able to support public transport provision are key considerations
- **Influencing investment decisions** – The ITA in its more detailed consideration of the structure plan area over time will help inform future investment decisions which will in turn influence the level and type of travel demand. This is particularly important given that sequencing to date in the business case process has primarily been considered in the context of consenting methodology.

All of the above opportunities are inherent within the proposed structure plan and transport network including provision of employment land in the structure plan (to promote shorter trips in the north Auckland area), appropriately locating activities around public transport stations, a transport network that is multi-modal and connected, and staged to occur in line with proposed land release.

In terms of system design, there are a number of measures available to reduce demand for private motor vehicles. These are outlined in the following table.

Table 6-1: Examples of System Design Options

System Design Options	Likely Effectiveness
Infrastructure projects: • New cycle and walking facilities • New rapid transit corridor and interchanges • New/ upgraded arterial corridors that provide for walking and cycling facilities	HIGH
Facility design: • Park and Ride facilities • Secure cycle parking at key destinations • Electric bike charging infrastructure • Electric vehicle charging infrastructure • CPTED principles and active surveillance	MEDIUM
Local network planning: • Integrated networks with direct connections • Appropriately sized roads • Appropriate access provision and design	LOW
Parking provision: • Parking regulations to limit vehicle use e.g. maximum parking requirements	MEDIUM
Priority measures implemented on corridors • Priority lanes on arterial corridors (e.g. high occupancy vehicles/ bus lanes) • Managed lanes on SH1 (e.g. for freight/ high occupancy vehicles/ public transport) • Managed lanes on SH1 on-ramps (as above)	MEDIUM

In addition, a number of operational interventions can be applied to individual activities as outlined in **Table 6-2**.

Table 6-2: Examples of Operational Options

Operational Options	Likely Effectiveness
Travel behaviour change schemes: • Workplace travel planning: • Personalised journey planning • Community cycling/ walking groups	MEDIUM
Service provision: • Carpooling schemes and support • Carsharing schemes	MEDIUM
Promotional/ educational campaigns: • Cycle incentives and training • Information provision • Advertising/ media campaigns	MEDIUM
Technology • Mobility as a Service • Protecting corridors for drones • On-demand services and deliveries etc	LOW
Priority measures implemented on corridors • Priority lanes on arterial corridors (e.g. high occupancy vehicles/ bus lanes) • Managed lanes on SH1 (e.g. for freight/ high occupancy vehicles/ public transport) • Managed lanes on SH1 on-ramps (as above)	MEDIUM

As part of subsequent development processes, the opportunities for TDM measures should be investigated as part of those individual traffic studies to ensure the desired mode shift can be achieved.

6.3. Network Development Inputs

6.3.1. Wider Area Network Assumptions – draft IBC Network

The draft IBC being prepared by Te Tupu Ngātahi for the entire North area (which includes the structure plan area) identifies the desired regional transport network and influences the transport network within the structure plan area. This provides the opportunity for this ITA to develop a proposed network and transportation response for this Structure Plan area that is cognisant of the intended growth across the entire north area.

Given the parallel timeframes for development, the ITA needs to make assumptions on key transport elements of the draft IBC, but it is noted that there may be changes arising from the IBC approval process that could influence the assessment and findings of the ITA. This will need to be reviewed in the future e.g. as part of future plan changes and supporting ITA.

The key strategic network assumptions arising from the draft IBC (at the time of writing) and informing the network development within the Structure Plan are:

- A new Motorway Interchange is to be provided at Wilks Road (or nearby) with south facing ramps only
- Wilks Road – Kahikatea Flat Road provides an east-west arterial connecting to the new Motorway Interchange and East Coast Road
- Penlink
- A new motorway crossing is provided between East Coast Road and Top Road
- A proposed RTN, which is recommended to be staged. In the short-medium term this will include bus priority improvements such as bus shoulders between Albany and Silverdale, and long term a new RTN route that diverts from SH1 at Redvale to service a new Dairy Flat town centre (located outside and to the south of the structure plan area) and then further north services the industrial and the employment land within this structure plan area.

As the preferred RTN route is not confirmed at the time this ITA was prepared, for transport modelling purposes in this ITA, an RTN route following the motorway (rather than diverting through the structure plan area) has been assumed as this is likely to be the worst case in terms of vehicle trip generation / effects. If the RTN routes more centrally through the structure plan area then improved access from within the site may reduce vehicle trip generation and thus there will be lower road network effects. However, at the time this ITA was prepared, assessing on a worst-case scenario is considered to be a robust approach.

6.3.2. Design Principles

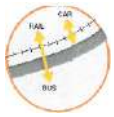
At the structure plan level additional key road links within the site need to be defined. These road alignments have been identified initially via a principles based approach and recognising the opportunities and constraints of the site as identified in the background documents[21].

The general principles that informed the network design are derived from draft principles in development by Te Tupu Ngātahi. The key considerations and responses that informed the network alignment are summarised in the following table.

Table 6-3: Network Design Principles and Response Taken

	Principle	Response
	Respect existing topography, landforms and urban structure.	Avoid aligning roads through areas that would exceed acceptable gradients or require significant earthworks to construct where practical.
	Support ecological corridors.	Avoid aligning roads within flood plains and avoid multiple road crossings of streams and flood plains where practical.

[21] https://www.aucklandcouncil.govt.nz/have-your-say/topics-you-can-have-your-say-on/structure-planning-silverdale-west-dairy-flat-business-area/Pages/structure-planning-documents.aspx

 	Prioritise active modes. & Balance between the built edge and movement function.	Provide a safe cycle network that is separated from general traffic (either within road corridors or off-road). Utilise flood plains for green corridors for walking and cycling where practical. It is undesirable to have rear boundaries adjacent to pedestrian and cycle routes, especially where large industrial buildings may back onto the boundary. Therefore, endeavour to align roads next to the green corridors where practical to provide passive surveillance and make these corridors more user friendly and accessible.
	Acknowledge significant sites.	Avoid aligning roads through sensitive areas or areas recommended for protection, e.g. flora and fauna habitats.
	Align corridors with density	Locate public transport stations/stops within walking distance of the activities that support and benefit from PT accessibility. Consider opportunities for light industrial activities best suited to higher PT accessibility to locate in areas best served by the proposed PT network.
 	Transport corridor scaled to the surrounding context. & Connect between areas as well as through central corridors.	Minimise intersections on arterial roads and enable intersections to be safely designed for all modes including PT, walking and cycling Appropriately space collector roads to provide connectivity through the site.

6.3.3. Road Classification

In designing the road network, a key consideration has been the classification of the roads, particularly, whether roads should be classified as arterial roads or collector roads. To inform this process, Table 6-4 shows the key considerations in classifying a road and the typical outcomes for various road classifications. Importantly, traffic volumes are not the only consideration in classifying arterial roads.

Table 6-4: Road Classification Criteria and Outcomes

Function	Measure	Road Classification			
		Strategic	Arterial	Collector	Local
Classification Criteria					
Public Transport	Route type	High frequency and capacity, focussed on longer-distance trips with infrequent, but major stations.	Forms part of Frequent Transit Network (FTN) or Connector network.	Lower frequency routes as part of Connector or Local Service network.	Limited bus services along these routes.
Freight	Access and Connections	Inter-regional connections.	Intra-regional connections and connectivity to major industrial areas/ ports.	Connections between arterials and minor business areas.	Waste vehicle access.
Connectivity	Through traffic	Greatest through movement	Predominantly through-put function	Carries some through traffic	Only local movement within individual areas expected
	Place Connections	Connections between or through regions	Connecting major suburbs/areas	Connecting local communities and property access	Access to property
	Connections to major airports/ hospitals/ social amenities etc.	Yes	Yes	No	No
	Function	Major, longer-distance connections	Connections to major destinations and to strategic routes	Safe local routes and connections to major routes and destinations	Local access
Traffic Volumes	Daily Flows, AADT (urban)	>20,000	Typically >15,000	Typically >3,000	Typically <2,000
	Heavy Vehicles	>500 vpd	>300 vpd	>150 vpd	<150 vpd

Function	Measure	Road Classification			
		Strategic	Arterial	Collector	Local
Classification Outcomes					
Public Transport	Priority	Separate facilities (busway, bus lanes, bus shoulder) where possible.	Separate facilities (bus lanes, bus advance at signals) where possible.	Some bus priority where warranted (e.g. traffic vols and frequency). In-lane bus stops.	Generally mixed traffic. In-lane bus stops.
Active Modes	Segregation	Full segregation expected	Segregated in urban areas	Lower design speeds. Segregated	Lower design speeds. Mostly on-road or on designated paths
Property Access	Accessibility	Generally prohibited direct property access	Generally limited access	Controlled access only at key locations	Full access
Parking	Controls	Generally prohibited	Generally controlled where provided	Designated areas	As determined by street function
Design Vehicle		Articulated truck.	Articulated truck.	Large rigid truck/ bus.	Waste collection vehicle (can cross centreline)

In summary, roads providing access to a strategic route and/or with a frequent PT route operating on it, could be classified as arterial roads even though they may have relatively low daily traffic volumes. In addition, any roads that carry greater than 15,000 vpd are likely to be classified as arterial roads. Predicted future road network volumes are discussed in **Chapter 7**.

In regard to outcomes, strategic routes and arterials will provide seperate facilities for buses and cycle routes protected from traffic. Access and parking on strategic and arterial routes are limited to support the through movement function. Collector roads will have bus priority where warrented and seperate cycle facilities but will also accommodate more access and some parking as appropriate. Local roads will provide access and parking and vehicle speeds are controlled to ehance safety and encourage travel by active modes.

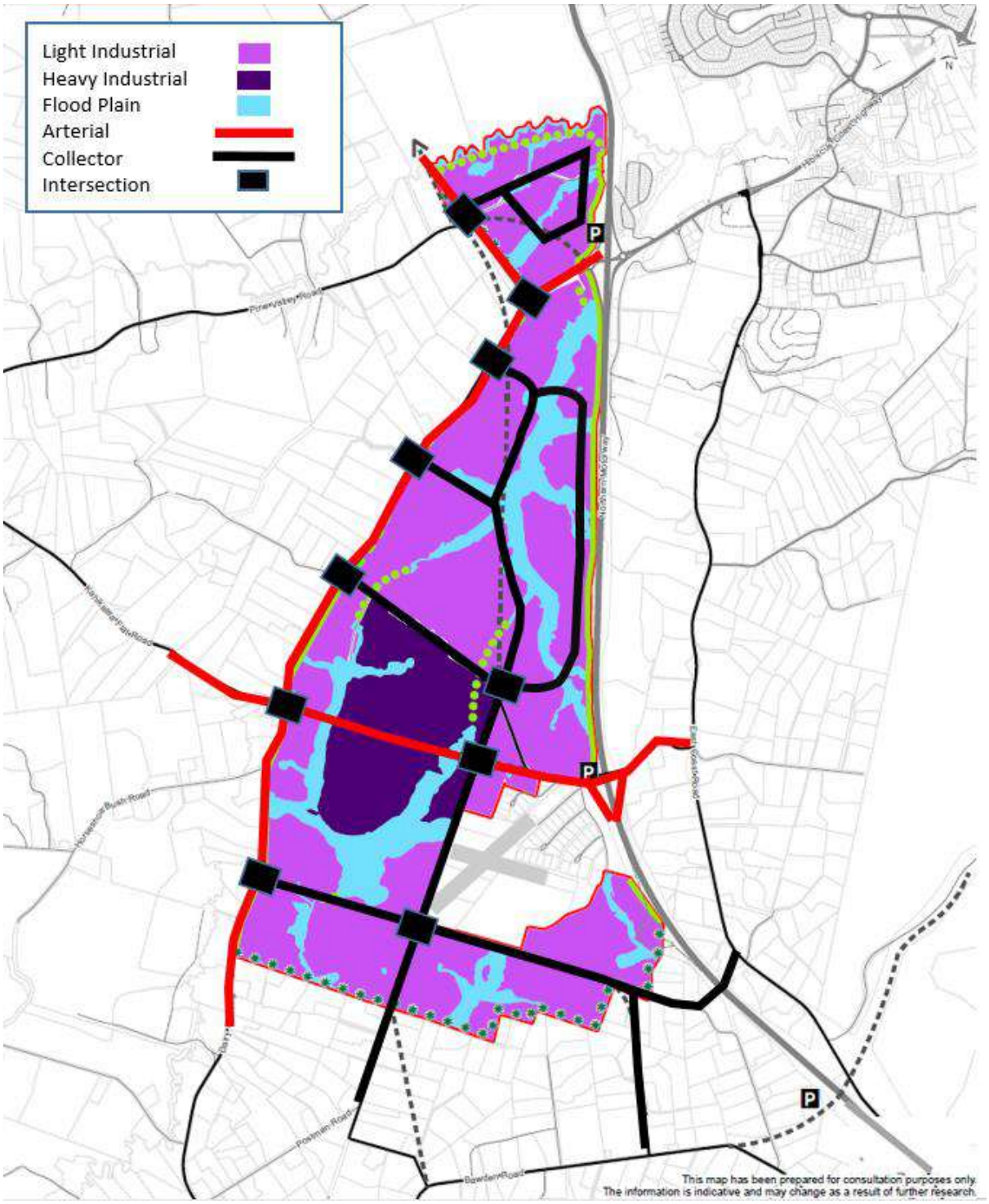
6.4. Proposed Road Network

The following diagram shows the proposed combined strategic and local road network within the structure plan area derived in this ITA based on the design principles and road network classification inputs. PT, walking and cycling networks will be described in subsequent chapters of this ITA.

The road network is indicative only for the purpose of the ITA and it is important to note that the proposed road network is not committed or funded. The road network may need to change as a result of the ongoing draft IBC approval process. For example, an internal collector road alignment or recommended staging could shift to respond to a change in what is approved for the strategic RTN network.

It is also noted that the proposed ITA road network is considered to be the preferred outcome at this stage but there may be policy, environmental or infrastructure changes etc in future that warrant changes to the proposed road network. The purpose of subsequent ITA's will be in part to review the network and determine whether changes are necessary at each stage of the planning process.

Figure 6-2: Proposed Road Network



The key parts of this proposed road network are:

- The proposed road network responds to the flood plain riparian corridor that routes north-south through the area by avoiding multiple crossings of this corridor. The road is aligned next to the corridor so that any public space provided along the corridor, e.g. walking and cycling paths, is overlooked by a road rather than the back of industrial buildings.

- Likewise, the collector road adjacent to the motorway has been aligned next to the landscape buffer along this boundary as the green corridor would also support public walking and cycling networks, and it is preferred that these are overlooked by roads.
- The road network seeks to avoid an area of Kanuka and exotic forest and a wetland (in the northern part of the structure plan area but south of Dairy Flat Highway) recommended for restoration in the ecological constraints report[22].
- The proposed network seeks to minimise the number of intersections on Dairy Flat Highway but this may change if modelling indicates that additional collector road access into the structure plan area is necessary.
- The industrial area to the north of Dairy Flat Highway has one collector road connection to the arterial network to avoid having multiple intersections in close proximity to the motorway interchange.
- A network of indicative pedestrian and cycle paths following the ecological corridors and connecting to the wider network has been identified in the ITA and this has informed definition of the road network, but these are not part of the transport modelling assessment in the ITA.

