Lisle Farm Proposed Private Plan Change

Integrated Transport Assessment

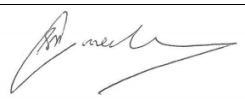
July 2023

flow
TRANSPORTATION SPECIALISTS

flow
TRANSPORTATION SPECIALISTS

Project:	**Lisle Farm Proposed Private Plan Change**
Title:	**Integrated Transport Assessment**
Document Reference:	**P:\FRAN\001 70A and 70B Lisel Farm Drive, Pukekohe- Plan Change\Report\R1B230725 Lisle Farm Plan Change final.docx**
Prepared by:	**Mikaire Paul / Harry Shepherd**
Project Manager	**Harry Shepherd**
Reviewed by:	**Bronwyn Coomer-Smit**

Revisions:

Date	Status	Reference	Approved by	Initials
24 July 2023	A	R1A230724	BA Coomer-Smit	
25 July 2023	B	R1B230725	BA Coomer-Smit	

SUMMARY OF OUR ASSESSMENT

SR and DS Smith (Requestor) has engaged Flow Transportation Specialists Ltd (Flow) to assess the transport planning and traffic engineering matters relating to a proposed Private Plan Change (Proposal) for land zoned Future Urban, located at 70A and 70B Lisle Farm Drive in Pukekohe (Site). The Private Plan Change proposes to rezone the Site from Future Urban to allow for residential landuse activities.

The Proposal includes the following elements that are material to transport matters:

- Rezoning the Future Urban Zone land to a Residential – Mixed Housing Urban Zone (to be consistent with Proposed Plan Change 78 – Intensification to the Auckland Unitary Plan – Operative in Part (Unitary Plan))
- This rezoning may enable approximately 189 residential dwellings or more.

A concept plan of the Proposal with the indicative road network is shown in Figure ES1.

- An indicative potential road network to support the Proposal includes a new intersection to the west onto Lisle Farm Drive, and to the north on William Andrew Road
- The planned Pukekohe Urban Arterial Road is included in the indicative road network. The proposed designation for this road is through the southeast corner of the Site.

Figure ES1: Plan Change Concept Plan

Our assessment concludes that the proposed Plan Change aligns well with future transport strategies, policies and programmes including Te Tupu Ngātahi Supporting Growth (TTNSG), and will result in transport effects that can be avoided, remedied or mitigated and are no more than minor.

- The Plan change aligns well with the Auckland Plan, Unitary Plan transport objectives, Future Connect and TTNSG by providing people with choices of healthy and sustainable transport modes
- Several new roads are proposed to enable traffic to flow in and out of the Site. This includes 2 new intersections with Lisle Farm to the West and William Andrew Road to the North. Car trips generated from the Site showed the most traffic will travel down Anselmi Ridge Road and use the intersection with Pukekohe East Road
- A predicted peak hour traffic generation resulting from the Proposal of 161 vehicles can be accommodated by the surrounding network, more specifically the Anselmi Ridge Road and Pukekohe East Road intersection, with no more than minor changes to the existing performance of the intersection
- We anticipate that the operating speed of the proposed roads will be some 30 km/hr, providing a safe environment for all road users
- Pedestrian footpaths are anticipated to be included on both sides of all proposed carriageways, ensuring pedestrians have a safe method to move
- A future arterial road – 'North East Arterial' is proposed to travel through the proposed Plan Change site as part of TTNSG. This will enhance the accessibility of the Site for walking, cycling and driving. The concept road network layout allows for this arterial road.

Overall, we conclude that the proposed Private Plan Change Request will enable development that aligns with or implements transport network upgrades as planned by Waka Kotahi and Auckland Transport.

We therefore conclude that there are no transportation planning or traffic engineering reasons to preclude the rezoning of the land as requested by the proposed Plan Change.

CONTENTS

APPENDICES

APPENDIX A SIDRA MODELLING OUTPUTS

1 WHAT THIS REPORT INCLUDES

SG and DS Smith (Requestor) has engaged Flow Transportation Specialists Ltd (Flow) to assess the transport planning and traffic engineering matters relating to a Private Plan Change Request for land zoned Future Urban, located at 70A and 70B Lisle Farm Drive in Pukekohe (Site). The Private Plan Change proposes to rezone the Site from Future Urban to Residential – Mixed Housing Urban Zone allow for residential landuse activities.

This Integrated Transport Assessment (ITA) provides the following information to support the Proposal.

- A description of the Proposal, focussing on the transport matters
- An assessment of the Proposal against the relevant transport planning documents, including Auckland Council's Auckland Plan and the Unitary Plan, and Auckland Transport's 'Future Connect' long-term transport plan
- The provision of background information to provide context to the Proposal's ITA, including
    - the Site location and the immediate surrounding transport network, including traffic volumes
    - a description and assessment of the historic crash record of the immediate transport network
    - a description of the private vehicle, public transport and walking and cycling accessibility of the Site
- An assessment of the Proposal and potential transport effects with regard to
    - vehicle access
    - traffic generation and impacts on the surrounding transport network
    - safety impacts
    - the planned future road network.

2 THE PLAN CHANGE PROPOSAL

The Request includes the following elements that are material to transport matters

- Rezoning the Site from Future Urban Zone land to a Residential – Mixed Urban Suburban Zone
- This rezoning is anticipated to enable the implementation of approximately 189 residential dwellings or more.

A concept plan of the development that could be enabled under the Proposal, including the indicative road and pedestrian network is shown in Figure 1.

- An indicative potential road network to support the Proposal includes
  - a new connection to William Andrew Road in the north
  - a new intersection to the west onto Lisle Farm Drive The planned Pukekohe Urban Arterial Road is included in the indicative road network. As shown, the proposed designation for this road is through the southeast corner of the Site.

Figure 1: Plan Change Concept Plan

3 STRATEGIC CONTEXT AND ASSESSMENT

3.1 The Auckland Plan

The Auckland Plan is Auckland Council's (Council) long-term spatial plan for Auckland, with a 2050[1] outlook. It considers how the Council will address key challenges such as high population growth and shared prosperity.

There are 6 outcomes of the Auckland Plan, with transport and access matters being one of these outcomes. Within the transport and access outcome, there are 3 key directions.

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

The Auckland Plan, in conjunction with other programmes, sets out how Council envisages to plan for areas such as this Site. Council's and Auckland Transport's key transport infrastructure projects in the immediate areas of the Site are discussed further in the report.

3.2 Auckland Unitary Plan

The Auckland Unitary Plan has the following region-wide transport objectives in Auckland.[2]

- Land use and all modes of transport are integrated in a manner that enables
  - the benefits of an integrated transport network to be realised
  - the adverse effects of traffic generation on the transport network to be managed.
- The provision of an integrated transport network including public transport, walking, cycling, private vehicles and freight
- The provision of parking and loading to support urban growth and the quality compact urban form
- The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone
- Pedestrian safety and amenity along public footpaths are prioritised
- Road/rail crossings operate safely with neighbouring land use and development.

This proposed Plan Change aligns with several of the Unitary Plan's transport objectives.

- Achieving a quality compact urban form consistent with the Unitary Plan's hierarchy for the area
- Providing safe pedestrian amenities by way of separated footpaths

[1] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/auckland-plan/Pages/default.aspx

