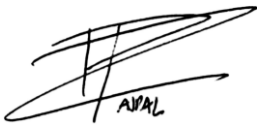


Planning | Surveying | Engineering | Environmental

A23016– Drury Centre Stage 2

Integrated Transportation Assessment Report

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1 Introduction

This report has been prepared in support of the application by Kiwi Property Holdings No.2 Limited (Kiwi Property) for a resource consent application under the Fast-track Approvals Act 2024. The Drury Centre Stage 2 development involves land use, subdivision, stream works, water permits and discharge consents at 64, 68, 108, 120 and 132 Flanagan Road, Drury. The Stage 2 development will consist of the construction of various dwellings, retail stores, commercial buildings, visitor accommodation and community activities with ancillary car parking; bulk earthworks; the construction and installation of reticulation networks; and roading infrastructure to service the project. The proposal also includes provision for various public and privately owned road corridors within the Stage 2 site. Additionally, this consent application also proposes obtaining land use consent for the further subdivision of the 13 super lots consented as part of the Drury Centre Stage 1 development in July 2023.

CKL has been engaged by Kiwi Property to provide a transportation assessment for the proposed development of Drury Centre Stage 2 and the further subdivision of the 13 super lots consented as part of the Drury Centre Stage 1 development. This Integrated Transportation Assessment (ITA) report outlines the transportation implications of the proposed development of the subject site.

The subject site forms part of a larger land area within Drury Centre Precinct created from Plan Change 48 – Drury Centre Precinct ('PC48'). Land to the east and north of the subject site falls within the adjacent Drury East and Waihoehoe Precincts and developments carried out by Fulton Hogan Land Development and Oyster Capital respectively.

The proposed development of Stage 2 includes development of the following activities and associated gross floor areas (GFA):

- 63,547sqm of Retail activities
- 33,048sqm of Commercial activities
- 10,216sqm of Community activities
- 17,168sqm of visitor accommodation (consisting of a total of 282 rooms)
- 102 dwellings (consisting of apartments and terrace housing) with a total floor area of 14,938sqm

In addition to the Stage 2 development, it is also proposed to obtain a land use consent to further subdivide the 13 super lots consented within the Stage 1 development into 292 individual lots.

This report addresses the transportation matters of the proposal and includes the following:

- The subject site and its surrounding transport environment;
- How the proposed land uses within the development fit within the Thresholds for Subdivision and Development table within the operative Drury Centre Precinct Provisions;
- Design of the internal road corridor and proposed intersections to serve the development;
- Associated effects on the performance and safety of the interim and final design of the surrounding road network;
- Active mode accessibility;
- Adequacy and function of the parking and access provisions;
- Consideration of the transportation related provisions within the Auckland Unitary Plan (AUP), including the Drury Precinct transportation requirements; and
- Development alignment with national policies and other relevant frameworks.

These and other matters will be addressed in the detail of the report that follows. By way of summary, it is concluded that the proposed development can be established such that there will be l expected and acceptable effects to the function, capacity and safety of the surrounding transportation network.

This report was produced by Daryl Hughes, an Associate / Principal Transportation Engineer at CKL Ltd. Daryl holds a Bachelor of Engineering degree in Civil Engineering (BEng), is a Chartered Engineer (CEng), is a Chartered Member of the Institution of Professional Engineers New Zealand (CMEngNZ), and the Institution of Civil Engineers (MICE). During his 30-year career he has been engaged by local authorities and private developers, advising on traffic and transportation issues covering safety, management and planning matters of many kinds. He has appeared before Council hearings, the Environment Court and Auckland Unitary Plan independent hearing panels.

Daryl provided comprehensive transportation advice for the three Drury East Plan Changes: Drury Centre Precinct (PC48), Drury East Precinct (PC49) and Waihoehoe Precinct (PC50), including presenting evidence at the combined Council hearing, then was involved in the subsequent Environment Court Appeals process. Daryl then oversaw the Covid-19 Fast Track consents for the first development stages within all three precincts, and a subsequent resource consent within the Drury Centre Precinct. During each of these processes, Daryl has undertaken extensive communications with Auckland Council, Auckland Transport, NZTA, KiwiRail and Supporting Growth Alliance.

Daryl is familiar with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and agrees to comply with it. He confirms that he has considered all the material facts and that this report is within his area of expertise.

2 Existing Transportation Environment

2.1 Site Location

The Drury Centre Stage 2 site comprises approximately 23ha of land at 64, 68, 108, 120 and 132 Flanagan Road, Drury, Auckland (the site) as shown in red in Figure 1 below. The site is irregularly shaped and is generally bound by rural properties to the east and north, Brookfield Road to the south and State Highway 1 (SH1) to the west. The site is located immediately north of the Drury Centre Stage 1 project by Kiwi property. The site is zoned a mixture of Business – Metropolitan Centre, Business – Mixed Use Zone and Open Space – Informal Recreation Zone. The Stage 2 area proposed to be developed as part of this consent application is outlined in red in Figure 1 below.

As stated earlier, this consent application also seeks to further subdivide the 13 super lots consented as part of the original Fast-track application granted in July 2023 into 292 lots. The area outlined in blue in Figure 1 below to the south of the site represents Stage 1 of the Drury Centre Fast-track area, which was consented in 2023 (report provided in Appendix 1). The 13 super lots which are proposed to undergo further subdivision as part of this consent are outlined in orange in Figure 1 below.

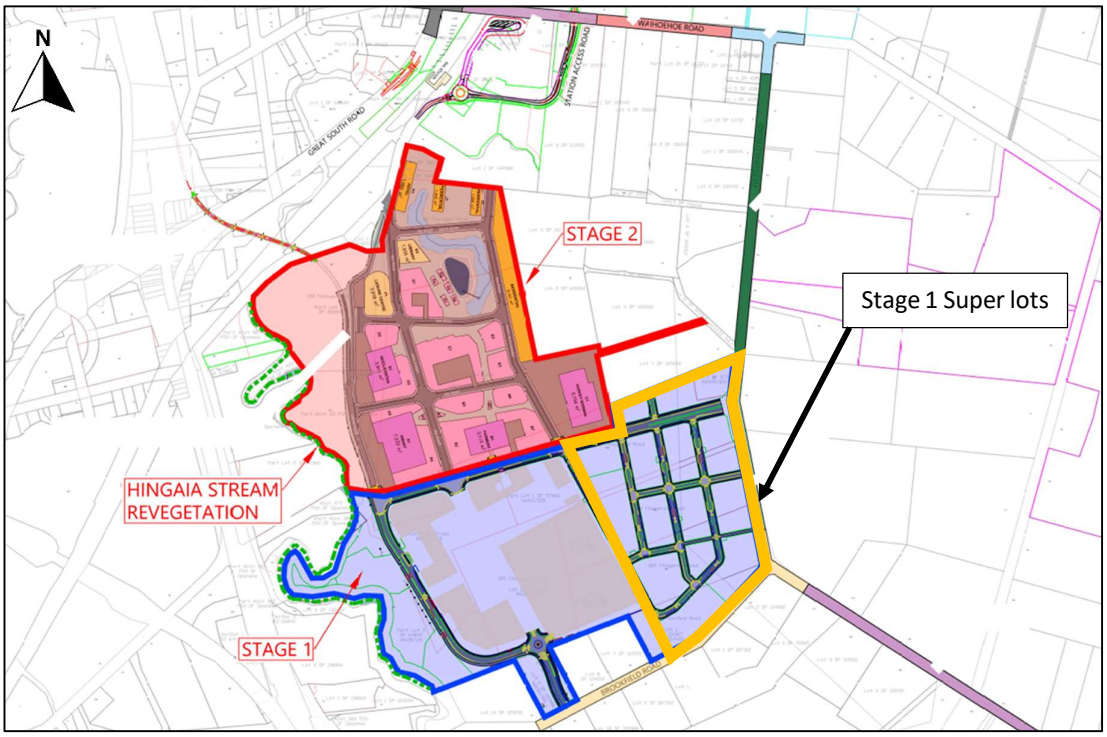


FIGURE 1: SITE LOCATION

The subject site is located approximately 30km southeast of Auckland's central business district (CBD),14km southeast of Manukau, 6km south of Papakura, and within 1km of the existing Drury Town Centre. The site is also located approximately 1km east of the major intersection between State Highway ('SH') 1, SH22 and Great South Road ('GSR'). All roads within the vicinity of the site are rural roads with limited active transport facilities. As part of the Drury South development works, a gravel shared path has recently been constructed on the northern side of Waihoehoe Road north of the site.

Further west of the site, the area is largely governed by rural, industrial and commercial activities. It is noted that construction works are underway for developments in vicinity of the site. This includes the Drury East Precinct and the Waihoehoe Precinct which are being developed by Fulton Hogan and Oyster Capital respectively.

2.2 Road Network

Figure 2 below shows the existing roading network in vicinity of the site.

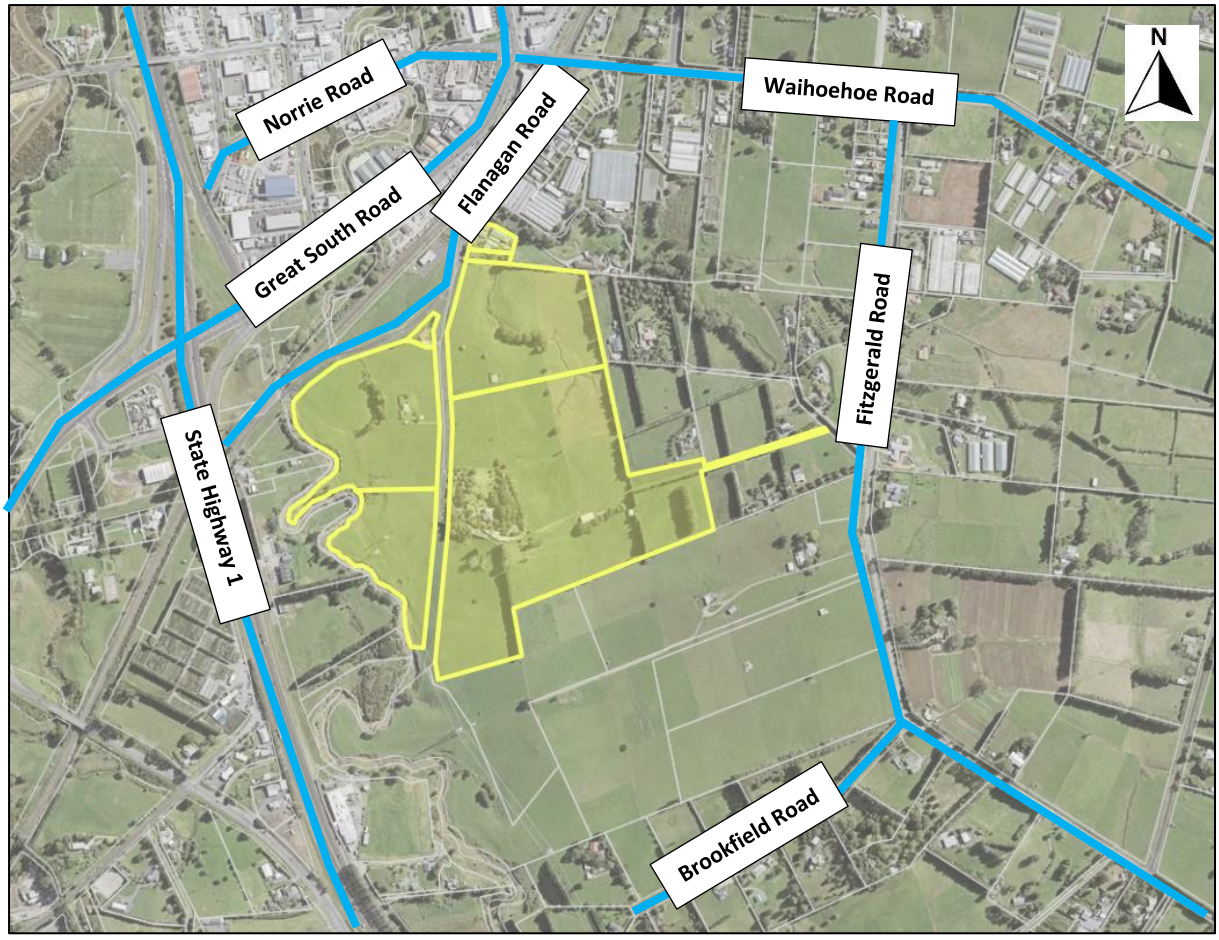


FIGURE 2: ROADING NETWORK SURROUNDING THE STAGE 2 SITE

2.2.1 Waihoehoe Road

Waihoehoe Road provides an east-west connection on the northern side of the subject site. It provides the primary arterial road connection between the subject site, the Drury East Precinct area, and the western side of Drury including the existing Drury Village Centre, GSR and the SH1 Drury Interchange. In proximity of the site, Waihoehoe Road has a carriageway width of approximately 7m wide with one traffic lane in each direction. The road corridor is marked with a painted centreline and edge lines. The carriageway widens near the Waihoehoe Road / Fitzgerald Road intersection to accommodate a right turning bay. Waihoehoe Road has a posted speed limit of 50km/h just east of Drury Interchange, 60km/h between Flanagan Road and Fitzgerald Road, and 80km/h east of Fitzgerald Road. As stated above, a gravel shared path is provided on the northern side of the road corridor. The road characteristics are largely typical for that of a rural road corridor with unsealed edges, table drains, and limited active mode facilities. Figure 3 below shows the typical cross-section of Waihoehoe Road.

It is noted that Waihoehoe Road is a subject of designation 1838. The purpose of designation 1838 is to widen the Waihoehoe Road corridor to serve the proposed future development in vicinity of the Drury East and Drury Centre precincts. It is understood that the Waihoehoe Road corridor in proximity of the Drury Centre Precinct will be upgraded to an urban standard as part of the Drury Centre Stage 1 development works. The extent of these upgrades were discussed extensively in section 4.4.1 of the original Fast-track ITA.



FIGURE 3: WAIHOEHOE ROAD CROSS-SECTION

2.2.2 Fitzgerald Road

Fitzgerald Road has a north-south alignment extending on the eastern side of the subject site and is currently rural in nature, with unsealed edges. It has a road reserve width of 20m and a carriageway width of approximately 6.5m, with one traffic lane in each direction. The road corridor is marked with a centreline and edge lines along its entire length. No active mode facilities exist along the road corridor, and similar to Waihoehoe Road, the corridor has typical rural road characteristics including unsealed edges, table drains, and wide grass berms. To the east of the site, the road has a north-south alignment connecting to Waihoehoe Road at a stop-sign controlled T-intersection with Waihoehoe Road being the major approach. As stated above, a right turn-bay is provided on Waihoehoe Road to assist vehicles turning right into Fitzgerald Road. The Drury Centre Stage 1 development has direct road frontage onto a small section of Fitzgerald Road (just north of Brookfield Road). It is noted that as part of the approved Stage 1 consent, the Fitzgerald Road corridor between Brookfield Road to Waihoehoe Road will be upgraded to an urban standard as discussed in section 4.4.2 of the original Fast-Track ITA. Figure 4 below shows the typical current cross-section of Fitzgerald Road.



