167 to 173 PILKINGTON ROAD
POINT ENGLAND

INTEGRATED TRANSPORTATION ASSESSMENT

13 July 2023

Prepared for Wyborn Capital Investments Ltd

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Wyborn Capital Investments Ltd

Document Information

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1. SUMMARY

This Integrated Transportation Assessment (ITA) report is required by the Auckland Unitary Plan. It sets out current and future transportation issues and effects of a proposed Plan Change that would rezone the site at Pilkington Road from Business – Light Industry to Business - Mixed Use.

The site is located beside the Eastern Rail Line and is a short walk from the Glen Innes Station. It has frontage to both Pilkington Road and Apirana Avenue and has the proximity to public transport that is typical of other similar zones in Auckland.

The site is large and has no specific transport deficiencies that would require addressing through a Precinct Plan. The proposed plan change therefore seeks to change the zone without additional transport related rules or requirements. This ITA demonstrates that the existing rules of the Auckland Unitary Plan are sufficient to ensure that any adverse transportation effects associated with future development can be avoided, remedied or mitigated through the existing AUP rules and assessment criteria.

Access to the site can either occur at the existing access points or at new locations developed in accordance with the AUP rules.

2. INTRODUCTION AND SCOPE

This ITA has been prepared in support of a proposed plan change of the 7.3ha site from Business - Light Industry to Business - Mixed Use.

The assessment has assumed a development on the site of 593 apartments, 118 terraced houses, 5500 sqm of commercial floor space and 1160sqm of community hub. This development case is based on a masterplan developed by Warren and Mahoney architects. It demonstrates the type and scale of activities that could be achieved as a result of the plan change, but it is not intended to be limiting. Instead future applications would be required under the AUP to assess effects of specific proposals.

An Integrated Transport Assessment (ITA) is required because this is a plan change and the likely future development would exceed the trip generation thresholds set out in the AUP for an ITA to be required.

The need for an ITA is set out in both the Auckland Unitary Plan (AUP) and the ITA guidelines through thresholds for development. The AUP requires an ITA when a development is applied for outside of existing centres that will provide more than 100 houses. The AT guideline requires an ITA when the development exceeds 120 houses. The plan change could allow 711 new dwellings, therefore an ITA is required.

This report has been structured to follow the AT Guidelines and specifically addresses the matters required for plan changes and structure plans as defined in that document.

2.1 Subject Site

The site is located on the western side of Pilkington Road and Apirana Avenue at Point England. The western boundary of the site is the Eastern Railway Line. The site extends to the north to Merton Road and to the south to approximately opposite Torino Street. Currently, the land is used for light industry and commercial activities. The location is shown in Figure 1 below.

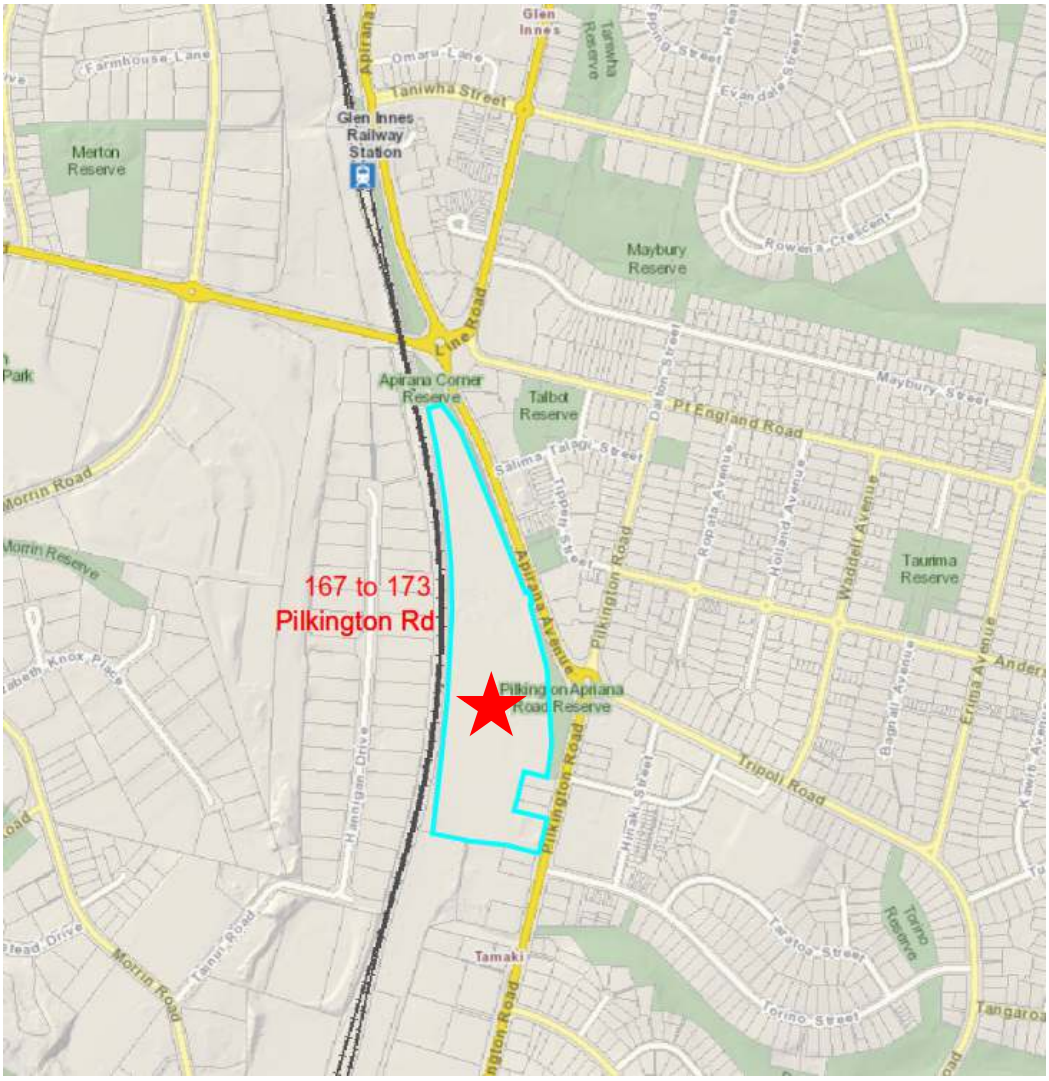


Figure 1: Locality Plan.

3. LAND USE AND TRANSPORT ENVIRONMENT

3.1 Auckland Unitary Plan Controls

The entire site is currently zoned as Business - Light Industry. The adjoining area has a mix of zones ranging from Residential Terraced Housing and Apartment Building zone on the land on the opposite side of Apirana Avenue and Pilkington Road, Business Light Industrial on the opposite side of the railway line to Business Mixed use on sites to the south and west. Glen Innes itself is zoned as Business - Town Centre.

The current zoning map is shown in Figure 2 below.

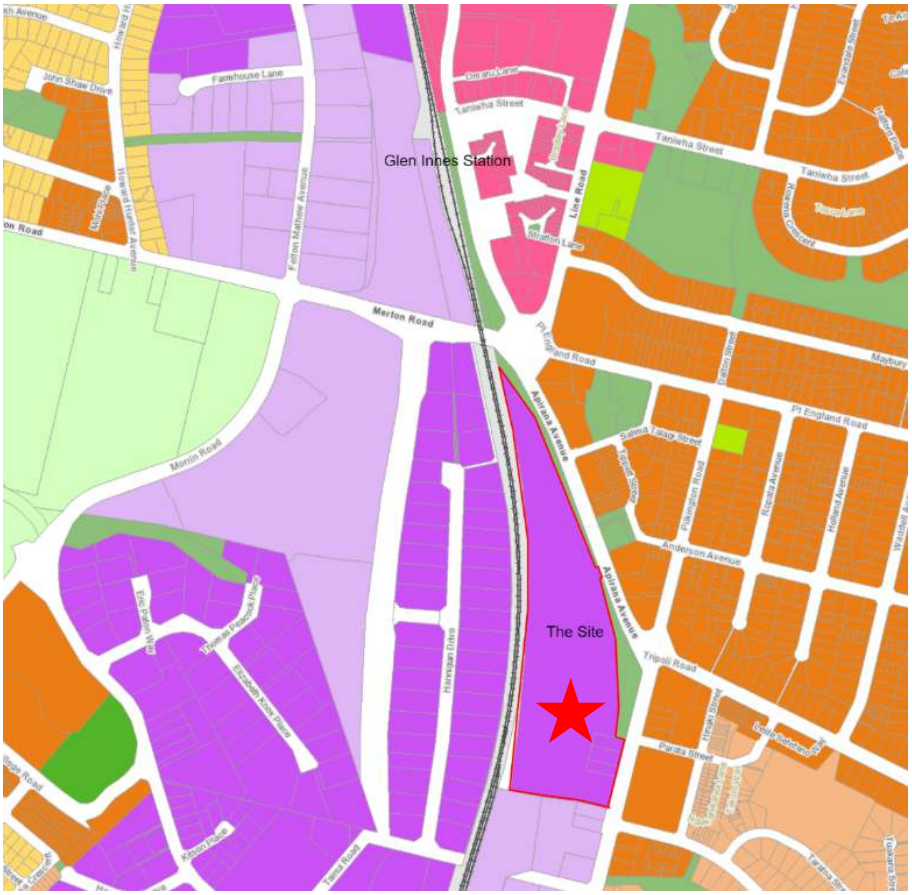


Figure 2: Auckland Unitary Plan Zones

The AUP shows that Pilkington Road, Apirana Avenue and Merton Road are all arterial roads where they pass the site.

3.2 Existing Roads

The frontage roads are classified as arterial roads in the AUP. Pilkington Road has a road reserve of approximately 24 metres and is marked with a single lane 5m in either direction and a 2m central flush median. No Stopping restrictions are in place on either side of Pilkington Road. The road carriageway is approximately 12 metres wide. There is a wide footpath along the site frontage and a generous front berm.

The site is separated from Apirana Avenue by a 3 metre wide corner reserve that extends along most of the Apirana Avenue frontage. This reserve area widens at the Pilkington Road intersection into a significant landscaped area. The Council's GIS system annotates this area as Pilkington Apirana Road Reserve and gives it the address of 233 Apirana Avenue. This strip is zoned Open Space – Informal Recreation zone under the AUP and appears to be land that has been set aside for road widening that has never been needed.

Apirana Avenue itself has a road reserve width of around 23 metres and like Pilkington Road it is generally marked as one lane in each direction with a central flush median. No Parking restrictions are in place on along the site frontage but parking is allowed on the eastern side of Apirana Avenue. Once again there is a generous 1.8m footpath along the site frontage and a wide front berm. There is no back berm but the 3 metre wide reserve provides separation to the site boundary. The road carriageway is around 13 metres wide.

Figure 3: Additional Road Reserve

Current traffic flows on roads in the area have been obtained from the regular Auckland Transport count programme. These flows are shown in Table 1 below.

	Pilkington Road	Apirana Avenue
Weekday	18734	18404
7-day average	17697	17670
Saturday	16509	17412
Sunday	13701	14262
Morning peak	1464	1486
Evening peak	1593	1640
Date	Sep 2022	Sept 2022

Table 1 - Traffic Flows September 2022

Pilkington Road traffic has been counted five times in the last eight years. The plot below shows there has been almost no growth with the average daily total (ADT) increasing by only 62 vehicles per year across the period. This is around 0.3% linear or 0.26% compounded.

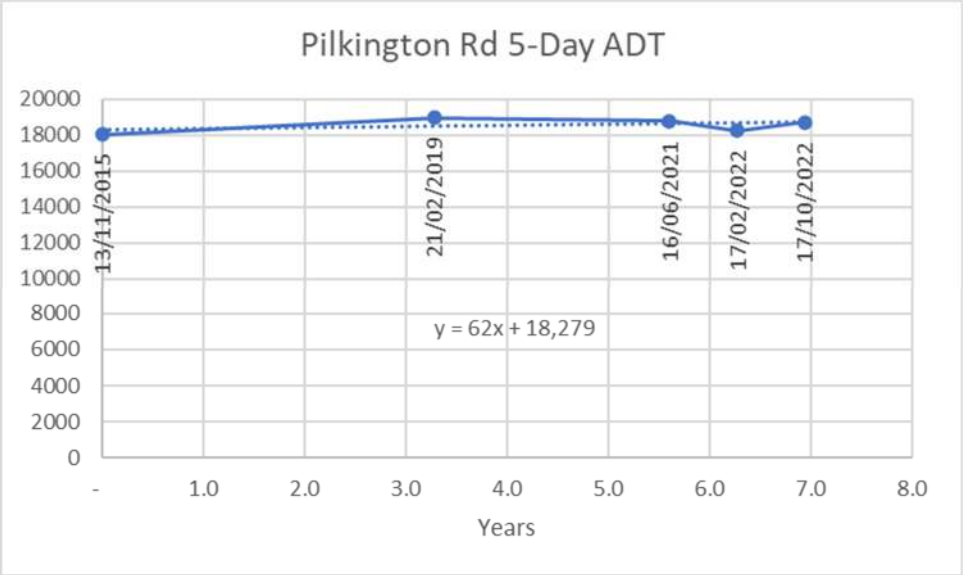


Figure 4: Traffic Trends on Pilkington Road

Traffic at Apirana Avenue has been counted four times since 2015. These counts have been plotted as shown below. The trend at Apirana Avenue is for a decline in traffic over the period.

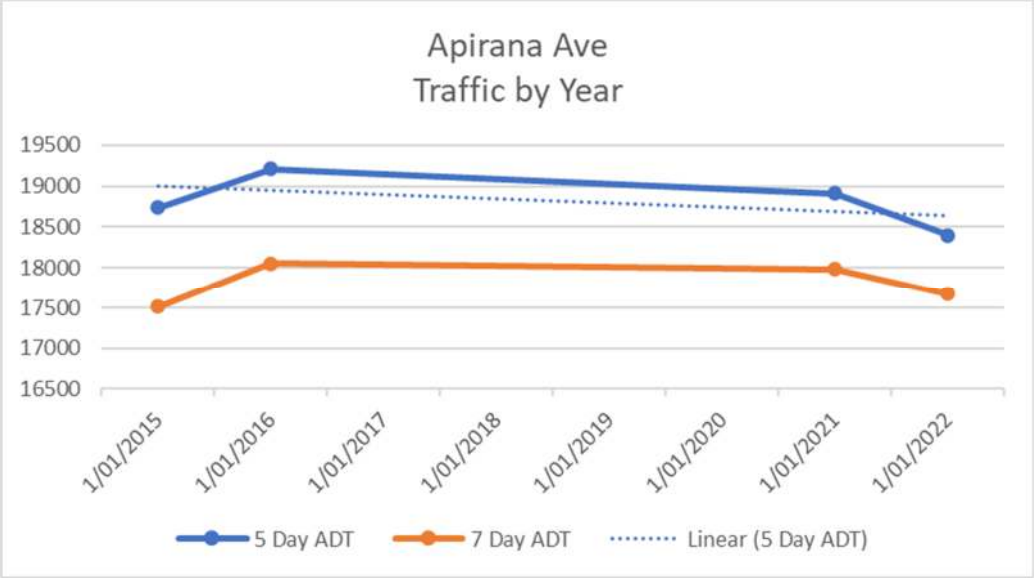


Figure 5: Traffic Decline on Apirana Avenue

As the graph shows, the weekday traffic flow has increased and then declined with an overall small decline in traffic on the street. The arithmetic growth rate of traffic on Apirana Avenue is -0.3%.