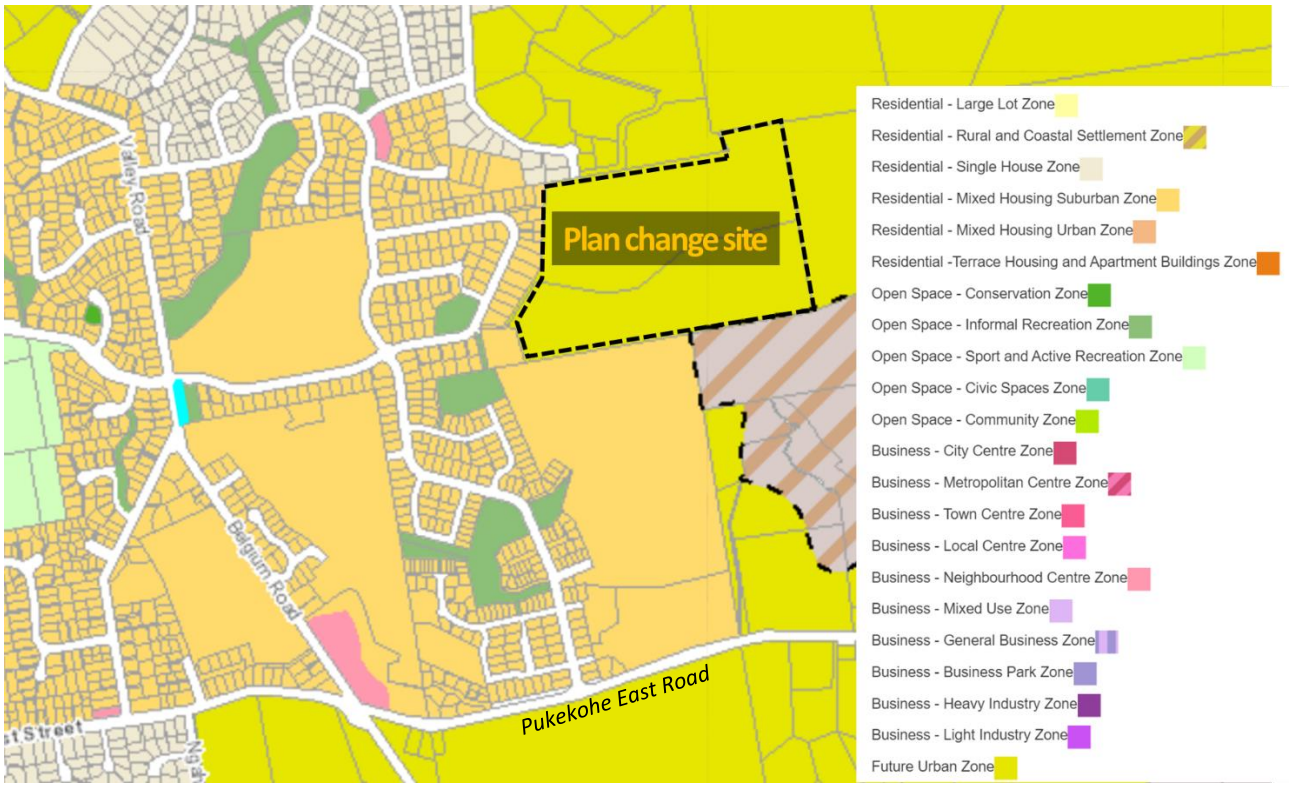
[2] https://unitaryplan.aucklandcouncil.govt.nz/Images/Auckland_Unitary_Plan_Operative/_Chapter_E_Auckland-wide/4.Infrastructure/E27 Transport.pdf

- A road network that will be able to accommodate trips generated from the Site, and which will be able to provide for safe and efficient parking, loading and access associated with each proposed residential dwelling enabled under the proposed Plan Change.

3.2.1 Site context

The Unitary Plan zoning of the Site is shown in Figure 2. The Site is zoned Future Urban Zone.

Figure 2: Unitary Plan zoning[3]



Much of the land to the north, east and south is primarily zoned Future Urban Zone. To the west, the primary activity is Residential – Mixed Housing Suburban Zone. It is noted that under Proposed Plan Change 78 – Intensification, which implements the Medium Density Residential Standards (MDRS), all land currently zoned Residential – Mixed Housing Suburban Zone is proposed to rezoned Residential – Mixed Housing Urban Zone with revised MDRS as the default development standards.

The closest arterial road to the Site is Pukekohe East Road, located some 90 m to the south.

3.3 Future Urban Land Supply Strategy

Council's Future Urban Land Supply Strategy (FULSS)[4] is a non-statutory document that identifies a programme to sequence land development over 30 years in Auckland.

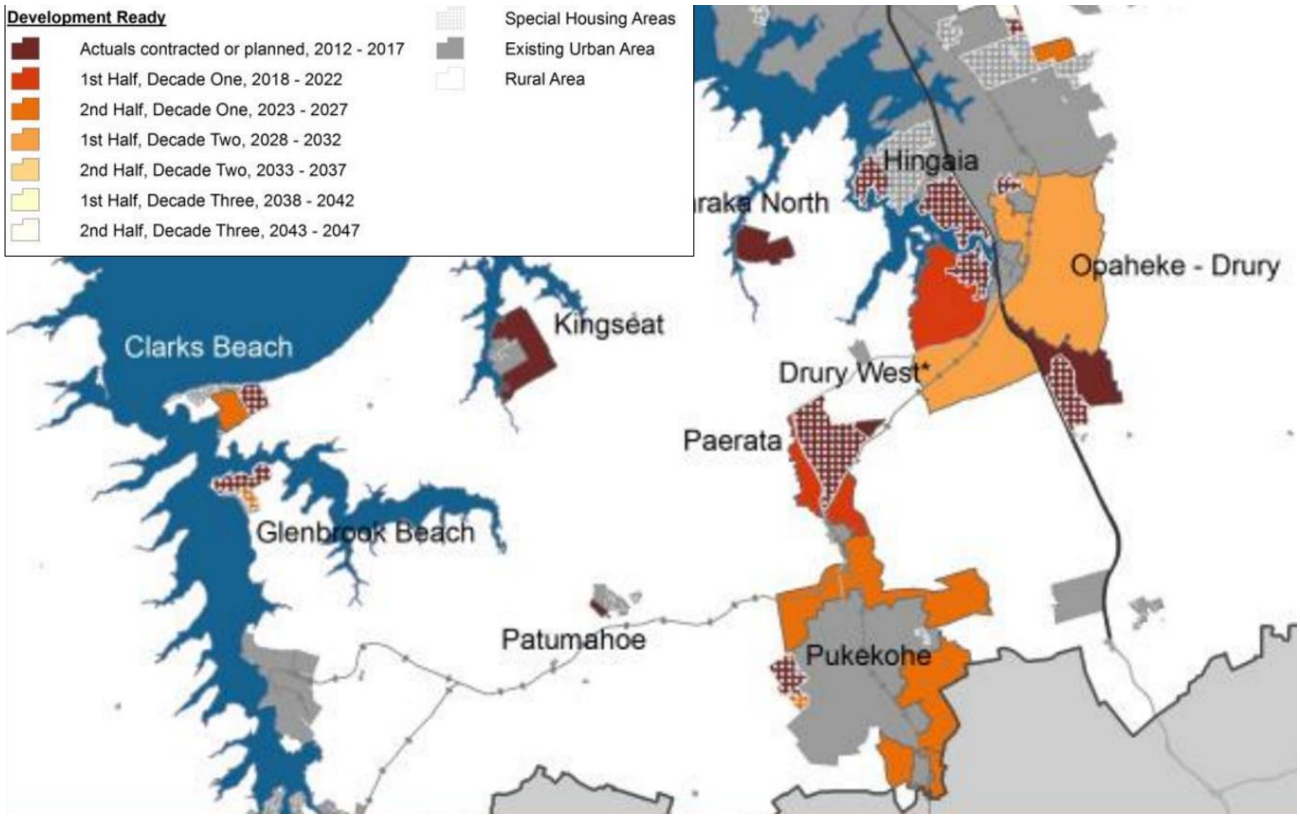
- It is a strategy that assists with the ongoing supply of greenfield land for development

[3] https://unitaryplanmaps.aucklandcouncil.govt.nz/upviewer/
[4] https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/topic-based-plans-strategies/housing-plans/Documents/future-urban-land-supply-strategy.pdf

- It determines the sequencing and timing for when future urban areas will be ready for development to commence, which requires necessary underpinning zoning and bulk infrastructure to be in place.

Figure 3 shows a map of the sequencing for South Auckland. Pukekohe is identified to be development ready by 2027.

Figure 3: Future Urban Land Supply Strategy – Sequencing of South Auckland



3.4 Future Connect

Auckland Transport's Future Connect programme sets out the long-term network plan for Auckland's integrated transport system, with the network plan helping to inform the 10-year investment programme. For Pukekohe, Future Connect classifies the following for implementation within the first decade (2021-2031).

- Public Transport – Rapid Transit Network via the Pukekohe Train Station
- General Traffic – Pukekohe East Road, Mill Road and Paerata are classified as Primary Arterials and are proposed to be upgraded
- Walking/cycling – Major upgrade in the first decade to Pukekohe East Road, Mill Road and other roads in and around the township to accommodate cyclists and pedestrians into the wider network.

This proposed Plan Change and recommended transport upgrades align with the network anticipated by Auckland Transport for Pukekohe.

4 A DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 The Site and surrounding environment

The extent of the proposed Plan Change Site is shown in Figure 4. The Site is occupied by a single dwelling with the existing land activity being rural pastoral use.