6.5. Proposed Public Transport Network

6.5.1. Rapid Transit Network (RTN)

As previously mentioned, the draft IBC has investigated options and staging for an RTN in north Auckland, where in the short to medium term bus priority improvements on SH1 continue to service current demand, and in the long term, an extension of the RTN services the Dairy Flat/Silverdale West and Wainui growth areas by diverting through the FUZ area, including following a north – south alignment between SH1 and Dairy Flat Highway (within this structure plan area).

RTN station locations are not defined in the draft IBC and will be considered in the next stage of any business case work. Correspondingly, there will need to be further design and planning around how these stations are accessed in the structure plan area in subsequent ITA's, e.g. at Plan Change stage.

At the appropriate time, this planning and design should consider how stations integrate with the overall transport network and apply design principles to achieve desirable transport outcomes, such as ensuring stations can be accessed via multiple routes and support a range of transport options. Stations will support access that should in-turn be complemented with appropriate activities in close proximity to the stations, i.e. it will be desirable to locate more commercial and light industrial activities in proximity to the stations where employees are likely to use the services for commuting, rather than located near heavy industrial uses that do not typically generate many PT trips.

The expected timing of the release of the land and the draft staging recommended for the RTN mean that the RTN may not be delivered before the majority of the structure plan area is built out. Frequent bus services with on road priority will therefore likely be necessary in the short to medium term to support land development within the structure plan area. These local services will still be required

[22] Silverdale West Structure Plan Ecological Constraints Analysis, Golder Associates

after the RTN is operational, to shift passengers to and from the RTN stops to destinations within the structure plan area and beyond.

6.5.2. Local Bus Routes

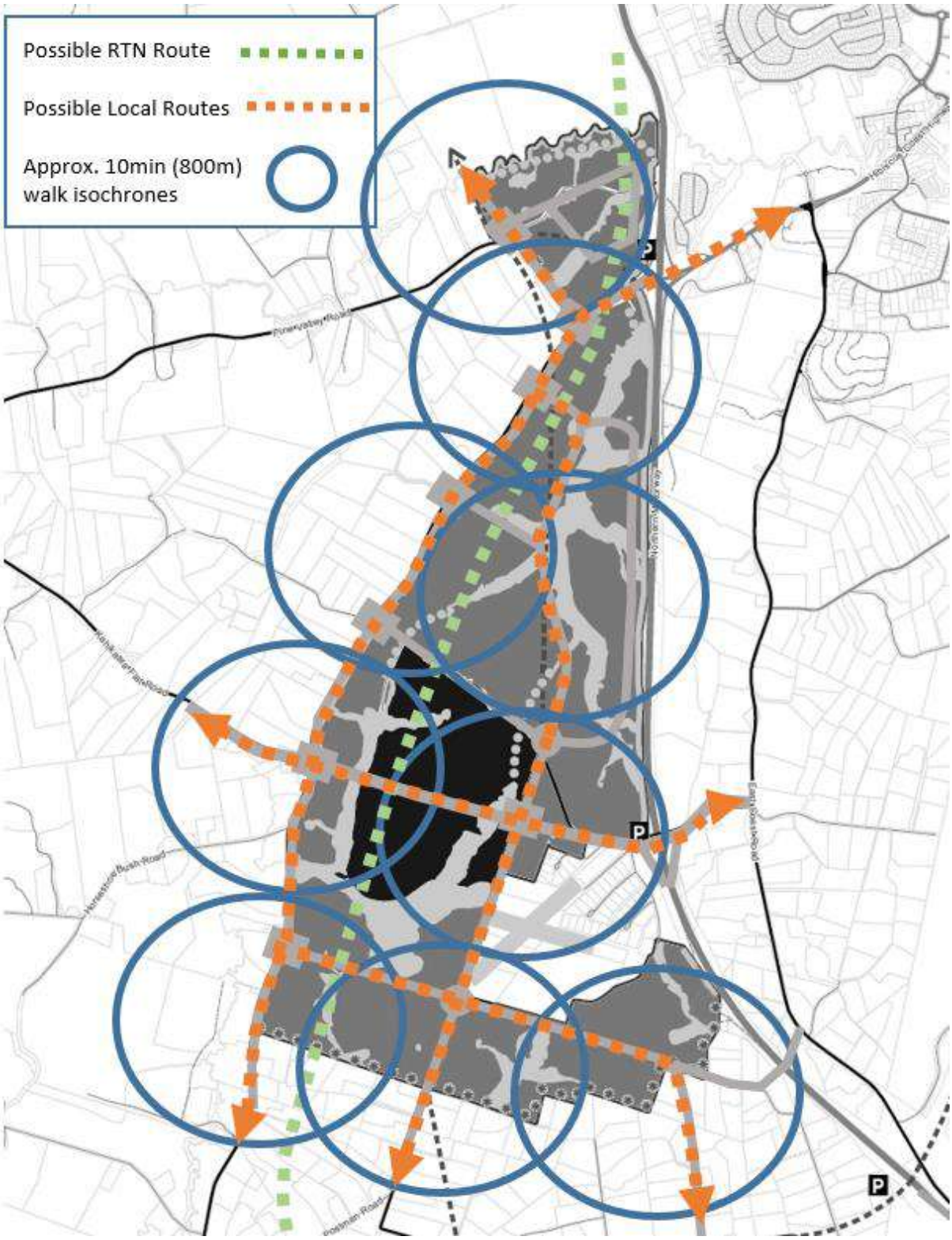
AT have provided indicative information on how the local bus network might look in this area. Currently this includes three potential local bus routes generally described as follows:

- A frequent route between Silverdale, the new Wainui Centre and a possible new Dairy Flat Centre. Between Dairy Flat and Wainui this route will travel via the Silverdale West industrial area (and some of the suburban areas between them). This route will provide good connectivity between the wider network and the industrial area.
- One route from Orewa in the north, through the northern FUZ area to Wainui centre, then down through the industrial area to the future suburban Dairy Flat, before finishing at a possible new centre.
- A local route (i.e. relatively infrequent) between Silverdale centre and the new Dairy Flat centre, via the edge of the industrial/urban area, along the existing Dairy Flat Highway. This is primarily a coverage service, though it may run more often at peak times to serve as a connection to employment.

Assuming such local routes eventuate, there will be good connections between the wider Silverdale/ Orewa/ Wainui/ Dairy Flat area and the Silverdale West industrial area.

The following figure shows possible PT routes within the structure plan site. The isochrones show indicatively that the majority of the site will be within a 10 minute walk (800m) of a bus route (approximately).

Figure 6-3: Proposed Future PT Network



6.6. Proposed Cycling and Pedestrian Network

The structure plan area presents an opportunity to utilise flood risk areas that cannot be built on to establish a network for off road pedestrian and cycling paths that can further support travel to and from work, as well as recreational travel by active modes.

A proposed pedestrian and cycling network has been developed based on key principles of:

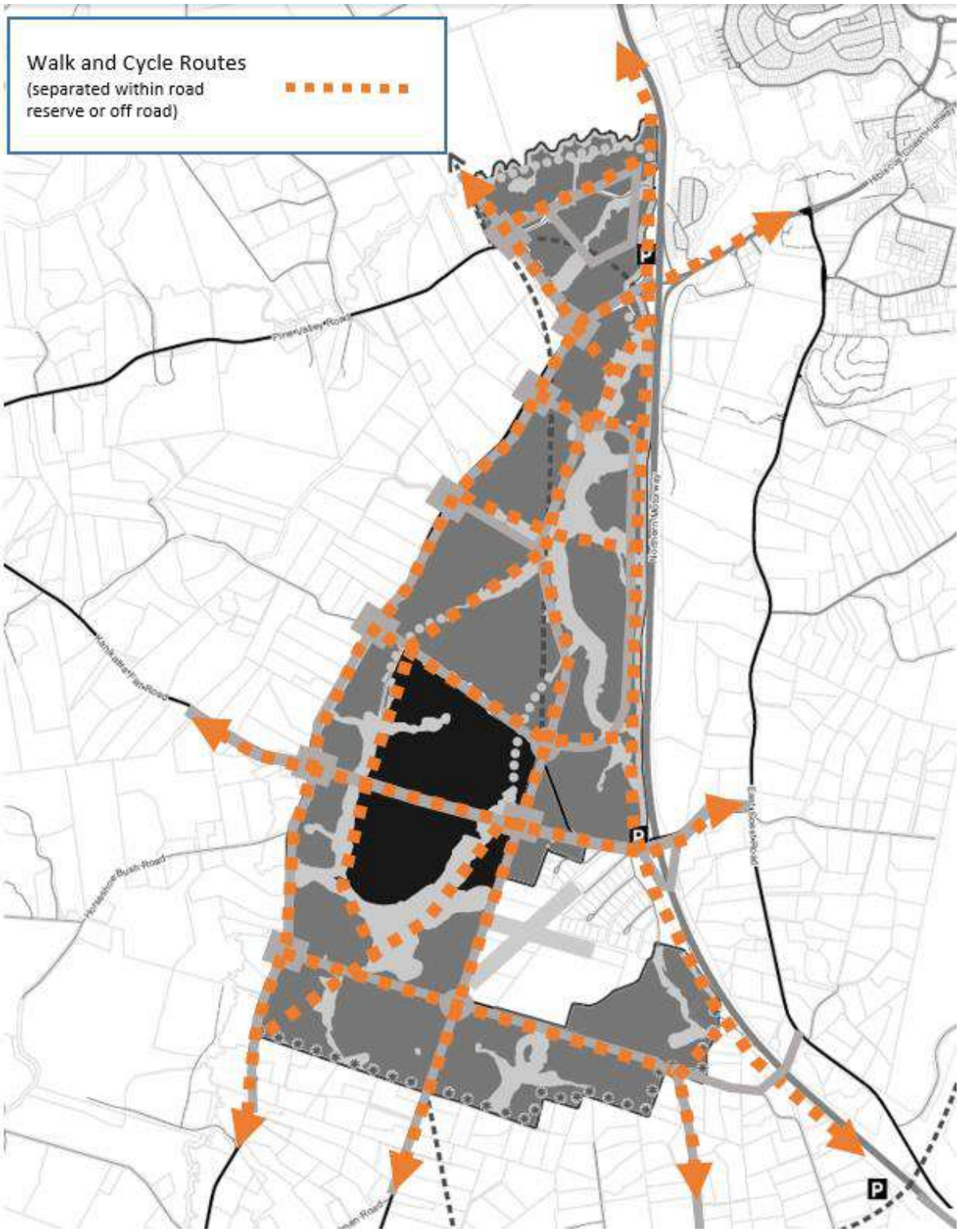
- The strategic walking and cycling routes identified in the draft IBC by Te Tupu Ngātahi for the north Auckland growth areas
- utilising local-level opportunities presented by the site, e.g. routes through riparian margins
- achieving connectivity through and within the structure plan area
- providing safe facilities on road corridors to support active travel modes and reduce conflict and crashes.

The proposed pedestrian and cycling network is shown in the following figure. As with the rest of the proposed networks, this pedestrian and cycling network may need to change as a result of outcomes from the draft IBC approvals process; future negotiations for delivery via developer contributions; future greenways plans and or other unknowns future projects / plans. The network will be reviewed and revised if necessary as part of future ITAs.

Design details such as on road vs off road alignments and intersection treatments will also be defined at later stages of the planning process. As part of this, it will be important to consider how the design of the network and facilities can support an increase in cycle use, along with emerging or future modes, such as electric bikes and e-scooters. Also as part of this, consideration of design methods where routes are located within flood zones will need to be considered, e.g. raised boardwalks etc.

It is noted that major parts of this network are components of the wider strategic walking and cycling network intended to serve through-movements as well as providing access to and from the structure plan area, for example the route alongside the motorway is likely to be of equal or more benefit for through-movement between areas around the structure plan area, as it is for visitors to sites within the structure plan area. The same would apply to the route along Dairy Flat Highway.

Figure 6-4: Proposed Walking and Cycling Network



7. Trip Generation and Mode Share

7.1. Vehicle Trip Generation

It is necessary to rebalance the trips in and out of each single MSM zone that is split to match the structure plan boundary in the Aimsun model so that the trip generation of the structure plan area is accurate. This requires some checking against established industrial trip rates (i.e. trips per hectare).

The Trip Database Bureau (TDB) database of trip generation includes surveys from comparable industrial sites within New Zealand. The peak hour trip rate of industrial (light, medium and heavy) surveys in this database is between 0.17 and 0.19 trips per 100 square meters of site area. These rates equate to a trip rate of 17 to 19 trips per hectare of net developable site area.

A survey of vehicle trips generated by an existing industrial area in Silverdale (Forge Road area) was also undertaken to inform the trip rate analysis. This site has a developable area of 53 hectares and generates around 1,040 movements in the morning and evening peak hours. The trip rate for this site is 20 trips per net developable hectare.

Therefore, the trip rate for the structure plan area is expected to be in the range of 17-20 trips per net hectare, or a total peak hour trip generation of around 6,000-7,000 vehicle trips. Provision of quality facilities for PT, walking and cycling may lead to a lower vehicle trip generation rate, but at this stage this figure provides a suitable basis for comparison.

Aimsun modelling for this ITA has returned peak period volumes generated by land within the structure plan area of around 5,900 movements in the AM peak hour and 7,800 movements in the PM peak hour. The modelled volumes align closely to the targeted range of 6,000-7,000 peak hour trips.

7.2. Public Transport Trip Generation

The number of PT trips generated by zones including the structure plan area have been obtained directly via the MSM model. These trips are defined in the following table for two-hour peak periods. Note these trips include some areas outside the structure plan area e.g. some residential areas. This trip generation is not solely for the structure plan area.

Table 7-1: Predicted PT Trips to/from Zones Containing Structure Plan Areas (two hours)

To				From			
Zone	**AM**	**IP**	**PM**	**Zone**	**AM**	**IP**	**PM**
34	189	81	32	**34**	30	57	171
39	86	81	233	**39**	457	146	96
40	110	68	128	**40**	219	94	114
42	250	118	138	**42**	236	126	230
Total	**635**	**348**	**531**	**Total**	**943**	**422**	**611**

The above table shows that there is expected to be over 1,500 PT trips to/from the area during the two hour AM peak period and over 1,100 in the PM peak period. Assuming demands are slightly higher during the one hour peak period then total peak hour PT trips could be around 900 in the morning and around 700 in the afternoon. These trips are on top of the private vehicle trips described in the previous section, not part of.

This may be a low estimate as the MSM model scenario used here has the RTN alongside the motorway, if the RTN routes more centrally through the site and therefore more of the site is accessible to the rapid network the PT trip making is likely to be higher.

7.3. Cycling and Walking Trip Generation

Active mode travel to industrial land uses is typically low, for example of the 72 travel surveys for industrial land uses in the TDB Database[23] only three include walking and cycling as a surveyed travel mode. For these surveys the mode share for cycling was 4%. This low mode share may be an outcome of the design of industrial areas that has not in the past typically included safe separated or off-road walking and cycling facilities, and that these areas typically have a low population density. This is an example for comparison only and has not been used to estimate the walking and cycling mode share of the structure plan area which aims to provide comprehensive and safe cycling facilities.

The draft IBC targets a 15% mode share for walking and cycling across the wider north Auckland future growth areas. Consideration of the structure plan area specifically as part of this ITA suggests that this mode share is likely to be lower for trips to and from the structure plan's specific industrial area. This is because the structure plan area is removed from the main centres, will not contain school or recreation facilities that typically generate more cycle trips, and the nature of industrial employment is less likely to attract active mode travel (e.g. the need to use a work vehicle during the day).