FIGURE 4: FITZGERALD ROAD CROSS-SECTION

2.2.3 Brookfield Road

Brookfield Road extends along the southern frontage of the Drury Centre Stage 1 site. Brookfield Road has a road reserve width of 20m, a carriageway width of approximately 5m, with one traffic lane in each direction and is unmarked along its entire length. Similar to the other roads in Drury, the road corridor has unsealed edges, wide grass berms, and no active mode facilities. The intersection between Brookfield Road and Fitzgerald Road is located at the southeastern corner of the Drury Centre Stage 1 site and the intersection takes the form of a give-way controlled T-intersection where Fitzgerald Road is the major approach to this intersection. As part of the approved Stage 1 consent, the Brookfield Road corridor will be upgraded to an urban standard. The extent of these upgrades was extensively discussed in section 4.4.3 of the original Fast-track ITA. Figure 5 below shows the typical current cross-section of Brookfield Road.



FIGURE 5: BROOKFIELD ROAD CROSS-SECTION

2.2.4 Great South Road

GSR provides a north-south connection though the wider Drury-Opaheke area. Within the AUP, it is classified as an arterial road corridor. GSR primarily exists as a two-way, two-laned road with an

approximately 13m wide carriageway. The carriageway consists of a painted centreline, edge lines, NSAAT lines and flush median near the GSR/Waihoehoe Road intersection. Parking is generally not permitted on either side of the road near the GSR/Waihoehoe Road intersection. The posted speed limit along the road corridor is 50km/h however increases to 60km/h near the SH1 on/off-ramp. Great South Road can be used as an alternative route to SH1 as both roads generally follow the same route. The intersection between GSR and Waihoehoe Road takes the form of a four-legged roundabout with GSR forming the northern and southern legs, Waihoehoe Road existing as the eastern approach and Norrie Road existing as the western approach. Figure 6 below shows the typical cross-section of Great South Road.



FIGURE 6: GREAT SOUTH ROAD CROSS-SECTION

2.3 Public Transport

2.3.1 Rail Network

Currently, the nearest train station to the proposed development site is the Papakura train station located about 5km north of the Drury SH1 interchange. The Southern train line between Papakura and Britomart currently runs every 10 minutes during weekday peak hours and every 20-30 minutes during off-peak times. Diesel shuttles between Papakura and Pukekohe operate every 20 minutes during peak periods and hourly at other times.

Three new Rail stations in proximity of the subject site are currently in the planning or construction stages. This includes the Drury Central Railway Station and Interchange, Ngākōroa (Drury West) Railway Station[1] and the Pāerāta Railway Station. Construction of the Pāerāta and Drury Central Railway Station (located nearest to the site) is currently underway and is expected to be completed by late 2025 with the stations becoming operational shortly thereafter. Planning is currently underway for the Ngākōroa Railway Station with KiwiRail obtaining the necessary designation in May 2024 and subsequent resource consent. The provision of the three new Railway Stations will greatly enhance local public transport access. The locations of the new stations can be seen in Figure 7 below with the subject site outlined with the green star.

[1] Also known as Drury West Railway Station

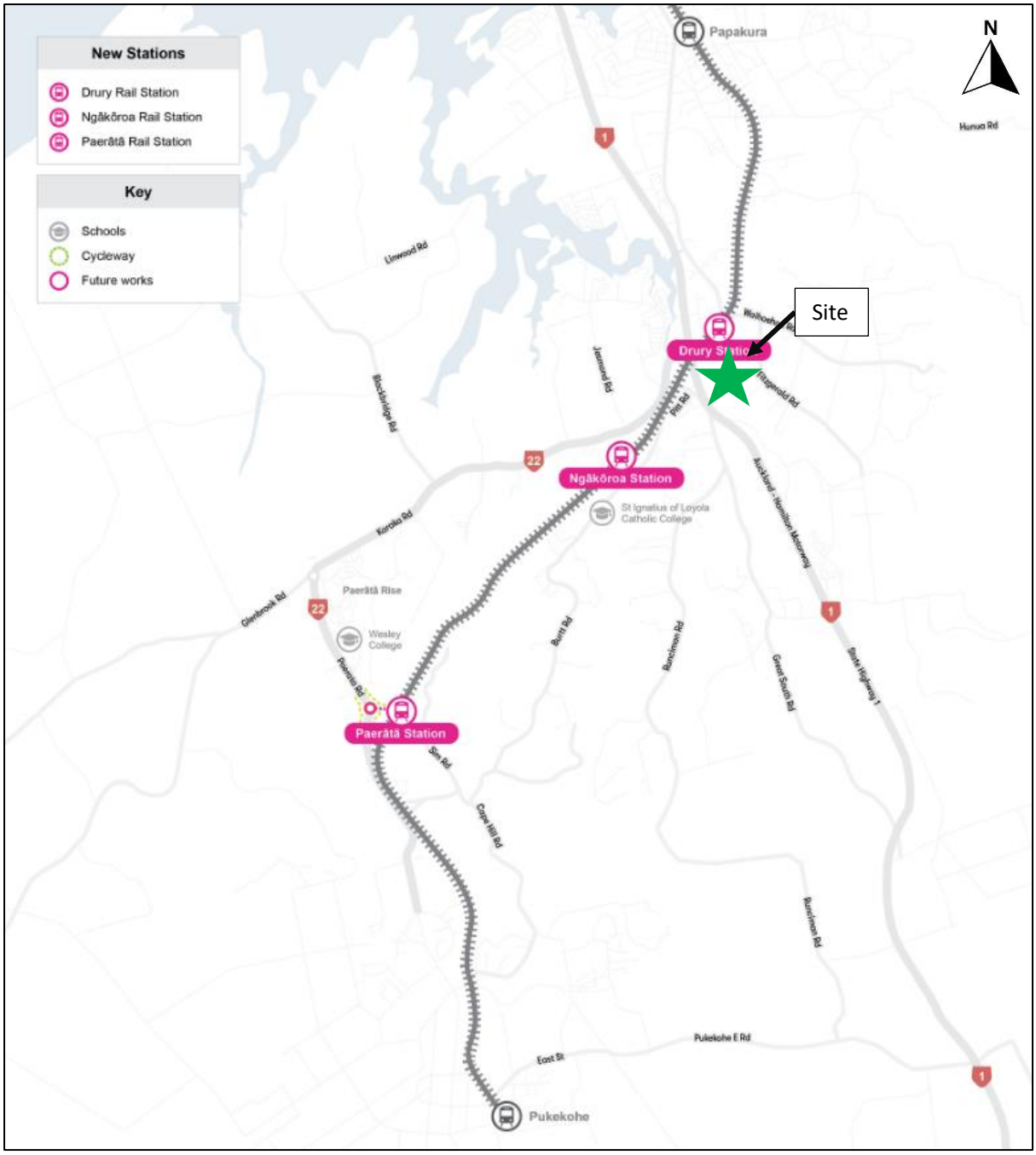


FIGURE 7: NEW RAILWAY STATION LOCATIONS

2.3.2 Bus Facilities

Bus service 376 is a scheduled service which currently operates between Auranga and Drury to Papakura. The service operates along Great South Road at an approximate 20-minute frequency during weekday peak times and 30-minute frequency during off-peak times and weekends. More recently, the bus service has been altered to include service to the newly constructed residential development within Auranga. The 376-bus route between Auranga and Papakura can be seen in Figure 8 below.

It is understood that bus services within and to/from Drury will improve significantly once further development occurs within the Suburb. A public transport hub will be constructed in proximity to the Drury Railway Station to provide commuters and residents with a highly efficient public transport system.

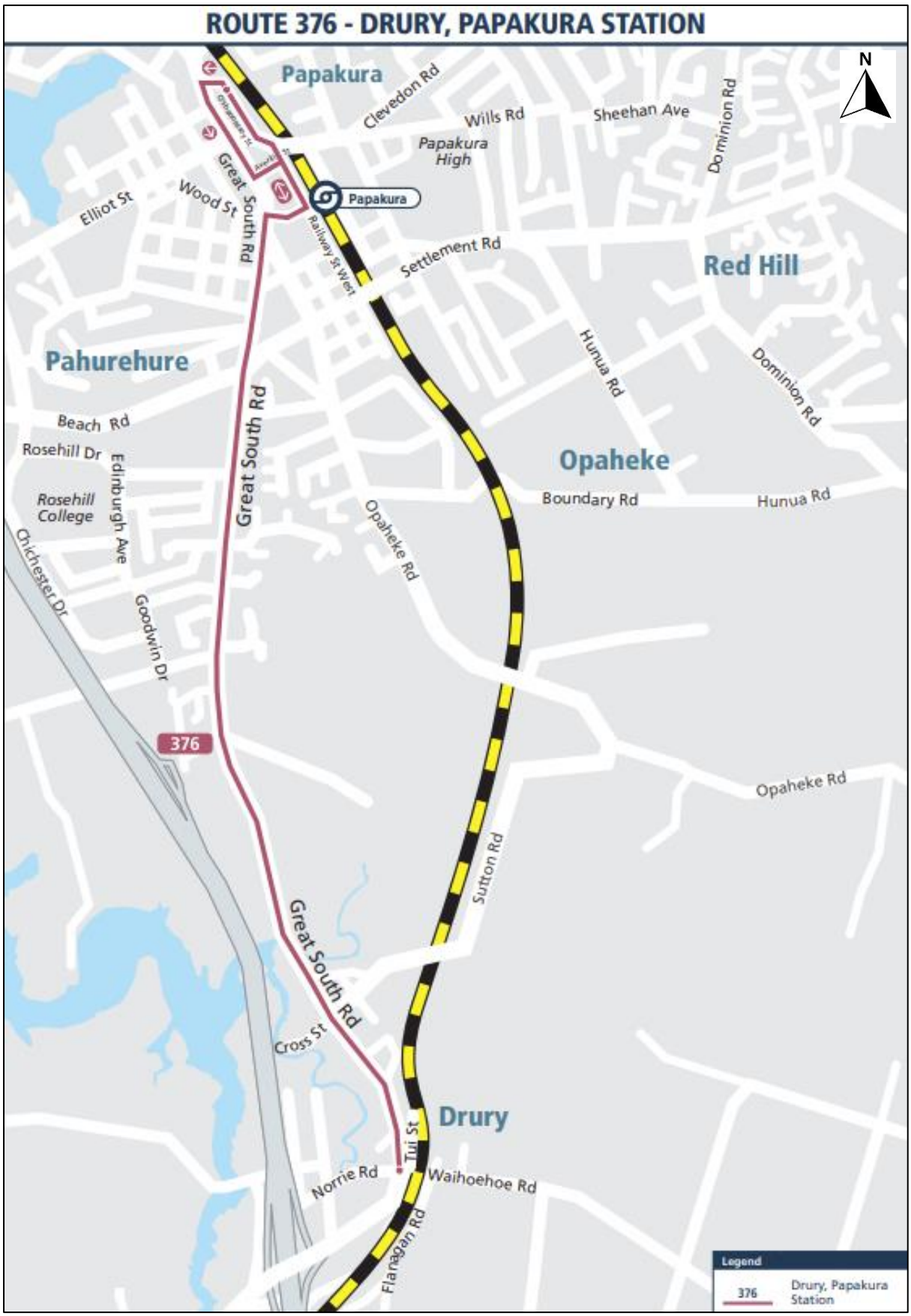


FIGURE 8: 376 BUS ROUTE

2.4 Walking and Cycling Provision

As discussed extensively in section 2.2, the local road network in Drury Centre currently lacks provisions for cycling and walking. Apart from the gravel shared path on the northern side of Waihoehoe Road (provided as part of the Drury South development works), there are no other active mode facilities on the surrounding road corridors.

It is understood that work is currently being undertaken by NZTA to extend the Southern Pathway (shared path) along the western side of SH1, from its current extent at the Papakura interchange to the Drury Interchange, with completion expected in 2025.

As stated in the approved Fast-Track Consent application, and also in section 2.2 above, as part of the Drury Centre Stage 1 development, it is proposed to upgrade the external road corridors in vicinity of the site (Waihoehoe Road, Fitzgerald Road and Brookfield Road) and also the internal road corridors within the Stage 1 development site to provide a high-quality, and well-connected active mode network within and around the side. It is expected, these active mode facilities will tie into the proposed active mode facilities within the Stage 2 development, resulting in excellent active mode connectivity within the site, the wider Drury suburb and also to the proposed public transport hub.

2.5 Road Safety

2.5.1 CAS Analysis

A search was made of the New Zealand Transport Authority (NZTA) Crash Analysis System for all reported crashes that had occurred along the site frontage on Fitzgerald Road, Waihoehoe Road west of Fitzgerald Road, and the full length of Brookfield Road, over the last five-year period from 2020 to 2025 (including all crashes from 2025). The search found that six crashes had been reported within the study area of which one resulted in serious injuries, three resulted in minor injuries, and the two remaining crashes resulted in property damage only. The search area can be seen in Figure 9 below.