Figure 4: The Site and immediate surrounds

Land uses in the surrounding area include

- land to the north, east and south all appear to be rural/farming although we recognise the Unitary maps show these locations as residential or future urban zone areas
- land to the west is zoned Residential – Mixed Housing Suburban Zone with single-story housing already constructed
- the Pukekohe Town Centre, located approximately 4 km south west of the Site.

4.2 Existing roads

4.2.1 Lisle Farm Drive

Lisle Farm Drive is a 1.5 km loop road that provides one traffic lane in each direction with footpaths on both sides across the entire road length. On-street parking is permitted, except near intersections.

Figure 5 below shows the sight lines on Lisle Farm Drive at the approximate location where the new road from the Site will intersect from the east.

The bottom 2 images of Figure 5 show that visibility is adequate. This is supported by a site visit we conducted which established visibility to the west (bottom left image) of 73 metres and 200 metres to the north (bottom right image).

- Using the Safe Intersection Sight Distance (SISD) assessment from Austroads, a SISD value of 73 m is required, assuming the operating speed on these roads will be 40 km/hr.
- The operating speed of Lisle Farm Drive in this area has an operating speed of around 40 km/h, due to the curved alignment and relatively narrow carriageway.

Figure 5: Lisle Farm Drive intersection visibility (bottom left looking west, bottom right looking north)

4.2.2 Anselmi Ridge Road

With a length of some 800 m, Anselmi Ridge Road intersects with Lisle Farm Drive to the north and Pukekohe East Road to the south. As shown in Figure 6, Anselmi Ridge Road has a single traffic lane in each direction with footpaths on both sides. On street parking is available in indented form.

Anselmi Ridge Road intersects with Pukekohe East Road, which is classified as an arterial road in the Unitary Plan. During the commuter peak periods, most traffic turns in and out from this intersection as Anselmi Ridge Road provides a key connection between the relatively new residential properties and the wider roading network.

Figure 6: General layout of Anselmi Ridge Road

4.2.3 William Andrew Road

William Andrew Road is a cul-de-sac with a footpath on one side of the road for much of its length. At the northern end, the road intersects with Grace James Road. On street parking is permitted.

A new road from the site is expected to intersect with William Andrew Road in the approximate location shown in Figure 7. These images also show a straight road topography along William Andrew Road with some 200 m of available sight distance. As such, visibility at the new intersection will be adequate.

Figure 7: General layout of William Andrew Road

4.3 Existing traffic conditions

Using traffic count data derived from Auckland Transport's database[5], Table 1 shows the volumes on Pukekohe Road as of March 2020. Daily traffic volumes average 16,194 vehicles per day.

Table 1: Existing vehicle volumes

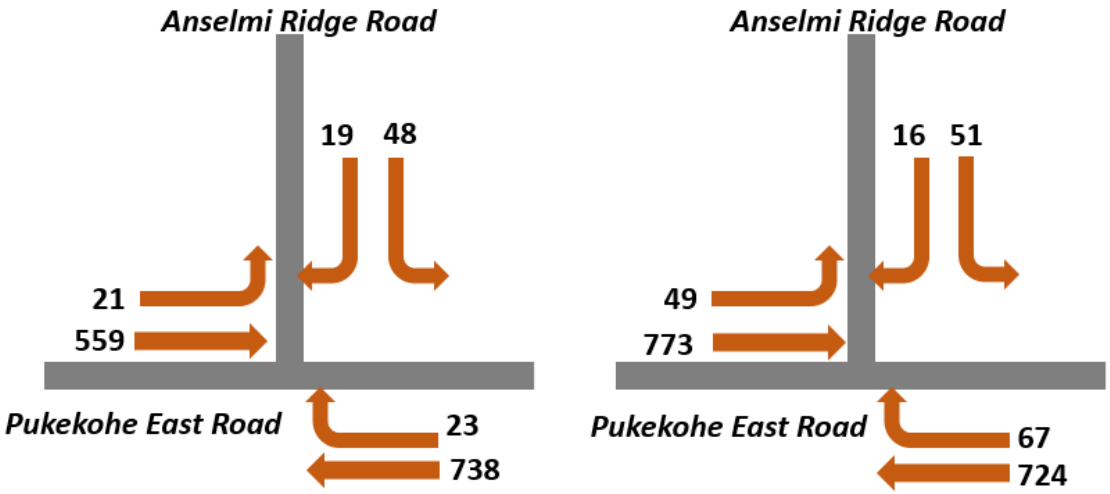
Road	Location	Count date	Average weekday daily traffic (vpd)	AM peak volume (vph)	PM peak volume (vph)
Pukekohe East Road	Between Belgium Rd RAB and Anselmi Ridge Rd	12 March 2020	16,194	800	1,700

[5] https://at.govt.nz/about-us/reports-publications/traffic-counts/

Additionally, Flow undertook a traffic survey at the Anselmi Ridge Road / Pukekohe East Road intersection in May 2023. Data was collected for the periods between 6.30-9.30 am and 4-7 pm peak weekday periods.

Figure 8 illustrates the results of this survey and the distribution of traffic through the intersection during the morning (AM) and evening (PM) peak hours.

Figure 8: Anselmi Ride Road / Pukekohe East Road intersection peak hour volumes (AM peak left, PM peak right)



4.4 The existing road safety record

We have assessed the crash records from 2018 to 2022 (plus all available crashes for 2023) for the surrounding roads obtained from the Waka Kotahi Crash Analysis System. The search area is shown in Figure 9 and includes all the areas within the vicinity of the proposed Plan Change that could have direct access to the road network.

A total of 2 crashes were reported, summarised as follows

- Both incidents occurred at the intersection of Anselmi Ridge Road and Pukekohe East Road
- 1 crash was a non-injury crash and the other was a minor injury crash
- Both incidents appear to have occurred as a result of the offending driver on Anselmi Ridge Road failing to give way to through traffic on Pukekohe Road East, resulting in a collision.

The crash history shows that there are not any significant safety issues in the surrounding network. Notably, there have been no fatal or serious injury crashes reported.

Figure 9: Crash search area and severity (2019-2023)

4.5 The Site's existing transport accessibility

4.5.1 Public transport accessibility

Pukekohe is located some 50 km from Auckland City Centre. As a result, all existing public transport modes between Pukekohe and the Auckland City Centre require transferring between 2 to 3 public transport resulting in an average commute time of 2 hours compared to 1 hour by car.

A map of the public transport network in Pukekohe is illustrated in Figure 10 with a breakdown of some of these services listed below.