Considering the proposed land use and the proposed provision for active mode connections to and within the area, a target mode share of 10% is considered appropriate. This mode share is not as high as targeted by the draft IBC for the wider area, but still much higher than has been achieved in the past for Industrial land uses. Assuming the walking and cycling trips are additional to the modelled vehicle and PT trips then the number of walking and cycling trips to / from the structure plan area could be around 700 to 900 trips per hour in the peak periods. Note this excludes walking trips made from stops and stations on the PT network.

It is possible that Travel Demand Management (TDM) measures could increase the level of walking and cycling, and the proposed network should still easily accommodate higher demands, but this would be considered in more detail as part of subsequent planning stages e.g. plan change and resource consent.

7.4. Summary Trip Generation

The following table summarises the estimated multi modal trip generation for the area as described in this Chapter. This is a high level estimate for indication only at this stage.

[23] Trips Database Bureau, Trip Database Spreadsheet 2018 Version

Table 7-2: Summary Trip Generation Peak Hour

Travel Mode	AM	PM
Vehicle Trips	5,900	7,800
PT Trips	900	700
Walk and Cycle Trips	700	900
Total	**7,500**	**9,400**

8. Assessment of Proposed Transport Network

8.1. Assessment Methodology

The traffic modelling undertaken for this ITA is used to support both the draft IBC and this ITA assessment, ensuring alignment between the two work streams.

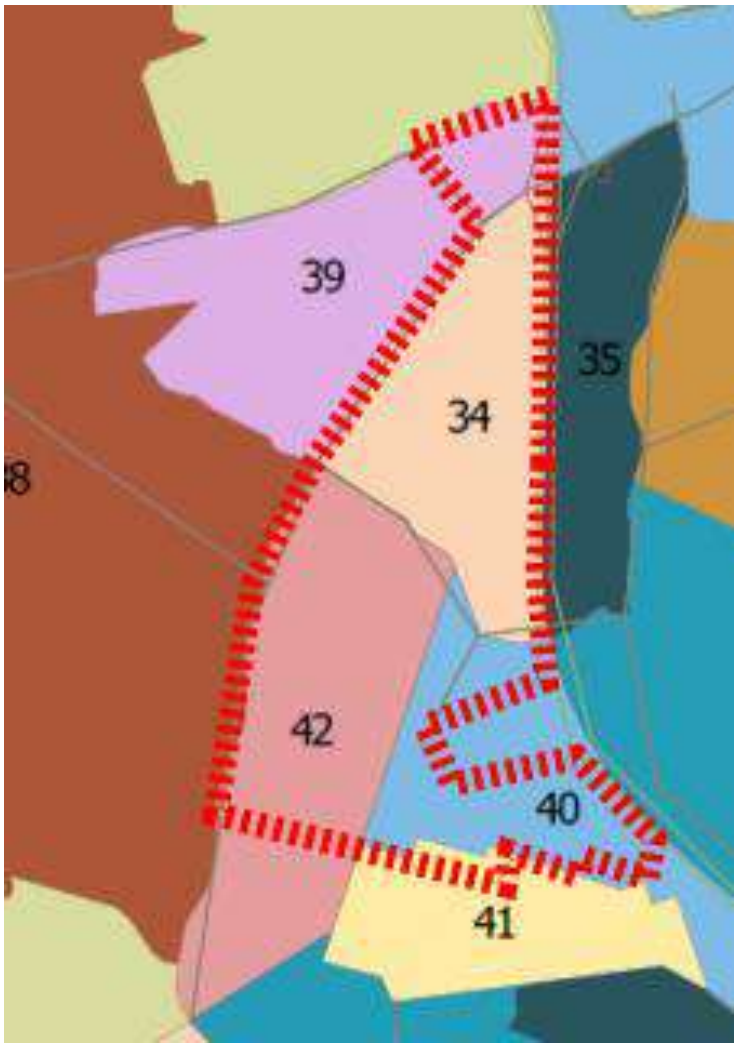
This structure plan area cannot be assessed in isolation, due to the significant growth planned to the north in Wainui East and to the south in Dairy Flat. The Supporting Growth Programme is investigating the preferred strategic transport system to support growth in the whole north Auckland future growth area, which clearly needs to integrate with the structure plan area. The modelling for the ITA assumes land use in the wider area outside the structure plan boundary in accordance with the transport modelling that is being undertaken for the draft IBC in this area. This will help to ensure consistency between the two assessments. The draft IBC is using a refinement of the regionally agreed Scenario I-11 land use forecast. The refinement takes a longer-term view of the area, assuming full build-out of the FUZ areas. Scenario I-11 assumed only a portion of Dairy Flat was developed within the forecasting horizon of 2046. The draft IBC modelling has therefore developed a '2046+' forecast to reflect this longer-term view. The 2046+ scenario has increased yield to 40,500 that reflects the localised refinement to development yields in the FUZ, as provided by AC for this ITA work.

8.2. Model Components

8.2.1. Model Zones

The current MSM zone configuration in this area is shown in the following figure.

Figure 8-1: MSM Zones and Structure Plan Boundary

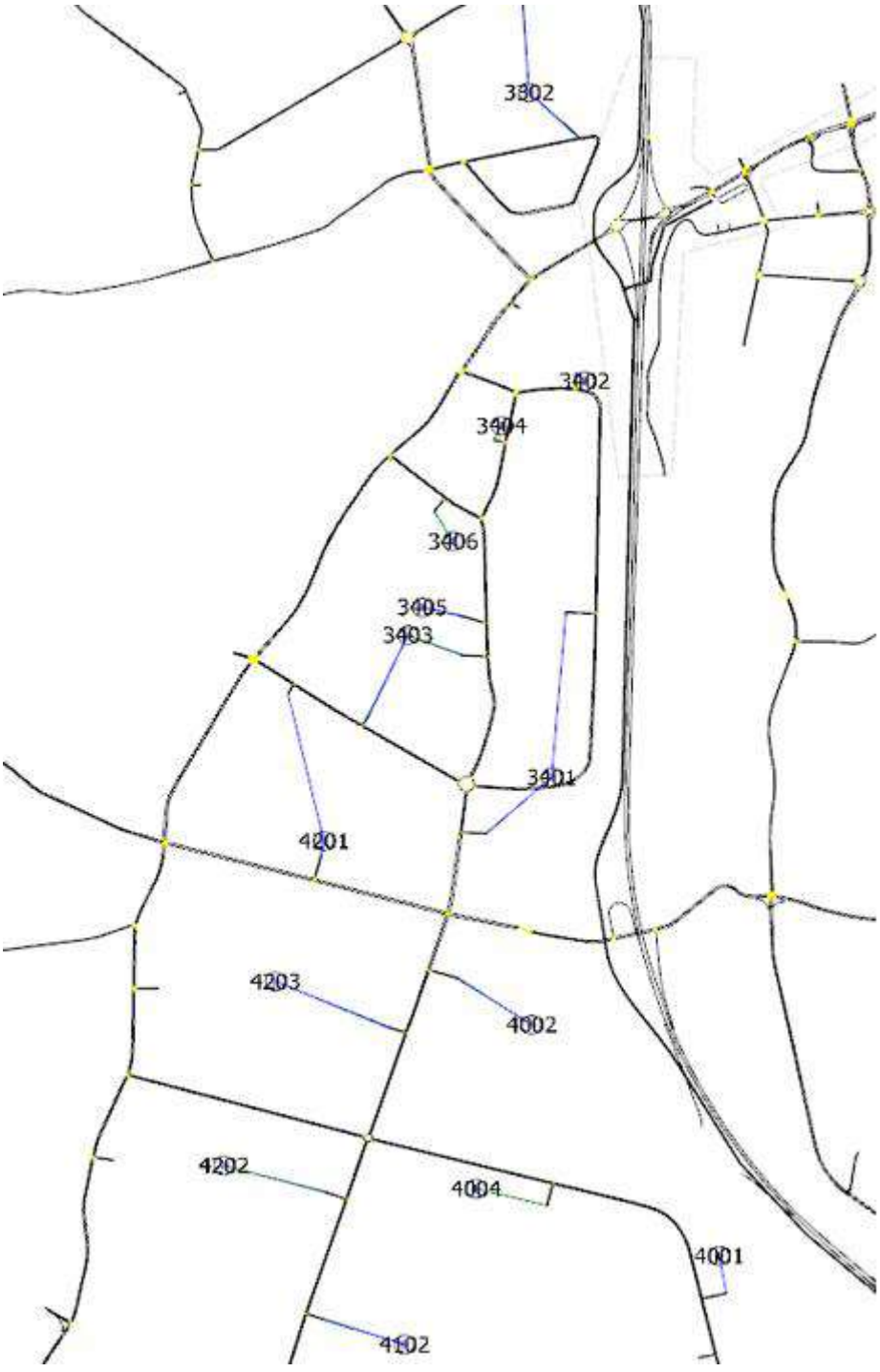


There are four MSM zones that encompass land within the structure plan area; zones 34, 39, 40 and 42. Zone 41 may also include some structure plan area.

Only zone 34 is entirely within the structure plan area. Accordingly, this zone includes predominantly employment land use within the MSM. Other zones that cross the structure plan boundary include a mix of employment and residential dwellings in the MSM.

The zone system in the Aimsun model has been refined from the MSM zones in this area so that there are no zones crossing over the structure plan boundary, and that land use within the zones inside the structure plan area is entirely employment. The following figure shows the zone system utilised in the Aimsun model.

Figure 8-2: Aimsun Zone System in Structure Plan Area



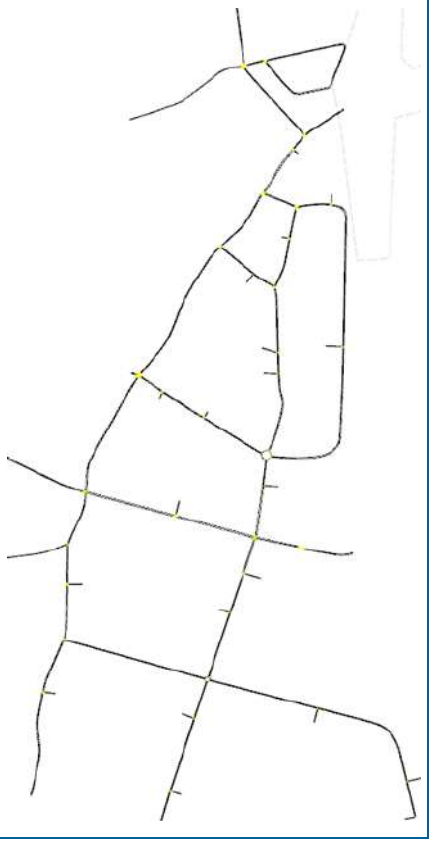
8.2.2. Modelled Network

The Aimsun model used for this analysis was also used to model the entire north area for the draft IBC. The network within the structure plan area was refined in the Aimsun model to replicate the proposed network of structure plan roads shown in **Figure 6-2.**

The following figure shows the road network replicated in Aimsun. The image on the left shows some of the wider network extending beyond the structure plan area but included in the Aimsun model, and

the image on the right shows the network and zone connections primarily within the structure plan area.

Figure 8-3: Aimsun Network for ITA Analysis (blue and green lines are model boundaries)

ITA network in Aimsun showing external connections	Core ITA network in Aimsun
	

8.3. Traffic Model Outcomes

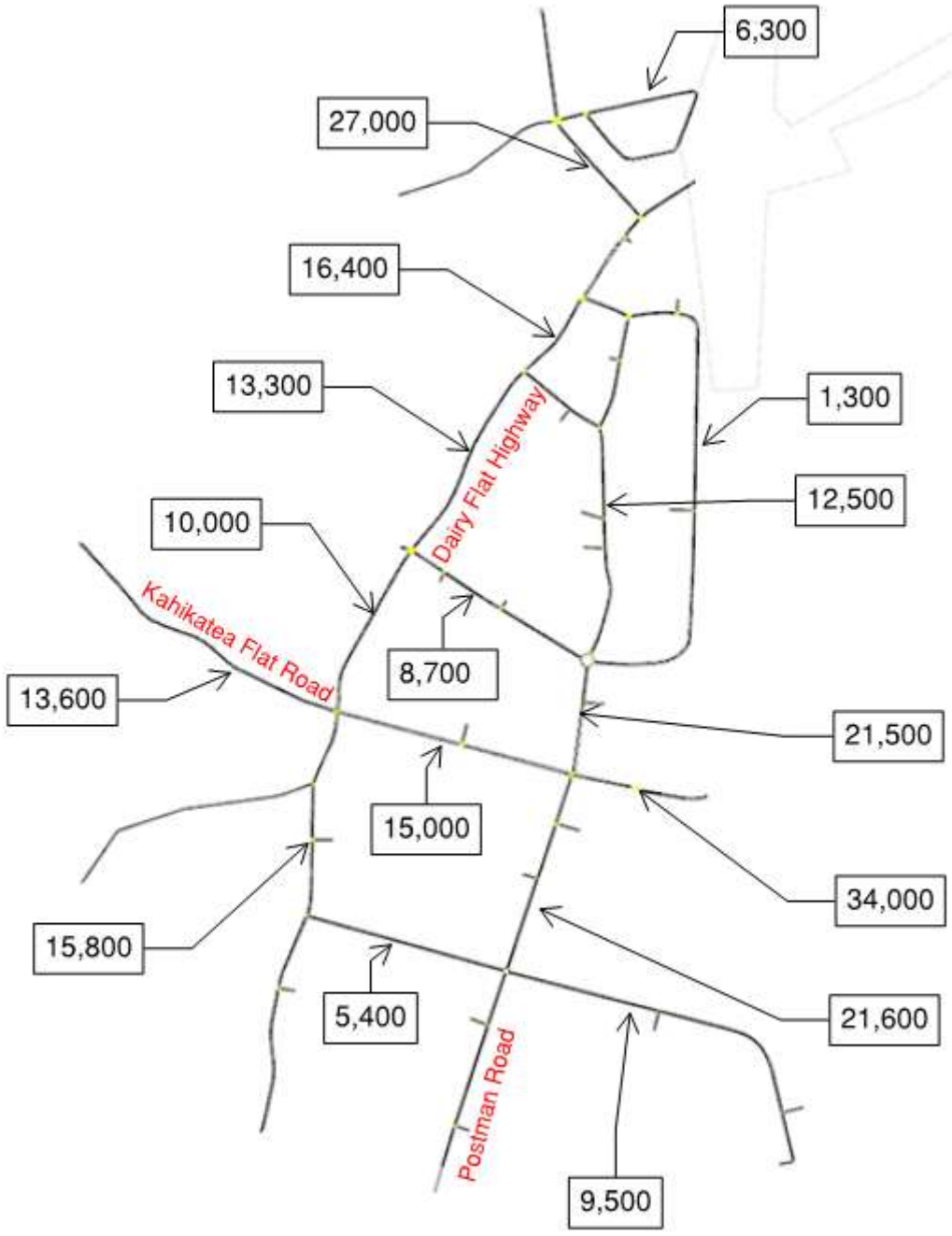
8.3.1. Traffic Volumes

The Aimsun modelling returned peak period volumes generated by land within the structure plan of around 5,900 movements in the AM peak hour and 7,800 movements in the PM peak hour (estimated from the four-hour Aimsun outputs based on applicable profiles). The modelled volumes align quite closely to the targeted range of 6,000-7,000 peak hour trips based on trip rate analysis described previously. The modelled volumes in the PM peak may be slightly higher than likely to eventuate.