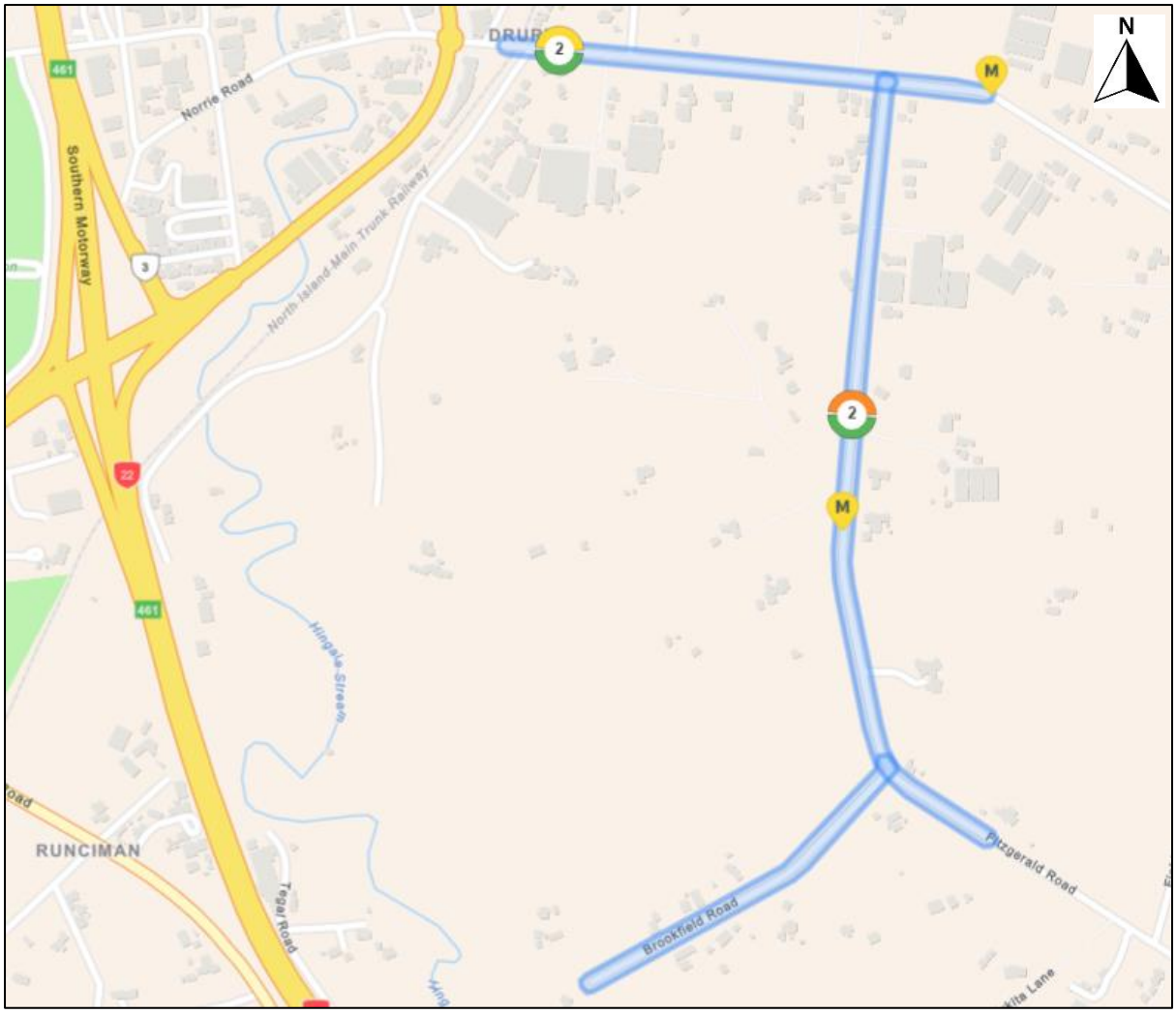


FIGURE 9: ROAD SAFETY RECORD

The crash resulting in serious injuries occurred where a vehicle travelling south on Fitzgerald Road lost control and crashed into a bank. The driver was under the influence of alcohol.

The first crash resulting in minor injuries occurred where a learner driver travelling west on Waihoehoe Road approached the moderate bend just before the intersection with Fitzgerald Road. The driver has lost control around the bend, crashing into a fence and a tree. The curve has advisory speeds of 50km/h while the learner driver was travelling at approximately 70km/h during heavy rain conditions.

The second crash resulting in minor injuries occurred where a driver travelling west on Waihoehoe Road when a young pedestrian walking home from school has run out onto the road. The driver was unable to stop in time resulting in a collision between the vehicle and the pedestrian. As mentioned earlier, Waihoehoe Road currently lacks provision for pedestrians given its current rural environment.

The third minor crash resulting in minor injuries occurred where a vehicle travelling on Fitzgerald Road has struck some metal debris on the road causing it to lose control and spin out onto the opposing movement lane. This has resulted in a collision with a vehicle travelling in the opposite direction. The driver was found to be travelling at an excessive speed inappropriate for the rainy weather conditions.

Overall, no crashes were reported that involved the subject site. The crashes that have occurred are due to driver error and not due to any road safety issues. No common crash trends or factors have been identified and as such, no specific road safety issues have been identified in relation to the subject site.

The Waka Kotahi MegaMaps database has been used to has identify both the personal and collective risk ratings for the roads described above.

- Collective risk is the measure of how likely a crash is to happen along a given stretch of road network.
- Personal risk relates to the chance that if a crash does occur that it involves a given individual. It is not unusual to see higher personal risks on a road, particularly when there are low traffic numbers.

Table 1 below shows a summary of the MegaMaps Risk Ratings for surrounding roads.

TABLE 1: MEGAMAPS RISK RATINGS

Road	Collective Risk	Personal Risk
Fitzgerald Road	Medium	Medium
Brookfield Road	Low	Low
Waihoehoe Road (east of Fitzgerald Rd)	Low Medium	Low
Waihoehoe Road (west of Fitzgerald Rd)	Medium	Medium

The associated risk ratings of medium collective and personal risks for Fitzgerald Road aligns with the road safety record given that over the past five years, one serious injury and one minor injury crash has occurred along the search area of this road corridor. The associated risk rating of low collective risk and personal risk along Brookfield Road aligns with the crash record given that no injury crashes have occurred along the road corridor over the past five years.

The Medium collective and personal risk along the western section of Waihoehoe Road does not align with the observed crash record given that only one minor injury crash has occurred over the past five years.

Based on the analysis above, no specific road safety issues have been identified in relation to the subject site. To further improve safety, it is understood that the proposed development includes significant upgrades to the existing road network which will have a further positive impact on road safety in vicinity of the site.

3 Proposal

3.1 Site Layout

The Drury Centre Stage 2 development involves land use, subdivision, stream works, water permits and discharge consents at 64, 68, 108, 120 and 132 Flanagan Road, Drury. The Stage 2 development will consist of the construction of various dwellings, retail stores, commercial buildings, visitor accommodation and community with ancillary car parking; bulk earthworks; the construction and installation of reticulation networks; and roading infrastructure to service the project. The proposal also includes provision for

various public and privately owned road corridors within the Stage 2 site. The approximate floor areas of the proposed activities are outlined below:

- 63,547sqm of Retail activities
- 33,048sqm of Commercial activities
- 10,216sqm of Community activities
- 17,168sqm of visitor accommodation (consisting of a total of 282 rooms)
- 102 dwellings (consisting of apartments and terrace housing) with a total floor area of 14,938sqm

Additionally, this consent application also proposes obtaining land use consent for the further subdivision of the 13 super lots consented as part of the Drury Centre Stage 1 development in July 2023. It is understood the 13 super lots will be subdivided into 292 lots. It should be noted that the Drury Centre Stage 1 development (consisting of 24,000sqm GFA of large format retail and 13 super lots) was granted consent under the Covid-19 (Fast-track Consenting) Act 2020. A subsequent resource consent was also obtained for a further 8,000sqm GFA of retail within the Stage 1 area.

The proposed Stage 2 development is essentially an extension of the Stage 1 development with proposed road corridors largely aligning with the Drury Centre Precinct Plans and what has been previously consented. The proposed site layout and approximate alignment of the roading corridors within the Drury Centre Stage 2 site is shown in Figure 10 below.

The proposed development includes several new public and private road corridors within the Stage 2 development site, and JOALs within the Stage 1 site to serve the proposed residential lots. The new public and private road corridors will provide multi-modal connectivity to the new Drury Central Railway station, the wider Drury suburb, as well as upcoming future developments within the vicinity of the site.

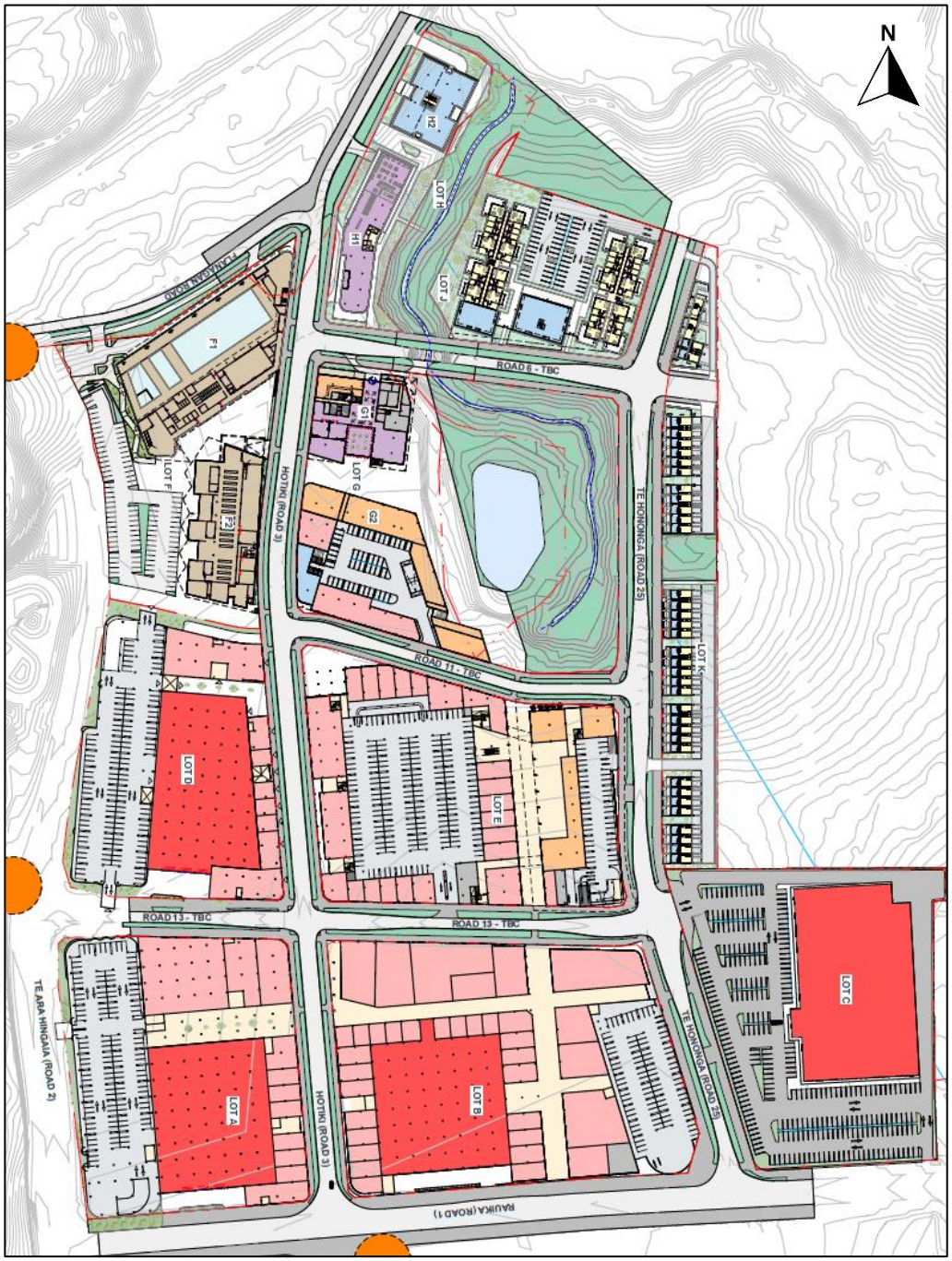


FIGURE 10: DRURY CENTRE STAGE 2 DEVELOPMENT SITE

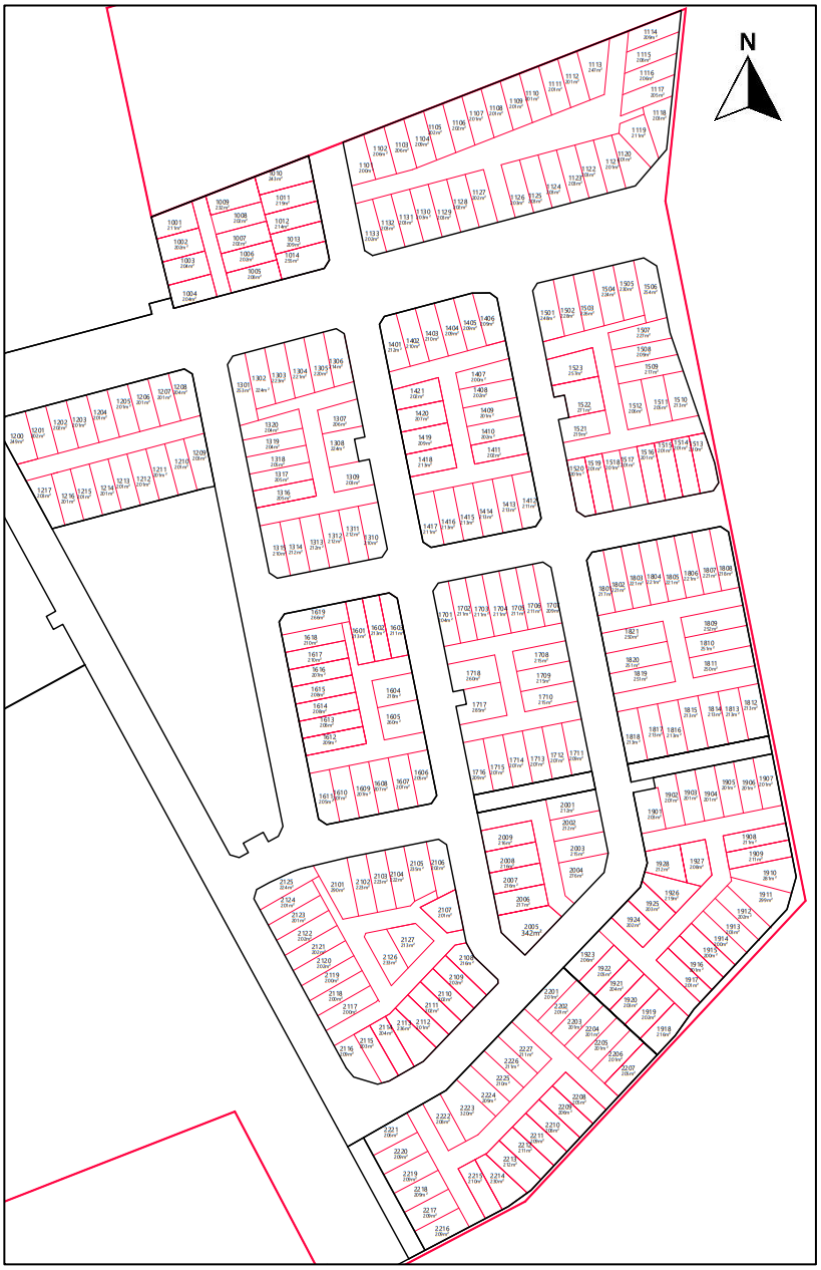


FIGURE 11: DRURY CENTRE STAGE 1 – FURTHER SUBDIVISION OF THE CONSENTED SUPER LOTS

4 Transport Design Report

As stated above, the proposed development includes several new public and private road corridors within the subject site and various JOALs within the Drury Centre Stage 1 site to serve the proposed residential lots. It is noted that the Drury Centre Stage 1 development also included several upgrades to the existing rural road corridors. These upgrades were extensively discussed in the Fast-track ITA dated 23 November 2022 and have also been summarised in section 4.1.2 below.