Bus

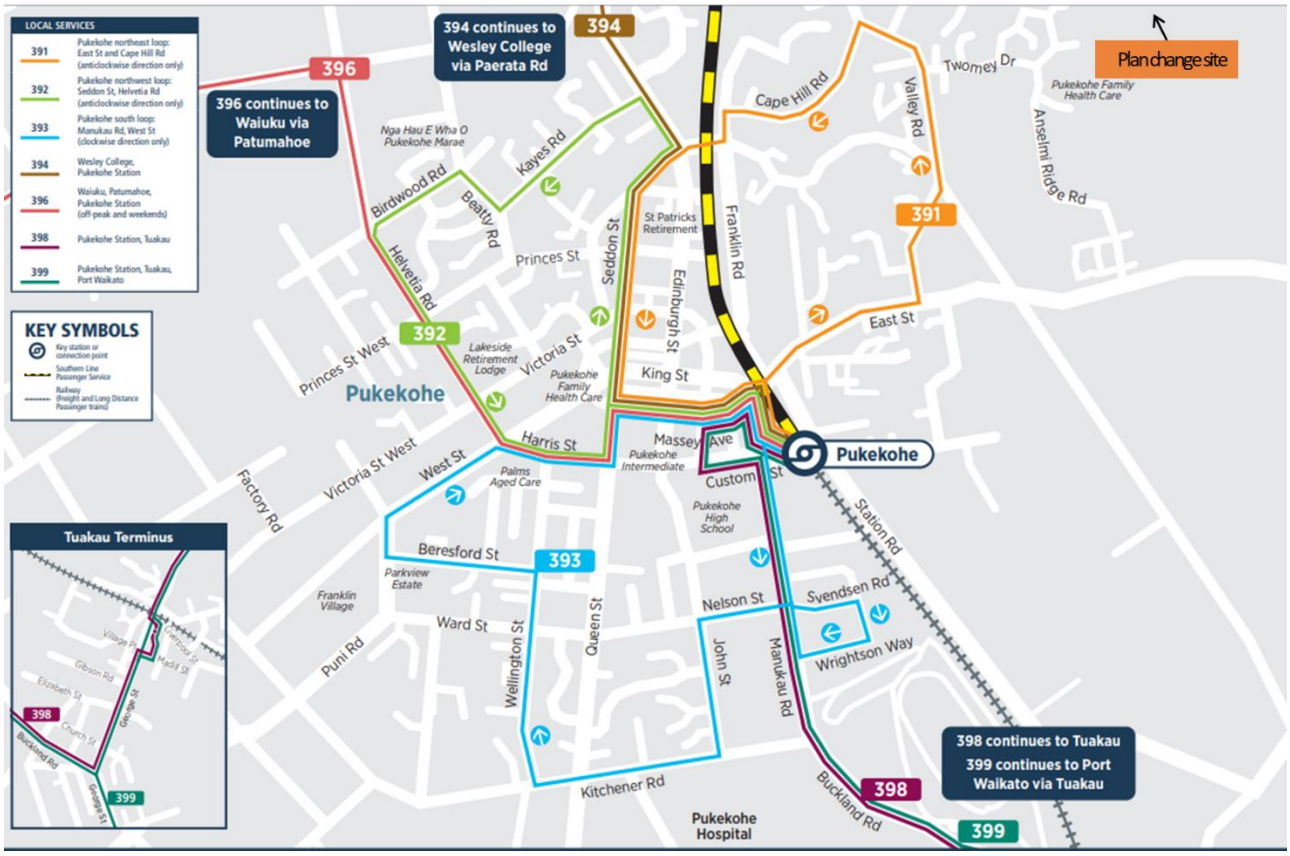
- Route 391 – Runs every 20 minutes and loops around Pukekohe East through to the Town Centre
- Route 394 – Runs every 15 minutes between Pukekohe and Papakura (current replacement for trains whilst Pukekohe train station is being upgraded)
- Patrons must catch the bus from Papakura to travel towards the CBD.

A park-and-ride facility was completed in 2018 at the Pukekohe Train station, where the 394 service begins and terminates.

Train

- Patrons must catch the train from Papakura to travel towards the CBD. Frequency is approximately every 15 minutes during peak periods.

Figure 10: Public transport in Pukekohe



Overall, we conclude that the Site at present is not well served by public transport, unless a resident drives to the Pukekohe Town Centre because

- the Pukekohe Town Centre has good public transport connectivity, there are no current bus routes near the Site.
- the park and ride facilities at the Pukekohe train station do provide options for passengers to park their car at the station, and then use the train or bus services.

Several future projects have been proposed which sets out to achieve a more accessible public transport system for the area and is discussed in Section 5.

4.5.2 Walking and cycling accessibility

Given the existing rural nature of the Site, there are currently limited active mode facilities available. We note:

- Most streets have footpaths on one or both sides of the road
- No facilities on Pukekohe East Road or East Street
- There are no dedicated cycling facilities in the local area.

Section 5 discusses the future infrastructure with regard to cyclists and pedestrians.

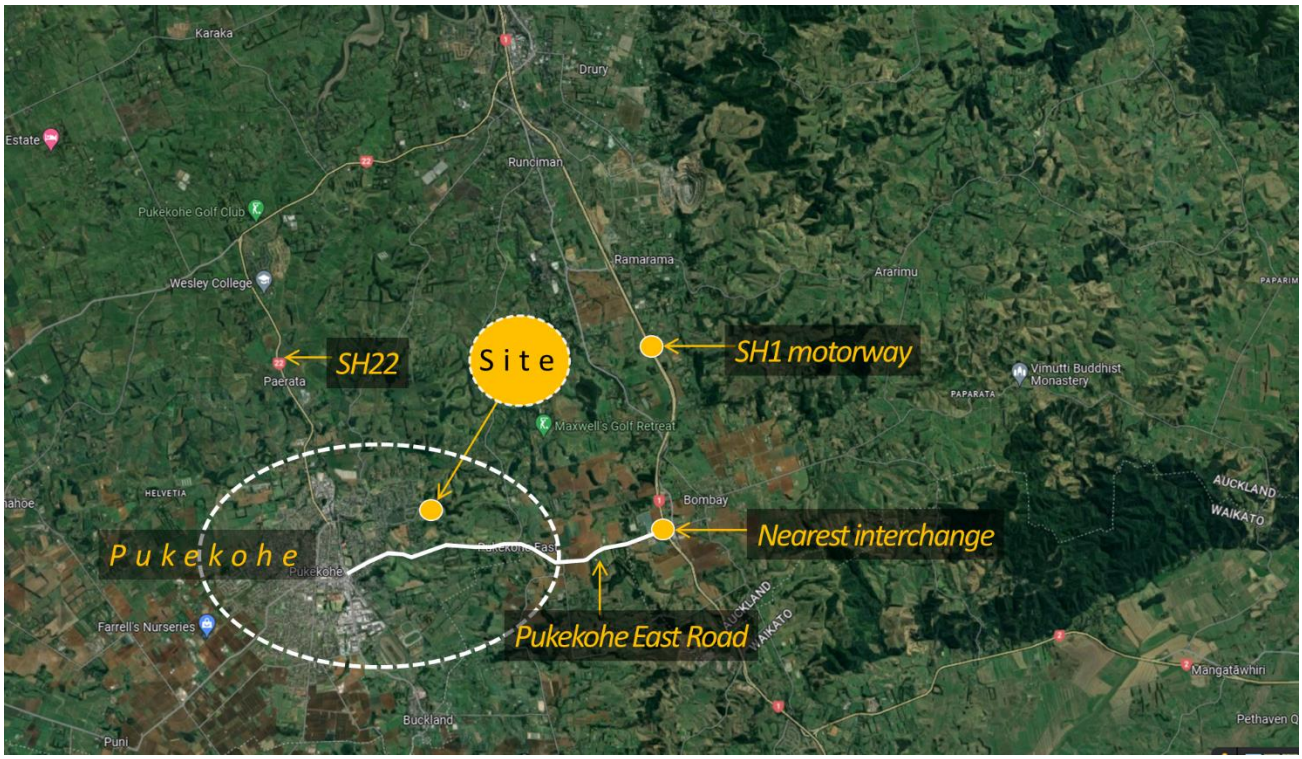
4.5.3 Private vehicle accessibility

As shown in Figure 11, the Site is well-located with respect to providing vehicle accessibility to the State Highway network.

- SH22 is some 2 km to the west and provides a connection between Pukekohe, Paerata and Drury
- SH1 is some 5 km to the east and is used as the main route north and south through the city.

Accordingly, we believe the site has good connection to the wider roading network.

Figure 11: Site location in the strategic transport network



5 THE FUTURE TRANSPORT NETWORK

5.1 Te Tupu Ngātahi Supporting Growth

Under the Auckland Transport and Waka Kotahi collaboration project, TTNSG, several new roads are proposed, with the intention to invest in transport infrastructure that supports future growth in and around the areas of Pukekohe, Drury and Paerata. All of these projects are likely to impact how people in these areas choose to travel.

A map of the future transport network is shown in Figure 12, overleaf.

- The Pukekohe Business Case process is expected to be scheduled for consideration by the Auckland Transport and Waka Kotahi Boards in August and September 2023
- Notice of requirement (NoR) lodgement is planned for late 2023.

In summary, the planned changes will support development at the Site, by increasing accessibility for all transport modes.

5.2 Pukekohe arterials

Several new arterial roads are planned to be provided in Pukekohe, as shown in Figure 13 overleaf.

- The Pukekohe Arterials will provide connections to the future urban zones in Pukekohe
- These arterial routes will connect people with key local destinations, provide connectivity and greater access to the wider transport network, and provide an alternative route to the current main road through the Pukekohe town centre
- This will provide alternative routes for heavy vehicles away from the Pukekohe Town Centre.