Overall the traffic counts show a static situation.

The intersection of Pilkington Road with Apirana Avenue is controlled by a large multi-lane roundabout as is the intersection of Apirana Avenue with Merton Road. Detailed turning movement counts were carried out at these two intersections as part of this project to allow models to be built.

3.3 Rail Transport

The site is a short walk from the Eastern Line railway station at Glen Innes. The Eastern line gives a direct link to Britomart, Sylvia Park and Manukau. Passengers can change trains at Britomart, Newmarket, Ōtāhuhu and Puhinui to reach all other rail destinations.

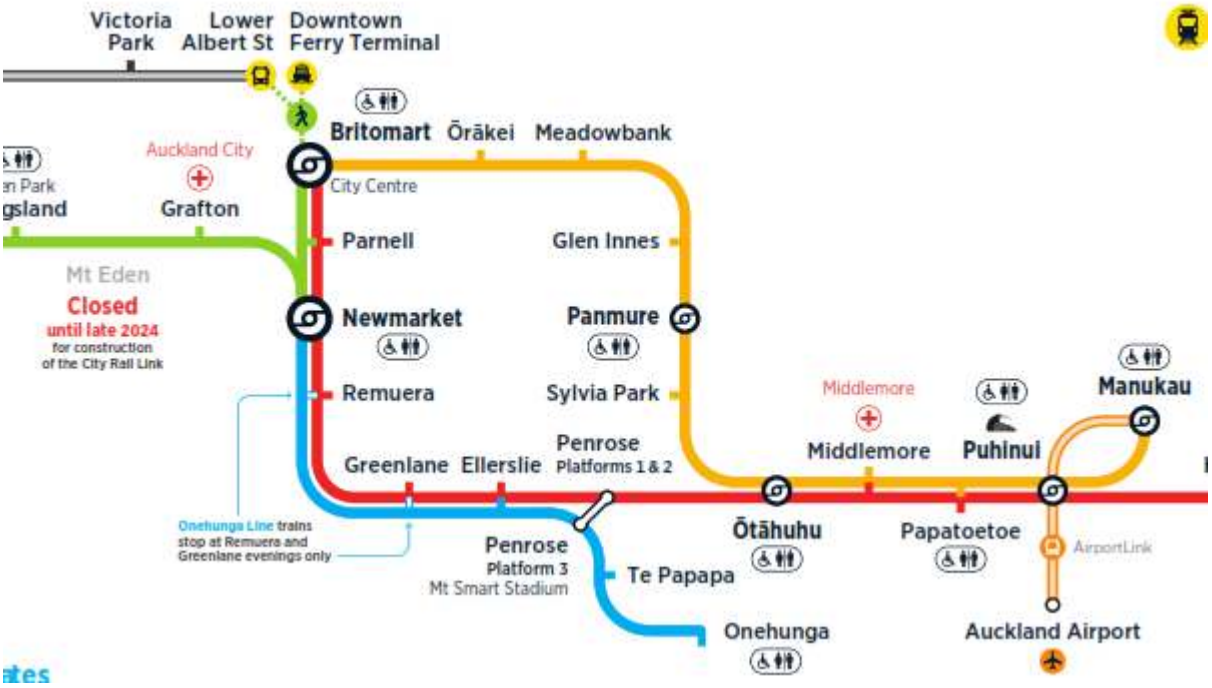


Figure 6: Rail Network (from AT Map)

Once the Central Rail Link (CRL) is completed trains are likely to run from West Auckland via the CRL to Glen Innes and on to Manukau. Interchanges with the Southern and Onehunga services will provide connections to the rest of the network.

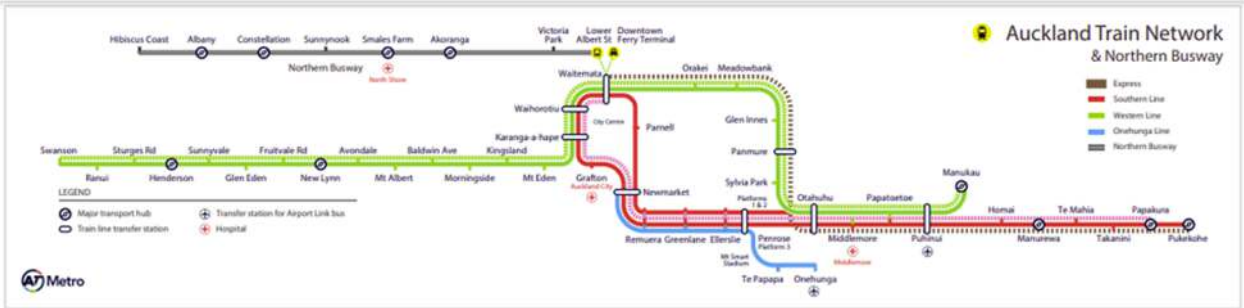


Figure 7: CRL Day One Services (Image from GreaterAuckland.org.nz 6 December 2022)

3.4 Public Bus Services

Currently there is only one connecting bus service that passes directly in front of the site. This is the 744 Panmure to St Heliers service which travels along Pilkington Road. However bus services available from Glen Innes include the Tāmaki Link, the 74 Onehunga to Glen Innes service, the 75 Glen Innes to Wynyard Quarter and the 76 Glen Innes to City via Orakei service.

Figure 8: Bus Services

This means people in the area can access any destination in Auckland that is reachable by public transport by walking the short distance into Glen Innes.

3.5 Walking

The site falls within the 10-minute walking catchment from Glen Innes Station that was defined for Plan Change 78 by Auckland Council as part of their work to address the changes required by the NPS-UD.

Auckland Council Walkable Catchment (10 minutes from Glen Innes Station) (Source PC78)

Figure 9: Walkable Catchment

Very good footpaths are available along the site frontage. The AT work programme on their Links to Glen Innes Cycleway project will also introduce a zebra crossing on each side of the Merton Road roundabout as shown below. These crossings will include raised tables, wider pram crossings, and tactile paving. The project will enhance the pedestrian environment immediately surrounding the site.

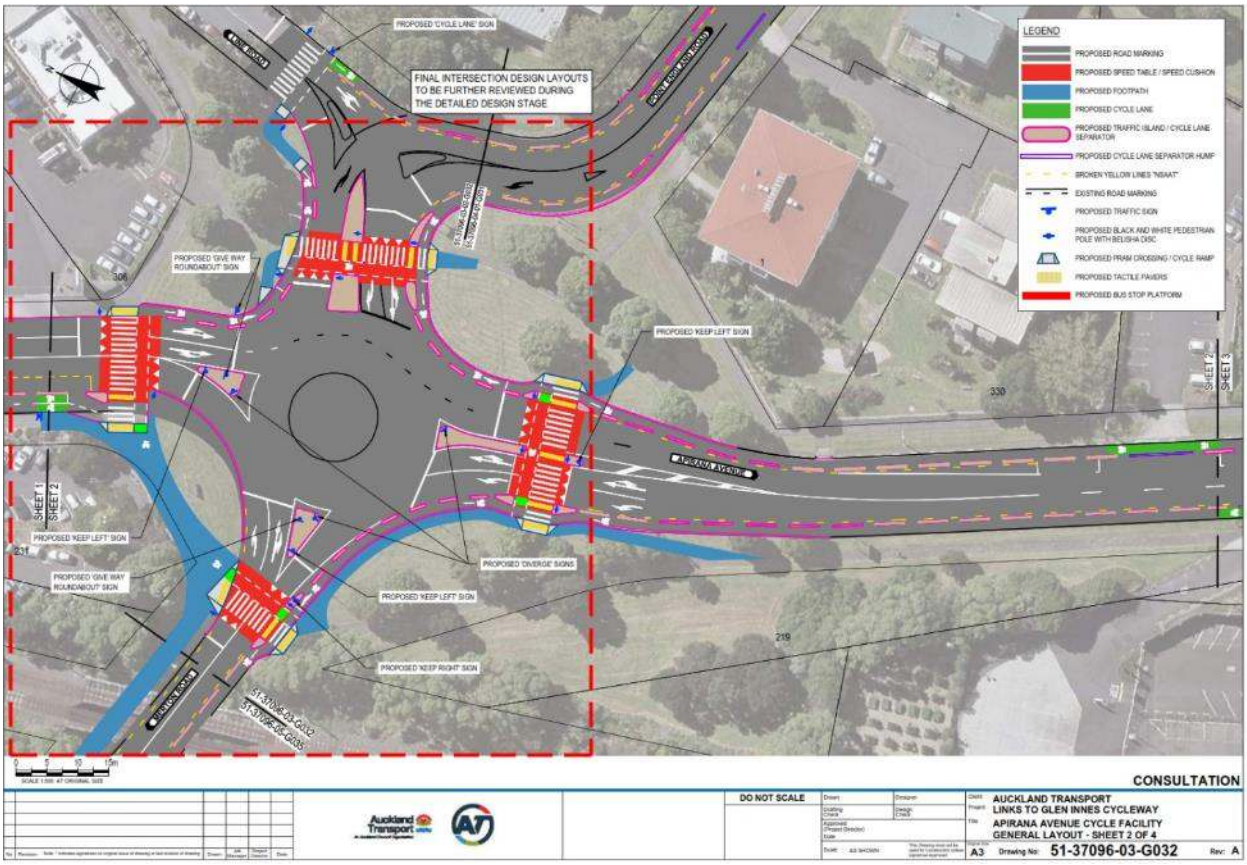


Figure 10: Auckland Transport Plan for Pedestrian Crossings (Source Links to Glen Innes Consultation)

The 10 minute and 15 minute walking catchment from the Pilkington Road roundabout is shown below. This shows that most of the site is within a 10 minute walk from the Glen Innes Station and the most distant part at the southern end of the site is within a 15 minute walk.

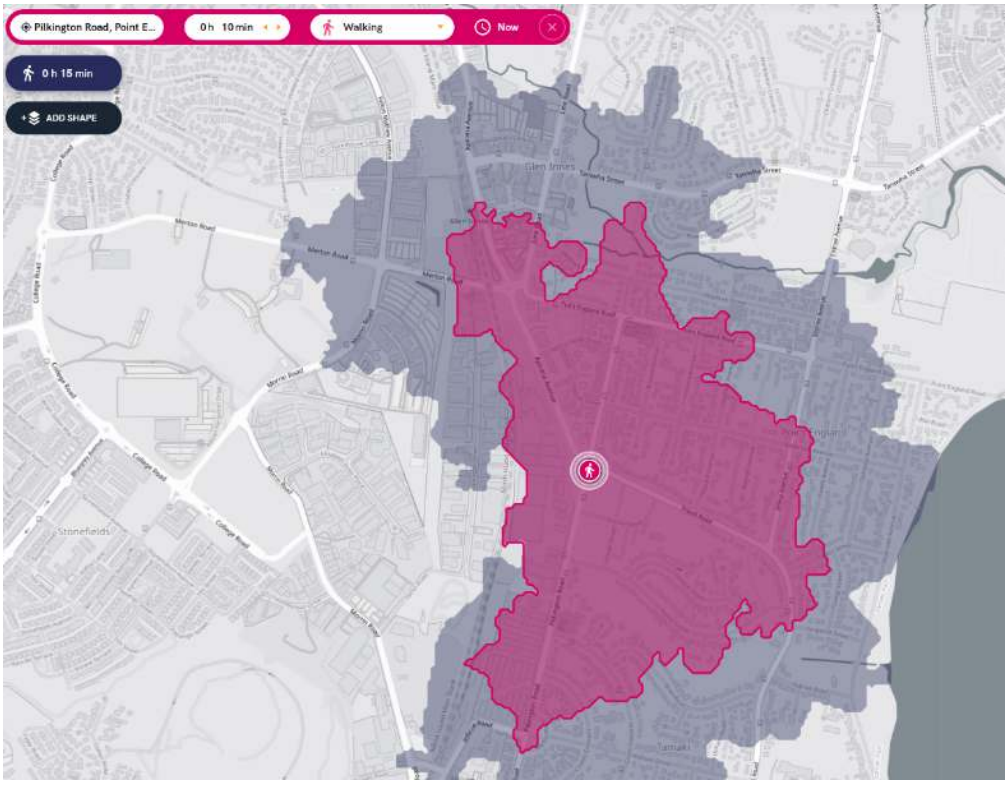


Figure 11: Existing 10-Minute Walking Catchment from the Site

The only part missing from the catchment is the area within the site itself. This will be addressed at the time of development.

3.6 Cycling

No specific cycling facilities are currently available on the exiting site frontage. However the Links to Glen Innes project includes a cycleway along Apirana Avenue as far as the Pilkington Road roundabout. Pilkington Road and beyond is shown as being future projects.

Figure 12: Links to Glen Innes Project (AT Brochure)

Currently cycling catchments for a 15 minute and 30 minute bike ride are shown in Figure 13.

These catchments will get larger as the Links to Glen Innes project is rolled out by AT.