The design of the proposed road corridors within the site is largely similar to what has been consented as part of the Stage 1 Fast-track application. Figure 12 and Figure 13 below show the location and alignment of the previously consented road corridors and also the approximate alignment and road hierarchy of the proposed internal local and collector roads.

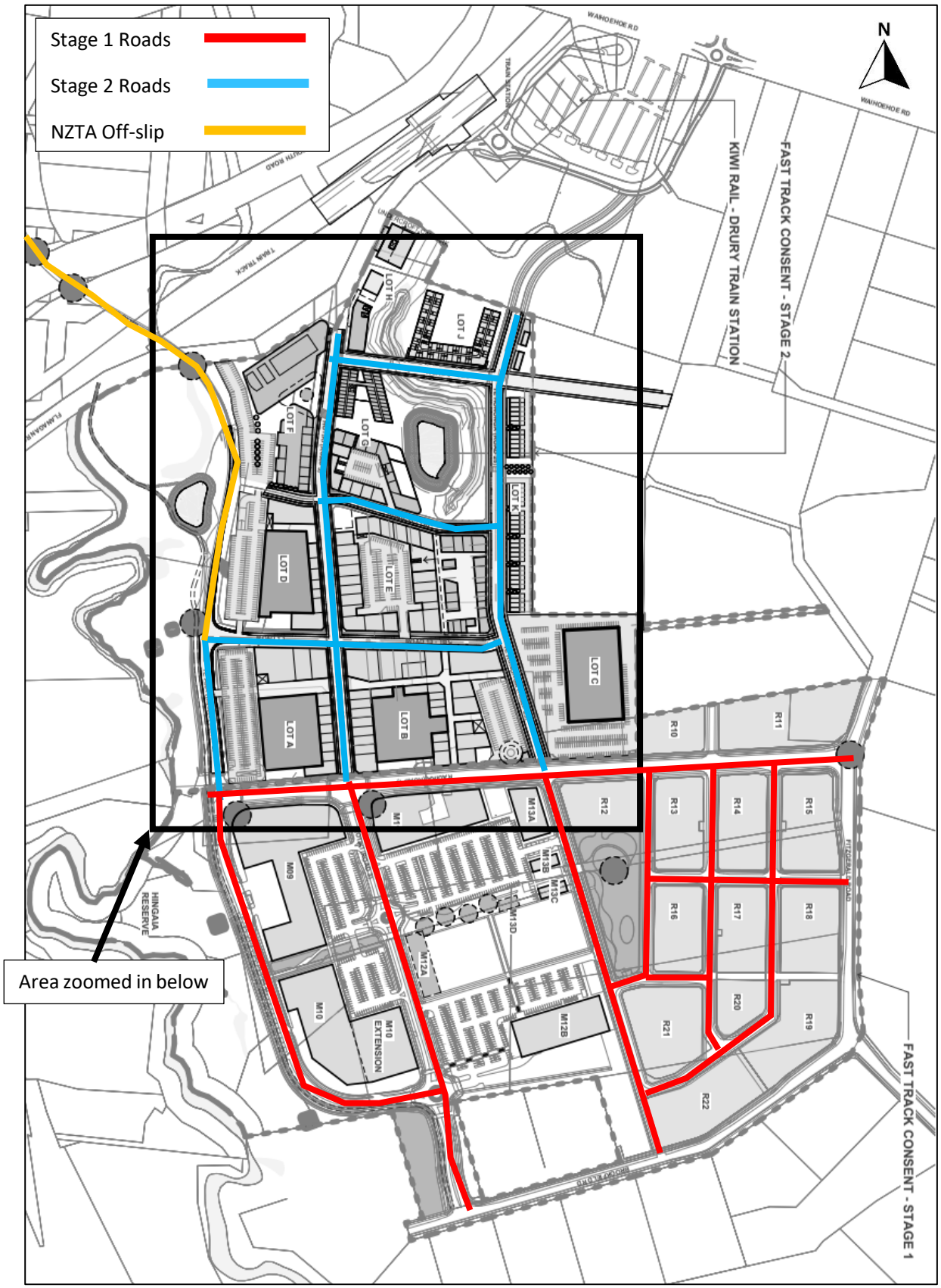


FIGURE 12: PROPOSED INTERNAL ROAD LAYOUTS IN STAGE 1 AND 2

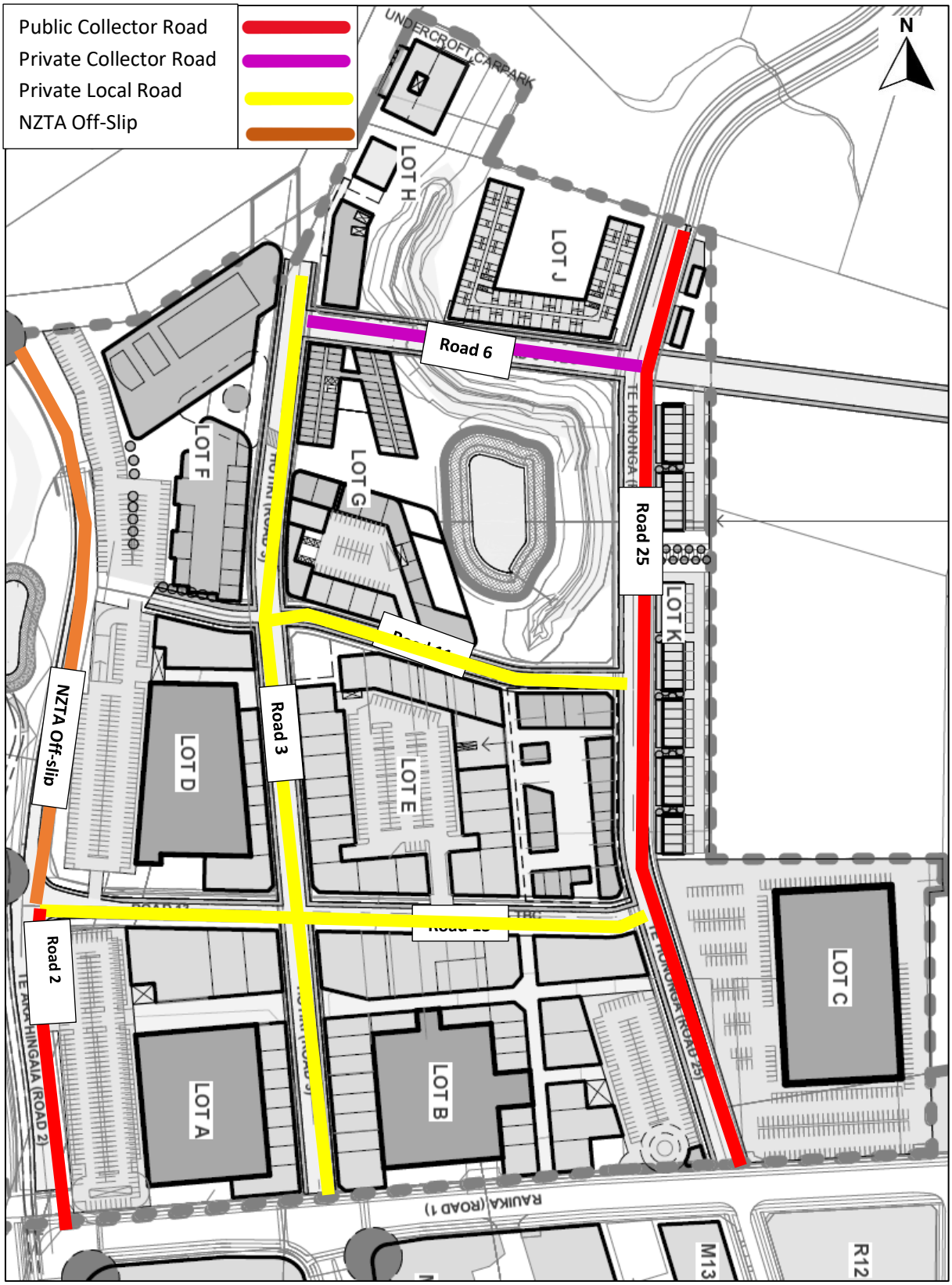


FIGURE 13: PROPOSED INTERNAL ROAD LAYOUT IN STAGE 2

It should be noted that the private road corridors (as identified in Figure 13), and intersections between these private and public road corridors have been designed to comply with AT Transport Design Manual (TDM) design guidance and engineering requirements.

4.1 General Road Layout

4.1.1 Proposed Roading Layout

As shown in Figure 12 and Figure 13, it is proposed to provide several privately and publicly owned local and collector road corridors within the development. These are outlined in detail below:

- A SH1 southbound off-ramp will provide a direct connection between the SH1 southbound carriageway and the Drury Centre Precinct. The off-ramp road will remain within NZTA ownership, and as such has been designed to NZTA standards. It should be noted that this off-ramp is already consented, and is scheduled to be constructed sometime between 2028-2030, however is not part of this consent application. The SH1 off-ramp is included as part of row (c) within the current precinct provisions trigger table, however it has been designed and consented to be a distinct project of its own, meaning that it could potentially be built earlier or later than that timeframe. As shown in Figure 13, this off-ramp connects into Road 2.
- Road 2 is classified as a private collector road and connects with the NZTA off-slip to the east-west Road 1 road corridor approved in the Stage 1 fast-track consent.
- Road 25 to the north of Road 1 is a public collector road providing access to the eastern side of the Stage 2 development and ultimately connecting to the Drury Central Railway Station located further north of the subject site. It should be noted that this ultimate connection to the Railway station is not part of this consent application.
- Road 6 is classified as a private collector road providing east-west connectivity across the northern portion of the Stage 2 site. As part of future design stages, it is expected that this road corridor will extend and connect to Fitzgerald Road at its eastern end.
- Road 3 is classified as a private collector road that provides a north-south link through the centre of the Stage 2 area, between Road 1 at its southern end and the northern site boundary at its northern end.
- Road 11 and Road 13 also exist as two private local roads with an east-west alignment extending through the site.

4.1.2 Upgrades to External Road corridors

As stated in section 2.2, the existing road corridors in proximity of the subject site (Waihoehoe Road, Fitzgerald Road and Brookfield Road) have characteristics which are typical for a rural road corridor. This includes poor provision of active mode facilities, unsealed shoulders, poor road markings, and mostly priority-controlled or stop-controlled intersections. Given the existing rural roadside environment, and low existing traffic volumes, the above roading characteristics are not out of context. However, given the proposed level of residential, commercial and industrial development expected to occur as a result of PC48, PC49 and PC50, it is evident that traffic volumes on these road corridors will increase significantly.

As such, the Stage 1 Fast Track consent outlined several upgrades to the Waihoehoe Road, Fitzgerald Road, and Brookfield Road corridors including urbanising the transportation network by providing well-connected active mode facilities, dedicated public transport facilities, safer intersections (roundabouts and signalised intersections), sub-surface drainage and lower posted speed limits where required. These upgrades are expected to result in a well-connected and safer transportation network across the Drury Suburb and are required as per the consent conditions of the approved consent for the Drury Centre Stage 1 development.

4.1.3 Proposed Internal Road Corridors

The proposed development also includes construction of several local, and collector road corridors to provide access to the proposed retail, commercial, residential and community centre activities within the Drury Centre Stage 2 site, and the residential lots within the Drury Centre Stage 1 site. Figure 12 above shows the alignment of the previously consented road corridors and also the approximate alignment and road hierarchy of the proposed internal local and collector road corridors. The roads consented as part of the Stage 1 application are outlined in red in Figure 12. As shown, most of the proposed local and collector road corridors in Stage 2 are an extension of the consented road corridors as part of the Stage 1 Fast-track application. As such, to ensure consistency across the roading network, the design of the proposed local and collector roads is largely consistent with what has been previously consented. Of the proposed corridors, only Road 25 and Road 2 along the eastern and western ends of the site respectively will be publicly vested. All other road corridors within the site will not be vested and remain privately owned by the applicant. Additionally, the SH1 off-ramp will also remain publicly vested, owned and controlled by NZTA. Further detail about the hierarchy, approximate alignment and proposed cross-section of these road corridors is provided in section 4.4 below.

4.2 Active Mode Network

As stated above, the existing road corridors in proximity of the site are being upgraded as part of the Stage 1 Fast Track consent. This includes provision for active mode facilities such as cycle lanes, shared paths and footpaths on several external roading corridor.

Additionally, all proposed roads within the Stage 2 site will provide for active mode facilities to encourage alternative modes of travel both within and around the subject site. All local roads will provide footpaths on both sides of the road corridor to encourage pedestrian movements and will be traffic calmed to enable safe cycling, and all collector roads will provide separated / protected footpaths and cycle lanes. These will connect to the proposed active mode facilities along the upgraded external road corridors resulting in a well-connected and practical active mode network. It should also be noted that all proposed road corridors will be designed to encourage a low vehicle operating speed and safe crossing provisions for both pedestrians and cyclists will be provided at intersections and specific mid-block locations. As such, the site and surrounding roads are designed to ensure high standards of service and safety for active modes of transport, such as walking, cycling, and scootering, within the Drury Centre Precinct.

4.3 Public Transport Network

As stated in section 2.3, the Drury suburb currently has a relatively poor public transport network. This is to be expected, given that most of the land is currently undeveloped and used primarily for farming and agricultural activities. However, with the proposed development of the Drury East, Drury Centre and Waihoehoe precincts, the land use across Drury is expected to change significantly to a combination of residential, commercial and industrial. This will result in a significant increase in traffic volumes, as residents and employees commute to/from these precincts. In order to encourage use of public transport facilities, and reduce reliance of private vehicle trips, a highly efficient and well-connected public transport network will be provided including a large public transport hub and the Drury Centre Railway station within the Drury Centre precinct. The improved rail network and bus facilities are discussed in the following sections.

4.3.1 Proposed Rail Network

As stated in section 2.3.1, the Drury Centre and Paerātā Railway Stations are currently under construction and are expected to be operational from late 2025. As shown in Figure 14, these Railway stations will extend the existing southern line which currently terminates at the Papakura Transport Hub and provide

train service connections to Pukekohe, Papakura, Newmarket and Britomart (CBD) amongst several other suburbs. The Drury Centre Railway Station is located approximately 300m north of the subject site just south of the Flanagan Road/Waihoehoe Road intersection, hence lies within a 10-minute walking catchment of the Drury Centre site.