Figure 12: TTNSG Future Transport Network for Pukekohe, Paraeta and Drury

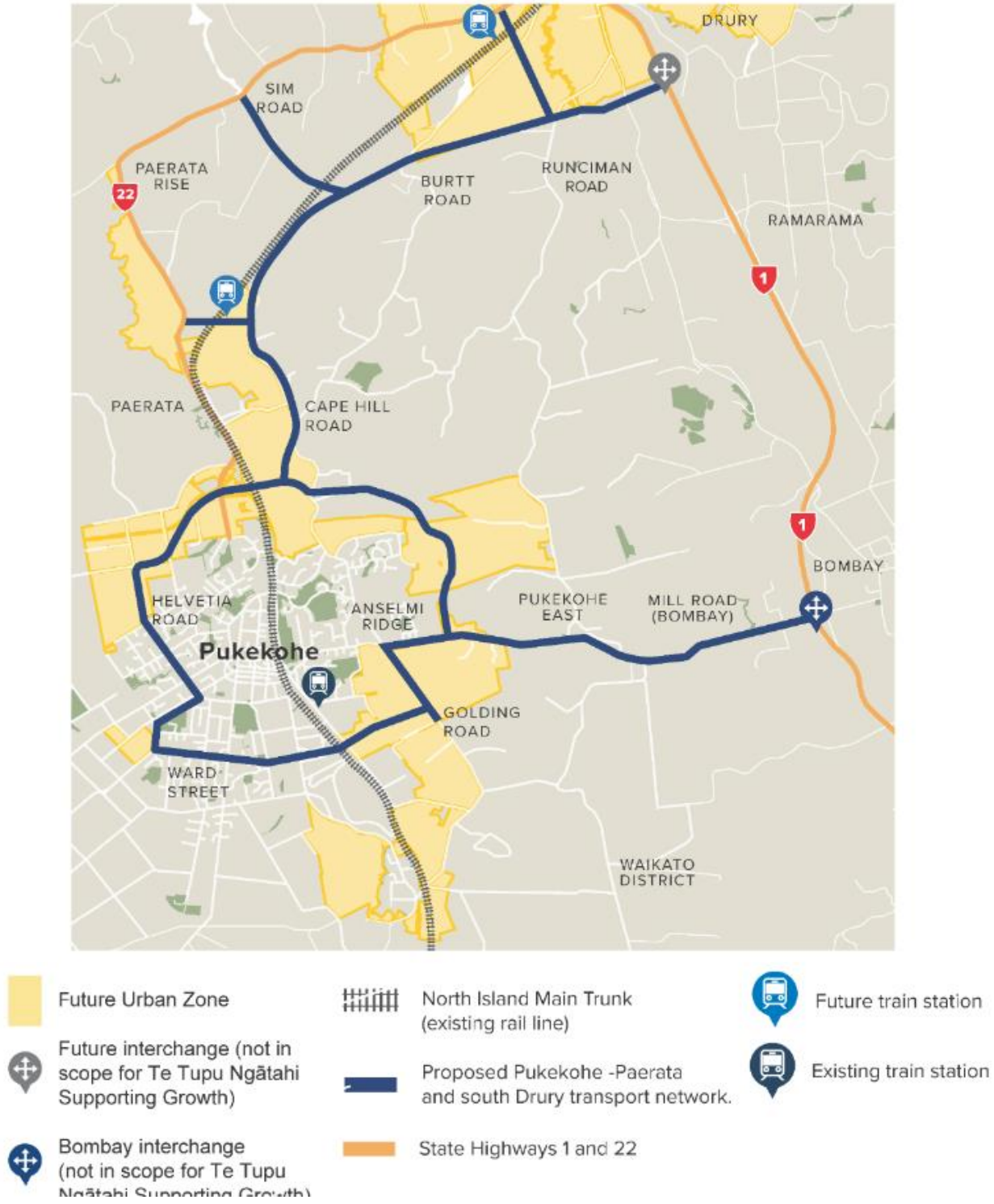


Figure 13: Planned Pukekohe Arterial Roads

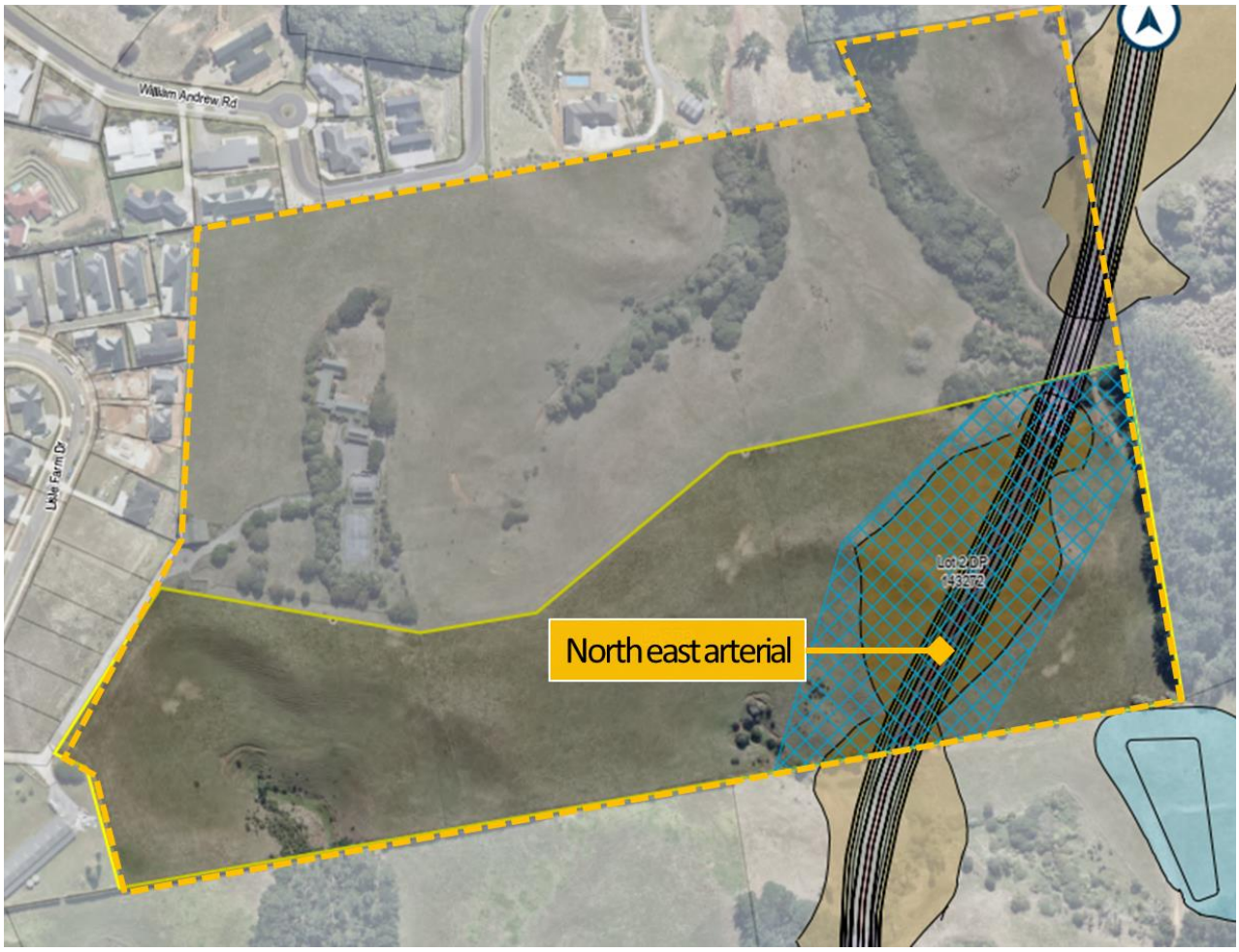
The arterial roads are expected to be two-lane carriageways with dedicated cycle lanes in each direction. They will be designed to operate with a 50 km/h speed limit.

The North East Arterial will intersect with the Site. TTNSG has issued a draft Notice of Requiremenmt (NoR) of this arterial road, shown in Figure 14.

When eventually constructed, this arterial road will improve the accessibility of the Site for all transport modes. It will provide a more direct access onto the external road network, will also provide new pedestrian and cyclist facilities and if a new bus route is implemented on the arterial, will increase the public transport accessibility of the Site.

The arterial road will form a new intersection with Pukekohe East Road south of the Site. There is an existing speed limit change from 80 km/h to 60 km/h on Pukekohe East Road, west of Anselmi Ridge Road. We anticipate that the speed limit of Pukekohe East Road will reduce west of the planned intersection with the arterial road, to account for future urbanisation.