8.3.2. Daily Volumes

The following figure shows the expected daily traffic volumes on the road network within and close to the structure plan area based on the model outputs.

Figure 8-4: Estimated Daily Traffic Volumes



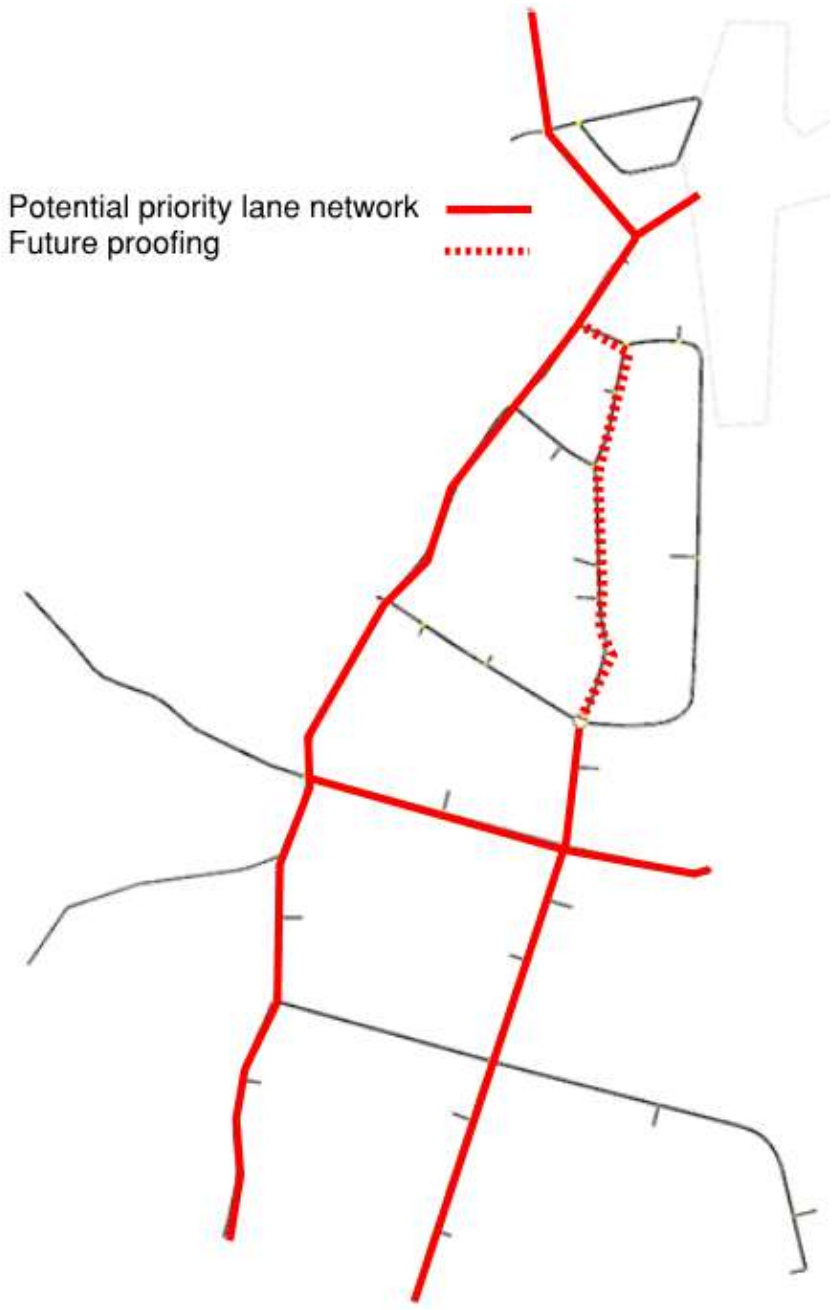
Applying an indicative daily traffic volume threshold of 15,000 VPD in urban areas as an indication for where additional capacity, potentially in the form of bus lanes, high occupancy vehicle lanes or other such modal priority lanes could be required , **Figure 8-5** shows the possible extent of this additional capacity on the road network within the structure plan area.

Whilst there is a section of Dairy Flat Highway where traffic volumes are expected to be below 15,000 VPD (north of Kahikatea Flat Road) this is a relatively short section and it would be desirable to maintain consistent capacity rather than reducing capacity for a short section and then expanding to four again.

It should not be necessary to construct new roads with the additional capacity described here initially as long as road reserves are adequate to provide for this additional capacity in future if and when

demands warrant it. Additionally there is a section of Postman Road north of Wilks Road where the need for additional capacity is not expected based on the traffic modelling undertaken for this ITA, but it would be sensible to make provisions for this road to provide additional capacity for priority modes in future should the expected demands change and to provide a complete connection between Dairy Flat Highway and Postman Road rather than a disconnected priority network.

Figure 8-5: Possible Extent of Priority Mode Additional Capacity
(shown in red with future proofing for additional priority mode capacity shown as dotted line)



8.3.3. HCV Movements

It is expected that the Industrial zone will generate a higher proportion of Heavy Commercial Vehicle (HCV) traffic than other non-commercial land uses. However, it is noted that a high proportion of the

structure plan area is zoned light industrial and this zoning allows for a wide range of land uses[24], many of which would not necessarily generate high HCV movements.

At this stage detailed analysis of HCV movements has not been carried out, however an Interpeak assessment of network operation is included in the transport model analysis to consider the level of delay during the day when the industrial land use is likely to generate higher volumes of commercial and freight trips. It will be particularly important that the network functions efficiently during these times to support the proposed land use. This is included in section 7.3.5 below.

8.3.4. Trip Distribution

The distribution of vehicle trips is derived based on AC land use inputs in the MSM model and the resulting trip distribution is applied in the Aimsun model. The following tables show the trip distribution for the peak periods.

Table 8-1: Trip Distribution AM Peak Period

	Internal	Orewa, Silverdale, Wainui	Whangaparaoa	North	Dairy Flat	South
In	11%	26%	3%	3%	36%	20%
Out	14%	17%	2%	2%	24%	40%

Table 8-2: Trip Distribution Inter Peak Period

	Internal	Orewa, Silverdale, Wainui	Whangaparaoa	North	Dairy Flat	South
In	18%	25%	2%	1%	33%	20%
Out	18%	25%	2%	2%	33%	21%

Table 8-3: Trip Distribution PM Peak Period

	Internal	Orewa, Silverdale, Wainui	Whangaparaoa	North	Dairy Flat	South
In	19%	22%	3%	1%	30%	25%
Out	13%	26%	3%	3%	36%	19%

The trip distribution outputs show a high proportion of trip generation from surrounding areas which indicates that the industrial land is supporting the nearby residential growth areas. In the AM peak 74% of trips to the structure plan area are from within the site, Orewa, Silverdale, Wainui and Dairy Flat areas. This figure is similar for the outbound PM peak trips and trips in both directions during the interpeak.

8.3.5. Network Performance

The following figures show the simulated vehicle speeds in the AM, interpeak and PM peak periods respectively. The speeds that vehicles are able to travel relative to the speed limit provides an indication of the level of congestion across the network.

[24] According to the AUP-OP this includes manufacturing, production, logistics, storage, transport and distribution activities as well as dairies, drive through restaurants, garden centres, motor vehicle sales, service stations and potentially others as discretionary activities.

Orange and red lines do not indicate there being a capacity issue that would need to be addressed, these figures are only to provide an indication of the expected network operation.

Green lines represent travel speeds close to the speed limit, orange lines represent areas of delay. Grey roads in the following figures indicate the model run had insufficient data to determine average speeds, this only applies to small sections of the road network and the RTN route that was used in the model.

Figure 8-6: Simulated Vehicle Speeds AM Peak Period

Figure 8-7: Simulated Vehicle Speeds Inter-Peak Period

Figure 8-8: Simulated Vehicle Speeds PM Peak Period

In general, from the above diagrams, the traffic modelling for all peak periods indicates the network is operating with relatively low levels of congestion. The intersection of Postman Road and Kahikatea Flat Road shows some delay in all peaks although this is not significant and may be able to be addressed in more detailed intersection modelling as part of subsequent ITAs.

It may be possible to reduce private vehicle capacity at intersections if this means priority can be enhanced for other modes and / or the scale of the infrastructure can be downsized. This would be considered in more detail in subsequent ITA's.

8.3.6. Intersections

Detailed modelling outputs for individual intersections within the structure plan area are provided in **Appendix B**. In general, the modelling shows the intersections operate efficiently and there are no significant issues that would need to be addressed at this stage.

8.3.7. Wilks Road Interchange Demand Analysis

The following figures show the level of demand to/from the proposed Wilks Road Interchange (south-facing ramps only) in the AM and PM peaks respectively.

The interchange carries around 2,500 vehicles per hour in the peak hours. Vehicle trips to/from zones within the structure plan area make up approximately 45% of all the trips using the interchange during the AM peak period and approximately 50% during the PM peak period. This shows a high utilisation of the interchange by land uses within the structure plan area and indicates that the interchange is supporting the proposed land use.

Figure 8-9: Wilks Road Interchange Demands Map Eastbound AM Peak (4 hours)

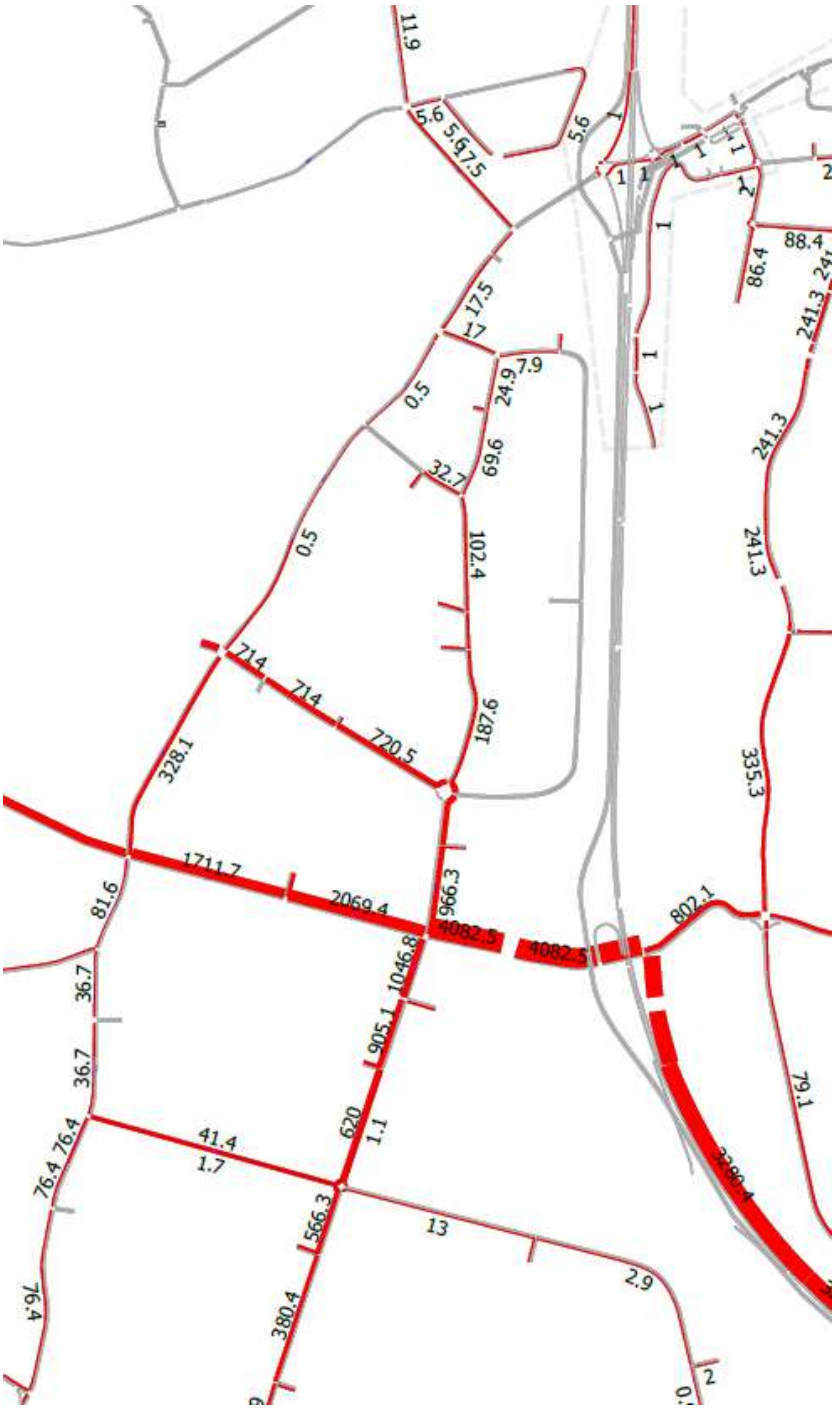


Figure 8-10 Wilks Road Interchange Demands Map Westbound AM Peak (4 hours)

Figure 8-11 Wilks Road Interchange Demands Map Eastbound PM Peak (4 hours)

Figure 8-12 Wilks Road Interchange Demands Map Westbound PM Peak (4 hours)

The interchange demand maps show the interchange predominantly serves trips to and from the structure plan area and this data reinforces the proposed need and timing for the interchange included in the draft IBC. The possible staging for the interchange is discussed in Chapter 9.

8.4. PT Network Capacity

The proposed bus network is expected to be able to accommodate the PT trip generation of the structure plan area for commuting to employment/industrial workplaces through the staged provision of local services and eventually the RTN. The routing and frequency of services will need to be identified in time as the planning process continues, e.g. at the plan change stage to ensure there is adequate time to plan for new services before the land is rezoned and becomes developed.

The RTN as identified in the draft IBC will be subject to further development with regard to the route alignment, form (e.g. separation from traffic etc) and location of stations through the subsequent business case work. It will be important that the next phases of land use planning consider ways to maximise the opportunity presented by the proposed alignment of the RTN for the structure plan area. For example, planning appropriately for connections to stations when locations are known. This integrated land use and transport planning will enhance the benefit of the RTN for the structure plan area.

8.5. Walking and Cycling

The proposed walking and cycling network described in Chapter 5 identifies a foundation to deliver on road (but physically separated from traffic) and off-road facilities that will provide a connected and legible network for active modes. Assuming design of the routes and facilities is advanced appropriately in subsequent planning stages, the network is expected to enable the desired walking and cycling mode share to be achieved and to safely accommodate the demands. There is unlikely to be capacity constraints if facilities are designed appropriately and with best practice safety treatments. Design of routes and facilities will need to be advanced as part of subsequent ITAs to make sure the network is safe and attractive for all users (including other electric modes etc).

8.6. Road Design

8.6.1. Road Classification

8.6.1.1. Arterials

Dairy Flat Highway and Kahikatea Flat Road are existing arterial roads and development in the structure plan area is only likely to increase demands on these strategic routes, so the classification of these roads is expected to remain as arterial.

As part of the Milldale development Argent Lane will be extended and upgraded to provide an arterial connection north from Dairy Flat Highway (upgrading the initial section of Pine Valley Road). The intersection of Dairy Flat Highway and Pine Valley Road will also be upgraded as part of this.