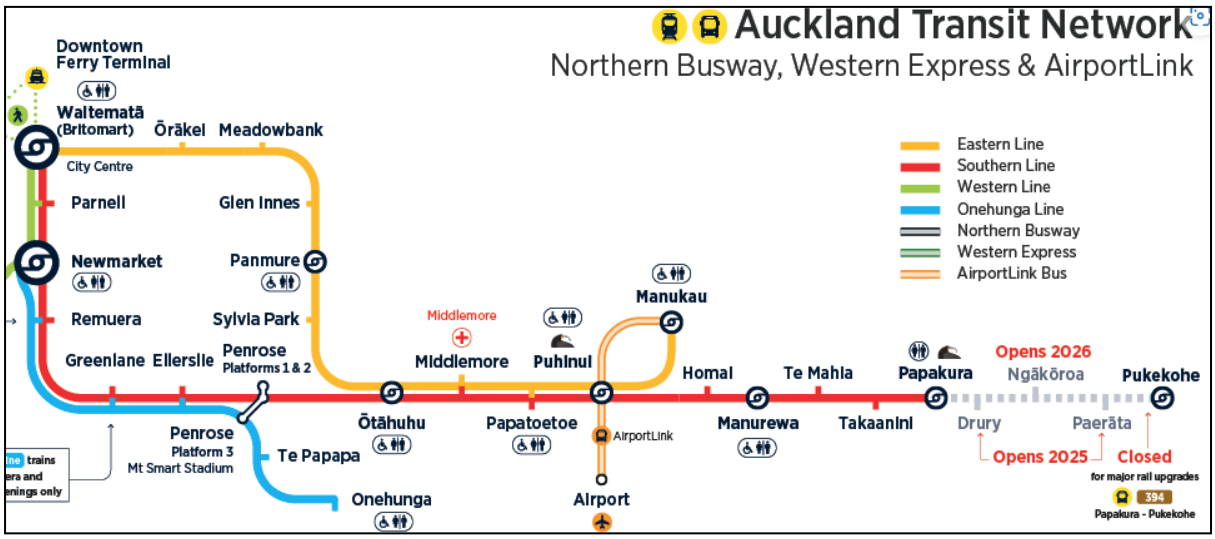


FIGURE 14: DRURY AND PAERĀTĀ RAILWAY STATION

4.3.2 Proposed Bus Facilities

The Drury suburb is currently served by one bus route. To support the proposed and planned level of development occurring in Drury East, it is understood that the existing bus network will be significantly improved. Detailed bus routes across the wider Drury Suburb have not yet been developed by Auckland Transport, however given the provision for dedicated bus lanes along Waihoehoe Road which extends along the northern boundary of the subject site, it is expected that the subject site will have excellent connectivity to future bus routes.

The proposed bus routing within the site is shown in Figure 15 below. As shown, buses will travel along Road 25 (Te Hononga). However, as part of this consent application, Road 25 (Te Hononga) will only extend until the northern boundary of the subject site, hence will not yet provide a direct connection to the Drury Public Transport Hub. As such, it is proposed that in the interim, buses will travel along Road 25, turn onto Road 6, and then turn onto Road 3 and lastly turn onto Flanagan Road that will connect to the Drury Public Transport Hub north of the site. As such, it is evident that the site will have excellent connectivity to the bus network and the wider rail network respectively.

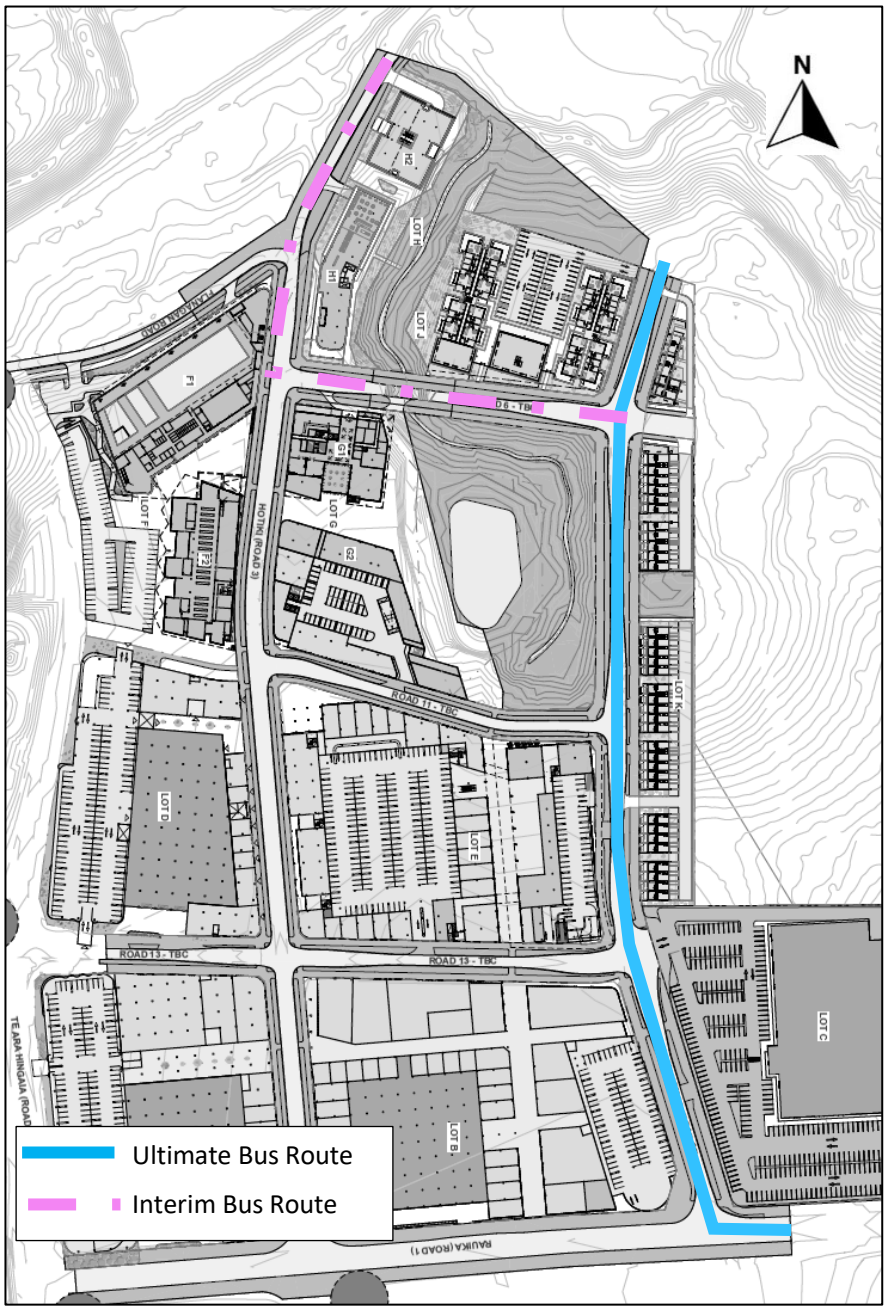


FIGURE 15: PROPOSED BUS ROUTE THROUGH THE SITE

Given the provision for buses to travel along Road 3, Road 6 and Road 25, these road corridors have been designed accordingly to accommodate the bus route within the site. This is discussed in further detail in section 4.4 below.

Within Stage 1, the Bus stops are located along the east-west Road 1corridor as this will serve both the Drury Centre Stage 1 and Stage 2 developments.. Within Stage 2, it is proposed to provide bus stops along Road 25. The southbound bus stop will be located directly outside the road frontage of Lot C, and the northbound bus stop will be located close to the wetland area, opposite the road frontage of Lot K. As such it is considered that the site will be very well served by public transport, providing residents, staff and customers with excellent access to alternative transport means.

Concept designs of the proposed bus stops are shown in Figure 16– Figure 17 below.

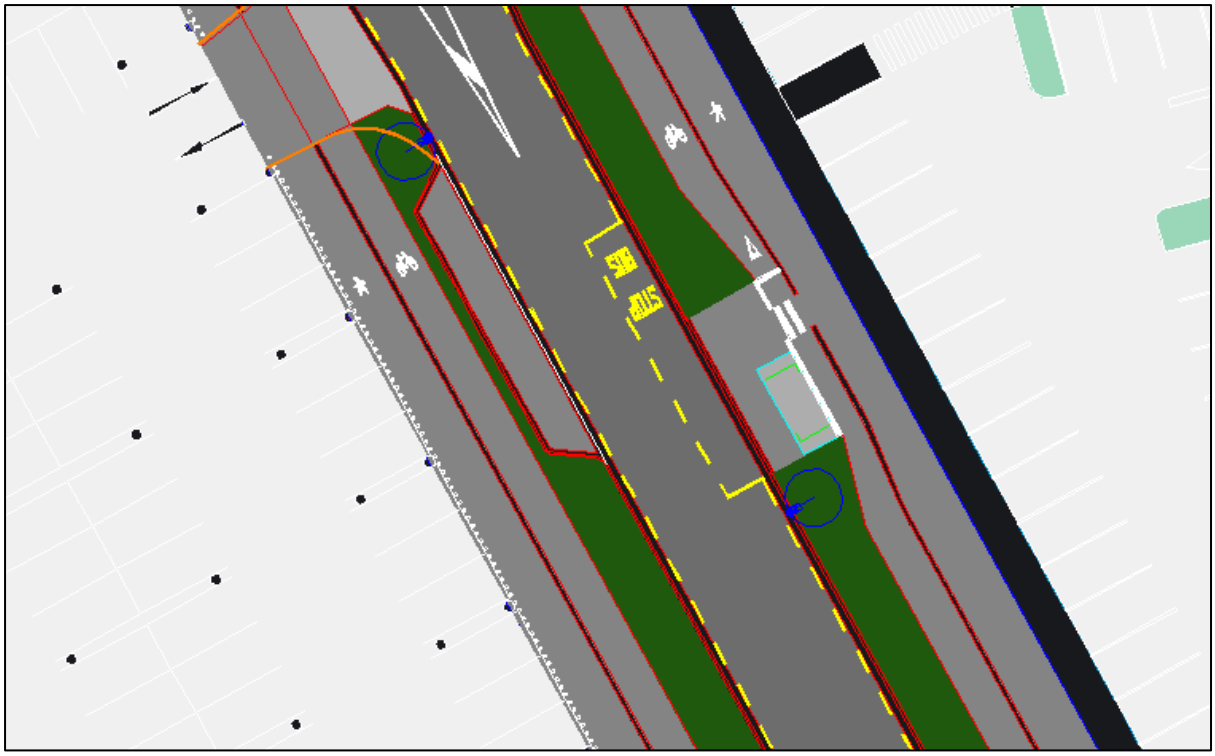


FIGURE 16: PROPOSED SOUTHBOUND BUS STOP LOCATION

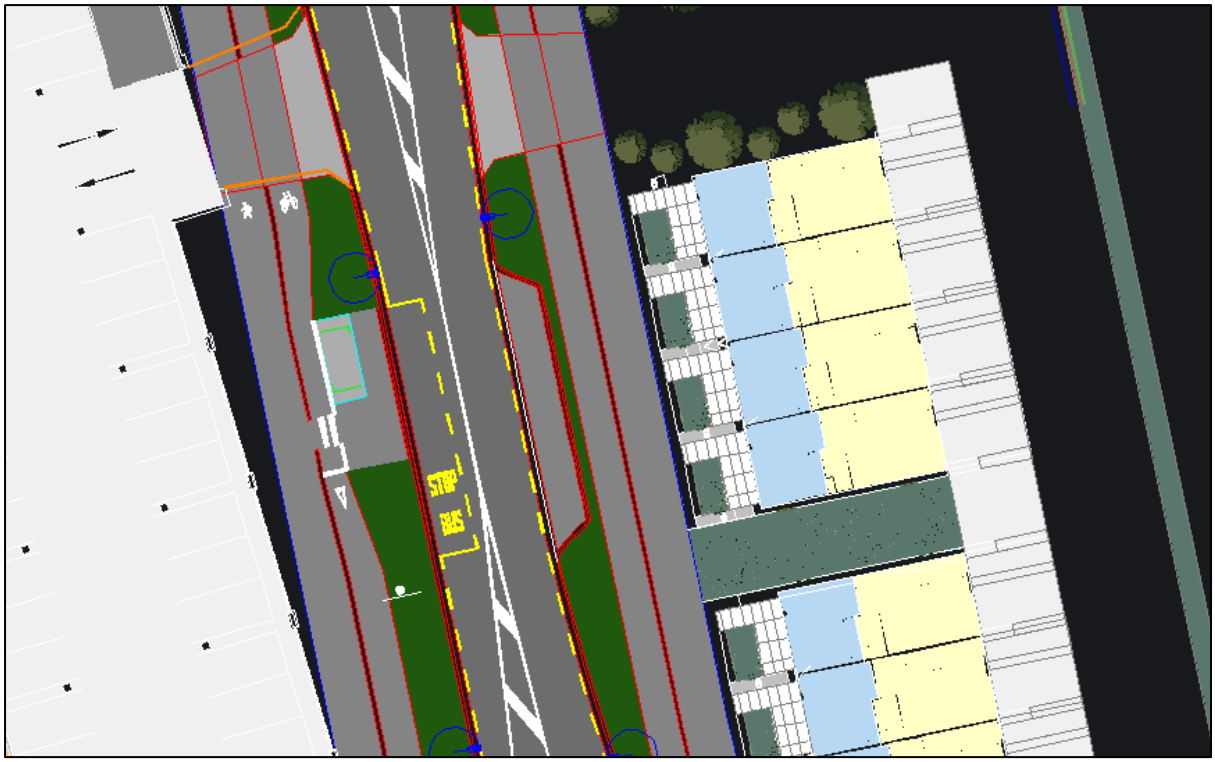


FIGURE 17: PROPOSED NORTHBOUND BUS STOP LOCATION

In both locations, the front berms have been widened to accommodate the required bus shelter, with the cycle lane slightly narrowed as it passes behind the stop. Along the temporary bus route, temporary signs will be placed at bus stop locations, but no shelters will be provided.

4.4 Internal Road Cross-Sections

4.4.1 Road 25

Road 25 will be classified as a public collector road corridor extending north-south along the eastern side of the Drury Centre Stage 2 development. It is described as Drury Boulevard within the Precinct Provisions and Precinct Plans. The road corridor extends from Road 1 at its southern end to the northern boundary of the proposed development site. As stated above, it is anticipated, that in the future the road corridor will extend further north beyond the current site boundary to connect to the Drury Railway Station and public transport hub at its northern end. However, this is beyond the scope of this consent application.