Figure 14: North East Arterial Road through plan change Site

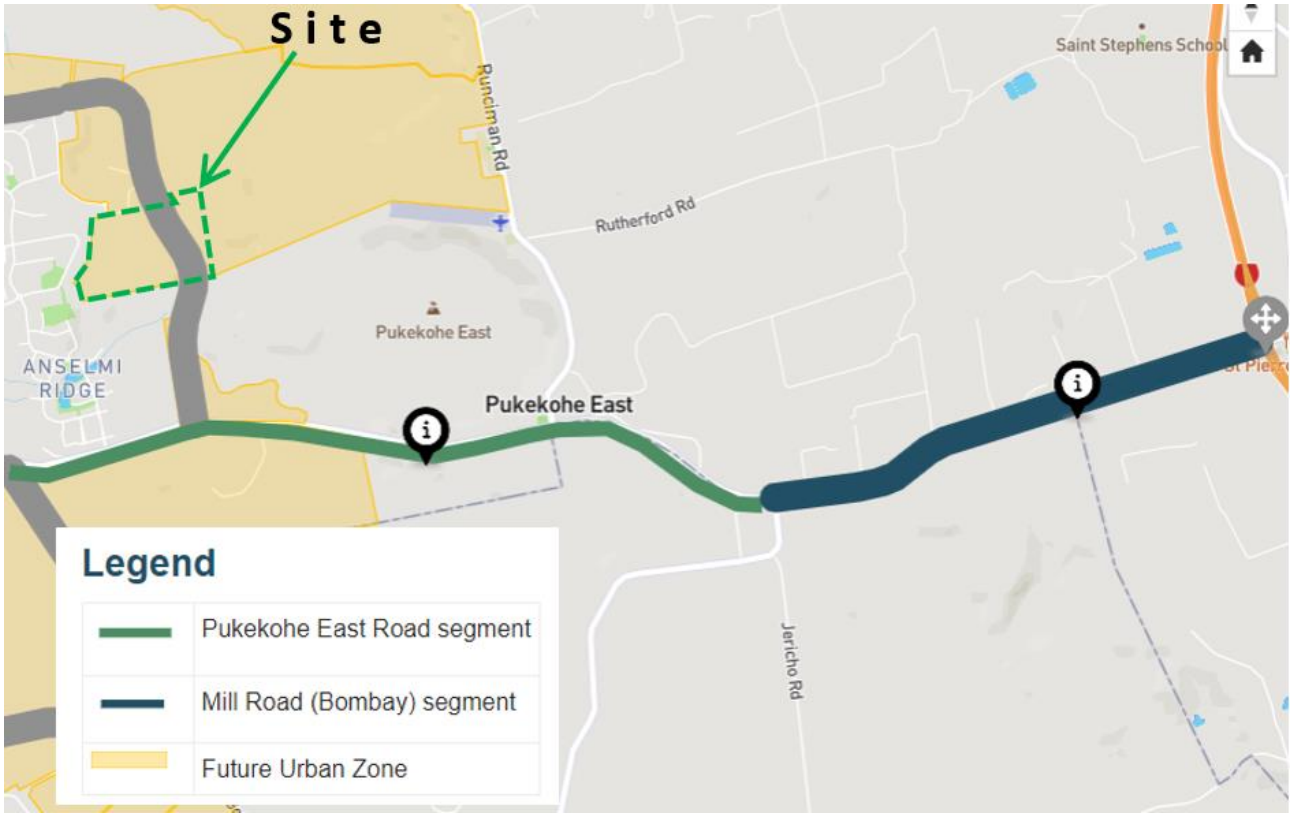


5.3 Pukekohe East Road & Mill Road upgrades

As shown in Figure 15, upgrades to Pukekohe East Road and Mill Road are planned.

- These roads form a strategic connection between Pukekohe and SH1 and the upgrades will tie into the planned upgrade of the Bombay interchange
- The Mill Road segment is expected to have four lanes in total, while the Pukekohe East Road section will have two lanes in total. Shared pedestrian and cycle paths are expected to be provided on one side of the road.

Figure 15: Pukekohe East Road & Mill Road upgrades



5.4 Other new roads and upgrades

Several other roads are proposed further to the north in Paerata and Drury and are included in the TTNSG list of works. These are also shown in previous Figure 12. All of these roads will include separated cycle lanes and footpaths or in some cases shared paths. These northern roads will provide an alternative north-south travel route for commuters living and working in the area.

5.5 New train stations and other train projects

Under the TTNSG, three new train stations[6] are proposed. This is to account for the growing population and ensure more travel options are available for the community. The expected locations for these are:

- Drury central
- Drury west
- Paerata

The project has been moving through the detailed design phase with construction expected to begin in late 2023 – early 2024 with completion in 2025.

As part of the New Zealand Upgrade Programme (NZUP)[7], KiwiRail received funding to electrify the train network from Papakura through to Pukekohe. This included redeveloping the train stations to allow for

[6] Te Tupu Ngātahi - https://findoutmore-supportinggrowth.nz/new-train-stations-drury-and-paerata
[7] https://at.govt.nz/projects-roadworks/electric-trains-to-pukekohe/

longer trains. These works are expected to be completed in 2024. The main benefits to the community will be:

- direct travel north – (no longer required to switch services at Papakura)
- frequent peak hour services
- closer services, as opposed to travelling to Paerata, Drury or Papakura.

6 PROPOSED TRANSPORT NETWORK TO SUPPORT THE PROPOSAL

A concept plan showing a likely road network within the Site is included in Figure 16 with a summary of the design of the local roads and intersections as follows.

Figure 16: Concept plan of Proposal's road network

Local roads

Given the location, all internally proposed roads will likely be classified as local, characterised by the low volume of vehicles. The design of these roads will be focussed on accommodating speeds of around 30 km/hr with appropriate lane width, horizontal design and the provision of on street parking (similar to the design of the local roads that have been constructed in the immediate area of the Site)). This will create a safe environment for all road users.

All the carriageways measure some 20 m which is in line with adjacent roads. As such, we can expect a cross-section to be similar to the following configuration:

- single traffic lanes in both directions
- 1.8 m footpaths on both sides
- front and back berms on both sides.

New intersections

Four new intersections are shown on the concept plan roading layout. This includes

- A new T-intersection onto Lisle Farm Drive to the west
- A connection to William Andrew Road to the north
- Two connections to the planned Pukekohe Arterial Road to the east.

Further details of the cross-section and roading facilities will be provided at subsequent detailed design stages.

7 TRANSPORT ASSESSMENT OF THE PROPOSAL

7.1 Access assessment of the Proposal

7.1.1 Vehicle access

As described above, the road network will provide several new roads and intersections to support the proposed Plan Change, thereby providing suitable vehicle access for Site users.

- Vehicle access can be provided onto Lisle Farm Drive and William Andrew Road immediately
- Future access can be provided onto the planned arterial road.

7.1.2 Visibility at intersections

We have outlined the visibility assessment at the Lisle Farm Drive intersection in Section 4.2.1. We conclude that the proposed location of this intersection ensures that there is more than sufficient sight distance to ensure that the intersection will operate safely

The planned Pukekohe North East Arterial will likely have a speed limit of 50 km/h, likely resulting in an operating speed of 55-60 km/h.

- Using the Safe Intersection Sight Distance (SISD) assessment from Austroads, at an operating speed of 60km/hr, a SISD value of 123 m is required at the intersection with the arterial road
- The alignment of the arterial road in the designation is relatively straight, although there are some horizontal curves.

We believe it will be possible to achieve the required SISD, and the intersection onto the arterial road will need to be designed to meet these parameters.

7.1.3 Vehicle access restrictions

The following vehicle access restrictions may apply under the Unitary Plan

- E27.6.4.1 (2)(a) Vehicle crossings must not be located within 10m of any intersection
- E27.6.4.1 (2)(c) Lots which front an arterial road (once the North East Arterial is constructed).

The road network concept plan provides access points onto the local roads, to avoid direct access onto the planned North East Arterial.

There may be some lots which have access within 10 m of an intersection, due to potential housing typologies. These may require assessments for future consents.

7.1.4 Pedestrian and cycle access

The proposed roading network has sufficient width to accommodate footpaths on both sides. We don't expect that any dedicated cycle facilities need to be provided given the local road classification and that speeds and traffic volumes will be low.

The planned North East Arterial through the Site will provide a cycle connection to the wider transport network.

7.1.5 Public transport access

As outlined in Section 4.5.1, the immediate vicinity will be served by one bus route which performs a loop around the township, stopping at locations where patrons can board other services which travel north to Papakura where transferring to further services are required for further travel north.