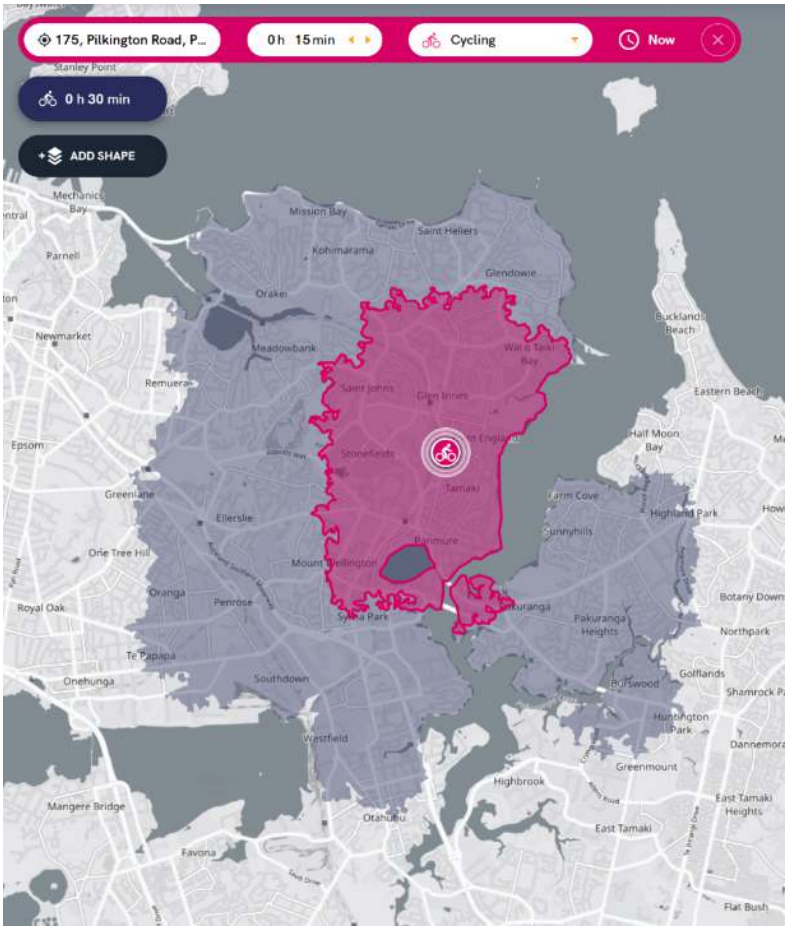


Figure 13: 15 minute and 30 minute cycle ride

3.7 Road Safety Record

A search of the NZTA database of reported crashes for the five-year period 2018 to 2022 shows there were 16 crashes on streets fronting the site, a distance of some 700 metres. Despite the site having four busy access points no crashes occurred at any of the access points. One crash (201845210) is shown in the diagram as involving a vehicle turning out of the site, however the crash report filled out by the Police shows this actually involved a car turning right out of Salima Talagi Street.

Of the sixteen reported crashes none of them resulted in a fatality, none of them resulted in serious injuries and only one crash resulted in minor injuries. That crash occurred at the Pilkington Road roundabout when a car failed to give way. In total, twelve of the sixteen crashes all occurred at the Pilkington Road roundabout resulting in one minor injury crash and ten non injury crashes. This type of crash pattern is quite common at busy roundabouts and demonstrates the high level of safety that roundabouts provide. Similar intersections controlled by traffic signals or left uncontrolled would exhibit a far higher level of injury crashes. Roundabouts tend to eliminate the

more dangerous conflicts between vehicles but do tend to convert some into fender-bender types of crashes instead.

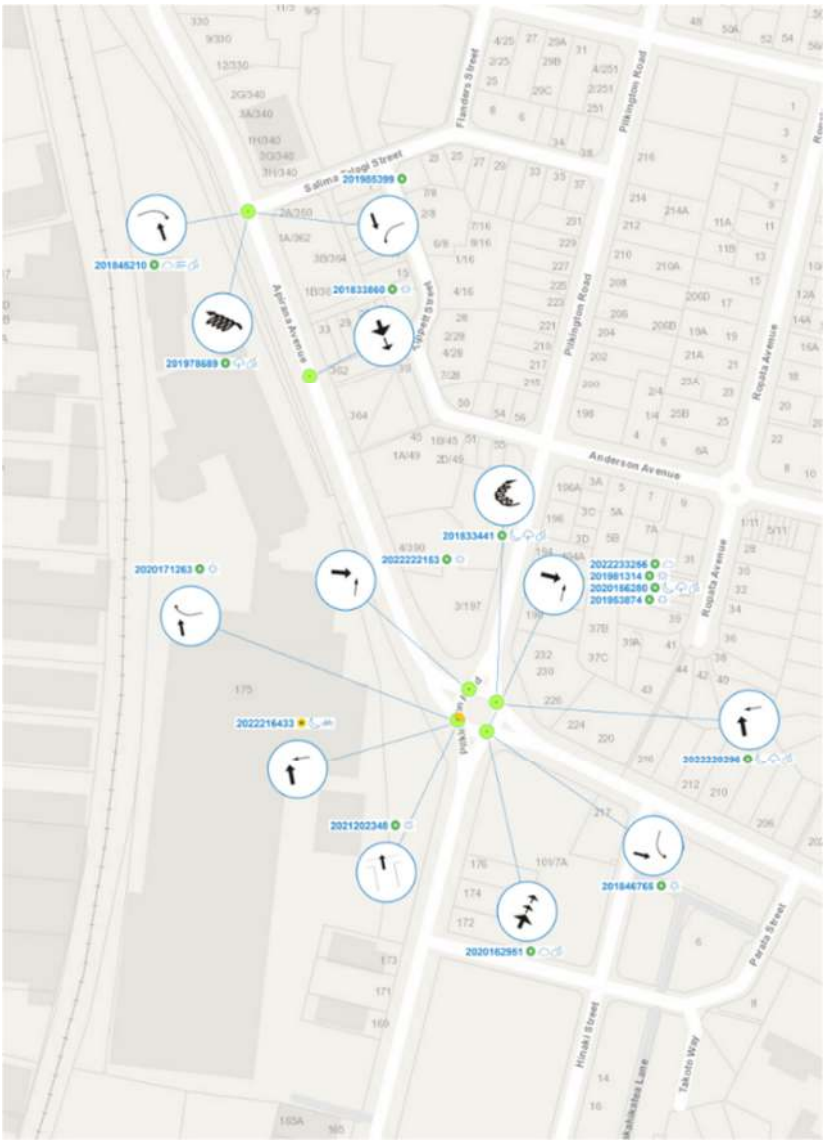


Figure 14: 2018 to 2022 Crashes on Apirana Avenue and Pilkington Road

There were no crashes on Pilkington Road in front of the site and four non-injury crashes on Apirana Avenue in front of the site. Three of these occurred at the Salima Talagi Street intersection.

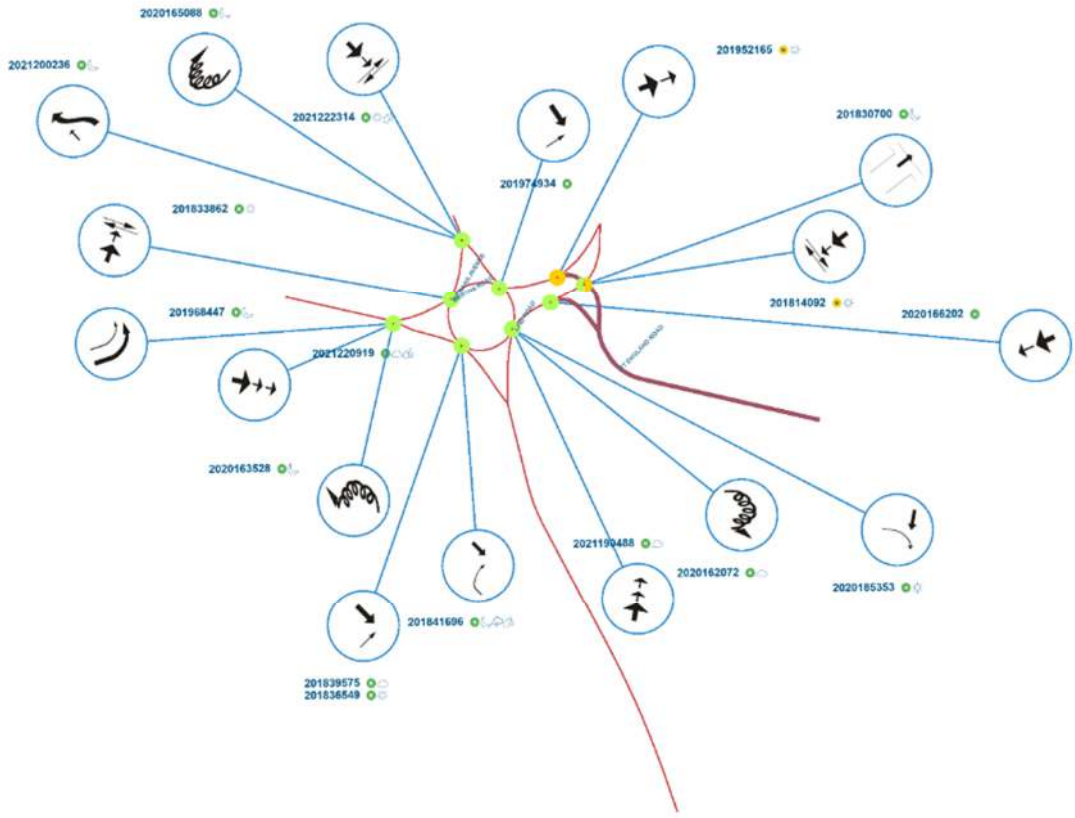


Figure 15: Reported Crashes 2018 to 2022 at the Merton Road Roundabout

The crash pattern does not indicate any safety issues along the long site frontage and does not suggest any issues that need to be mitigated as part of the proposed plan change.

3.8 Current Activities on the Site

The sites are currently used primarily for warehousing and storage activities. The site has four access points. The southern access from Pilkington Road (Gate 1) is a very wide vehicle crossing that provides access to large warehouse buildings used for goods handling and storage. Tenants of this area include Briscoes who bring in large trucks loaded with goods that are then stored and broken down into shipments to their stores throughout Auckland. This activity creates a large number of truck movements, many of which are by articulated trucks.

The second site access onto Pilkington Road provides access to a day care centre. There is no through site link to the warehousing behind that part of the site. The day-care generates traffic in the morning peak and in the evening peak from 3pm onwards.

The southernmost access onto Apirana Avenue (signposted as Gate 2) provides the second access to the warehouse and industrial areas of the site. As with Gate 1 this access generates traffic throughout the day with peak staff arrivals and departures in the morning and evening peak periods.

The fourth access is a minor access on Apirana Avenue to a container business. This existing vehicle crossing joins Apirana Avenue at an angle that requires large vehicles turning left out to swing quite wide.

3.9 The Current Zone

While the site is already comparatively busy the current zoning does provide scope for further intensification to occur without requiring a plan change. The Business – Light Industry zone provides for a number of permitted and discretionary activities. Some of these permitted activities have the potential to generate high levels of private vehicle traffic. Examples of these permitted activities include:

- Drive through restaurants;
- Service Stations;
- Garden Centres;
- Trade supplies;
- Dairies up to 100sqm;
- Food and beverage up to 120sqm;
- Retail accessory to industrial activities;
- And Emergency services.

Any of these or a combination of these activities would result in a large increase in traffic accessing the site but would only require an assessment in terms of the Trip Generation rules of the AUP.

The current zone also provides for some very high traffic generating activities as discretionary activities such as Hospitals, Care Centres and tertiary education facilities.

Therefore, it is noted that the existing AUP zoning of the site is likely to generate higher levels of traffic in the future given its large size and its proximity to other centres.

3.10 Neighbouring Developments

The land on the south eastern corner of Tripoli Road and Pilkington Road is being developed for housing as part of the Tāmaki Regeneration project. The Hīnaki development of 75 apartments at 7 Hīnaki Street was completed in December 2021 and is already accounted for in the traffic counts.

The Kupenga development of 132 long term rental units is currently under construction. This site is accessed from Parata Street and Hīnaki Street. The traffic effects of these apartments will be additional to the traffic count data collected. For the traffic assessment the trips generated by the 132 apartments have been added to the traffic counts to form a 2023 Base scenario.

Figure 16: Kupenga Apartments from Pilkington Road

4. STRATEGIC CONTEXT

4.1 NPS-UD

The NPS-UD requires Tier 1 councils to consider how they will intensify land uses around Rapid Transit Stations. Auckland Council has responded to that Government directive by defining the intensification area as being a 10-minute walk from rail stations and North Shore Busway stations.

In the case of Glen Innes the Council has shown that the entire subject site is within the 10-minute walkable catchment from the Glen Innes train station.
Intensification of the site is therefore not only consistent with the NPS-UD, it is actually required.

4.2 Auckland Plan 2050

The Auckland Plan 2050 sets out Auckland Council's vision for the city. It includes a number of high level goals that the proposed rezoning would be consistent with such as urban intensification, integration of land use and transport, and reducing fossil fuel emissions. There are a few specific matters listed in the Auckland Plan 2050 that are directly relevant to the site.

Page 126 of the Auckland Plan 2050 includes the cycling strategy which shows the Links to Glen Innes project which the cycleway on Apirana Avenue and Merton Road is a part of.

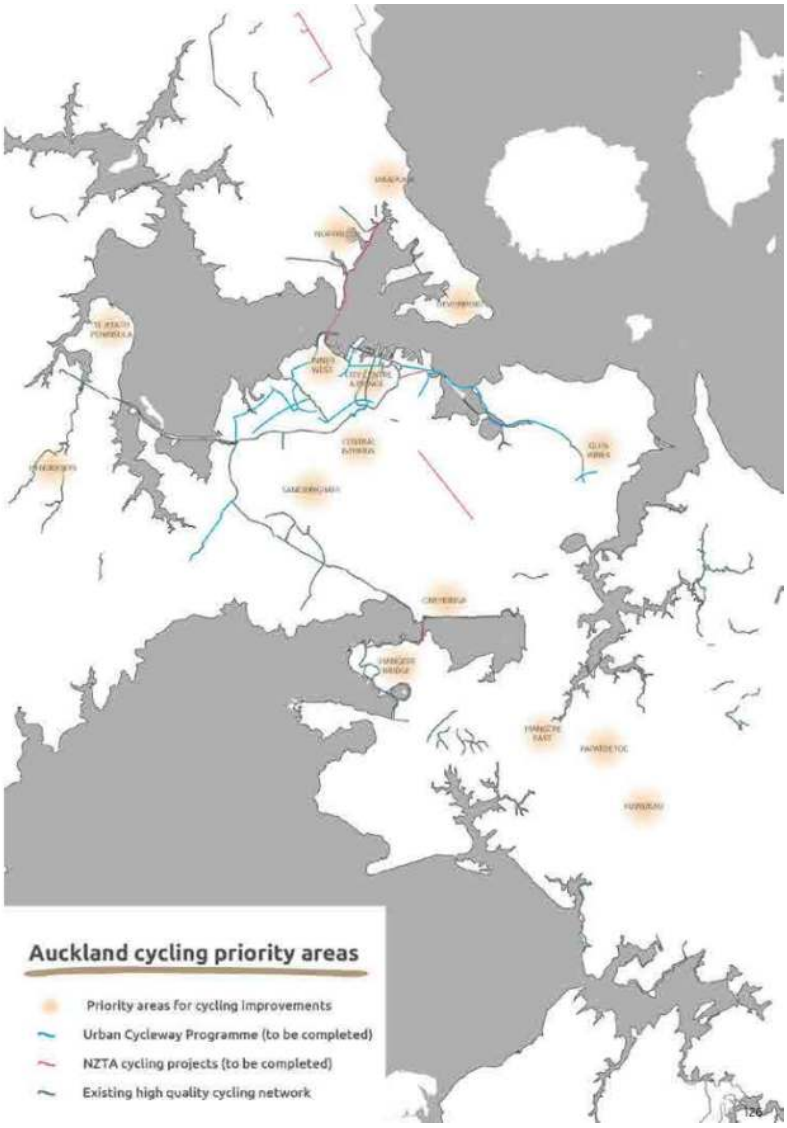


Figure 17: Auckland Plan 2050 Cycling Priorities Showing Links to Glen Innes

Page 211 sets out the development strategy for the existing urban area which defines Glen Innes and the site as a development area.