8.6.1.2. Postman Road

Postman Road routes north – south and intersects with Kahikatea Flat Road in the middle of the structure plan area. Postman Road carries up to 21,000 VPD but this reduces to around 12,000 VPD in the northern part of the structure plan area.

The following table provides an assessment of Postman Road against the road network classification inputs identified previously. The table below highlights where this ITA considers Postman Road to sit in each of the category.

Table 8-4: Road Classification for Postman Road

Function	Measure	Road Classification			
		Strategic	Arterial	Collector	Local
Classification Criteria					
Public Transport	Route type	High frequency and capacity, focussed on longer-distance trips with infrequent, but major stations.	Forms part of Frequent Transit Network (FTN) or Connector network.	Lower frequency routes as part of Connector or Local Service network.	Limited bus services along these routes.
Freight	Access and Connections	Inter-regional connections.	Intra-regional connections and connectivity to major industrial areas/ ports.	Connections between arterials and minor business areas.	Waste vehicle access.
Connectivity	Through traffic	Greatest through movement	Predominantly through-put function	Carries some through traffic	Only local movement within individual areas expected
	Place Connections	Connections between or through regions	Connecting major suburbs/areas	Connecting local communities and property access	Access to property
	Connections to major airports/ hospitals/ social amenities etc.	Yes	Yes	No	No
	Function	Major, longer-distance connections	Connections to major destinations and to strategic routes	Safe local routes and connections to major routes and destinations	Local access
Traffic Volumes	Daily Flows, AADT (urban)	>20,000	Typically >15,000	Typically >3,000	Typically <2,000
	Heavy Vehicles	>500 vpd	>300 vpd	>150 vpd	<150 vpd

On the basis of this analysis the ITA considers the north-south Postman Road is best suited as a collector road, as the majority of its expected functions fall into this category.

8.6.1.3. Other Roads

All other roads within the structure plan area have been identified primarily to disperse traffic between the arterials and these roads typically have volumes below 15,000 vehicle movements per day. As such these other roads are assumed to be collector roads at this stage.

Additional local roads will be necessary, but these are not defined at the Structure Plan stage.

8.7. Road Cross-sections

Indicative cross sections for the various components of the internal transport networks are shown in the following figures. Actual cross section will be developed as part of the subsequent planning stages. These figures including the road reserve width are indicative only.

Figure 8-13: Indicative Four Lane Arterial (approximately 25m Road Reserve)

Figure 8-14: Indicative Two Lane Collector Road (approximately 21m Road Reserve)

In the cross sections above there will be alternative means of providing protected cycle paths, such as protected lanes on each side of the carriageway or a two-way off-road path on one side if it suits the location (e.g. on roads next to open space). The key design outcome at this stage is that cyclists should be protected from traffic and separated from pedestrians within the collector road cross section.

Figure 8-15: Off Road Walking and Cycling Route

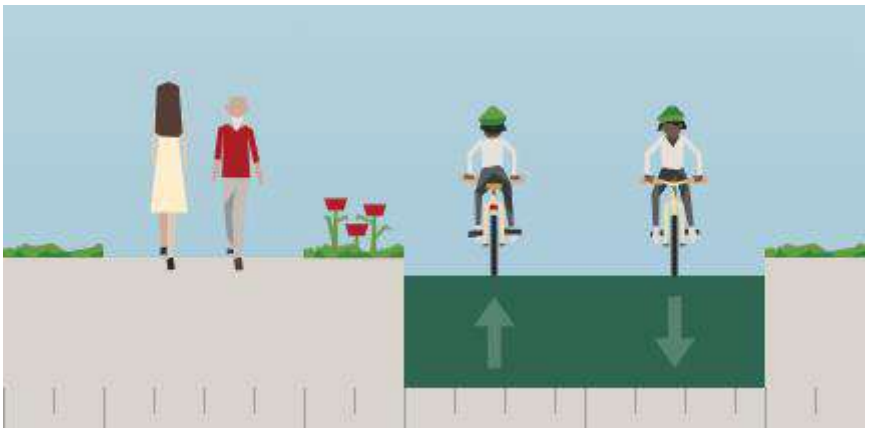
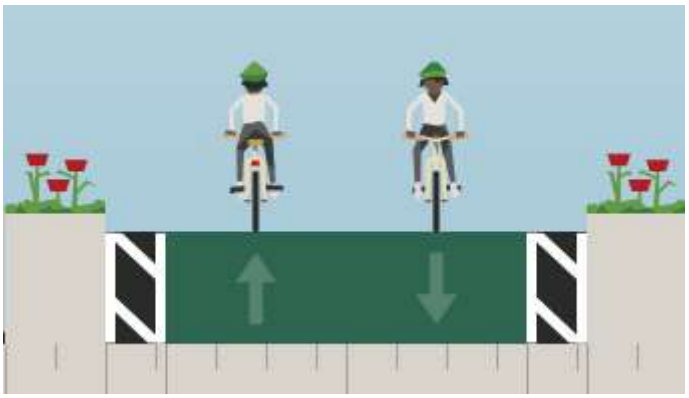


Figure 8-16: Dedicated Cycle Route



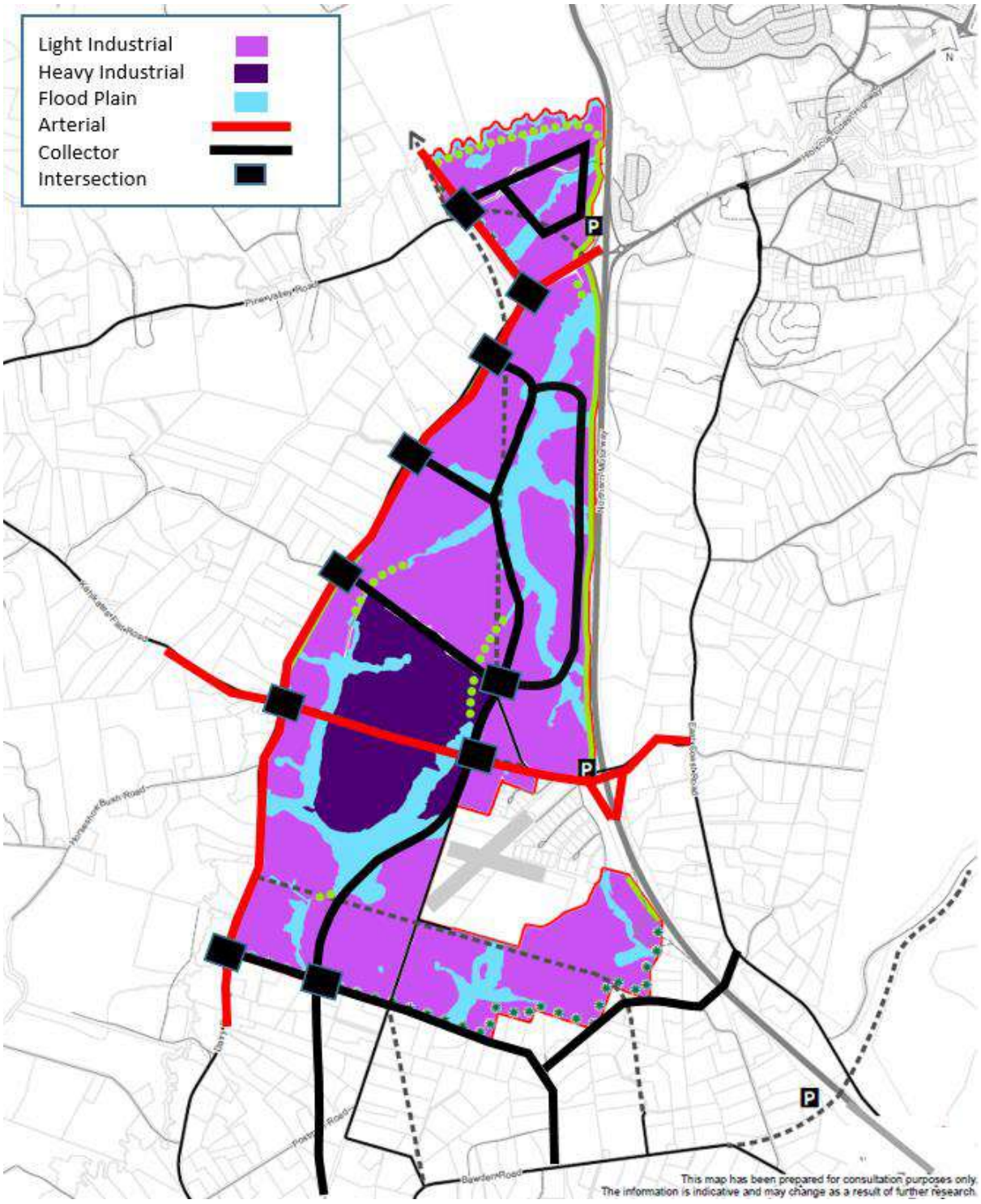
8.8. Airport Expansion Scenario

The North Shore Airport has indicated that it has aspirations to extend the northeast southwest runway which would mean extending it across Postman Road. The airport has not acquired any land on the western side of Postman Road at this time.

However, as the Airport does potentially provide a facility that could reduce the need to travel to the existing Auckland Airport and thus may have some network benefits at some stage in future. This ITA has therefore considered a scenario whereby the Airport runway extends on its current alignment to understand possible impact and response of the structure plan.

The following figure shows how the structure plan road network could potentially be adapted to respond to an Airport expansion. The key differences being the realignment of Postman Road and the relocation of the east-west collector road south of the Airport to make way for a runway expansion.

Figure 8-17: Possible Airport Expansion Road Network



Should further progress be made by the airport on this proposal, it may be worth considering the likelihood of a possible Airport runway expansion further as part of any future ITA's for the area, so that potential changes to the road network can be ruled out or considered further.

8.9. Requirements for Next Stage Transport Assessments

A number of matters have been identified in this ITA as requiring further design or assessment as part of future ITAs. This is either due to the level of detail being beyond the structure planning stage (e.g. intersection design) or that supporting information at the time this ITA was prepared is uncertain (e.g. RTN stations and route design). Additionally, land use and transport planning integration requires an ongoing process to deliver the desired outcomes. Without such ongoing management there are risks of the land use activities becoming inconsistent with the desired transport network (or vice-versa). For example, high use of the motorway ramps by commuter traffic or low density heavy industry being located around RTN stations.

These matters will need to be considered as part of subsequent more detailed ITA's, e.g. plan change/consent and infrastructure business cases. In summary the following key matters will need to be addressed in more detail within subsequent ITA's:

- Advance the design and assessment of the proposed bus services and facilities identified in this ITA to support the identified mode share and urban form outcomes
- Detailed cycling and pedestrian facility design to deliver the wider network strategy and support the identified mode share outcomes
- Continued refinement of transport modelling as more knowledge around specific land use activities and strategic infrastructure design and timing becomes available.
- Detailed design of roads and intersections to provide an appropriate level of service for all modes and support the identified mode share outcomes. This should include identifying where it may be possible to reduce private vehicle capacity at intersections if this means priority can be enhanced for other modes and / or the scale of the infrastructure can be downsized.
- Consideration of business activities that support and benefit from the RTN once route and station locations are confirmed. There is an opportunity for transitioning to higher intensity business activity around strategic public transport infrastructure and future station locations. This opportunity needs to be carefully targeted in regard to the number of RTN stations and weighed against the travel time objectives for the overall RTN system
- Design of local transport components around RTN stations and facilities at stations for all modes so stations have high accessibility levels
- Further development and identification of Travel Demand Management activities that reduce the need to travel and support mode share outcomes
- Further review of transport network and implications should an Airport expansion scenario be identified as a possibility in future
- Refinement to proposed staging and triggers for supporting infrastructure once more detail is available on the specific sequencing of land release
- Review of transport components following public consultation on the structure plan.

Generally, it should be noted that the majority of transport infrastructure identified in this ITA is not currently funded and accordingly there is potential for the delivery of this infrastructure to lag behind future Plan Change processes. There will need to be consideration in any Plan Change provisions to encourage land owners/developers to seek the same transport and land use outcomes as identified in this ITA.

9. Transport Network Staging

9.1. Proposed Transport Infrastructure

The following table provides a list of transport infrastructure identified as necessary to support development within the structure plan site. Staging of this infrastructure is described in the following section.

Table 9-1: List of Key Necessary Transport Infrastructure

Roads and Intersections
Dairy Flat Highway arterial upgrade
Pine Valley Road arterial upgrade (delivered as part of the Milldale subdivision, Argent Lane)
Wilks Road SH1 Interchange (south facing ramps only)
Kahikatea Flat Road/Dairy Flat Highway to Wilks Road Interchange new arterial
Postman Road north of Wilks Road to Dairy Flat Highway new collector road
Postman Road south of Wilks Road to Dairy Flat Highway collector road upgrade
Internal new collector roads north of Kahikatea Flat Road
Internal new east-west collector road south of Kahikatea Flat Road
Internal collector road north of Dairy Flat Highway (Old Pine Valley Road upgrade)
Walking and Cycling
Cycle route alongside SH1
Cycle route following Postman Road / flood plain alignment within structure plan area
Cycle route following Dairy Flat Highway
Cycle route following Kahikatea Flat Road
Secondary east-west cycle route connections
Public Transport
RTN (as proposed in the draft IBC)
Feeder buses / local services
Bus priority on arterial roads and collector roads part of the frequent local bus network
Bus stops and interchange stations with the RTN

9.2. Recommended Staging Plan

Being a largely greenfield site, the transport infrastructure required to support land use within the structure plan is predominantly new rather than upgrades to existing roads.

The entire structure plan area is identified as being development ready in the FULSS between 2018 and 2022. There is no further breakdown of staging of the structure plan area within this strategy.

Whilst the staging of most local-level (collector, PT and walking and cycling) infrastructure identified in this ITA will be dependent on developers progressing new developments within their land, AT and the

Transport Agency also need to make provisions for new arterial and strategic roads, strategic RTNs and strategic walking and cycling routes well ahead of the required implementation timeframe.

In addition to this, the ITA analysis has identified a broad implementation strategy for the local-level network within the structure plan area, based on an approach that delivers infrastructure from the north to the south. This approach is considered likely to align with the provision of major wastewater infrastructure required to service the north area, as advised by Watercare.

The approach seeks to unlock development land in the north by upgrading Old Pine Valley Road and a new collector road connection to Dairy Flat Highway. For the initial release of the structure plan area, access to SH1 will still be provided via the Silverdale Interchange.

Approximately 70 hectares of development (net developable area, i.e. not including roads etc) could be served by the Silverdale Interchange (with the interchange capacity[25] upgrades proposed by other projects, i.e. Milldale, in place). This represents around 20% of the total structure plan area. This estimate has been derived through analysis of traffic model outputs as follows:

1. Identified the total peak hour structure plan vehicle movements through the interchange with the full structure plan development in place. This indicates the level of structure plan trips that the modelling suggests the Interchange is able to accommodate.
2. Estimated the proportion of all vehicle trips generated by the northernmost structure plan zones in the model (representing the northern area of the structure plan site) that pass through the interchange via a select link analysis of interchange movements.
3. Applied the trip rates previously identified for this land use to back calculate the level of development achievable without increasing the volume of trips passing through the Interchange beyond that identified in Step 1 and without additional interchanges in place.