There are no existing plans in place to improve bus services, although we note that the planned North East Arterial could potentially include bus services.

We do note that the Supporting Growth programme does include the upgrade to the Pukekohe train station which is currently underway with a date of 2024 for completion. This will see train services able to run north without patrons requiring to transfer at Papakura. Services are also expected to be frequent during peak periods.

7.2 Traffic effects assessment

7.2.1 Trip generation and distribution of the Proposal

7.2.2 Trip generation rates

The following weekday peak hour vehicle trip rates are applicable to this Proposal.

Residential dwellings

Based on the residential trip generation data presented in the RTA guide to Traffic Generating Developments, a trip rate of 0.85 is specified for dwelling houses. This rate has been applied to the 189 dwellings currently shown in the Plan Change Concept Plan. As shown in Table 2, this results in 161 peak hour car trips predicted to be generated by the Proposal.

Table 2: Proposal's weekday peak hour trip generation

Activity	Units	Trip rate	
		AM	PM
Residential – single detached housing	189	0.85 / dwelling	0.85 / dwelling
Total peak hr trips		**161**	**161**

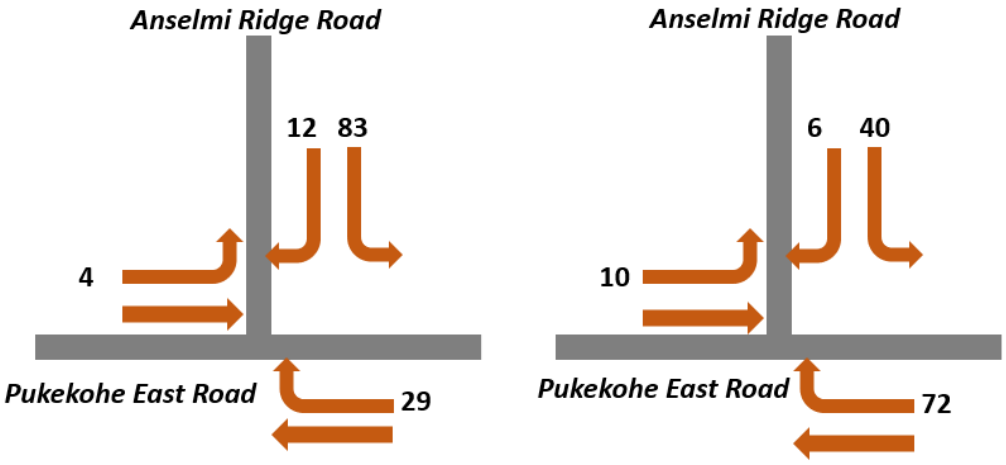
7.2.3 Trip distribution

Figure 17 shows the trip distribution about the immediate roading network for the AM and PM peak hours.

- This diagram concentrates on the Anselmi Ridge Road / Pukekohe East Road intersection as we estimate some 80% of the total generated traffic is likely to travel through this intersection during peak periods. Of this 80%, we have assumed 70% will travel east to SH1 and 10% will travel west to the Pukekohe Town Centre

- The remaining 20% is split evenly between traffic using Lisle Farm Drive to continue westward or using William Andrew Road to join the network to the north
- This distribution has been informed by NZ 2018 census data
- We have adopted inbound and outbound distributions for residential dwellings based on the ITE Trip Generation Handbook. In the AM peak, 26% of trips are inbound and 74% are outbound. In the PM peak, 64% of trips are inbound and 36% are outbound.

Figure 17: Distribution of additional trips at Pukekohe East Road / Anselmi Ridge Road intersection



7.2.4 Traffic modelling methodology

To assess the traffic effects of the Plan Change, we have assessed the performance of the Anselmi Ridge Road / Pukekohe East Road intersection using the SIDRA intersection modelling software.

We have assessed the weekday AM and PM peak hour periods for the following situations:

- Without the Proposal model – existing performance
- With the Proposal model – following the completion/construction of the Proposal

As shown in Figure 18, we have assumed the layout of the Anselmi Ridge Road / Pukekohe East Road intersection to include the existing elements of:

- A two-way carriage on Pukekohe East Road, providing a single lane in each direction and forming a T-intersection with Anselmi Ridge Road
- Flush median strip with a right turning bay into Anselmi Road
- A 90 m left turning short lane into Anselmi Road
- Anselmi Ridge Road includes a single trafficable lane in each direction.

The SIDRA intersection layout and movement summary results of the peak periods are provided in Appendix A.

Figure 18: Pukekohe East Road / Anselmi Ridge Road intersection

7.2.5 Traffic modelling results and traffic effects

Table 3 and Table 4 summarise the predicted performance of the Anselmi Ridge Road/Pukekohe East Road intersection during the AM and PM peak hours for the Without and With the Proposal scenarios.

Our assessment is based on the 4 parameters of Degree of Saturation (DoS), Level of Service (LOS), Average Delay and Queue Length.

Table 3: Anselmi Ridge Road / Pukekohe East Road intersection, AM peak SIDRA results

Approach	Without the Proposal				With the Proposal			
	DoS (%)	LOS	Average delay (sec)	85th % Queue (m)	DoS (%)	LOS	Average delay (sec)	85th % Queue (m)
Anselmi Ridge Road								
Left turn	0.055	A	7.2	1.4	0.149	A	7.3	4.0
Right turn	0.094	C	20.0	2.0	0.150	C	20.0	3.1
Pukekohe East Road (east approach)								
Right turn	0.027	A	7.5	0.8	0.057	A	7.3	1.7
Through	0.399	A	0.2	0.0	0.399	A	0.2	0.0
Pukekohe East Road (west approach)								
Through	0.311	A	0.1	0.0	0.311	A	0.1	0.0
Left turn	0.014	A	4.7	0.4	0.017	A	4.8	0.5
Total Intersection	**0.399**	**n/a**	**0.8**	**2.0**	**0.399**	**n/a**	**1.4**	**4.0**

Table 4: Anselmi Ridge Road / Pukekohe East Road intersection, PM peak SIDRA results

Approach	Without the Proposal				With the Proposal			
	DoS (%)	LOS	Average delay (sec)	85th % Queue (m)	DoS (%)	LOS	Average delay (sec)	85th % Queue (m)
Anselmi Ridge Road								
Left turn	0.084	A	9.3	2.2	0.145	A	9.3	3.8
Right turn	0.118	D	28.2	2.4	0.172	D	30.6	3.5
Pukekohe East Road (east approach)								
Right turn	0.100	A	9.2	2.8	0.202	A	9.3	5.7
Through	0.387	A	0.2	0.0	0.386	A	0.2	0.0
Pukekohe East Road (west approach)								
Through	0.411	A	0.2	0.0	0.411	A	0.2	0.0
Left turn	0.032	A	4.7	0.9	0.041	A	4.9	1.2
Total Intersection	**0.411**	**N/A**	**1.2**	**2.8**	**0.411**	**n/a**	**1.8**	**5.7**

The results of the modelling show that for both peak hours, the intersection is anticipated to operate in the same manner under both Without and With the Proposal scenarios. There is no noticeable increase in any of the four parameters on any of the approaches

In summary, we conclude that any adverse traffic effects at the Anselmi Ridge Road / Pukekohe East Road intersection will be no more than minor.

8 CONCLUSIONS

Based on the analysis described in this report, we conclude that the proposed Plan Change aligns well with future transport strategies, policies and programmes including Te Tupu Ngātahi Supporting Growth, and will result in transport effects that are no more than minor and considered acceptable.