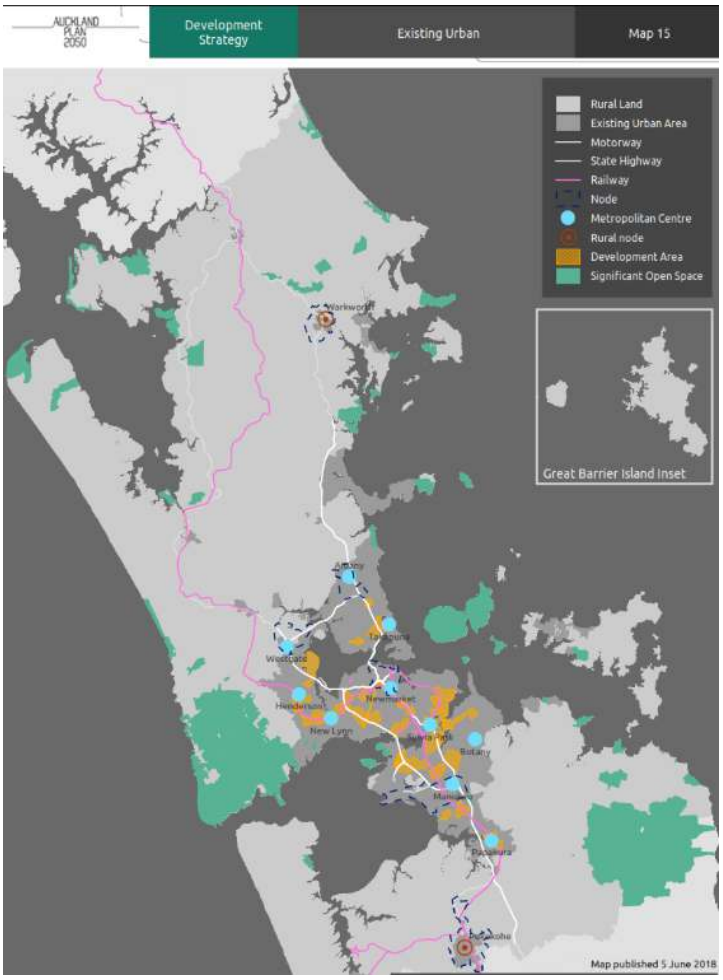


Figure 18: Auckland Plan 2050 Development Strategy

The Auckland Plan 2050 then sets a goal of 3600 new homes in the Glen Innes area with growth occurring in the first decade[1]. Enabling the future development of the site for residential apartments and terraced housing would be consistent with that goal.

[1] Auckland Plan 2050 page 222.

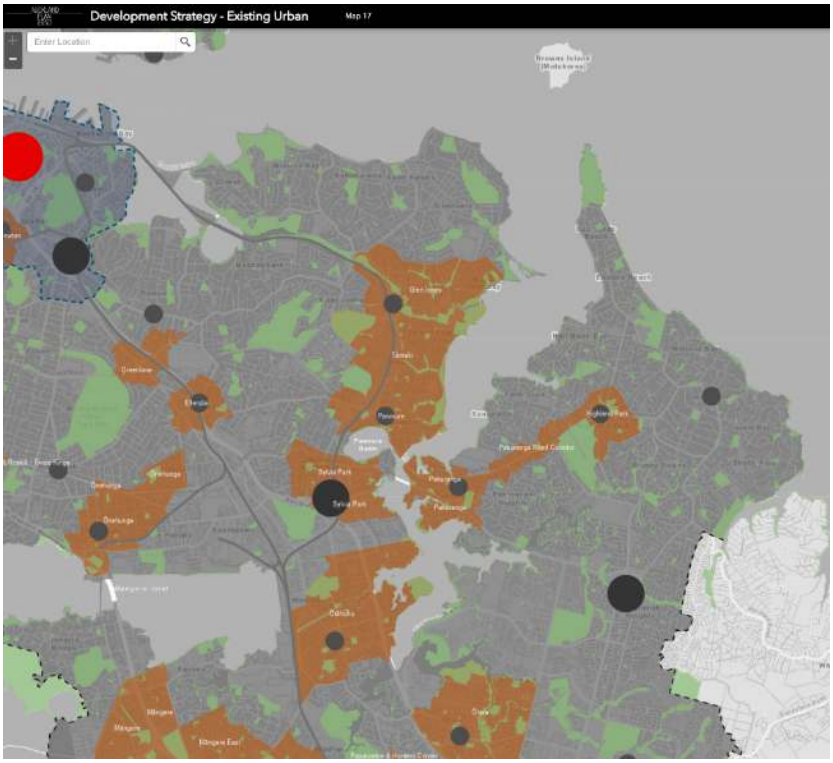


Figure 19: Auckland Plan 2050 Map 17 (part) Showing the Site as part of the Development Strategy

Overall the proposed plan change is consistent with the aims of the Auckland Plan 2050 and because it includes mixed use activities within the Glen Innes station walkable catchment it supports the stated Transport and Access goals of the Auckland Plan 2050.

4.3 Future Connect

Future Connect is Auckland Transport's long term future network plan and is used to inform the funding decisions made in the Regional Land Transport Plan. Future Connect defines focus areas for the first decade of network development. The site (and Point England in general) is not within either a Category one or Category two focus area.

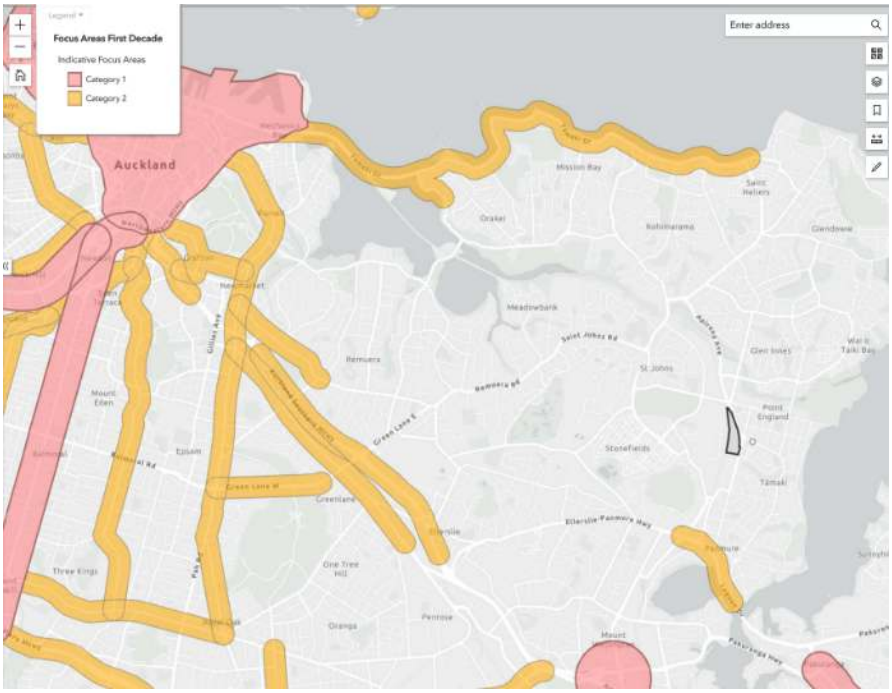


Figure 20: Future Connect Focus Areas

Future Connect also sets out the top level deficiencies in the network on a multi-modal basis. Neither Pilkington Road nor Apirana Avenue are listed as having any such deficiencies. Point England Road, Merton Road and Apirana Avenue north of Merton Road are shown as having deficiencies for one mode as shown below.

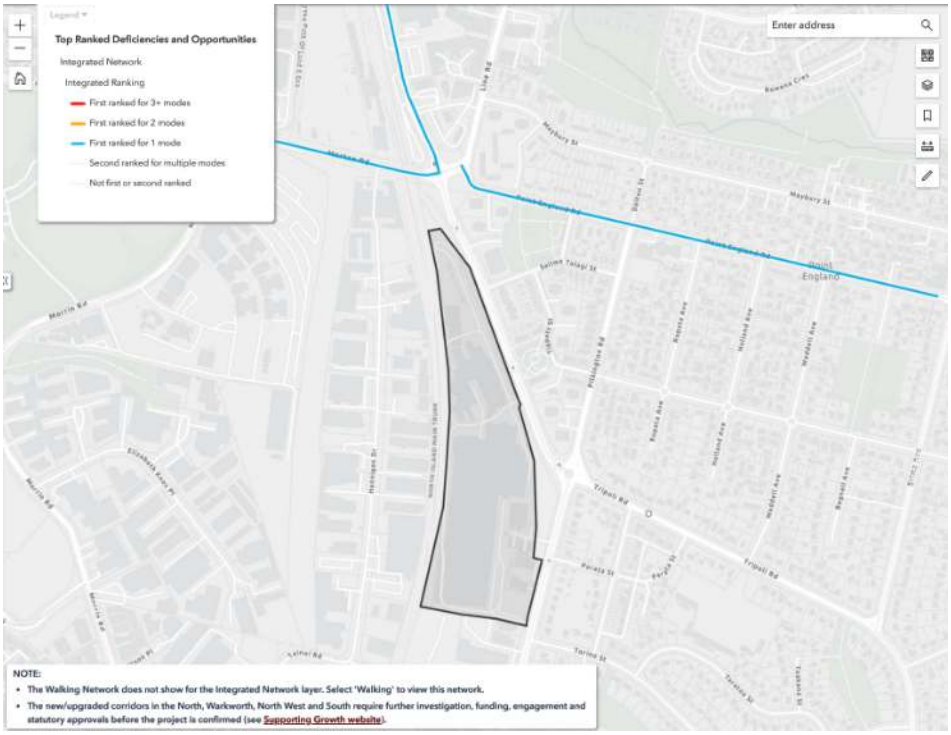
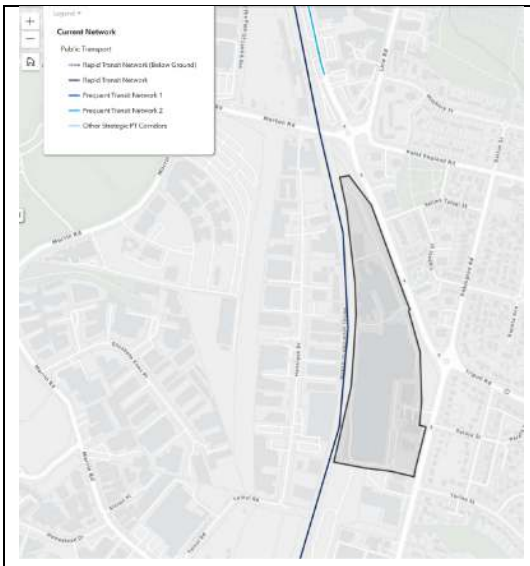


Figure 21: Future Connect Deficiencies Map

An investigation of Future Connect by mode shows that the deficiency map is referring to Public Transport on all three of these roads.



Current Public Transport Network

First Decade Public Transport Network

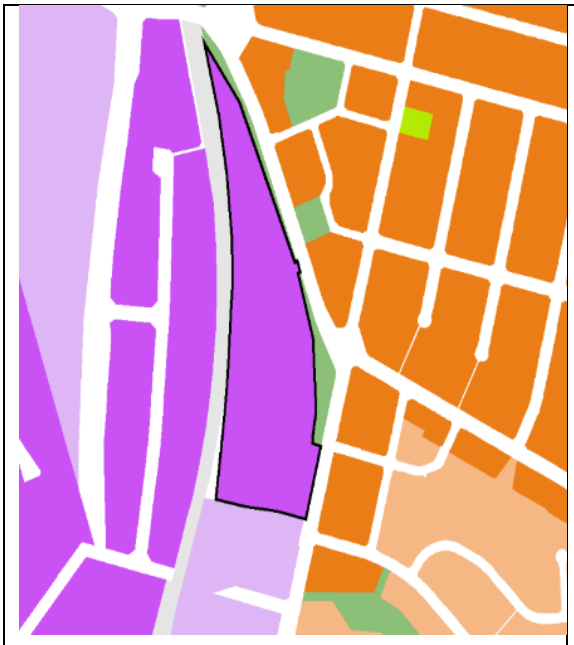
Figure 22: Future Connect Public Transport Existing and 1st Decade

The current and first decade public transport maps show that these three roads need to become part of the Frequent Transit Network 2. No changes are proposed or required on the frontage roads of the site where access occurs.

5. THE PROPOSAL

5.1 Plan Change

The plan change seeks to change the existing zone from Business – Light Industrial to Business – Mixed Use.



Current Zone Business – Light Industrial

Proposed Zone Business – Mixed Use

Figure 23: Proposed Plan Change

The plan change proposes that the AUP provisions of E27 Transport will apply to future development and consideration of transportation matters.

The main change of transport significance as a result of this rezoning is that it would provide for dwellings as a permitted activity, however buildings will require a restricted discretionary consent. It would also change the status of some high traffic generating activities such as service stations, which would become restricted discretionary.

As set out in later sections of this ITA the site does not have any specific transportation related constraints that require specific consideration as part of the plan change proposal, and it is considered that the AUP provisions under chapter E27 Transport are sufficient to ensure any transport effects of future development can be appropriately managed.

In particular, specific assessments will be required to address issues such as location and number of access points, vehicle crossing widths and grades, loading facilities and cycle parking, and end of trip facilities.