Therefore, additional motorway access (Wilks Road or Penlink) is likely to needed before the 70 hectares (net) referred to above, is fully developed so that additional land can be zoned. This threshold will be subject to further analysis and refinement as part of more detailed ITA's in future.

The majority of the network is developed in Stage Two. It is likely that there would be interim stages as the network develops from north to south. The Kahikatea Flat Road arterial connection and Dairy Flat Highway upgrade would likely precede the completion of the internal collector road network.

Key infrastructure in Stage Two will be the Kahikatea Flat Road arterial and the Wilks Road interchange.

Stage three finishes off the structure plan network by completing the connections south of Kahikatea Flat Road.

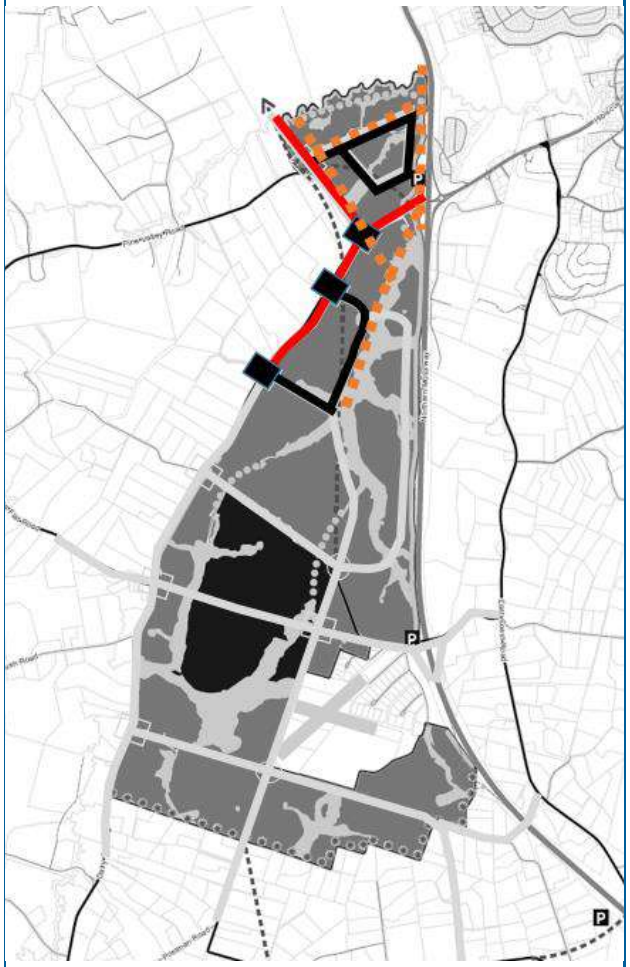
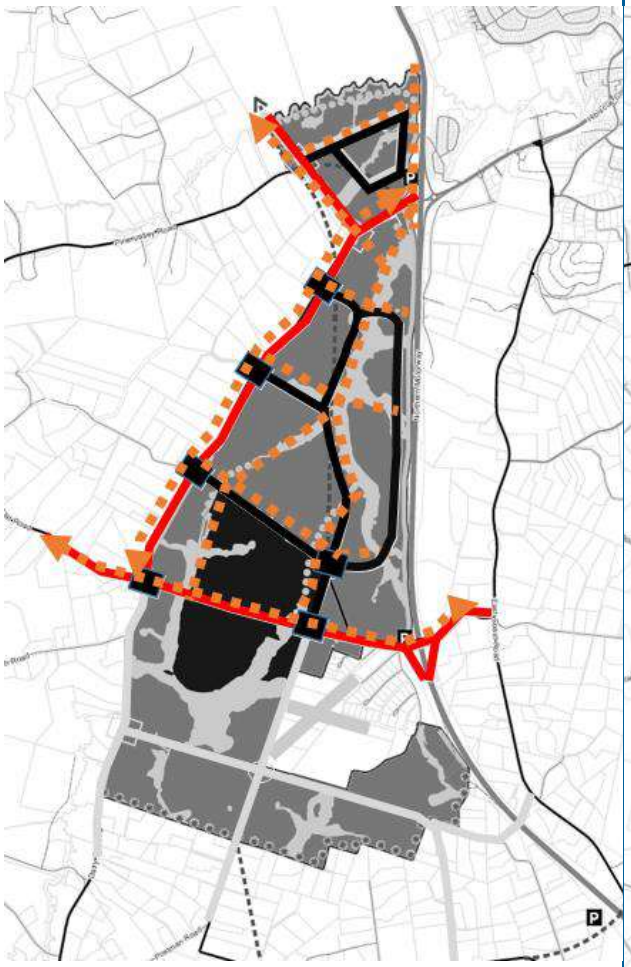
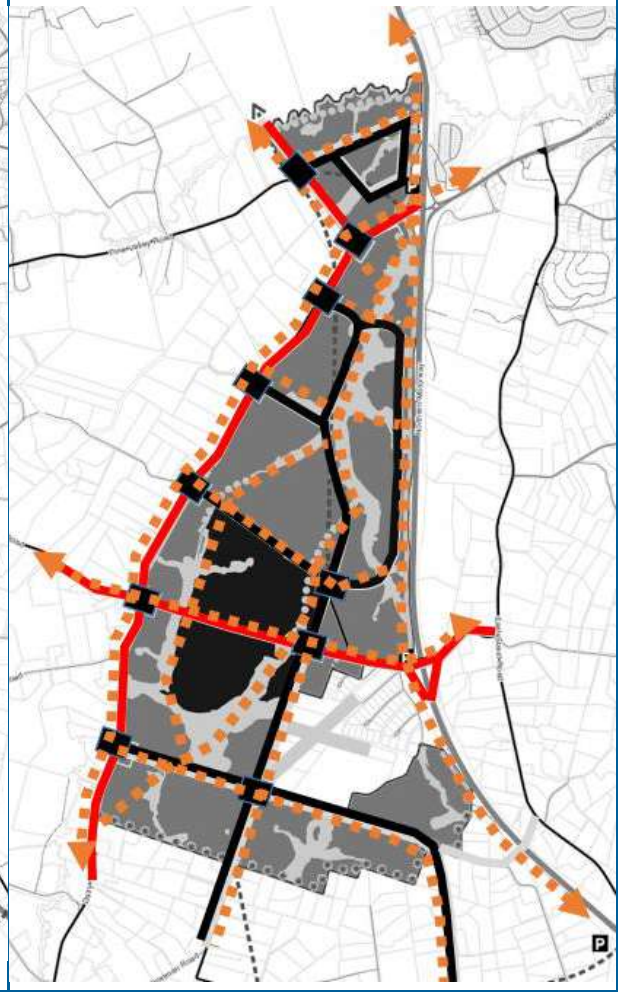
The indicative staging will need to be reviewed following approval of the draft IBC for this area through subsequent ITA and planning processes, e.g. Plan Change.

[25] Understood to include widening of the northbound off ramp and provision of a second westbound lane across the motorway.

The following diagrams show the indicative sequencing of infrastructure provision for key roads (shown as red for arterial and black for collector roads) and walking and cycling routes (shown as orange dash lines). The ITA staging is broadly as follows:

- Stage 1: to 2028
- Stage 2: 2028 to 2038
- Stage 3: 2038 to 2048.

Figure 9-1: Indicative Sequencing Diagram

Stage One – Starts in the North	Stage Two – Middle	Stage Three – Completes the South
		

10. Consultation Summary

Consultation with AT, AC and the Transport Agency teams has been ongoing throughout the development of the ITA including meetings to discuss specific matters such as road design and key infrastructure requirements and via feedback on the draft versions of the ITA.

Public feedback was sought on the Structure Plan Background Report and associated topic reports by AC during December 2017 through until February 2018. The ITA was not prepared at the time of this consultation.

With regard to transport the following opportunities were highlighted in the consultation feedback:

- Access by public transport, cycle ways
- Off road bike/walking tracks
- Part of a connecting cycleway to others in the Rodney district
- Implementation of a good public transport system connecting Hibiscus Coast, Silverdale, North Shore and Warkworth is important building a good place for jobs
- Create plenty of parking so it never becomes an issue
- Create parking for bus commuters wanting to get to the city
- Ensure a balance of access for parking, driving for those visiting for short periods i.e. 1-2 hours and those longer for the day that may need to take their car as well as easy access to reliable public transport
- Reduce the speed on the roads! All of Dairy Flat Highway should be less than 80kmh
- Northern part of the Structure Plan area should be developed first because of the existing access to the interchange.

With regard to transport the following issues were highlighted in the consultation feedback:

- Traffic management and high volume of traffic, no motorway on/off ramp
- Congestion
- Transportation improvements and road must be upgraded to cope with the increase of industry
- High volume traffic and fast roads make it unsafe for horse riders
- There is a high density of equestrian sport and bridle paths [which] are just as important as cycleways
- Safety for all road users and especially for locals and their children
- The amount of traffic that will end up on our already overwhelmed roads.

The networks proposed in the ITA respond well to many of the opportunities and issues identified in the public consultation. Further public consultation on the structure plan is currently planned for early 2019. The ITA will be updated and finalised after this consultation and feedback from the consultation will inform this final update.

11. Conclusion

This ITA has considered and assessed the proposed structure plan for the Silverdale West Dairy Flat Industrial Area. The purpose of the ITA is to ensure that the transportation effects of the structure plan area are well considered, that there is an emphasis on efficiency, safety and accessibility to and from the site by all transport modes and that the adverse transport effects of the development have been effectively avoided, remedied or mitigated. The ITA has identified transport networks for a range of travel modes suitable to accommodate multimodal travel to and from the site. With these networks in place the transport system is expected to enable the proposed land use. Subsequent ITA's to be prepared for future planning stages, e.g. Plan Change and Consents, will refine the analysis to a more detailed level with more detailed and certain inputs.

The ITA has identified the following key recommendations and considerations for next stage ITA's:

- Advance the design and assessment of the proposed bus services and facilities identified in this ITA to support the identified mode share and urban form outcomes
- Detailed cycling and pedestrian facility design to deliver the wider network strategy and support the identified mode share outcomes
- Continued refinement of transport modelling as more knowledge around specific land use activities and strategic infrastructure design and timing becomes available
- Detailed design of roads and intersections to provide an appropriate level of service for all modes and support the identified mode share outcomes. This should include identifying where it may be possible to reduce private vehicle capacity at intersections if this means priority can be enhanced for other modes and / or the scale of the infrastructure can be downsized
- Consideration of business activities that support and benefit from the RTN once route and station locations are confirmed. There is an opportunity for transitioning to higher intensity business activity around strategic public transport infrastructure and future station locations. This opportunity needs to be carefully targeted in regard to the number of RTN stations and weighed against the travel time objectives for the overall RTN system
- Design of local transport components around RTN stations and facilities at stations for all modes so stations have high accessibility levels
- Further development and identification of Travel Demand Management activities that reduce the need to travel and support mode share outcomes
- Further review of transport network and implications should an Airport expansion scenario be identified as a possibility in future
- Refinement to proposed staging and triggers for supporting infrastructure once more detail is available on the specific sequencing of land release
- Review of transport components following public consultation on the structure plan.

Appendix A: Structure Plan Map

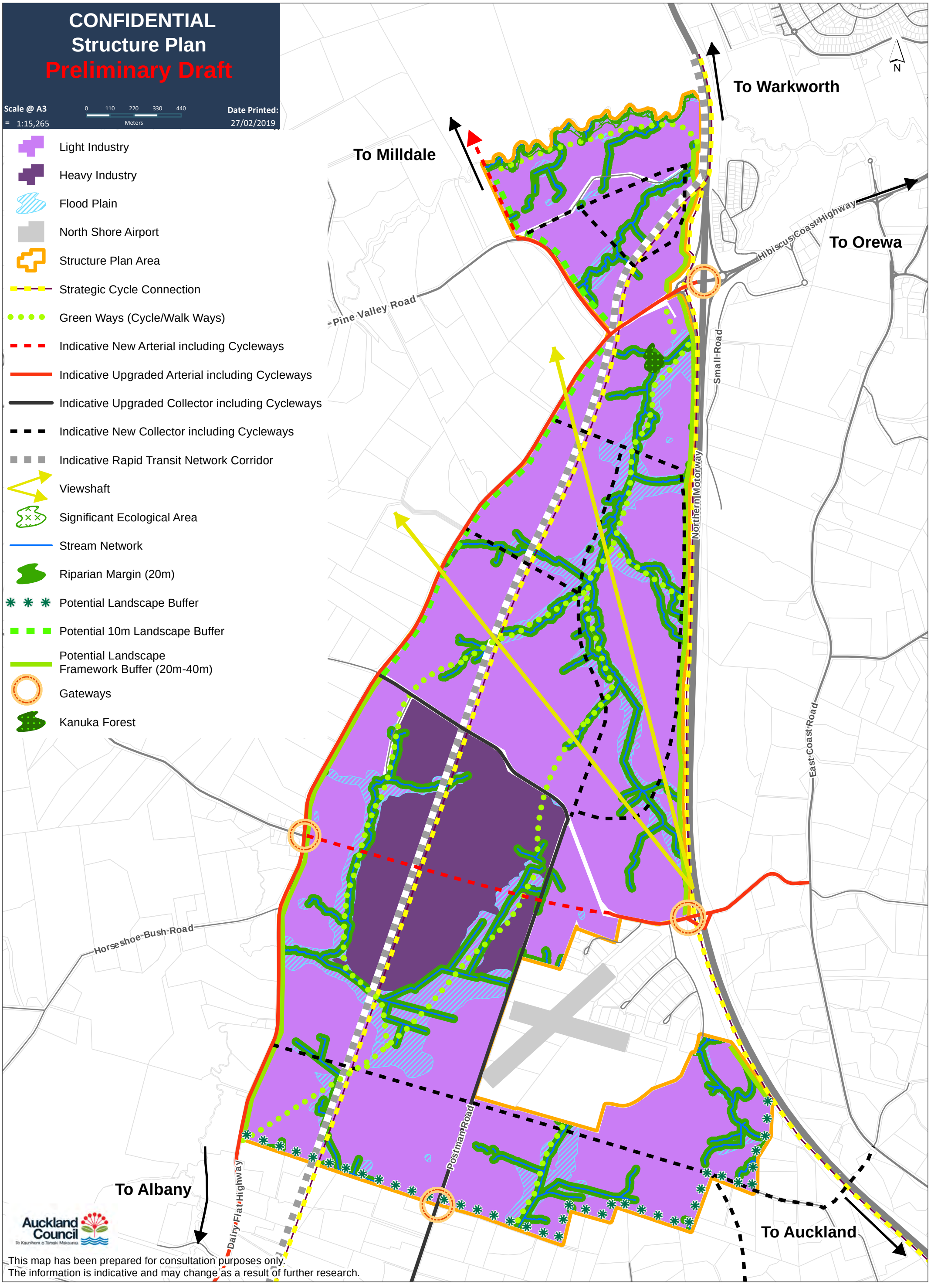
CONFIDENTIAL
Structure Plan
Preliminary Draft

Scale @ A3
= 1:15,265

0 110 220 330 440
Meters

Date Printed:
27/02/2019

- Light Industry
- Heavy Industry
- Flood Plain
- North Shore Airport
- Structure Plan Area
- Strategic Cycle Connection
- Green Ways (Cycle/Walk Ways)
- Indicative New Arterial including Cycleways
- Indicative Upgraded Arterial including Cycleways
- Indicative Upgraded Collector including Cycleways
- Indicative New Collector including Cycleways
- Indicative Rapid Transit Network Corridor
- Viewshaft
- Significant Ecological Area
- Stream Network
- Riparian Margin (20m)
- Potential Landscape Buffer
- Potential 10m Landscape Buffer
- Potential Landscape Framework Buffer (20m-40m)
- Gateways
- Kanuka Forest