Road 25 is proposed to have a 23m cross-section along its entire length including provision for a 7m wide two-way, two-lane carriageway, 3.1m wide front berms to accommodate street furniture and trees, 2.2m uni-directional cycleways, and 2.7m wide footpaths and back berms on both sides of the road corridor. A 7m wide carriageway has been provided as the road corridor will frequently facilitate bus movements especially once the Drury Public Transport Hub is operational and the road corridor is extended to the public transport hub. Additionally, it is proposed to provide on-street parking on both sides of the road corridor. Where parking is provided, a minimum 0.8m buffer will be provided between the on-street parking spaces and the uni-directional cycleway on both sides of the corridor. The proposed cross-section of Road 25 is shown in Figure 18 and Figure 19 below and complies with the Collector Road design requirements as outlined in I450.11 Appendix 1 Road Function and Required Design Elements Table within the precinct provisions.

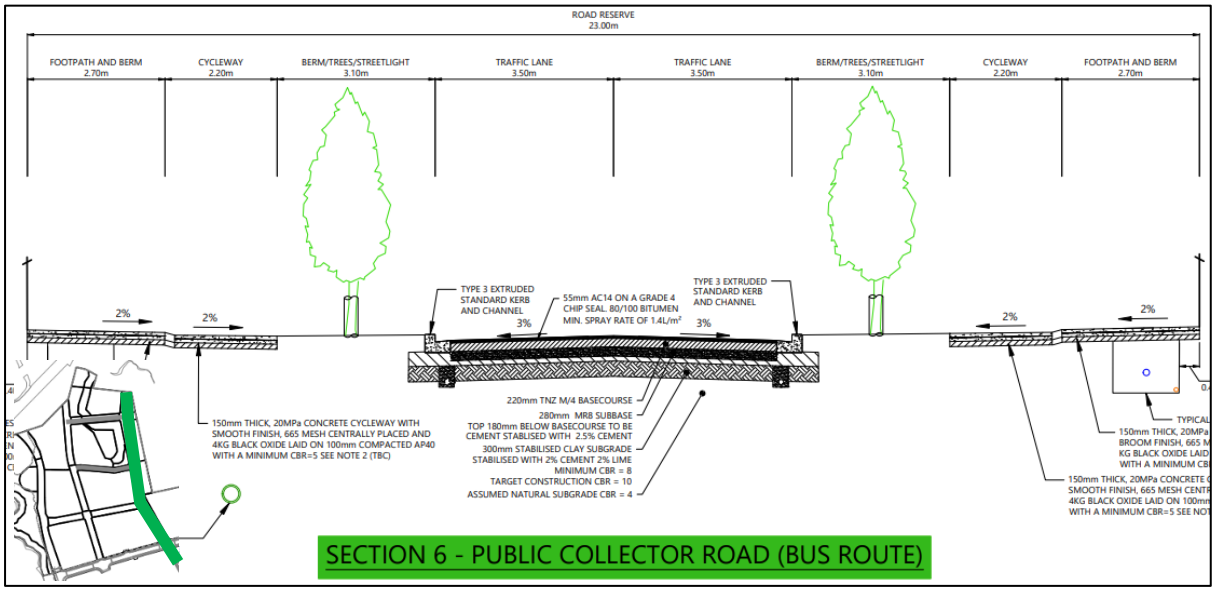


FIGURE 18: ROAD 25 - NO ON-STREET PARKING FACILITIES

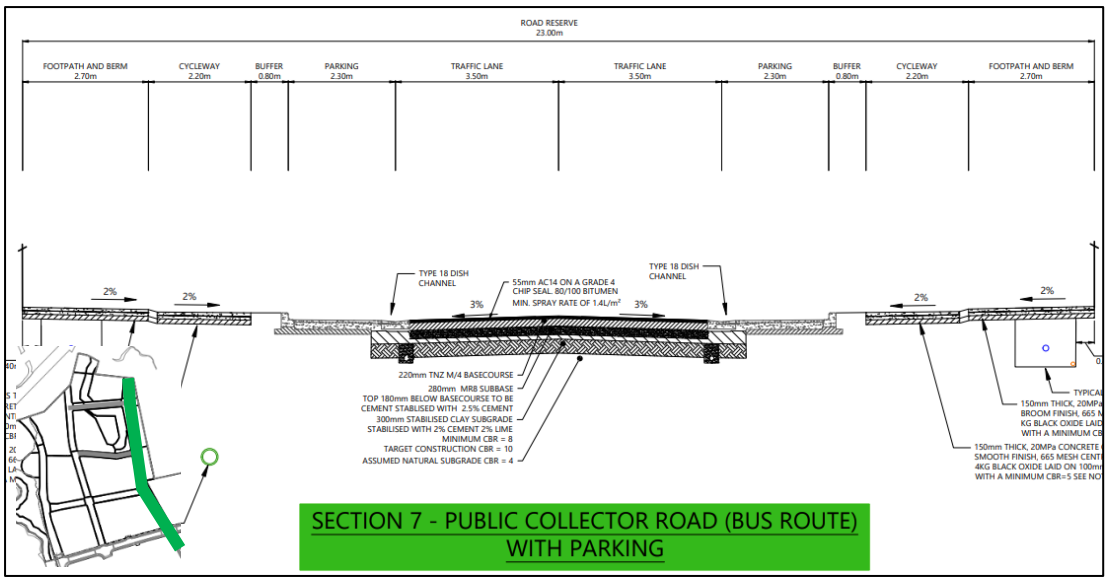


FIGURE 19: ROAD 25 - ON-STREET PARKING FACILITIES

4.4.2 Road 3

Road 3 will be classified as a private local road corridor extending north-south through the centre of the Drury Centre Stage 2 development. It is described as the Key Retail Street within the Precinct Provisions and Precinct Plans. As shown in Figure 13, the road alignment is parallel to Road 25 and extends from Road 1 at its southern end to the northern boundary of the Drury Centre Stage 2 site. Similar to Road 25, it is anticipated that in the future, Road 3 will extend further north beyond the current site boundary to connect to the Drury Railway Station and public transport hub, however this is beyond the scope of this application.

Road 3 is proposed to have a 20.4m cross-section along its entire length including provision for a 9m carriageway consisting of 3m wide traffic lanes in each direction and a 3m flush median separating the two traffic lanes on some sections of its length. The provision of a flush median allows vehicles turning from Road 3 into Road 13, Road 11 and Road 6 to refuge without obstructing through traffic along the corridor. A 3m shared path, and 2.5m front berm including provision for on-street parking and street furniture on both sides of the road corridor will also be provided on both sides of the corridor as shown in Figure 20 below. As such, the proposed design of Road 3 complies with the requirements outlined in the road function and required design elements table in the precinct provisions. Although the provision of a flush median is not explicitly required in the design elements table, its infrequent use for turning purposes was considered a useful addition.

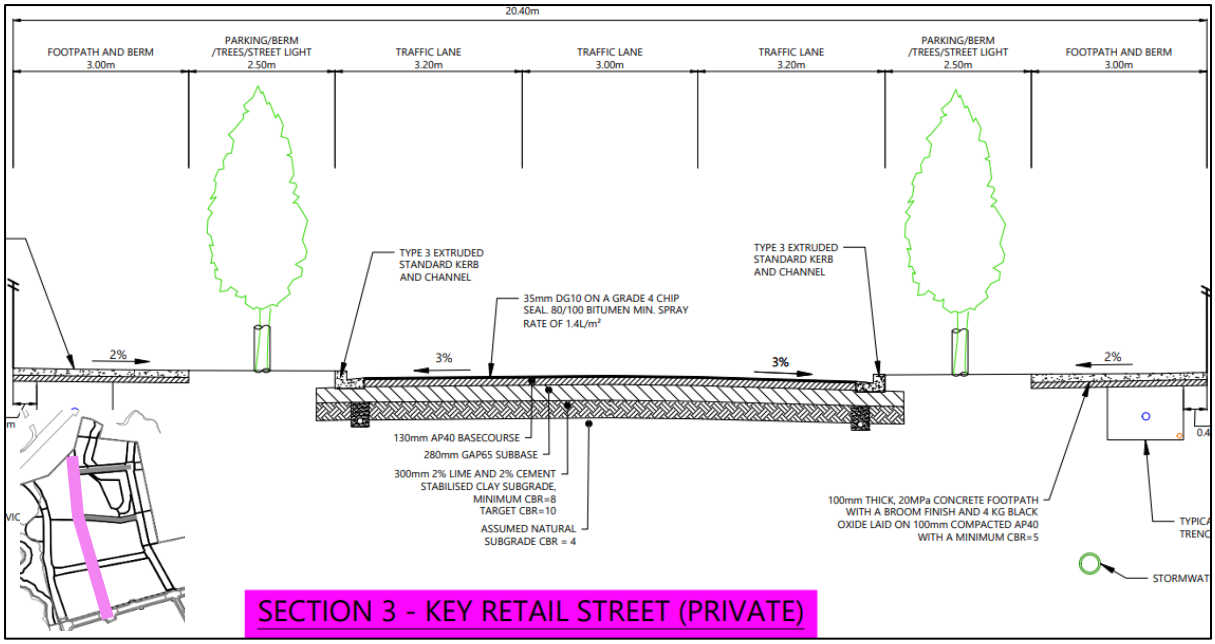


FIGURE 20: ROAD 3 CROSS-SECTION

4.4.3 Road 2

Road 2 will be classified as a public collector road extending between Road 1 at its southern end the SH1 off-ramp at its northern end along the western boundary of the Drury Centre Stage 2 development. It is described as Creek Road within the Precinct Provisions and Plans. As stated above, the road corridor connects to the SH1 off-ramp at the Road 13/ Road 2 / Road 13 T-intersection. This intersection is discussed in further detail in section 4.9.7 below.

The southern section (between Road 1 and Road 13) will have a 22m cross-section including provision for two 3.5m wide traffic lanes in the southbound direction, one 3.5m wide traffic lane in the northern direction, a 1m wide traffic island, 2m front berms on both the eastern and western side, and a 4m wide shared path, and 2.5m back berm on the western side of the road corridor only. The 1m wide traffic island restricts inbound and outbound traffic movements to left-in and left-out (LILO) only. This is shown in Figure 21 below. Appendix 1 of the precinct provisions requires collector roads to have a minimum overall road reserve width of 23m, and both cycling and pedestrian provisions on both sides of the corridor. As stated above, the road corridor only provides a 4m wide shared path on the western side of the corridor, and an overall width of 22m, hence does not comply with the precinct provisions. However, given that this road corridor intersects with the SH1 off-ramp, it has been designed in accordance with the NZTA design of the off-ramp. As such, the non-compliance against the precinct provisions will have no adverse impact on the safe and efficient operation of the road corridor.

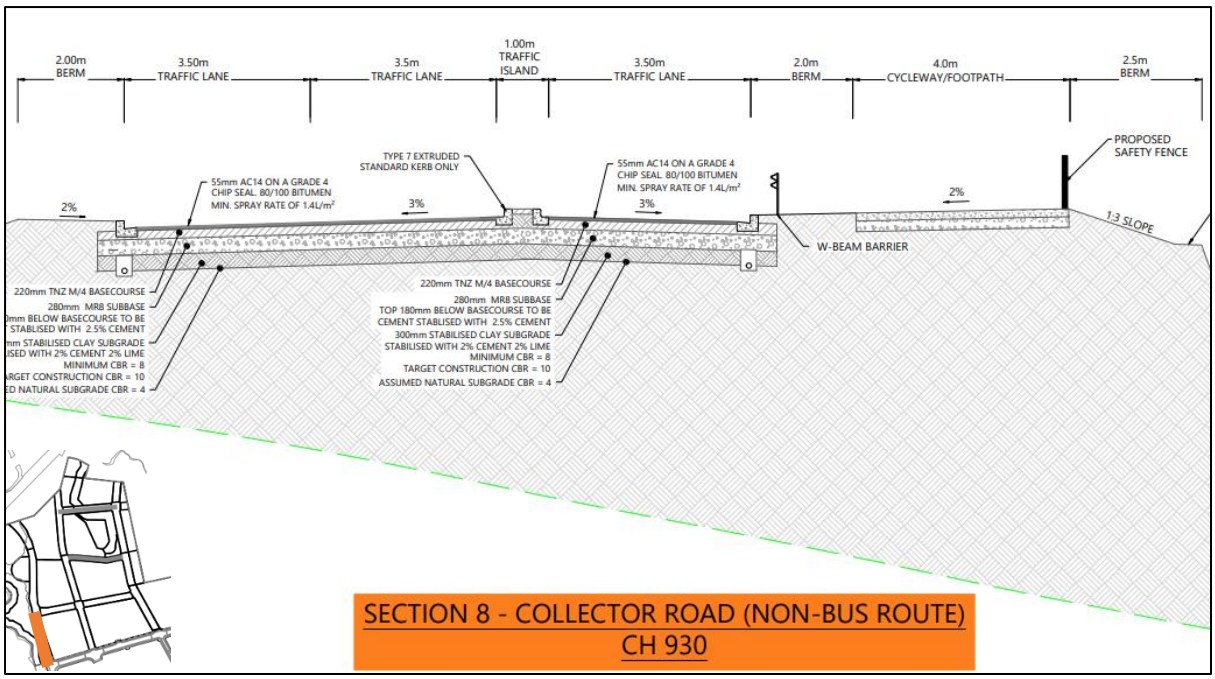


FIGURE 21: ROAD 2 CROSS-SECTION (SOUTH)

The northern section (to the north of Road 13) will be retained in NZTA ownership and is effectively a transition road between the SH1 direct connection slip lane and the metropolitan centre. It will have a 10.2m cross-section including provision for a single 3.5m wide traffic lane in the southbound direction with a 2m and 1m shoulder at each side, with 1.7m and 2.0m berms each side. The specification of the cross section is compliant with NZTA's design guidance, and the design was agreed with NZTA through the slip lane consenting process. As this section of road approaches Road 13, it splits into two lanes to enable turning into Road 13. The cross section of this northern section is shown in Figure 22 below.