5.2 Assumed Development Scenarios for Assessment

In order to assess the overall traffic effects of the plan change, potential development scenarios have been assessed. These are indicative of the type of development that may occur within the site under a Mixed Use zoning, and are not intended to constrain a future outcome. For the sake of an assessment we have considered the traffic impacts of two development scenarios developed by Warren and Mahoney. These are a medium and a high development scenario of a mixed use development spread across the various quadrants of the site.

The medium density option developed by Warren and Mahoney is shown in Figure 24 below. This scheme has apartments to the north with terraced houses in the southern half of the site with commercial areas and a community hub on the front areas.

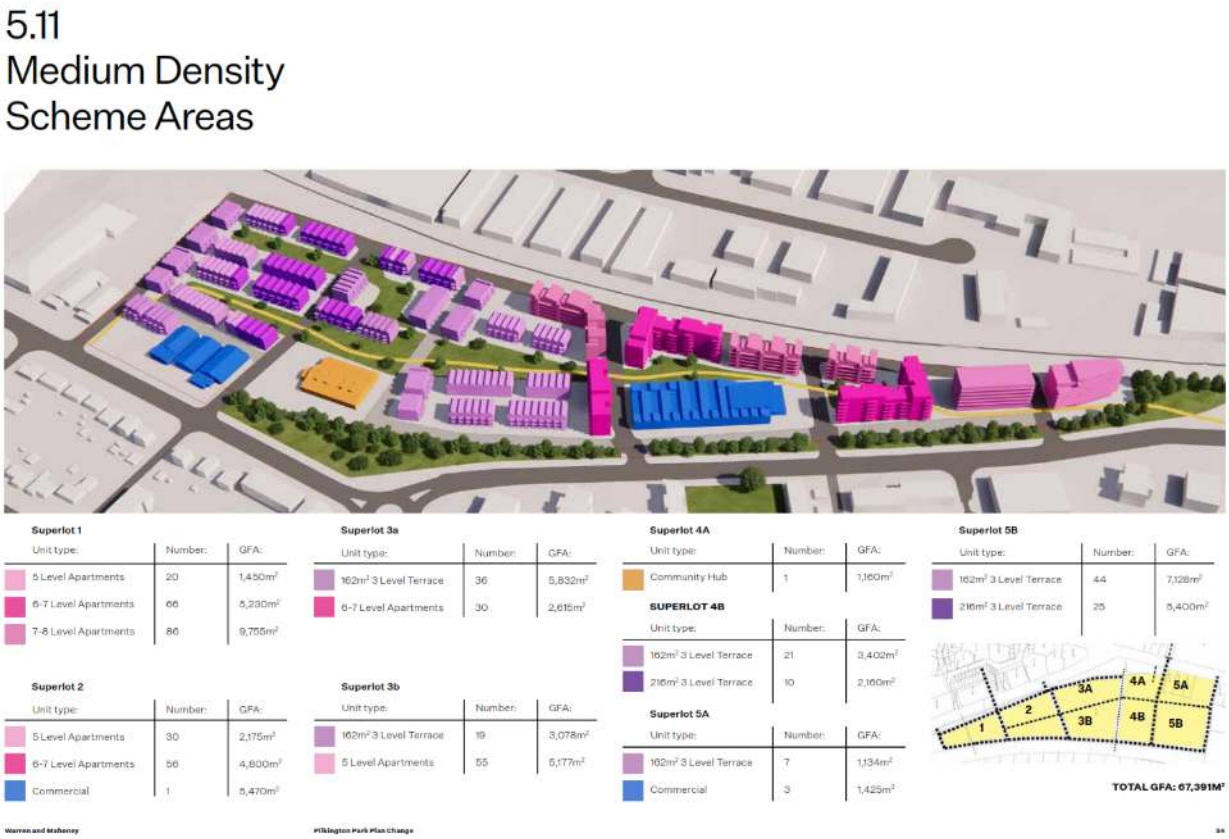


Figure 24: Medium Density Option (Warren and Mahoney)

The higher density scheme extends the apartments across the middle part of the site and replaces some of the commercial space with housing.

Figure 25: High Density Scenario (Warren and Mahoney)

Both of these options have been tested and assessed. In transport terms there is little between them with the higher density option resulting in only a slightly higher level of trips.

6. ASSESSMENT OF EFFECTS

6.1 Mode Share and Transportation Efficiency

The Plan Change is likely to encourage the development of residential dwellings on the site. This is a positive effect in terms of both mode share and transportation efficiency because a resident population is more likely to use public transport to travel to work than the current employees of the light industrial zone are.

Evidence of this can be found in the Census Journey to Work data from 2018. The plot in Figure 26 shows the origins and mode share used by people who work in the Panmure Glen Innes Industrial Statistics Area.

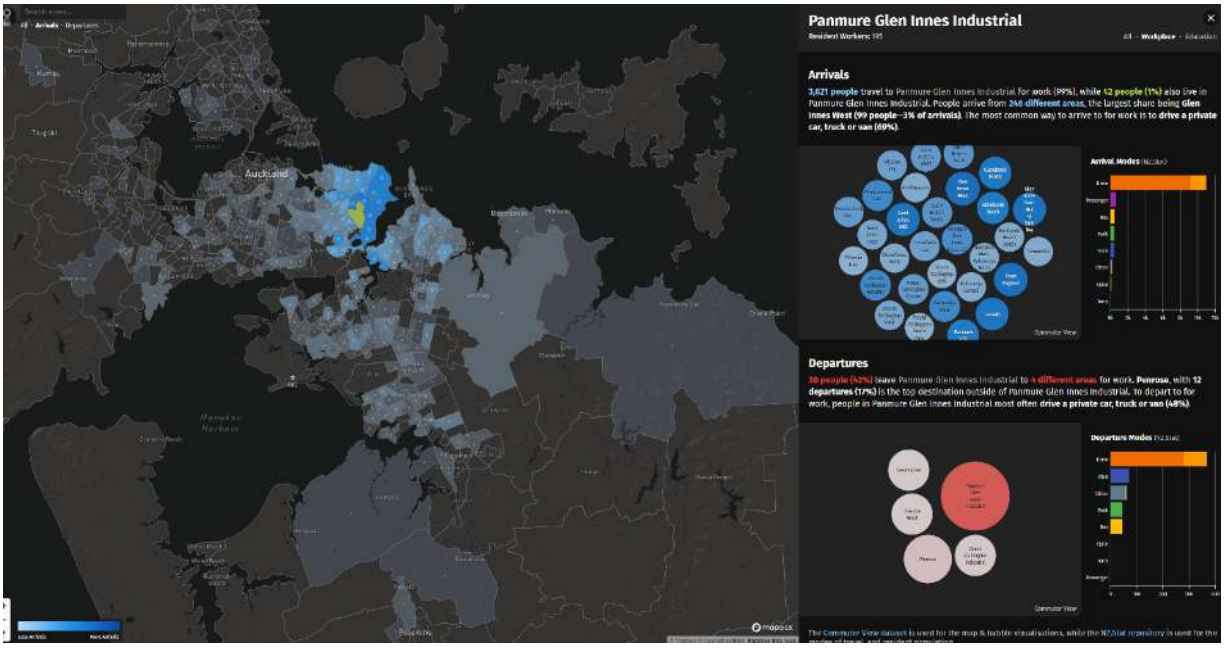


Figure 26: Arrivals at Panmure Glen Innes Industrial SA (Statistics NZ Journey to Work 2018)

This can be directly compared with the destinations and mode share of people resident in the neighbouring Statistics Areas of Saint Johns, Glen Innes West, Point England and Tāmaki shown in Figure 27.

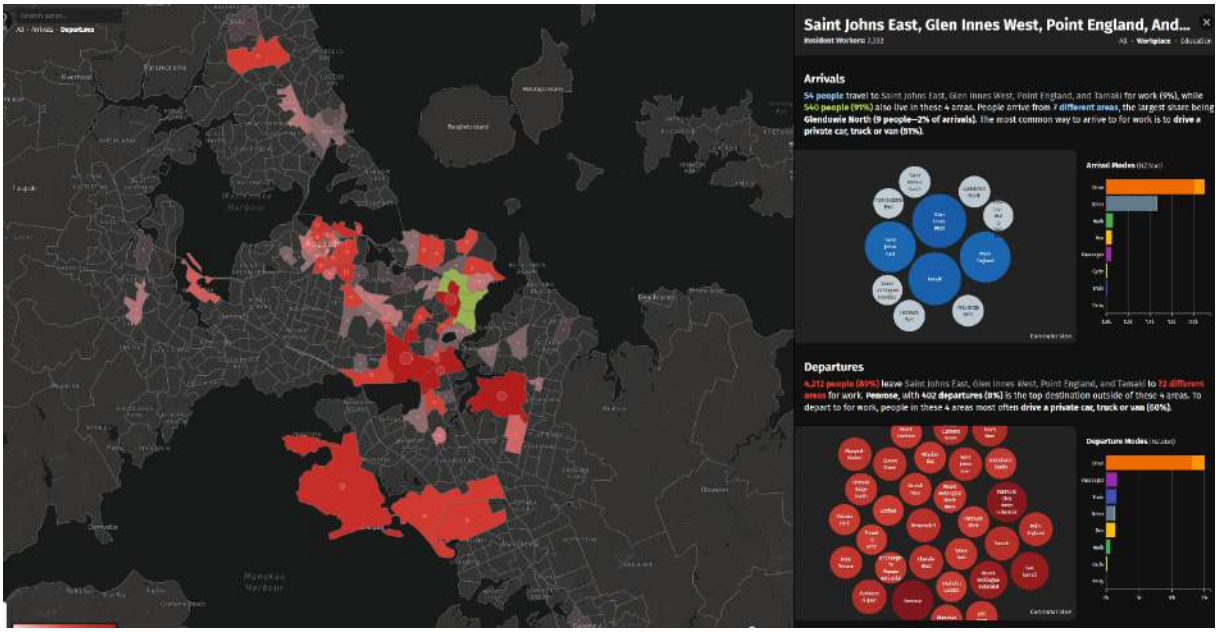


Figure 27: Work Departures from Neighbouring Statistics Areas (Statistics NZ Journey to Work 2018)

Plotting the mode share of both groups we can see that the local residential areas generate a lower proportion of car drivers than the industrial zone does.

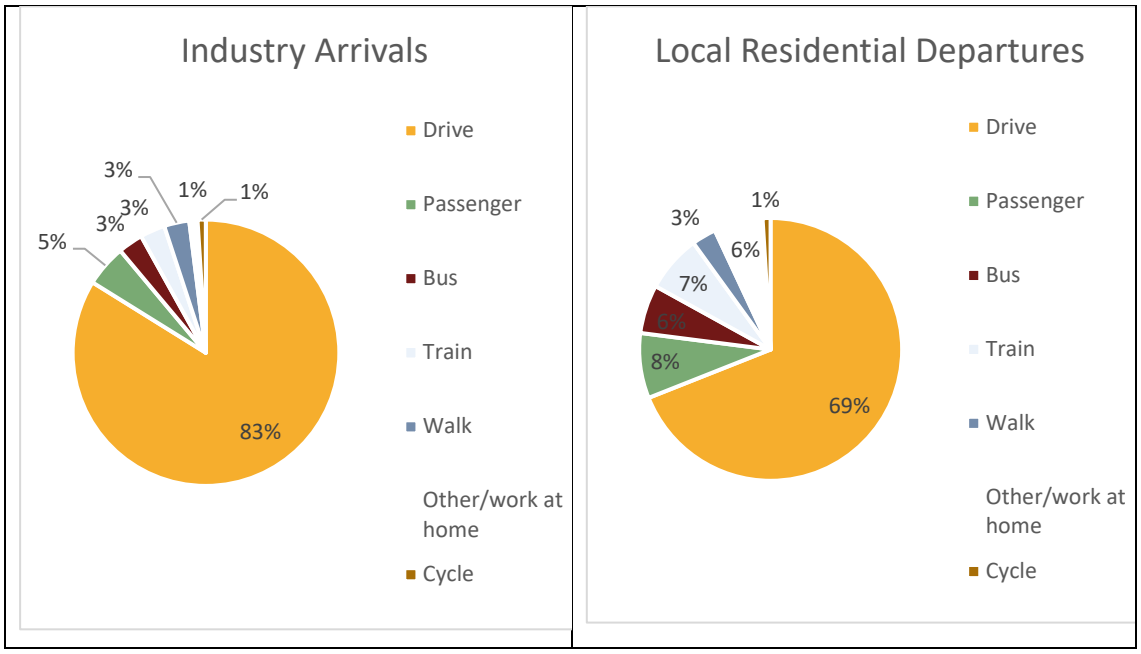


Figure 28: Comparison of Mode Share for Neighbouring Industrial and Residential Areas (Statistics NZ Journey to Work 2018)

We see that 31% of residents travelling to work don't drive a car whereas 17% of employees arriving at light industry do drive. The proportion of people not driving can be expected to almost double if industry changes to residential.

Arrivals	Industry Arrivals	Residential Departures
Drive	83%	69%
Passenger	5%	8%
Bus	3%	6%
Train	3%	7%
Walk	3%	3%
Other/work at home	1%	6%
Cycle	1%	1%

Table 2 – Mode Share of Existing Area Compared to Neighbouring Areas with Residential Activity

The local residents are twice as likely to use the bus, 2 1/3 times more likely to use the train and six times more likely to work at home or use other modes of travel.

6.2 Traffic Forecasts

Trip generation rates from the Guide to Traffic Generating Developments have been adopted where applicable. Where a range of rates are available a mid-point has been assumed.

Activity	Trip Rate	Source
Apartments	0.29 trips per unit	RTA Guide 3.3.3 High density residential flat building – Metropolitan sub-regional centres.
Terraced houses	5.75 trips per unit	RTA Guide 3.3.2 Medium density residential flat building gives a range for town houses of 0.5 to 0.65. the midpoint has been adopted.
Commercial	2.0 trips per 100sqm	RTA Guide Section 3.5 Office and Commercial
Community Hub	7.42 trips per 100sqm	See below

Table 3 - Traffic Generation Rates Adopted

The community hub may contain a range of activities including shops, commercial services, medical, day-care and restaurants or cafes. These have a range of rates and also have differing

levels of internal and external trips. For example shops can generate more trips than commercial services, but shops will create more of their trips that that are part of an existing trip into or out of the development, creating a level of double counting. The relevant activities are listed as follows:

Activity	Published Trip rate
Commercial services	2.0 per 100sqm
Restaurants	5.0 per 100sqm
Medical	8.8 per 100sqm
Day-care	9 per 100sqm
Shops	12.3 per 100sqm
Average Rate	7.4 per 100sqm

Table 4 – Trip Rates Considered for Community Hub

The average rate is intended to represent a fair rate for the number of new trips the community hub could create. It is lower than the standalone shop rate but many of the peak hour trips generated by a shop located in the community hub will be by people coming home who are already counted in the residential rates. Commercial services on the other hand might generate all of their trips externally as the peak rate reflects staff travel.