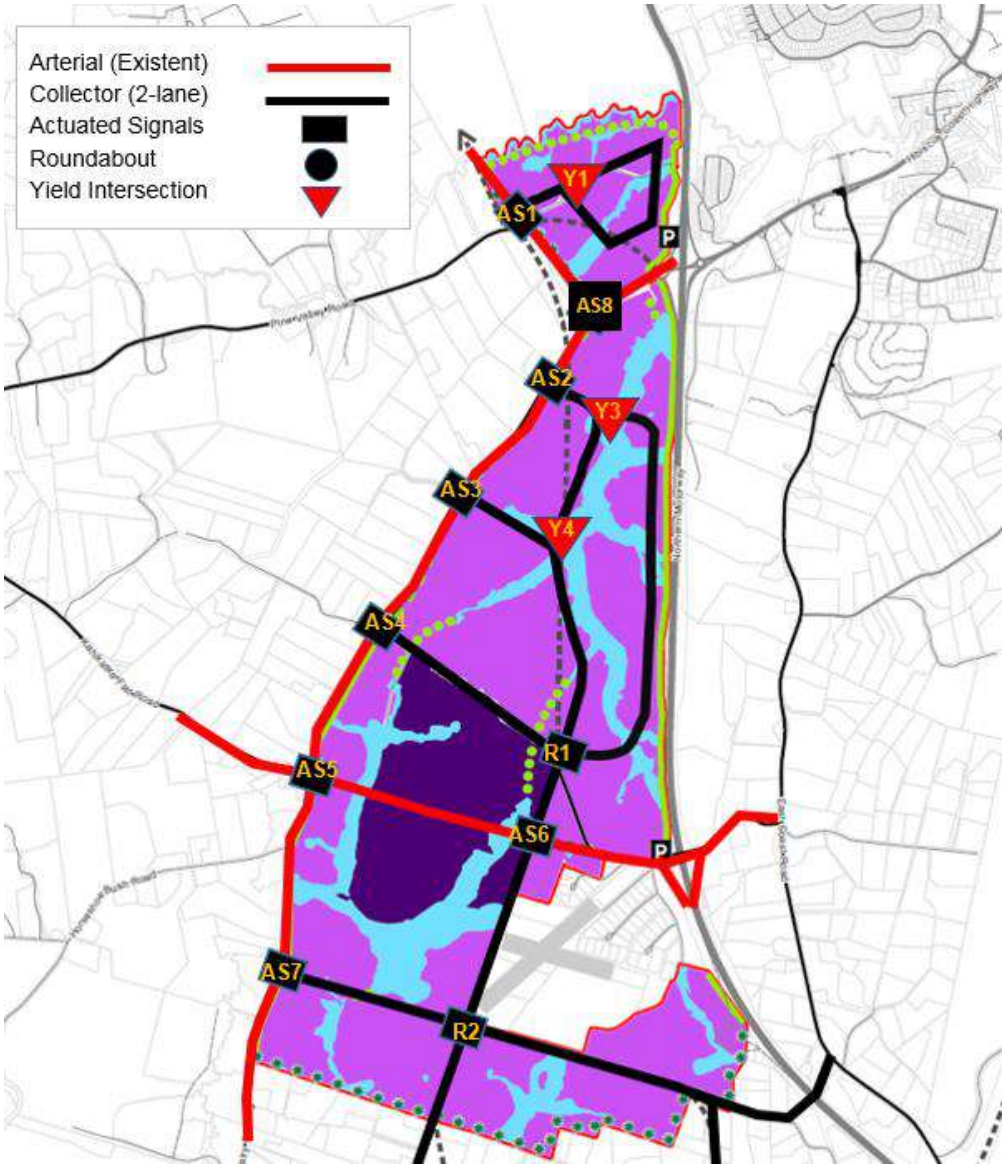
Auckland Council
Te Kaunihera o Tāmaki Makaurau

This map has been prepared for consultation purposes only.
The information is indicative and may change as a result of further research.

Appendix B: Detailed Intersection Modelling

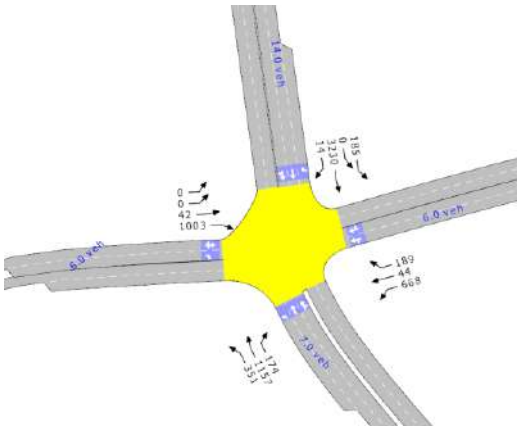
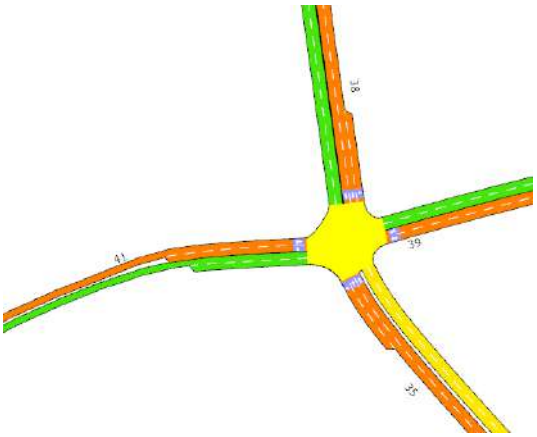
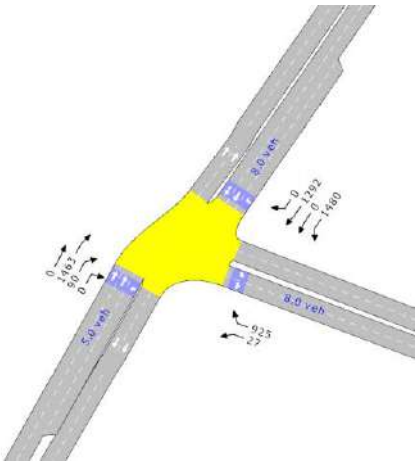
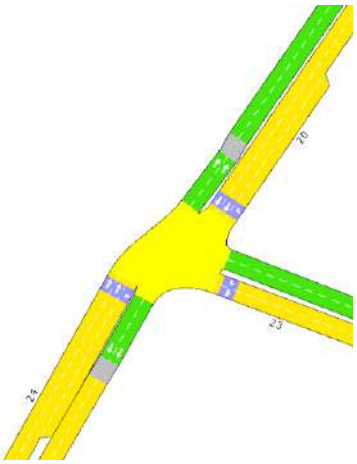
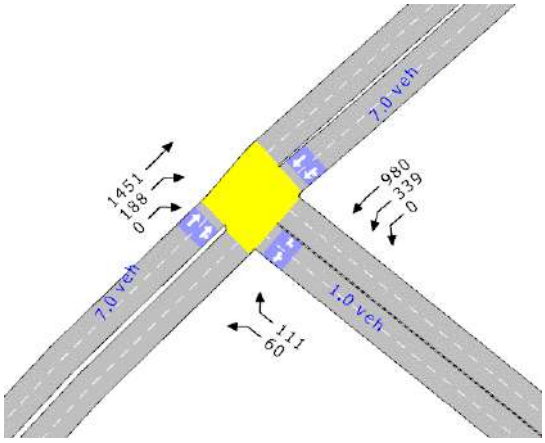
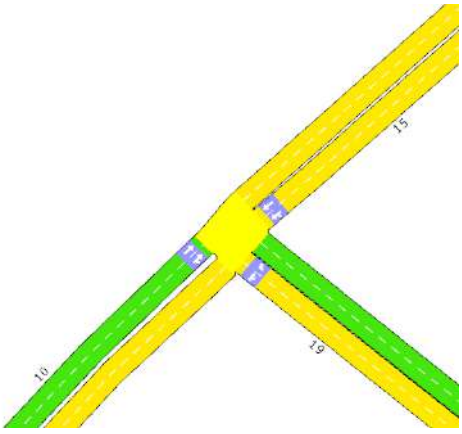
This appendix summarises the findings of the Aimsun modelling at the signalised intersections within the structure plan area. The following figure shows the intersection labelling used in the subsequent tables.

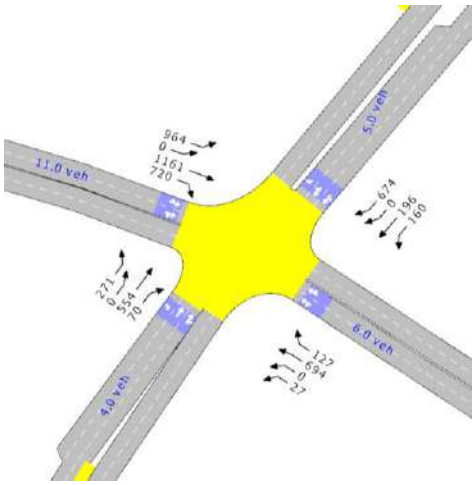
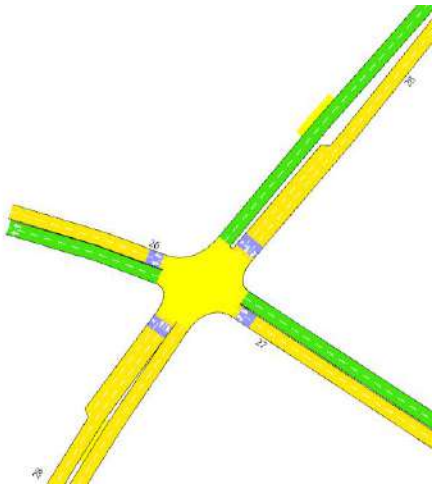
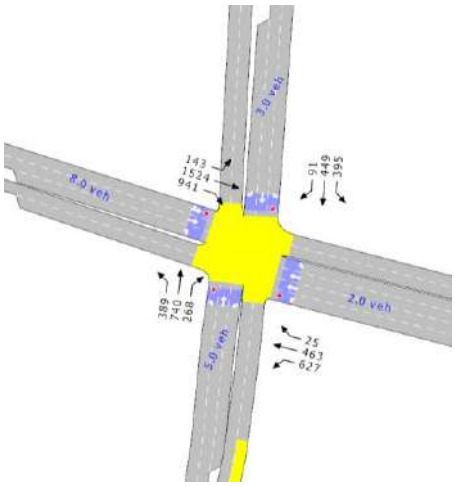
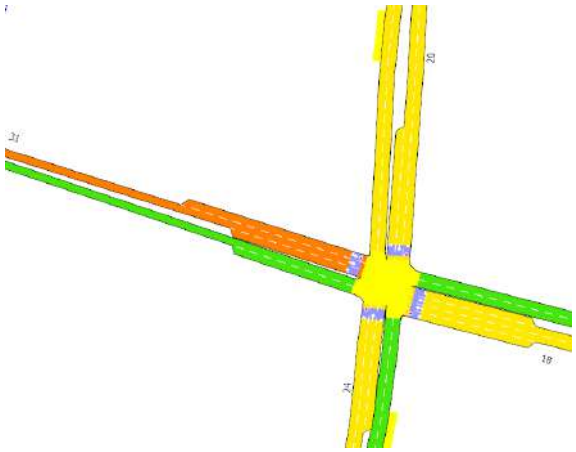
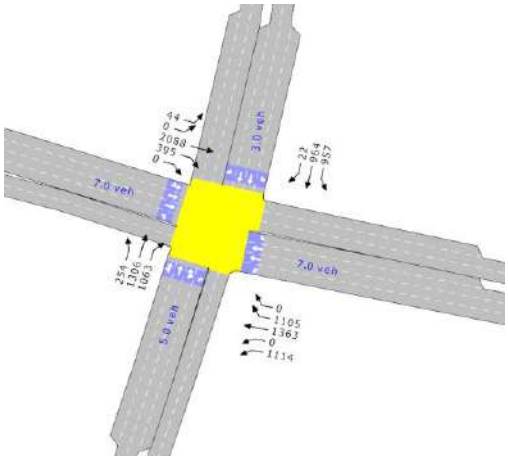
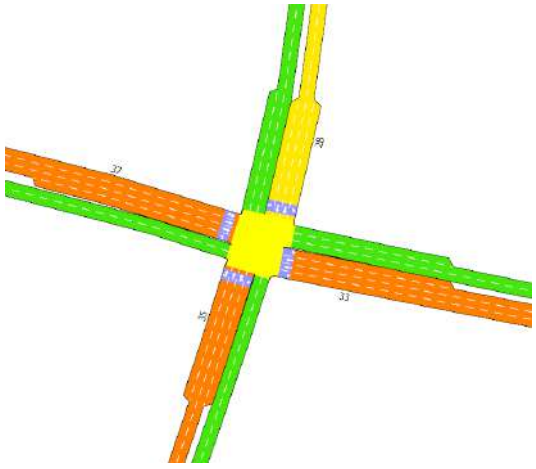
Figure 11-1: Intersection Referencing

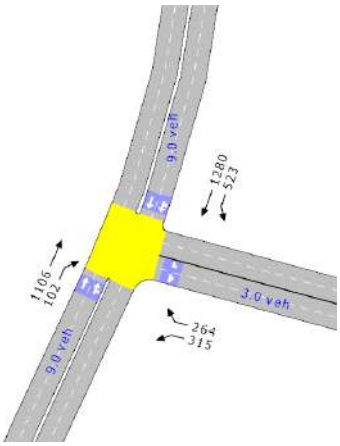
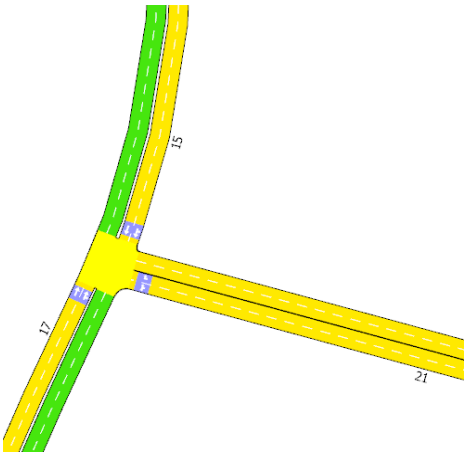
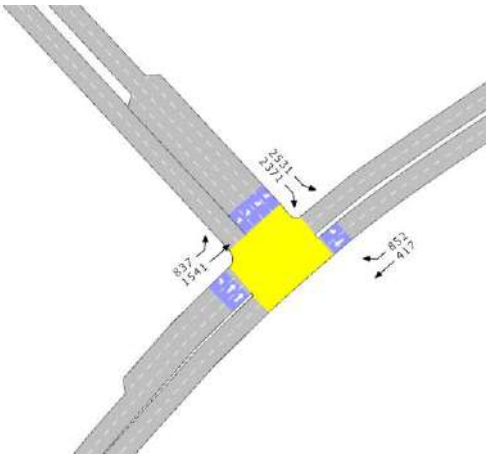
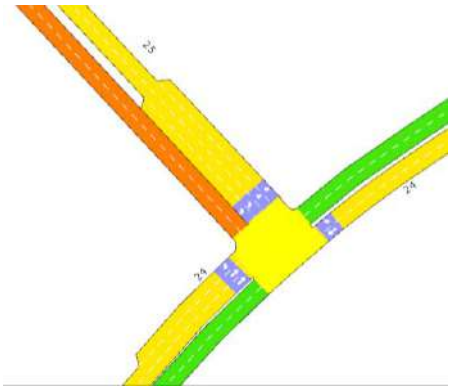


The purpose of the following diagrams is to show the form of the signalised intersections applied in the modelling and the traffic volume outputs from the model. The results are indicative of network operation at a high level at this stage. It is likely that the layout and size of the intersections will change following more detailed transport modelling and with further consideration of design for all road users as part of subsequent ITA's. The volumes in the diagrams are for four-hour peak periods e.g. 6am to 10am and 3pm to 7pm weekdays. Where the volumes show a '0' this is typically where a movement does not exist.