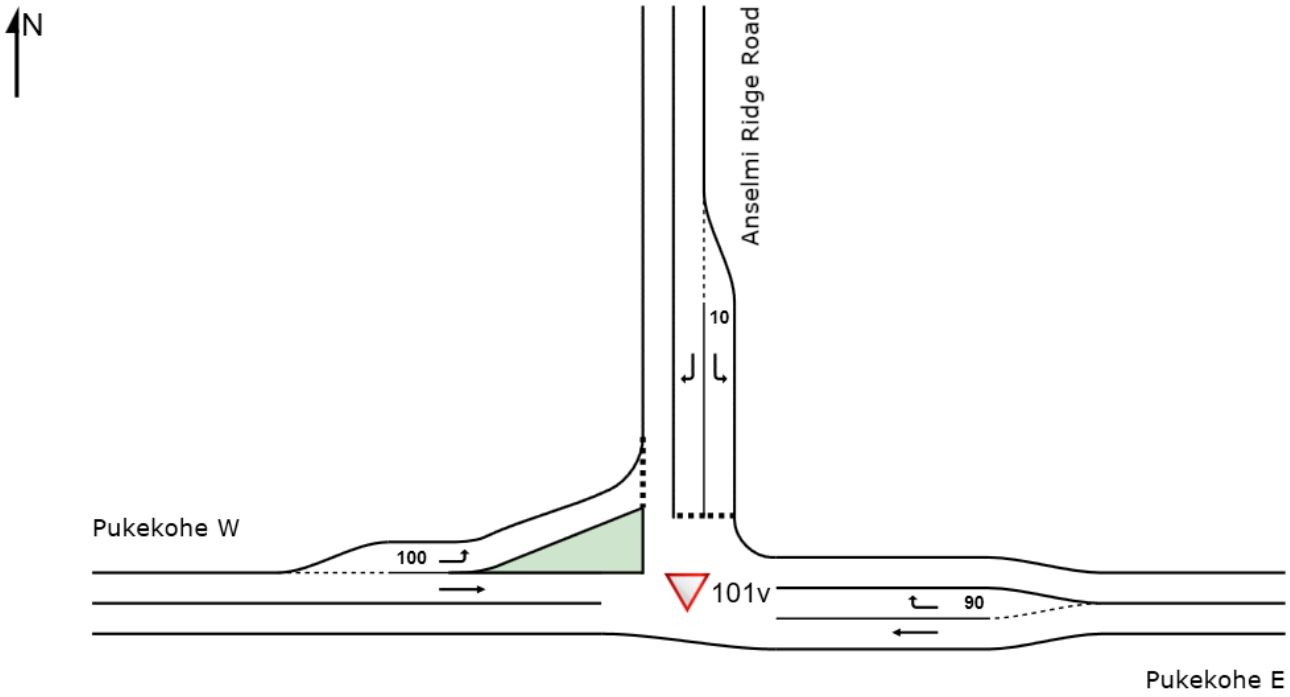
- The rezoning of Future Urban land will enable a range of complementary activities, including residential dwellings as proposed
- The Plan change aligns well with the Auckland Plan, Unitary Plan transport objectives, Future Connect and TTNSG by providing people with choices of healthy and sustainable transport modes
- Several new roads are proposed to enable traffic to flow in and out of the Site. This includes 2 new intersections with Lisle Farm to the West and William Andrew Road to the North. Car trips generated from the Site showed the most traffic will travel down Anselmi Ridge Road and use the intersection with Pukekohe East Road
- A predicted peak hour traffic generation resulting from the Proposal of 161 vehicles can be accommodated by the surrounding network, more specifically the Anselmi Ridge Road and Pukekohe East Road intersection, with no more than minor changes to the existing performance of the intersection
- We anticipate that the operating speed of the proposed roads will be some 30 km/hr, providing a safe environment for all road users
- Pedestrian footpaths are anticipated to be included on both sides of all proposed carriageways, ensuring pedestrians have a safe method to move
- A future arterial road – 'North East Arterial' is proposed to travel through the proposed Plan Change site as part of TTNSG. This will enhance the accessibility of the Site for walking, cycling and driving. The concept road network layout allows for this arterial road.

Overall, we are of the view that the proposed Lisle Farm Plan Change will enable development that aligns with or implements transport network upgrades as planned by Supporting Growth and Auckland Transport.

We therefore consider that there are no transportation planning or traffic engineering reasons to preclude the implementation of the Plan Change as intended.

APPENDIX A SIDRA modelling outputs

Model
Intersection Layout



Existing AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pukekohe E														
5	T1	738	54	738	7.3	0.399	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
6	R2	23	3	23	13.0	0.027	7.5	LOS A	0.1	0.8	0.55	0.67	0.55	44.6
Approach		761	57	761	7.5	0.399	0.3	NA	0.1	0.8	0.02	0.02	0.02	68.5
North: Anselmi Ridge Road														
7	L2	48	1	48	2.1	0.055	7.2	LOS A	0.2	1.4	0.52	0.69	0.52	45.1
9	R2	19	2	19	10.5	0.094	20.0	LOS C	0.3	2.0	0.84	0.92	0.84	38.7
Approach		67	3	67	4.5	0.094	10.8	LOS B	0.3	2.0	0.61	0.76	0.61	43.1
West: Pukekohe W														
10	L2	21	3	21	14.3	0.014	4.7	LOS A	0.1	0.4	0.08	0.46	0.08	46.8
11	T1	559	73	559	13.1	0.311	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		580	76	580	13.1	0.311	0.3	LOS A	0.1	0.4	0.00	0.02	0.00	68.5
All Vehicles		1408	136	1408	9.7	0.399	0.8	NA	0.3	2.0	0.04	0.05	0.04	66.7

Future AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pukekohe E														
5	T1	738	54	738	7.3	0.399	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
6	R2	52	3	52	5.8	0.057	7.3	LOS A	0.2	1.7	0.55	0.70	0.55	44.8
Approach		790	57	790	7.2	0.399	0.6	NA	0.2	1.7	0.04	0.05	0.04	67.2
North: Anselmi Ridge Road														
7	L2	131	1	131	0.8	0.149	7.3	LOS A	0.6	4.0	0.54	0.75	0.54	45.0
9	R2	31	2	31	6.5	0.150	20.0	LOS C	0.4	3.1	0.85	0.93	0.85	38.8
Approach		162	3	162	1.9	0.150	9.8	LOS A	0.6	4.0	0.60	0.78	0.60	43.7
West: Pukekohe W														
10	L2	25	3	25	12.0	0.017	4.8	LOS A	0.1	0.5	0.13	0.46	0.13	46.7
11	T1	559	73	559	13.1	0.311	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		584	76	584	13.0	0.311	0.3	LOS A	0.1	0.5	0.01	0.02	0.01	68.3
All Vehicles		1536	136	1536	8.9	0.399	1.4	NA	0.6	4.0	0.08	0.11	0.08	64.0

Existing PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pukekohe E														
5	T1	724	38	724	5.2	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
6	R2	67	3	67	4.5	0.100	9.2	LOS A	0.4	2.8	0.64	0.83	0.64	43.8
Approach		791	41	791	5.2	0.387	0.9	NA	0.4	2.8	0.05	0.07	0.05	66.4
North: Anselmi Ridge Road														
7	L2	51	4	51	7.8	0.084	9.3	LOS A	0.3	2.2	0.64	0.83	0.64	43.9
9	R2	16	2	16	12.5	0.118	28.2	LOS D	0.3	2.4	0.89	0.95	0.89	35.6
Approach		67	6	67	9.0	0.118	13.8	LOS B	0.3	2.4	0.70	0.86	0.70	41.6
West: Pukekohe W														
10	L2	49	1	49	2.0	0.032	4.7	LOS A	0.1	0.9	0.15	0.47	0.15	46.8
11	T1	773	44	773	5.7	0.411	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
Approach		822	45	822	5.5	0.411	0.4	LOS A	0.1	0.9	0.01	0.03	0.01	67.7
All Vehicles		1680	92	1680	5.5	0.411	1.2	NA	0.4	2.8	0.06	0.08	0.06	65.4

Future PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Pukekohe E														
5	T1	724	38	724	5.2	0.386	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
6	R2	139	3	139	2.2	0.202	9.3	LOS A	0.8	5.7	0.67	0.85	0.67	43.8
Approach		863	41	863	4.8	0.386	1.6	NA	0.8	5.7	0.11	0.14	0.11	63.6
North: Anselmi Ridge Road														
7	L2	91	4	91	4.4	0.145	9.3	LOS A	0.5	3.8	0.64	0.83	0.64	43.9
9	R2	22	2	22	9.1	0.172	30.6	LOS D	0.5	3.5	0.91	0.96	0.93	34.8
Approach		113	6	113	5.3	0.172	13.4	LOS B	0.5	3.8	0.70	0.86	0.70	41.8
West: Pukekohe W														
10	L2	59	1	59	1.7	0.041	4.9	LOS A	0.2	1.2	0.23	0.48	0.23	46.6
11	T1	773	44	773	5.7	0.411	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
Approach		832	45	832	5.4	0.411	0.5	LOS A	0.2	1.2	0.02	0.03	0.02	67.3
All Vehicles		1808	92	1808	5.1	0.411	1.8	NA	0.8	5.7	0.10	0.13	0.10	63.1