Applying the trip generation rates to the two development scenarios gives total trip ends as shown below.

Activity	Medium Scenario			High Scenario		
	Scale	Trip Rate	Trips (veh/hr)	Scale	Trip Rate	Trips (Veh/hr)
Apartments	343 units	0.29 veh/unit	99	593 units	0.29 veh/unit	172
Terrace Houses	162 units	0.575 veh/unit	93	118 units	0.575 veh/unit	68
Commercial	6895sqm	2 veh per 100sqm	138	5470sqm	2 veh per 100sqm	109
Community Hub	1160sqm	7.4 veh per 100sqm	86	1160sqm	7.4 veh per 100sqm	86
Total			416			435

Table 5 – Trip Generation Estimates

The differences between the two options are not large and so the rest of the traffic assessment has focused on the high density option.

Traffic was then assigned to the nearest gate and shortest path based on the following assumptions:

- Residential traffic is assumed to be 67% out and 33% in in the morning peak;
- Commercial traffic is 75% in and 25% out in the morning;
- Community hub traffic is assumed to be 50:50 by direction;
- Evening peak splits are assumed opposite to the morning peak;
- Traffic is distributed in a similar way to existing traffic patterns.

Future traffic flows for the morning peak hour are shown in Figure 29 below.

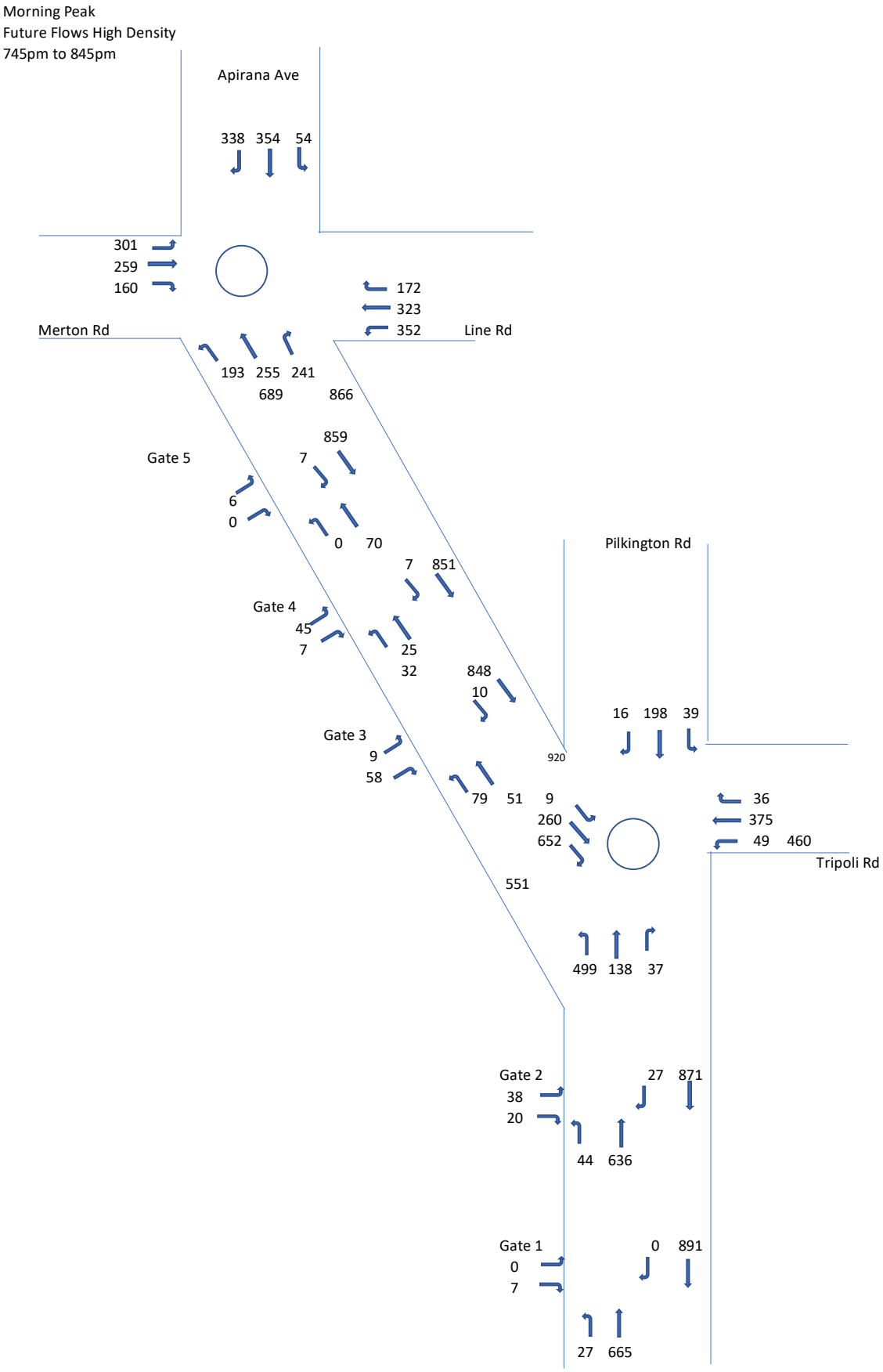


Figure 29: Future Traffic Flows Morning Peak Hour

Similarly forecast traffic flows for the evening peak are shown in Figure 30.

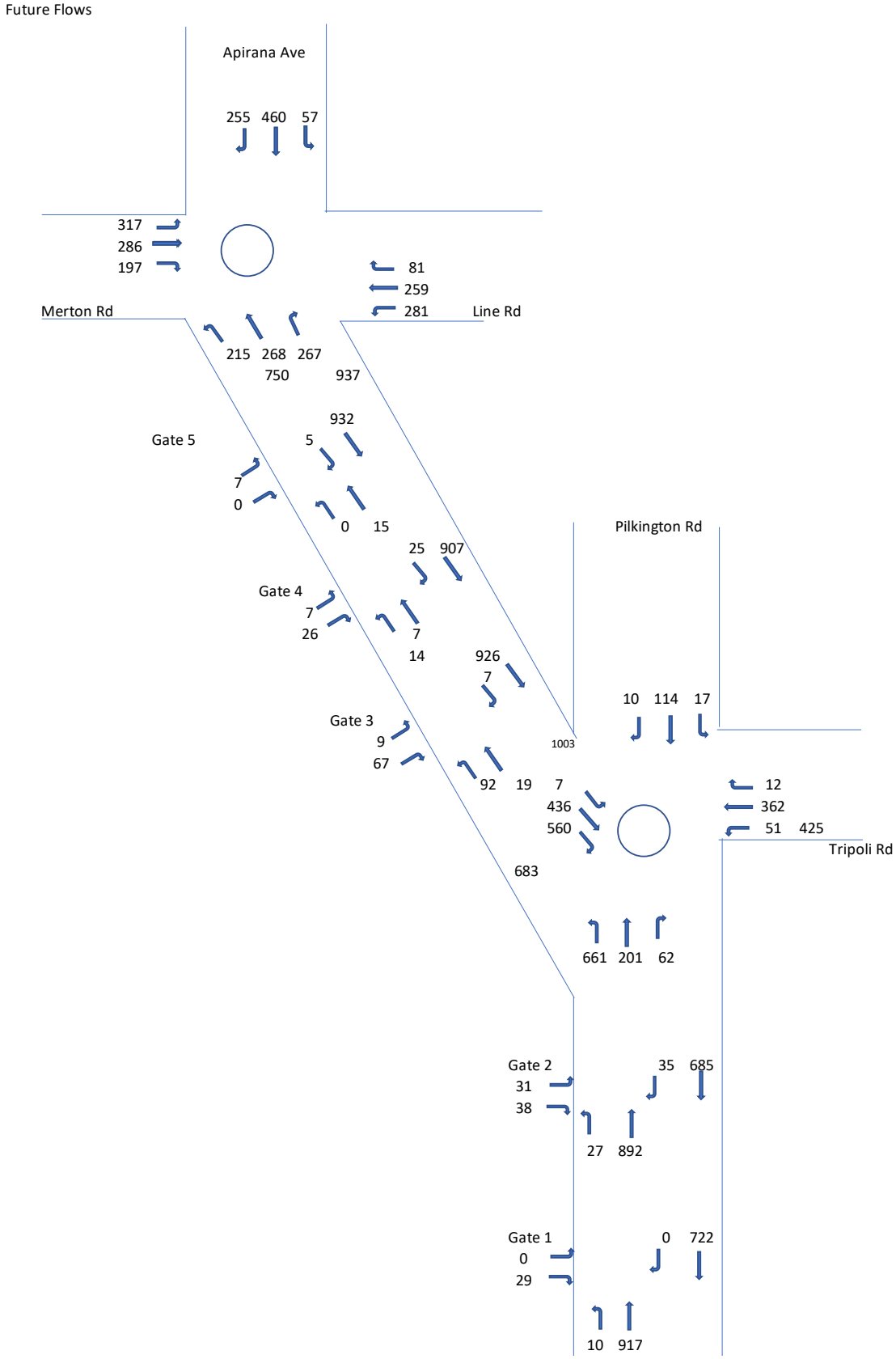


Figure 30: Future Evening Peak Hour Traffic Flows

6.3 Additional Traffic Generated by the Neighbouring Development

The traffic generated by the 132 Kupenga Apartments has been estimated using the same trip generation rates. The 132 apartments multiplied by the trip rate of 0.29 trips per apartment gives a total trip generation of 38 vehicles per hour. The builders' trips have then been removed (13 vehicles per hour) and the traffic assigned to the network using the same directional splits. This additional traffic has been added to the 2023 counts to create a 2023 Base for comparison purposes, and the additional trips have also been added to the site traffic generations to get high and low traffic forecasts.

6.4 Traffic Effects at the Pilkington Road Roundabout

A Sidra Network model was used to assess the impact of flows at the Pilkington Road Apirana Avenue and Tripoli Road roundabout. The morning peak hour results are shown in Table 6 below.

Approach	Movement	Existing Morning Peak Traffic			Future Morning Peak Traffic		
		Flow (Veh/hr)	Ave Delay (sec)	LOS	Flow (Veh/hr)	Ave Delay (sec)	LOS
Pilkington Rd South	Left	437	6.9	A	553	8.4	A
	Through	154	7.2	A	155	8.3	A
	Right	39	11.9	B	45	11.9	B
Tripoli Rd	Left	47	18.0	B	55	24.3	C
	Through	393	19.9	B	395	25.7	C
	Right	37	17.4	B	37	18.7	B
Pilkington Rd North	Left	43	12.1	B	43	12.8	B
	Through	207	7.9	A	210	8.8	A
	Right	16	13.2	B	16	14.3	B
Apirana Ave	Left	9	5.2	A	9	5.3	A
	Through	273	4.5	A	286	4.6	A
	Right	638	7.7	A	702	8.0	A
All	All movements	2295	9.8	A	2506	11.3	B

Table 6 – Morning Peak Traffic at Pilkington Rd Roundabout Before and After

The model results show the Pilkington Road roundabout can easily cope with traffic generated by the proposed plan change. The results show a small increase in delay will occur at the roundabout however it is unlikely to be noticeable.

Evening peak Sidra Network results for the Pilkington Road roundabout are shown in Table 7.

Approach	Movement	Existing Evening Peak Traffic			Future Evening Peak Traffic		
		Flow (Veh/hr)	Ave Delay (sec)	LOS	Flow (Veh/hr)	Ave Delay (sec)	LOS
Pilkington Rd South	Left	598	7.4	A	680	10.0	B
	Through	209	7.4	A	209	9.5	A
	Right	55	10.8	B	66	11.0	B
Tripoli Rd	Left	42	8.7	A	58	11.1	B
	Through	343	11.4	B	372	11.3	B
	Right	13	14.3	B	13	15.5	B
Pilkington Rd North	Left	18	11.3	B	18	12.0	B
	Through	115	7.2	A	118	7.7	A
	Right	10	12.6	B	10	13.4	B
Apirana Ave	Left	7	5.1	A	7	5.2	A
	Through	440	4.3	A	451	4.5	A
	Right	506	7.8	A	587	8.0	A
All	All movements	2351	7.7	A	2588	9.1	A

Table 7 – Evening Peak Traffic at Pilkington Rd Roundabout Before and After

Again the Pilkington Road roundabout can easily cope with the expected small increase in traffic flows. Most drivers will not notice any change.

6.5 Traffic Effects at the Merton Road Roundabout

Morning peak hour traffic at the Merton Road roundabout is shown in Table 8.

Approach	Movement	Existing Morning Peak Traffic			Future Morning Peak Traffic		
		Flow (Veh/hr)	Ave Delay (sec)	LOS	Flow (Veh/hr)	Ave Delay (sec)	LOS
Apirana Ave South	Left	152	16.7	B	208	17.4	B
	Through	259	42.9	D	277	53.3	E
	Right	259	47.1	D	262	57.5	E
Line Rd	Left	384	17.1	B	384	18.7	B
	Through	345	19.6	B	345	22.2	C
	Right	185	23.9	C	185	26.5	C
Apirana Ave North	Left	61	10.9	B	61	11.2	B
	Through	363	20.5	C	375	24.4	C
	Right	367	28.0	C	367	32.9	C
Merton Rd	Left	333	12.9	B	333	14.1	B
	Through	279	12.9	B	279	16.8	B
	Right	164	18.0	B	179	21.8	C
All	All movements	3149	23.1	C	3244	27.1	C

Table 8 – Morning Peak Traffic at Merton Rd Roundabout Before and After

The Merton Road roundabout experiences some delays due the morning peak, particularly to traffic on Apirana Avenue from the south. That will increase as a result of the development but is still in the acceptable range.