Table 11-1: Model Outcomes for Signalised Intersections AM Peak Period (4 hours)

Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS1		
AS2		
AS3		

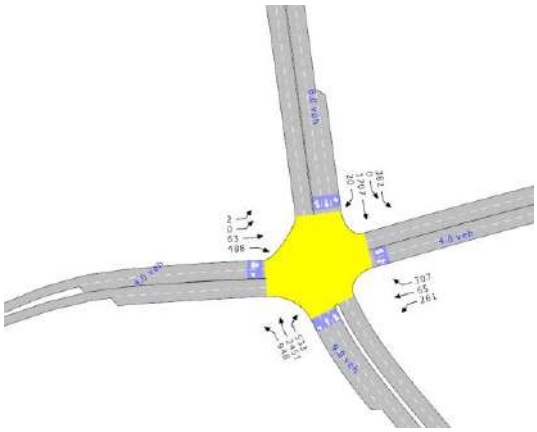
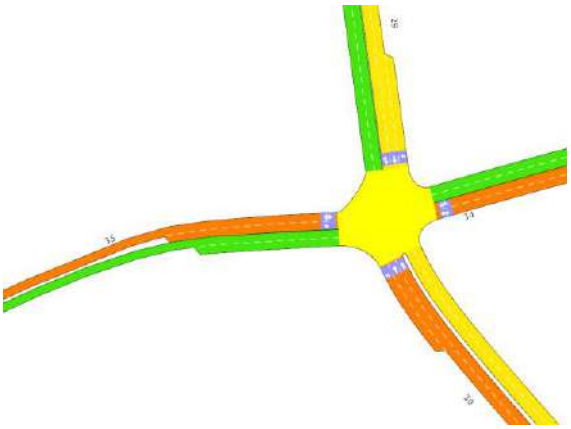
Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS4		
AS5		
AS6		

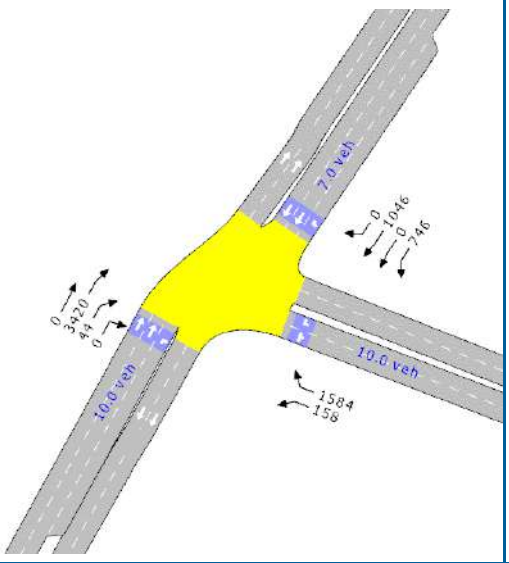
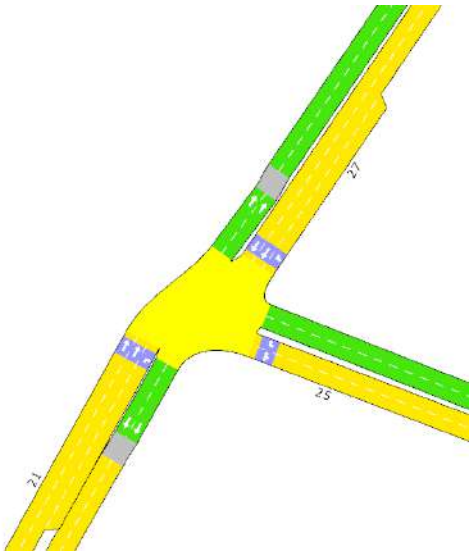
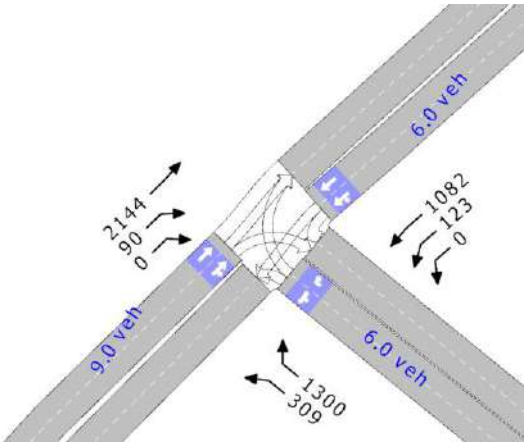
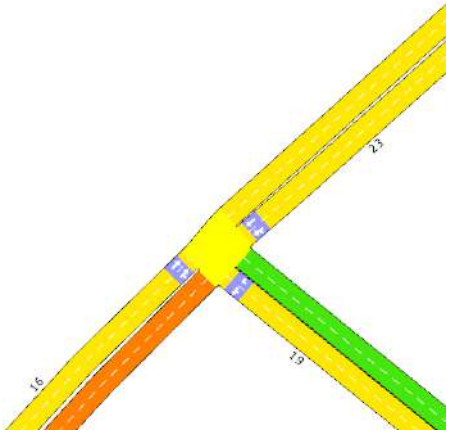
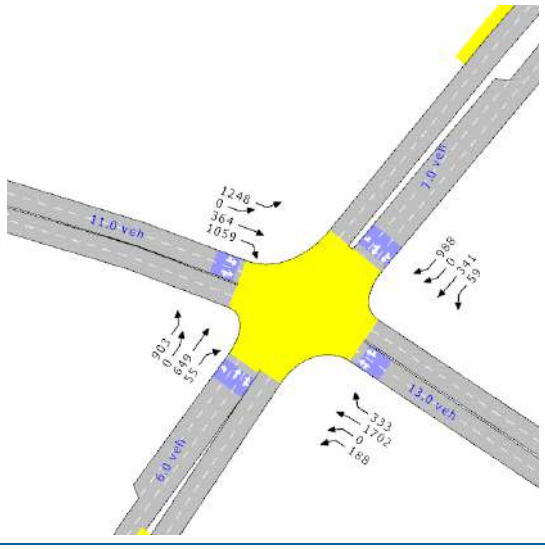
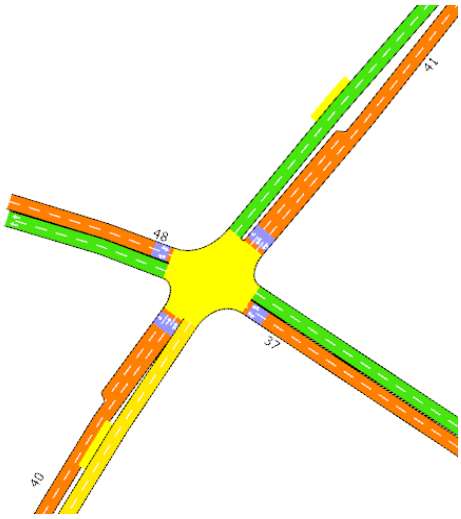
Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS7		
AS8		

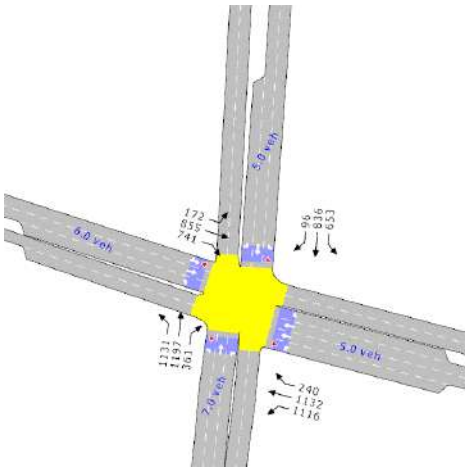
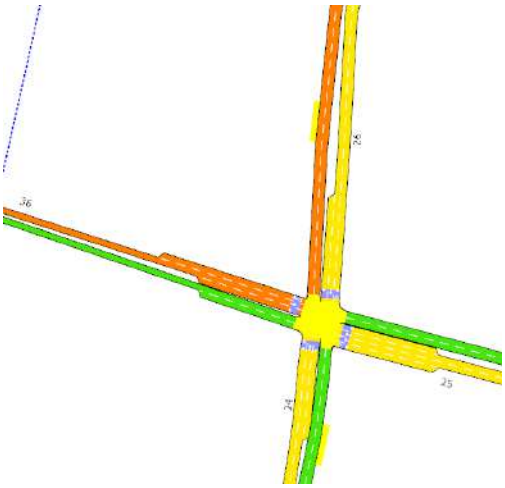
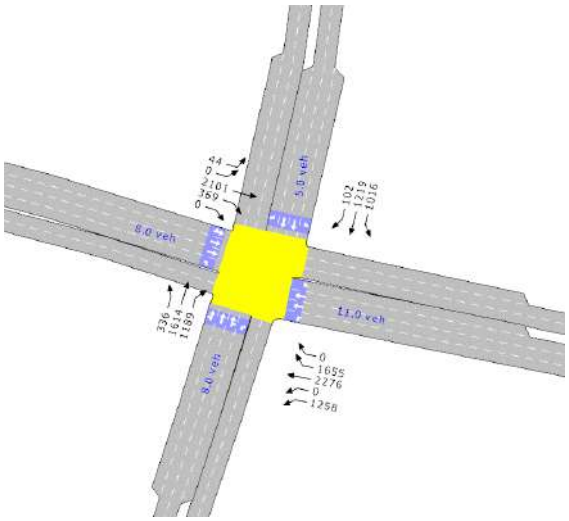
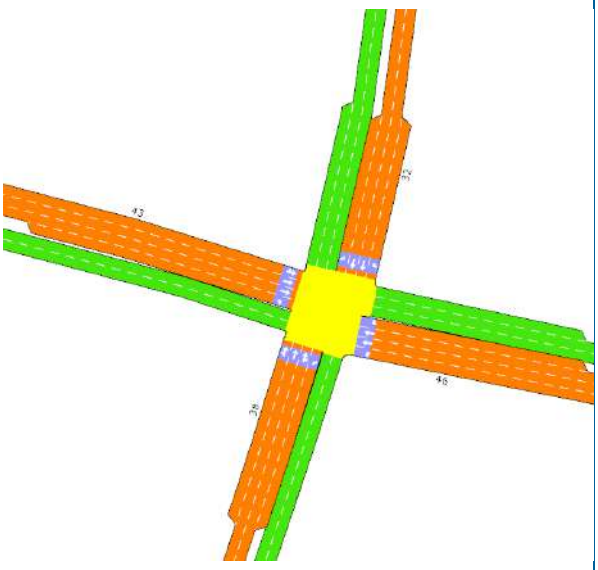
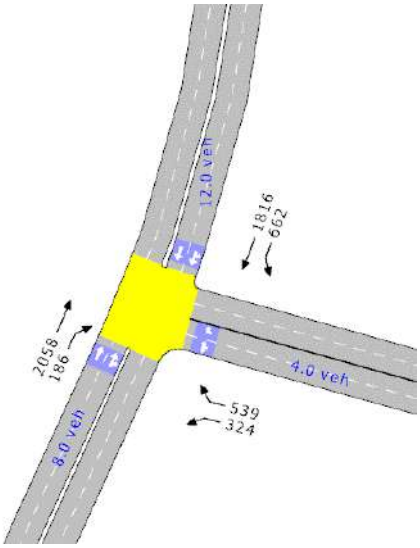
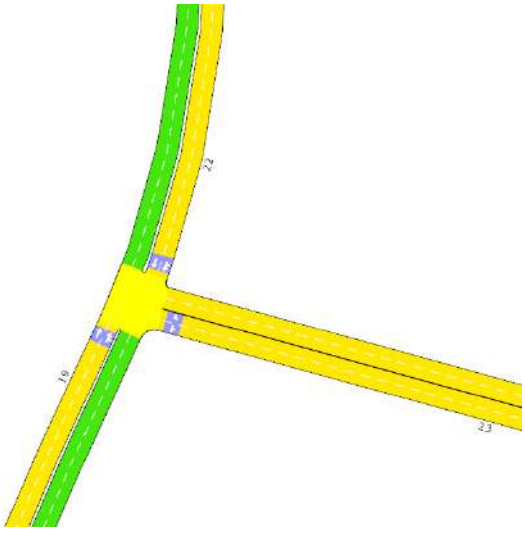
In general the signalised intersection in the network are operating to an acceptable level with delays of less than 40 seconds per vehicle in the AM peak period.

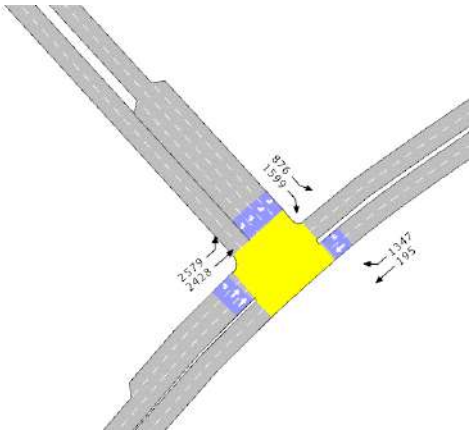
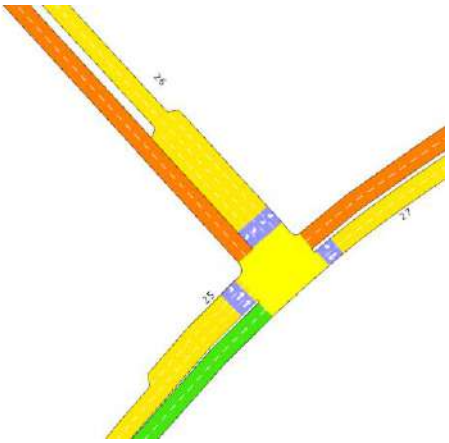
The following table provides the intersection outcomes for the PM peak period.

Table 11-2: Model Outcomes for Signalised Intersections PM Peak Period (4 Hours)

Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS1		

Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS2		
AS3		
AS4		

Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS5		
AS6		
AS7		

Ref	Traffic Volume and Queue Length	Simulated Delay (sec)
AS8		

The signalised intersection operation in the PM peak is similar to the AM peak, but with higher levels of delay at some intersections. Intersection AS6 which is located on Kahikatea Drive near the Wilks Road interchange has levels of delay above 40 seconds in the PM peak, but vehicle queues are not significant and the operation is considered to be acceptable. It is also worth noting that the model may be over estimating demands during the PM peak as model demands are slightly higher than the demands expected based on the trip rate research.