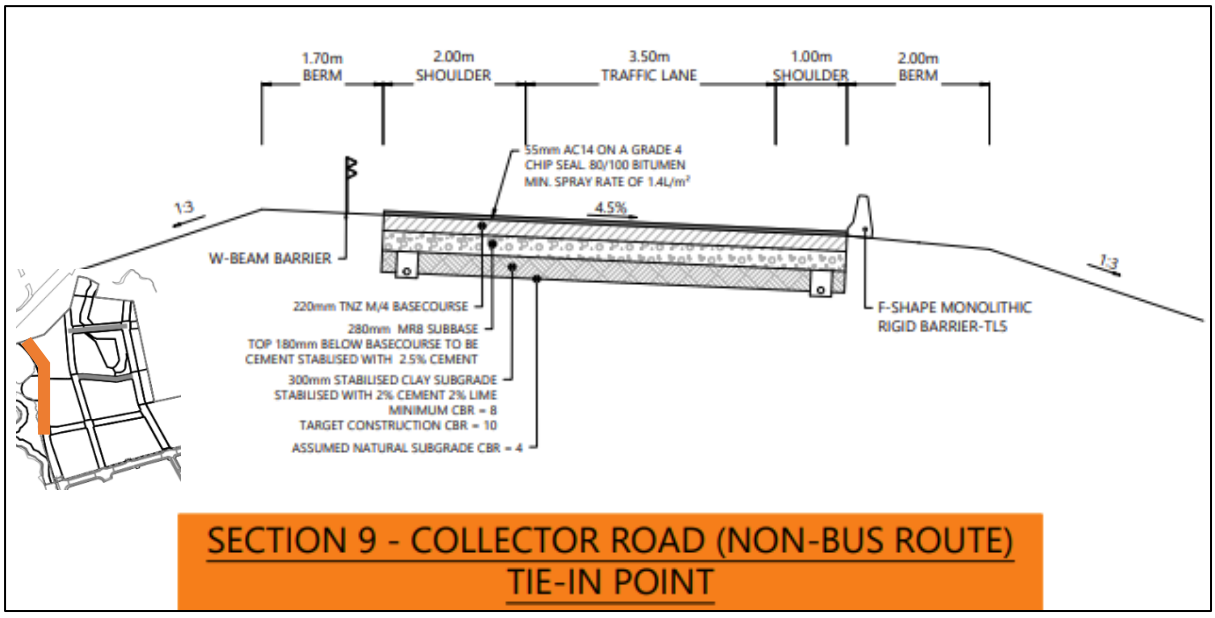


FIGURE 22: ROAD 2 CROSS-SECTION (NORTH)

4.4.4 Road 13

Road 13 will be classified as a private local road extending east-west in the southern half of the subject site. The road corridor extends between Road 2 at its western end and Road 25 at its eastern end.

Road 13 retains the same overall road reserve width (20.40m) along its entire length, however the cross-section varies slightly along different sections of the road corridor. East of Road 3, Road 13 contains provision for a 6m carriageway (consisting of 3m wide traffic lanes in both directions), 3.7m wide front berms for street furniture, and landscaping and a 3.5m wide footpath and back berm on both sides of the corridor. This is shown in Figure 23 below.

West of Road 3, Road 13 maintains a 20.4m road reserve width, containing provision for a 6m wide carriageway (3m traffic lanes in both directions), 2.3m wide front berm, a 2.2m wide uni-directional cycleway and a 2.7m wide footpath and back berm on both sides of the road corridor. This is shown in Figure 24 below. A mid-block cycle crossing will be provided to take all cyclists to and from the northern side of the road, therefore to the west of that crossing point, a shared path will be provided on the northern side, with no cycle facilities on the southern side.

Appendix 1 of the precinct provisions table requires Local Roads to have a minimum road reserve width of 16m, and pedestrian provision on both sides of the road corridor. The proposed design provides footpaths on both sides of the corridor, and has a 20.4m overall road reserve width, hence complying with the requirements outlined in the precinct provisions. The provision of cycle facilities is not required along local roads, therefore the cycle facilities provided are surplus to requirements, intended to ensure safe and convenience cycle journeys through the precinct.

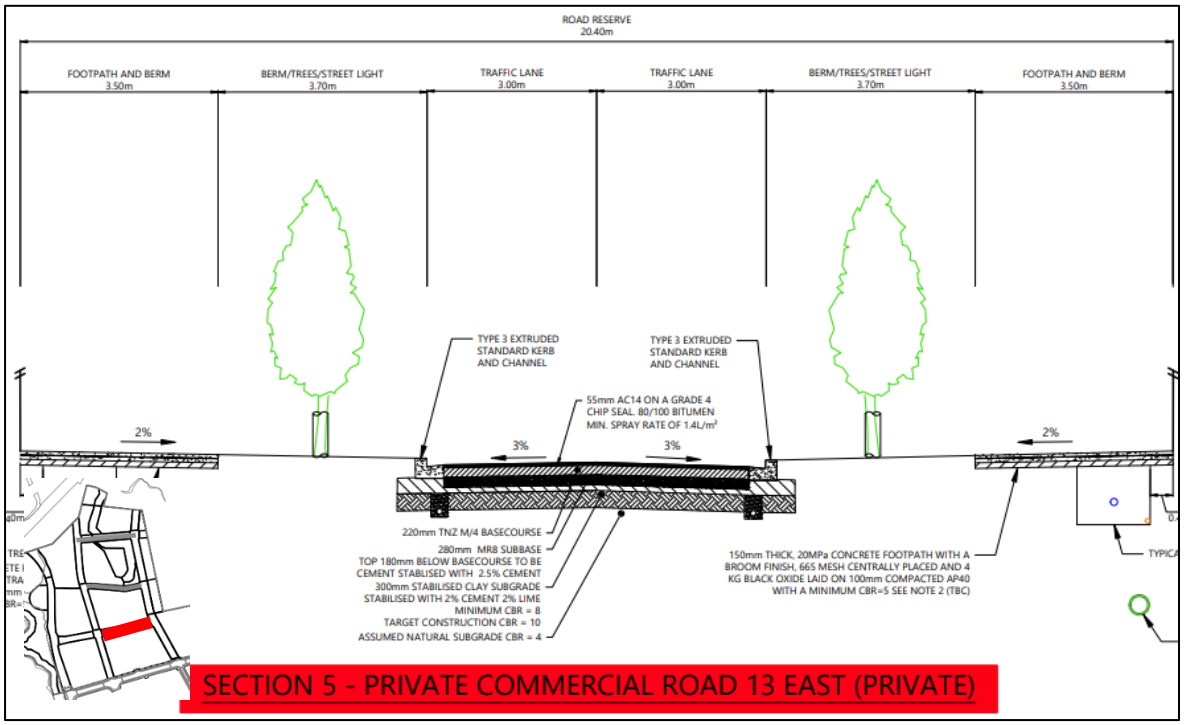


FIGURE 23: ROAD 13 CROSS-SECTION (EAST OF ROAD 3)

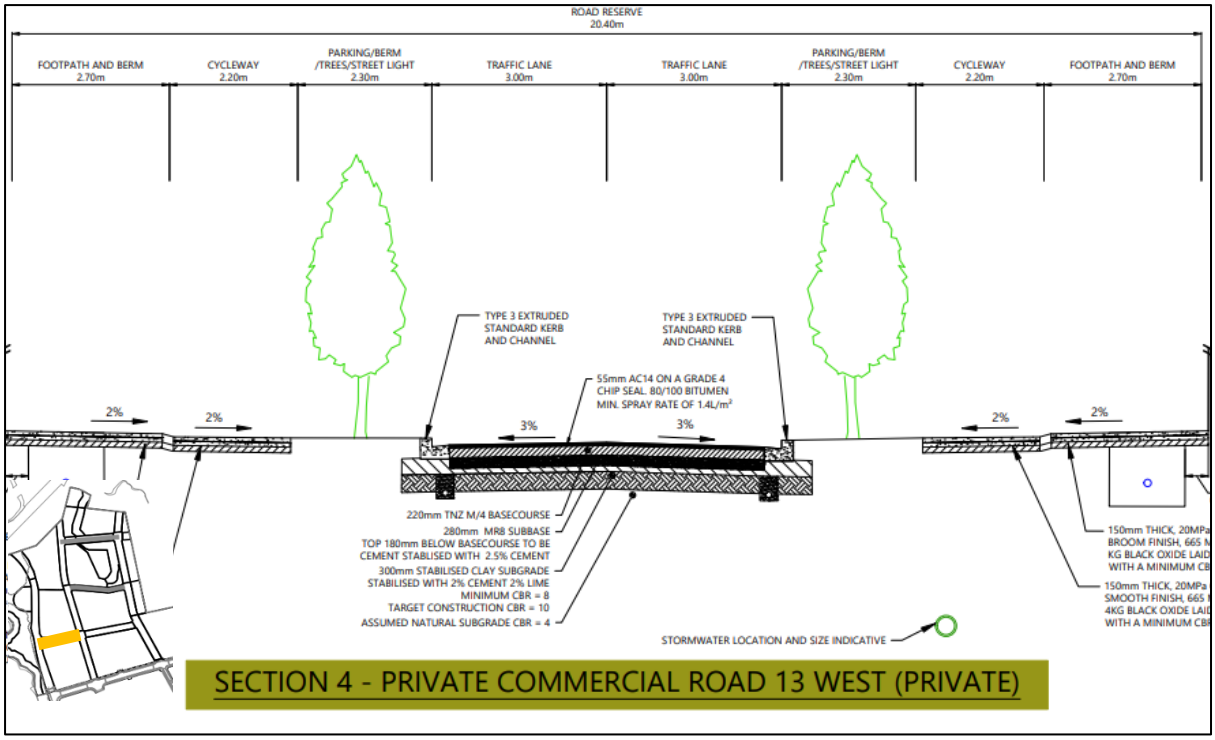


FIGURE 24: ROAD 13 CROSS-SECTION (WEST OF ROAD 3, TO THE EAST OF THE MID-BLOCK CYCLE CROSSING)

4.4.5 Road 11

Road 11 will be classified as a private local road extending east-west along the centre of the site. The road corridor extends between Road 3 at its western end and Road 25 at its eastern end. As part of future design stages, it is understood that Road 11 will extend further west beyond Road 3 to provide access to Lot F, but for the purposes of this application, this western section of the road corridor will be formed as a private driveway only.

Between Road 3 and Road 25, Road 11 will have a total road reserve width of 16m including a 6m wide carriageway, 2.3m front berms and 2.7m footpaths and back berms on both sides of the corridor. The front berm will contain provision for on-street parking, street furniture and landscaping along the length of the corridor. This is shown in Figure 25 below. As a private local road, its 16m road reserve width complies with the requirements outlined in Appendix 1 of the precinct provisions.

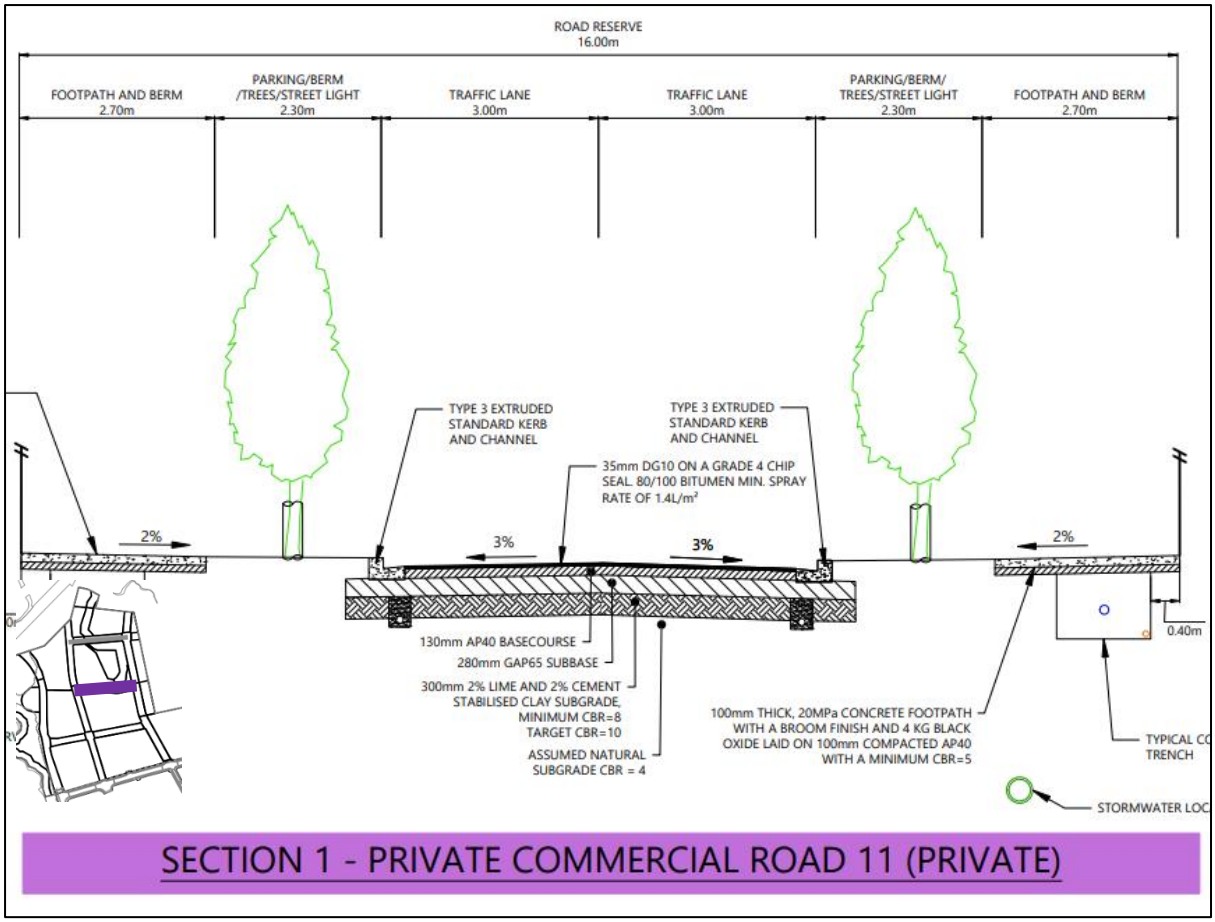


FIGURE 25: ROAD 11 CROSS-SECTION (BETWEEN ROAD 3 AND ROAD 25)

4.4.6 Road 6

Road 6 will be classified as a private collector road extending east-west along the northern portion of the Drury Centre Stage 2 development. It is named Station Road within the Precinct Provisions and Plan. The private collector road corridor extends between Road 3 and Road 25 at its western and eastern ends respectively. Further east of the Road 25 corridor, Road 6 will exist as a private accessway serving the two vehicle crossings into Lot K. It is anticipated that in the future, the road corridor can be extended further east beyond the current site boundary to connect to Fitzgerald Road at its eastern end. However, this extension is beyond the scope of this consent application, as the adjacent property is owned by a third-party developer.