Approach	Movement	Existing Evening Peak Traffic			Future Evening Peak Traffic		
		Flow (Veh/hr)	Ave Delay (sec)	LOS	Flow (Veh/hr)	Ave Delay (sec)	LOS
Apirana Ave South	Left	204	9.1	A	220	9.1	A
	Through	270	11.6	B	275	11.6	B
	Right	283	15.9	B	280	15.9	B
Line Rd	Left	288	11.7	B	295	13.0	B
	Through	268	10.5	B	268	11.5	B
	Right	87	15.0	B	87	16.0	B
Apirana Ave North	Left	64	11.6	B	64	11.9	B
	Through	458	25.2	C	478	32.2	C
	Right	267	32.7	C	267	41.0	D
Merton Rd	Left	327	10.3	B	327	10.5	B
	Through	290	10.7	B	290	11.5	B
	Right	185	15.7	B	206	16.5	B
All	All movements	2989	15.8	B	3056	18.1	B

Table 9 – Evening Peak Traffic at Merton Rd Roundabout Before and After

Evening peak flows will not change greatly as a result of the development.

6.6 Network Levels of Service

Level of Service is a method of rating traffic flow conditions from A to F where A is free flowing traffic conditions and F is fully congested. Traditionally a Level of Service of E was seen as the limit that could be consented before adverse effects became a problem. Now however, it is common to see a Level of Service of F at many locations in Auckland. Indeed the AUP actually encourages a Level of Service F at major centres by not requiring any traffic assessment at those locations while limiting growth elsewhere. Essentially the AUP now recognises that centres are supposed to be busy places.

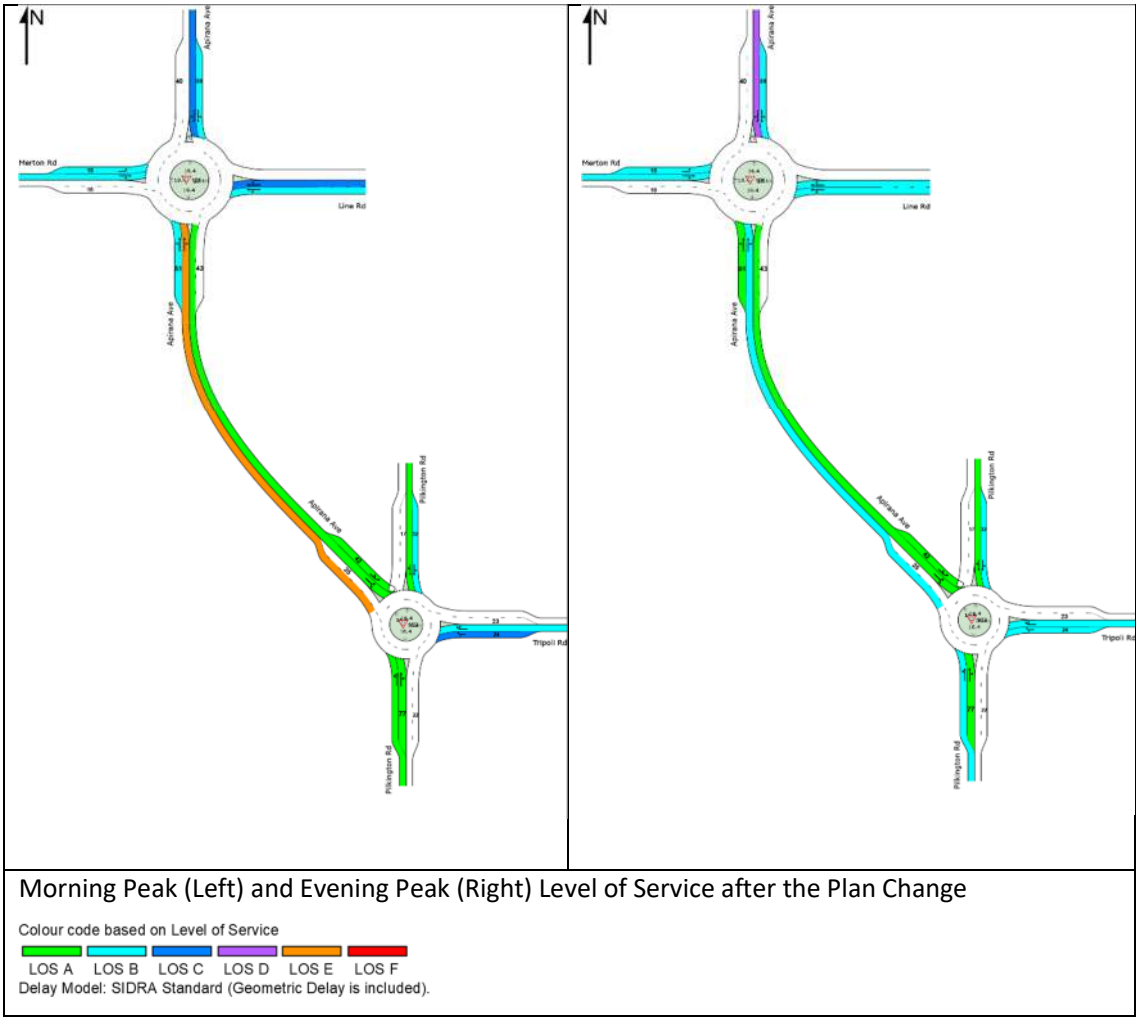


Figure 31: Future Level of Service

The plots show how the levels of service on frontage roads will still be acceptable after the site is developed.

7. CONSULTATION SUMMARY AND MITIGATION WORKS REQUIRED

7.1 Consultation

A pre-application meeting was held with AT on 4 May 2023. Further details of the transportation matters discussed are included in the Section 32 Report prepared by Barker and Associates.

7.2 Mitigation Works Required

There are no physical works required to mitigate the Plan Change and therefore the provisions under AUP are suitable to manage the transport effects of future development.

Work planned by AT will improve the Merton Road and Pilkington Road intersection for pedestrians by including a zebra crossing with raised tables. That work is likely to be completed well before any development of the site occurs under the new zoning provisions.

Works will be required within the site in the form of driveways, footpaths, loading areas and cycle parking at the time of future development. These will be assessed under the rules of the AUP at the time of a Resource Consent application.

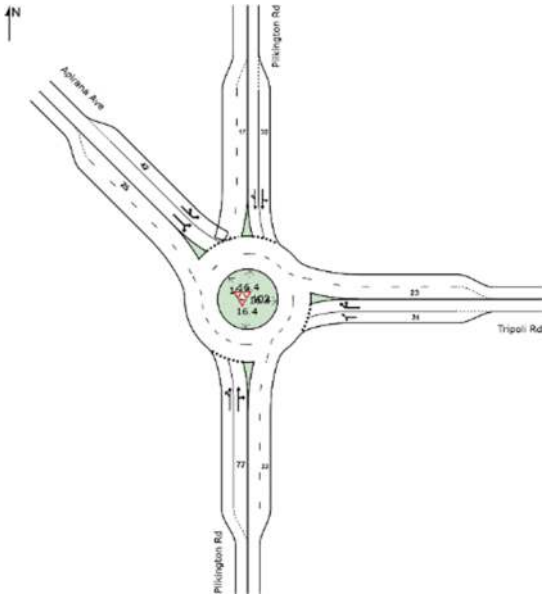
8. CONCLUSION

The proposal to rezone the Pilkington Road land from Business -Light Industry to Business -Mixed Use is supported by higher level transport policy. An assessment of a likely development has shown that transport effects of the development can be accommodated within the existing road network and will be subject to further assessment in accordance with the existing rules and assessment criteria of the AUP.

No mitigation measures have been identified as being necessary prior to the land being rezoned or developed.

John Parlane BE(Civil), BApplEcon, CMEngNZ
Consulting Traffic Engineer
13 July 2023

9. ATTACHMENT 1 SIDRA MODEL RESULTS PILKINGTON ROAD ROUNDABOUT



9.1 Morning Peak Models

9.1.1 Existing Morning (with other developments)

MOVEMENT SUMMARY

Site: 102 [AM Tripoli 2023 Base (Site Folder: General)]

Network: N101 [AM 2023 Base (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pilkington Rd														
1a	L1	437	8.7	437	8.7	0.611	6.9	LOS A	2.1	16.1	0.79	0.85	0.91	42.2
2	T1	154	8.1	154	8.1	0.611	7.2	LOS A	2.1	16.1	0.75	0.83	0.84	46.1
3	R2	39	18.4	39	18.4	0.154	11.9	LOS B	0.3	2.2	0.62	0.76	0.62	45.1
Approach		630	9.2	630	9.2	0.611	7.2	LOS A	2.1	16.1	0.77	0.84	0.87	43.9
East: Tripoli Rd														
4	L2	47	8.7	47	8.7	0.648	18.0	LOS B	2.8	20.4	0.98	1.20	1.44	39.3
6a	R1	393	2.1	393	2.1	0.648	19.9	LOS B	2.8	20.4	0.97	1.17	1.38	33.1
6	R2	37	0.0	37	0.0	0.199	17.4	LOS B	0.4	3.0	0.81	0.92	0.81	41.5
Approach		477	2.6	477	2.6	0.648	19.5	LOS B	2.8	20.4	0.96	1.16	1.34	34.9
North: Pilkington Rd														
7	L2	43	7.1	43	7.1	0.127	12.1	LOS B	0.2	1.7	0.74	0.86	0.74	42.7
8	T1	207	3.0	207	3.0	0.337	7.9	LOS A	0.8	5.5	0.79	0.87	0.79	45.8
9b	R3	16	0.0	16	0.0	0.337	13.2	LOS B	0.8	5.5	0.79	0.87	0.79	41.1
Approach		267	3.5	267	3.5	0.337	8.9	LOS A	0.8	5.5	0.78	0.87	0.78	45.1
NorthWest: Apirana Ave														
27b	L3	9	0.0	9	0.0	0.328	5.2	LOS A	0.7	5.2	0.49	0.56	0.49	46.3
27a	L1	273	6.4	273	6.4	0.328	4.5	LOS A	0.7	5.2	0.49	0.56	0.49	47.3
29a	R1	638	4.7	638	4.7	0.547	7.7	LOS A	1.6	11.3	0.56	0.68	0.56	45.4
Approach		921	5.2	921	5.2	0.547	6.8	LOS A	1.6	11.3	0.54	0.64	0.54	45.9
All Vehicles		2295	5.5	2295	5.5	0.648	9.8	LOS A	2.8	20.4	0.72	0.83	0.83	43.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

9.1.2 Future Morning Traffic

MOVEMENT SUMMARY

Site: 102 [AM Tripoli High (Site Folder: General)] **Network: N101 [AM High (Network Folder: General)]**

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pilkington Rd														
1a	L1	553	6.9	553	6.9	0.721	8.4	LOS A	3.1	23.4	0.87	0.96	1.09	40.9
2	T1	155	8.0	155	8.0	0.721	8.3	LOS A	3.1	23.4	0.80	0.91	0.96	45.5
3	R2	45	15.9	45	15.9	0.182	11.9	LOS B	0.3	2.6	0.63	0.78	0.63	45.1
Approach		753	7.7	753	7.7	0.721	8.6	LOS A	3.1	23.4	0.84	0.94	1.04	42.7
East: Tripoli Rd														
4	L2	55	7.5	55	7.5	0.727	24.3	LOS C	3.7	26.6	1.00	1.31	1.70	36.9
6a	R1	395	2.1	395	2.1	0.727	25.7	LOS C	3.7	26.6	0.99	1.28	1.62	30.2
6	R2	37	0.0	37	0.0	0.223	18.7	LOS B	0.5	3.5	0.84	0.94	0.84	40.9
Approach		487	2.5	487	2.5	0.727	25.0	LOS C	3.7	26.6	0.98	1.25	1.57	32.3
North: Pilkington Rd														
7	L2	43	7.1	43	7.1	0.136	12.8	LOS B	0.2	1.8	0.76	0.87	0.76	42.3
8	T1	210	2.9	210	2.9	0.366	8.8	LOS A	0.9	6.3	0.82	0.91	0.87	45.3
9b	R3	16	0.0	16	0.0	0.366	14.3	LOS B	0.9	6.3	0.82	0.91	0.87	40.4
Approach		270	3.4	270	3.4	0.366	9.8	LOS A	0.9	6.3	0.81	0.90	0.85	44.6
NorthWest: Apirana Ave														
27b	L3	9	0.0	9	0.0	0.352	5.3	LOS A	0.8	5.7	0.51	0.58	0.51	46.2
27a	L1	286	6.1	286	6.1	0.352	4.6	LOS A	0.8	5.7	0.51	0.58	0.51	47.2
29a	R1	702	4.3	702	4.3	0.603	8.0	LOS A	1.9	13.8	0.61	0.70	0.62	45.3
Approach		997	4.8	997	4.8	0.603	7.0	LOS A	1.9	13.8	0.58	0.66	0.59	45.8
All Vehicles		2506	5.1	2506	5.1	0.727	11.3	LOS B	3.7	26.6	0.76	0.89	0.94	42.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

9.2 Evening Peak Models

9.2.1 Existing Evening Traffic

MOVEMENT SUMMARY

Site: 102 [PM Tripoli 2023 Base (Site Folder: General)]

Network: N101 [PM 2023 Base (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pilkington Rd														
1a	L1	598	2.0	598	2.0	0.727	7.4	LOS A	3.3	23.6	0.83	0.86	1.00	41.8
2	T1	209	2.9	209	2.9	0.727	7.4	LOS A	3.3	23.6	0.77	0.83	0.89	46.1
3	R2	55	5.6	55	5.6	0.184	10.8	LOS B	0.3	2.5	0.57	0.72	0.57	45.6
Approach		862	2.5	862	2.5	0.727	7.6	LOS A	3.3	23.6	0.80	0.85	0.95	43.6
East: Tripoli Rd														
4	L2	42	14.3	42	14.3	0.431	8.7	LOS A	1.3	9.0	0.80	0.87	0.83	43.4
6a	R1	343	1.8	343	1.8	0.431	11.4	LOS B	1.3	9.0	0.79	0.86	0.82	38.8
6	R2	13	7.7	13	7.7	0.132	14.3	LOS B	0.3	1.9	0.71	0.84	0.71	43.2
Approach		399	3.3	399	3.3	0.431	11.2	LOS B	1.3	9.0	0.79	0.86	0.81	39.8
North: Pilkington Rd														
7	L2	18	5.6	18	5.6	0.053	11.3	LOS B	0.1	0.7	0.72	0.83	0.72	43.1
8	T1	115	2.6	115	2.6	0.188	7.2	LOS A	0.4	2.7	0.73	0.82	0.73	46.2
9b	R3	10	0.0	10	0.0	0.188	12.6	LOS B	0.4	2.7	0.73	0.82	0.73	41.7
Approach		143	2.8	143	2.8	0.188	8.1	LOS A	0.4	2.7	0.73	0.82	0.73	45.6
NorthWest: Apirana Ave														
27b	L3	7	0.0	7	0.0	0.430	5.1	LOS A	1.1	7.5	0.54	0.55	0.54	46.1
27a	L1	440	2.3	440	2.3	0.430	4.3	LOS A	1.1	7.5	0.54	0.55	0.54	47.1
29a	R1	506	4.2	506	4.2	0.458	7.8	LOS A	1.2	8.5	0.55	0.69	0.55	45.4
Approach		954	3.3	954	3.3	0.458	6.2	LOS A	1.2	8.5	0.55	0.62	0.55	46.2
All Vehicles		2358	3.0	2358	3.0	0.727	7.7	LOS A	3.3	23.6	0.69	0.76	0.75	44.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

9.2.2 Future Evening Traffic

MOVEMENT SUMMARY

Site: 102 [PM Tripoli High (Site Folder: General)] **Network: N101 [PM High (Network Folder: General)]**

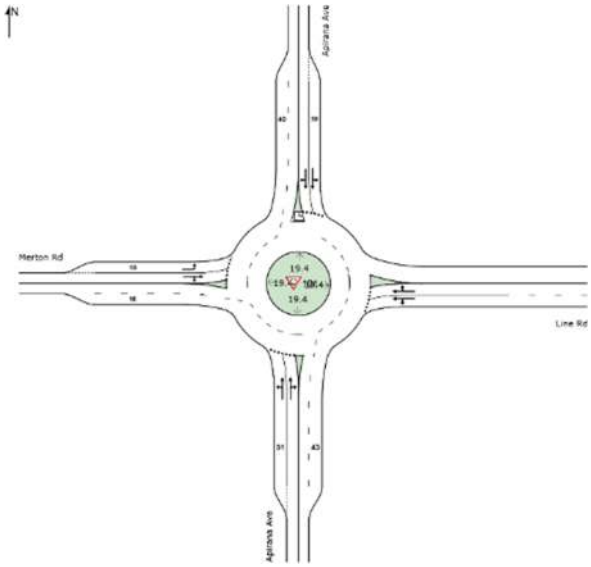
New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pilkington Rd														
1a	L1	680	1.8	680	1.8	0.825	10.0	LOS B	4.9	34.8	0.95	1.04	1.29	39.5
2	T1	209	2.9	209	2.9	0.825	9.5	LOS A	4.9	34.8	0.87	0.97	1.12	44.9
3	R2	66	4.6	66	4.6	0.208	11.0	LOS B	0.4	2.9	0.60	0.76	0.60	45.4
Approach		955	2.2	955	2.2	0.825	10.0	LOS A	4.9	34.8	0.91	1.01	1.20	41.8
East: Tripoli Rd														
4	L2	58	10.5	58	10.5	0.524	11.3	LOS B	1.8	13.2	0.89	1.00	1.06	42.2
6a	R1	372	1.6	372	1.6	0.524	13.8	LOS B	1.8	13.2	0.87	0.98	1.02	37.1
6	R2	13	7.7	13	7.7	0.160	15.5	LOS B	0.3	2.4	0.75	0.88	0.75	42.6
Approach		442	3.0	442	3.0	0.524	13.6	LOS B	1.8	13.2	0.87	0.98	1.01	38.3
North: Pilkington Rd														
7	L2	18	5.6	18	5.6	0.057	12.0	LOS B	0.1	0.7	0.74	0.85	0.74	42.8
8	T1	118	2.6	118	2.6	0.208	7.7	LOS A	0.4	3.1	0.77	0.86	0.77	45.9
9b	R3	10	0.0	10	0.0	0.208	13.4	LOS B	0.4	3.1	0.77	0.86	0.77	41.3
Approach		146	2.8	146	2.8	0.208	8.6	LOS A	0.4	3.1	0.76	0.86	0.76	45.3
NorthWest: Apirana Ave														
27b	L3	7	0.0	7	0.0	0.458	5.2	LOS A	1.2	8.2	0.58	0.57	0.58	46.0
27a	L1	451	2.2	451	2.2	0.458	4.5	LOS A	1.2	8.2	0.58	0.57	0.58	47.0
29a	R1	587	3.6	587	3.6	0.532	8.0	LOS A	1.5	10.7	0.61	0.71	0.61	45.3
Approach		1044	3.0	1044	3.0	0.532	6.4	LOS A	1.5	10.7	0.59	0.65	0.59	46.0
All Vehicles		2588	2.7	2588	2.7	0.825	9.1	LOS A	4.9	34.8	0.77	0.85	0.90	43.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

10. ATTACHMENT 2 SIDRA MODEL RESULTS MERTON ROAD ROUNDABOUT



10.1 Morning Peak Models

10.1.1 Existing Morning Traffic

MOVEMENT SUMMARY

Site: 101 [AM Merton 2023 Base (Site Folder: General)]

Network: N101 [AM 2023 Base (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Apirana Ave														
1	L2	152	6.1	152	6.1	0.439	16.7	LOS B	1.1	8.3	0.88	1.00	1.05	40.9
2	T1	259	5.6	259	5.6	0.919	42.9	LOS D	7.8	57.1	1.00	1.77	2.73	32.1
3	R2	259	5.2	259	5.2	0.919	47.1	LOS D	7.8	57.1	1.00	1.77	2.73	32.1
Approach		669	5.5	669	5.5	0.919	38.6	LOS D	7.8	57.1	0.97	1.60	2.35	33.7
East: Line Rd														
4	L2	384	5.4	384	5.4	0.727	17.1	LOS B	2.8	20.5	0.96	1.19	1.47	34.3
5	T1	345	3.6	345	3.6	0.823	19.6	LOS B	4.3	31.2	1.00	1.34	1.78	39.6
6	R2	185	3.9	185	3.9	0.823	23.9	LOS C	4.3	31.2	1.00	1.34	1.78	39.7
Approach		913	4.4	913	4.4	0.823	19.4	LOS B	4.3	31.2	0.98	1.28	1.65	38.1
North: Apirana Ave														
7	L2	61	8.5	61	8.5	0.300	10.9	LOS B	0.8	5.7	0.86	0.88	0.86	43.6
8	T1	363	2.8	363	2.8	0.835	20.5	LOS C	6.5	46.9	0.97	1.30	1.69	31.6
9	R2	367	5.1	367	5.1	0.835	28.0	LOS C	6.5	46.9	1.00	1.42	1.93	37.8
Approach		791	4.3	791	4.3	0.835	23.2	LOS C	6.5	46.9	0.97	1.32	1.73	36.1
West: Merton Rd														
10	L2	333	6.8	333	6.8	0.582	12.9	LOS B	2.1	15.6	0.93	1.08	1.19	42.4
11	T1	279	4.4	279	4.4	0.661	12.9	LOS B	2.9	21.3	0.98	1.14	1.33	42.6
12	R2	164	8.8	164	8.8	0.661	18.0	LOS B	2.9	21.3	0.98	1.14	1.33	36.3
Approach		776	6.4	776	6.4	0.661	14.0	LOS B	2.9	21.3	0.96	1.11	1.27	41.6
All Vehicles		3149	5.1	3149	5.1	0.919	23.1	LOS C	7.8	57.1	0.97	1.31	1.73	37.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

10.1.2 Future Morning Traffic

MOVEMENT SUMMARY

Site: 101 [AM Merton High (Site Folder: General)]

Network: N101 [AM High (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Apirana Ave														
1	L2	208	4.5	208	4.5	0.527	17.4	LOS B	1.6	11.4	0.91	1.06	1.18	40.6
2	T1	277	5.2	277	5.2	0.955	53.3	LOS E	9.7	71.0	1.00	1.99	3.23	29.5
3	R2	262	5.1	262	5.1	0.955	57.5	LOS E	9.7	71.0	1.00	1.99	3.23	29.6
Approach		747	5.0	747	5.0	0.955	44.8	LOS D	9.7	71.0	0.98	1.73	2.66	31.9
East: Line Rd														
4	L2	384	5.4	384	5.4	0.749	18.7	LOS B	3.0	21.9	0.97	1.22	1.55	33.3
5	T1	345	3.6	345	3.6	0.846	22.2	LOS C	4.7	34.1	1.00	1.40	1.92	38.6
6	R2	185	3.9	185	3.9	0.846	26.5	LOS C	4.7	34.1	1.00	1.40	1.92	38.7
Approach		913	4.4	913	4.4	0.846	21.6	LOS C	4.7	34.1	0.99	1.32	1.76	37.1
North: Apirana Ave														
7	L2	61	8.5	61	8.5	0.312	11.2	LOS B	0.8	6.0	0.87	0.90	0.87	43.4
8	T1	375	2.7	375	2.7	0.870	24.4	LOS C	7.6	55.1	0.97	1.40	1.88	29.8
9	R2	367	5.1	367	5.1	0.870	32.9	LOS C	7.6	55.1	1.00	1.54	2.17	36.0
Approach		803	4.2	803	4.2	0.870	27.3	LOS C	7.6	55.1	0.98	1.43	1.94	34.3
West: Merton Rd														
10	L2	333	6.8	333	6.8	0.608	14.1	LOS B	2.3	16.7	0.95	1.10	1.25	41.9
11	T1	279	4.4	279	4.4	0.748	16.8	LOS B	3.6	26.2	1.00	1.25	1.54	40.8
12	R2	179	8.0	179	8.0	0.748	21.8	LOS C	3.6	26.2	1.00	1.25	1.54	33.8
Approach		792	6.3	792	6.3	0.748	16.8	LOS B	3.6	26.2	0.98	1.19	1.42	40.2
All Vehicles		3256	4.9	3256	4.9	0.955	27.1	LOS C	9.7	71.0	0.98	1.41	1.93	35.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

10.2 Evening Peak Models

10.2.1 Existing Evening Traffic

MOVEMENT SUMMARY

Site: 101 [PM Merton 2023 Base (Site Folder: General)]

Network: N101 [PM 2023 Base (Network Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Apirana Ave														
1	L2	204	1.5	204	1.5	0.363	9.1	LOS A	0.8	5.9	0.75	0.86	0.76	44.4
2	T1	270	1.5	270	1.5	0.688	11.6	LOS B	3.0	21.8	0.92	1.08	1.25	43.2
3	R2	283	3.6	283	3.6	0.688	15.9	LOS B	3.0	21.8	0.92	1.08	1.25	43.3
Approach		757	2.3	757	2.3	0.688	12.5	LOS B	3.0	21.8	0.87	1.02	1.11	43.6
East: Line Rd														
4	L2	288	3.9	288	3.9	0.528	11.7	LOS B	1.6	11.4	0.89	1.02	1.10	38.1
5	T1	268	2.3	268	2.3	0.550	10.5	LOS B	1.8	13.0	0.91	1.04	1.12	44.1
6	R2	87	5.8	87	5.8	0.550	15.0	LOS B	1.8	13.0	0.91	1.04	1.12	44.1
Approach		642	3.5	642	3.5	0.550	11.7	LOS B	1.8	13.0	0.90	1.03	1.11	42.2
North: Apirana Ave														
7	L2	64	9.5	64	9.5	0.309	11.6	LOS B	0.8	6.0	0.87	0.90	0.87	43.2
8	T1	458	2.9	458	2.9	0.860	25.2	LOS C	7.3	52.7	0.98	1.42	1.93	29.5
9	R2	267	3.4	267	3.4	0.860	32.7	LOS C	7.3	52.7	1.00	1.53	2.15	36.3
Approach		788	3.6	788	3.6	0.860	26.6	LOS C	7.3	52.7	0.98	1.42	1.92	33.7
West: Merton Rd														
10	L2	327	2.2	327	2.2	0.521	10.3	LOS B	1.7	12.4	0.89	0.98	1.04	43.8
11	T1	290	0.3	290	0.3	0.639	10.7	LOS B	2.7	19.5	0.95	1.06	1.22	43.6
12	R2	185	3.8	185	3.8	0.639	15.7	LOS B	2.7	19.5	0.95	1.06	1.22	37.8
Approach		802	1.9	802	1.9	0.639	11.7	LOS B	2.7	19.5	0.93	1.03	1.14	42.8
All Vehicles		2989	2.8	2989	2.8	0.860	15.8	LOS B	7.3	52.7	0.92	1.13	1.33	40.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

10.2.2 Future Evening Traffic

MOVEMENT SUMMARY

Site: 101 [PM Merton High (Site Folder: General)] **Network: N101 [PM High (Network Folder: General)]**

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Apirana Ave														
1	L2	220	1.4	220	1.4	0.380	9.1	LOS A	0.9	6.4	0.76	0.87	0.78	44.4
2	T1	275	1.5	275	1.5	0.691	11.6	LOS B	3.1	22.1	0.92	1.09	1.25	43.2
3	R2	280	3.6	280	3.6	0.691	15.9	LOS B	3.1	22.1	0.92	1.09	1.25	43.3
Approach		775	2.2	775	2.2	0.691	12.5	LOS B	3.1	22.1	0.87	1.03	1.12	43.6
East: Line Rd														
4	L2	295	3.8	295	3.8	0.565	13.0	LOS B	1.8	12.7	0.91	1.06	1.17	37.1
5	T1	268	2.3	268	2.3	0.574	11.5	LOS B	1.9	13.9	0.92	1.07	1.18	43.6
6	R2	87	5.8	87	5.8	0.574	16.0	LOS B	1.9	13.9	0.92	1.07	1.18	43.6
Approach		649	3.4	649	3.4	0.574	12.8	LOS B	1.9	13.9	0.92	1.06	1.18	41.5
North: Apirana Ave														
7	L2	64	9.5	64	9.5	0.325	11.9	LOS B	0.9	6.4	0.89	0.92	0.89	43.1
8	T1	478	2.7	478	2.7	0.905	32.2	LOS C	9.2	66.3	0.98	1.59	2.27	26.7
9	R2	267	3.4	267	3.4	0.905	41.0	LOS D	9.2	66.3	1.00	1.73	2.55	33.6
Approach		808	3.5	808	3.5	0.905	33.5	LOS C	9.2	66.3	0.98	1.59	2.26	30.9
West: Merton Rd														
10	L2	327	2.2	327	2.2	0.529	10.5	LOS B	1.8	12.7	0.89	0.99	1.05	43.7
11	T1	290	0.3	290	0.3	0.669	11.5	LOS B	3.0	21.5	0.97	1.09	1.28	43.2
12	R2	206	3.4	206	3.4	0.669	16.5	LOS B	3.0	21.5	0.97	1.09	1.28	37.1
Approach		823	1.8	823	1.8	0.669	12.4	LOS B	3.0	21.5	0.94	1.05	1.19	42.4
All Vehicles		3056	2.7	3056	2.7	0.905	18.1	LOS B	9.2	66.3	0.93	1.19	1.45	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.