Road 6 is proposed to have a 23m cross-section along its entire length including provision for a 7m wide two-way, two-lane carriageway, 3.1m wide front berms to accommodate on-street parking, street furniture and trees, 2.2m uni-directional cycleways, and 2.7m wide footpaths and back berms on both sides of the road corridor. Where on-street parking is provided, a minimum 0.8m buffer will be provided between the on-street parking spaces and the uni-directional cycleway on both sides of the corridor. As stated in section 4.3.2, Road 6 will facilitate bus movements until Road 25 is extended further north to provide a direct connection between the site and the public transport hub. As such, a 7m wide carriageway has been provided to sufficiently accommodate bus movements to/from the Drury Public Transport Hub.

Given the road corridor has an overall width of 23m, provides separate pedestrian and cycling provisions on both sides of the corridor, and bus provisions, it complies with the Collector Road function and required

design elements table as outlined in the precinct provisions. The proposed cross-section of Road 6 is shown in Figure 26 below.

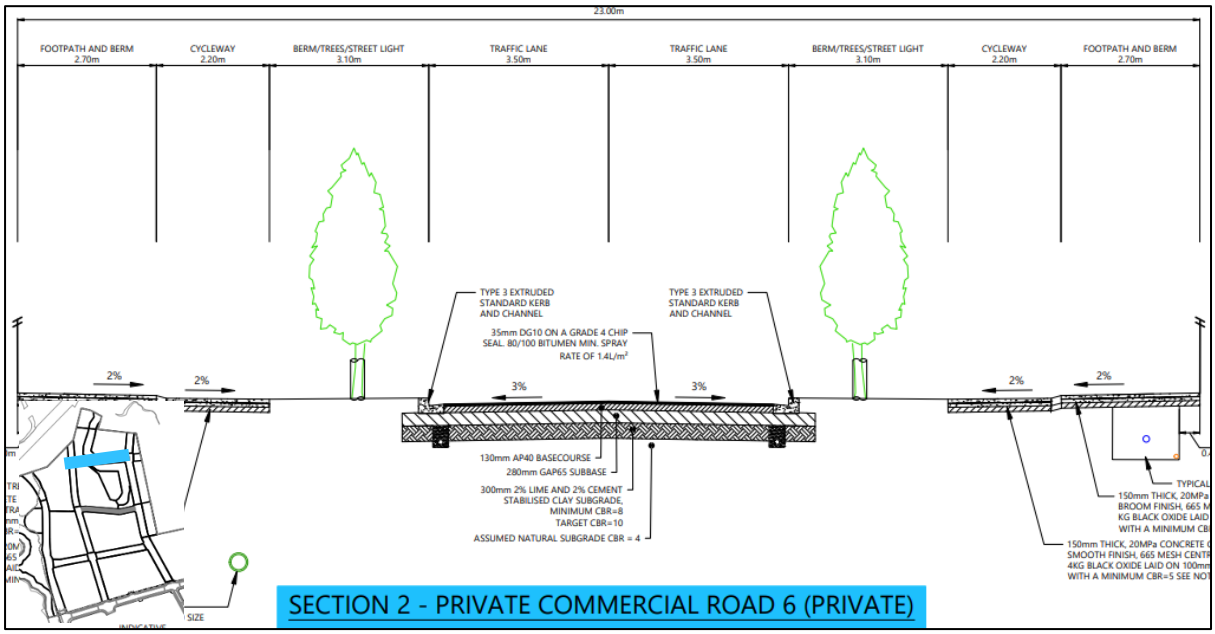


FIGURE 26: ROAD 6 CROSS-SECTION

4.4.7 Stage 1 Roads

The proposed road corridors within Stage 1 of the Drury Centre Precinct were consented as part of the initial Fast-Track consent, granted in July 2023. As stated in section 3 above, as part of this application, the 13 super lots consented in the Fast-track application are proposed to undergo further subdivision into 292 individual lots, however the local road corridors surrounding these super lots will remain unchanged. Figure 27 below shows the overall alignment of the proposed road corridors in proximity of the residential super lots.



FIGURE 27: OVERALL ALIGNMENT OF ROAD CORRIDORS SURROUNDING RESIDENTIAL SUPERLOTS

All local roads will have a total width of 16m including provision for a 6m wide carriageway, and a 2.2m wide front berm (for on-street parking, landscaping and street furniture), 1.8m wide footpath and 1.0m back berm on both sides of the road corridor as shown in Figure 28 below, and as such comply with road design elements in the precinct provisions.

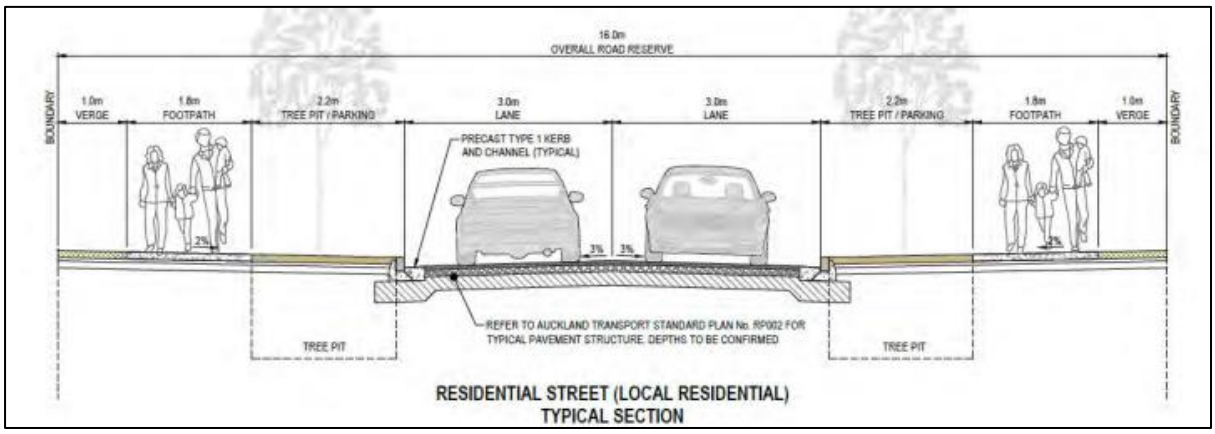


FIGURE 28: LOCAL ROADS WITHIN STAGE 1

4.4.8 Jointly Owned Access Lots

The proposed subdivision of the 13 super lots into 292 individual lots includes provision for several jointly owned access lots (JOALs) to provide property access. JOALs are favourable as they provide a shared accessway to multiple properties whilst restricting the total number of vehicle crossings onto the road corridor. As shown in Figure 27 above, it is proposed to provide 13 JOALs within the Stage 1 residential development. All the proposed JOALs will have a legal width of 8m, however the accessway and footpath widths vary across the JOALs. 10 of the 13 proposed JOALs (JOAL #500, 502, 503, 504, 505, 506, 507, 508, 510, 511) have an accessway width of 6.6m and footpath width of 1.4m as shown in Figure 29. The remaining three JOALs (JOAL #501,5012 and 509) will have an accessway width of 6.2m, and footpath width of 1.8m as shown in Figure 30 below.

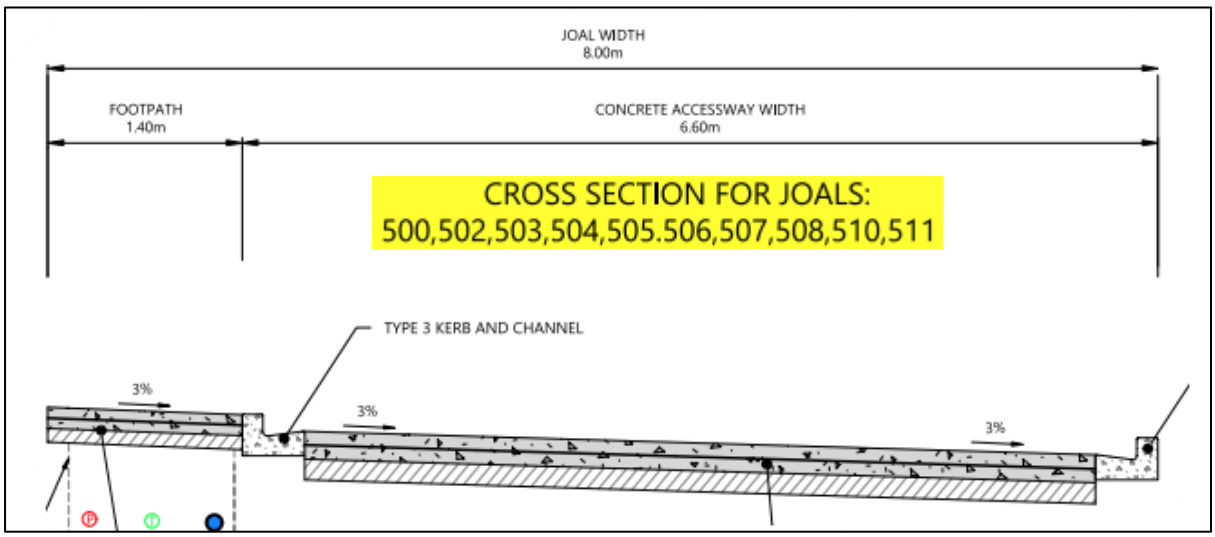


FIGURE 29: JOAL CROSS-SECTION – 1

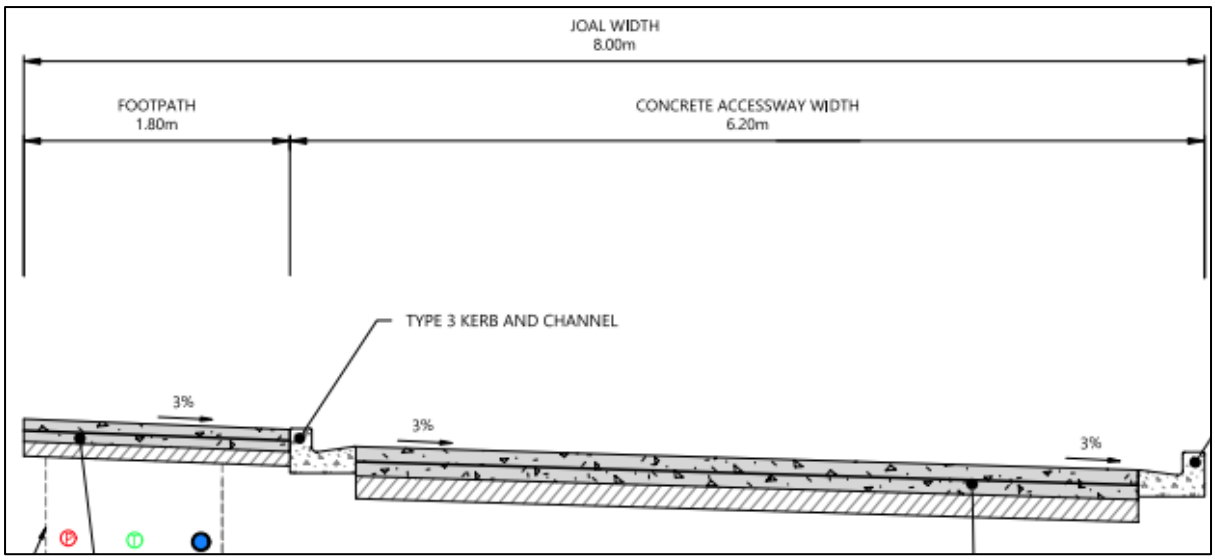


FIGURE 30: JOAL CROSS-SECTION -2

4.5 Individual Lot Access

4.5.1 Vehicle Crossing Widths

Table E27.6.4.3.2 of the AUP requires vehicle crossings in Business – Metropolitan Centre Zones and Business – Mixed Use Zones serving nine or less parking spaces to have a width between 3m and 3.5m, and vehicle crossings serving 10 or more parking spaces to have a width between 5.5m and 6m respectively to allow for simultaneous two-way movement. Note 1 of this rule also states that for General Business, Business Park or Industrial Zones a vehicle crossing width of 9m is permitted where the crossing accommodates tracking paths of large heavy vehicles. The subject site is zoned as a combination of Business – Metropolitan Centre Zone and Business-Mixed Use Zone.

Several vehicle crossings are proposed to serve the proposed lots within the Drury Centre Stage 1 and Stage 2 site. The widths of these vehicle crossings (at the property boundary) and their compliance with the requirements outlined in E27 are provided in Table 2 below.

TABLE 2: PROPOSED VEHICLE CROSSING WIDTHS

Lot	Road Frontage	Location of Vehicle Crossing	Permitted Vehicle Crossing Width	Vehicle crossing width provided (m)
A	Road 1	Serving Carpark	6	6
		Western Loading	3.5	8.5*
		Eastern Loading	3.5	8.5*
	Road 13	-	6	6
B	Road 1	Western Loading	3.5	8.5*
		Eastern Loading	3.5	8.5*
		Eastern	6	7*
	Road 25	Eastern	6	7*
C	Road 1	-	6	8
	Road 25	-	6	21*

D	Road 13	Western	6	6
		Western Loading	3.5	6*
		Eastern Loading	3.5	6*
	Private accessway (off Road 11)	-	6	6
E	Road 13	Western	6	10*
		Eastern	6	7*
	Road 25	-	6	7*
F1	Flanagan Road	Eastern	6	6
		Western	6	6
F2	Private accessway (off Road 11)	-	6	6
G1	Road 6	-	6	6
G2	Road 11	-	6	9*
H1	Road 3	Northern	6	6
	Road 3	Southern		
H2	Road 3	-	6	6
J	Road 25	-	6	6
K	Road 25	Northern Lot	3.5	3.5
	Private accessway (off Road 6)	Northern Lot	3.5	3.5
	Private accessway (off Road 6)	Southern Lot	6	6
	Road 25	Southern Lot	6	6

As shown in Table 2 above, there are 14 vehicle crossings (*) which do not comply with the maximum vehicle crossing widths as outlined in the AUP. These non-compliances are discussed below:

3.5m Permitted Width – 6m/8.5m Proposed width

- As per Table E27.6.4.3.2 of the AUP, the vehicle crossings serving the dedicated loading spaces in Lot A and B are technically only permitted to have a maximum width of 3.5m as they serve less than nine parking spaces. However, these vehicle crossings will facilitate inbound/outbound movements for a 19.45m semi-trailer design vehicle and given the size of this vehicle, the additional (8.5m total width) is required to accommodate these vehicle movements.
- Similarly, the loading zone within Lot B is permitted to have a maximum width of 3.5m, however a 6m width has been provided to sufficiently accommodate the larger loading vehicle expected to visit the site. As such, the 6m width is necessary and is unlikely to have any adverse impact on the safe and efficient operation of the road corridor.

6m Permitted Width – 7m/8m/9m Proposed Width

- Table E27.6.4.3.2 of the AUP requires vehicle crossings serving more than 10 parking spaces to have a width between 5.5m and 6m. However, many of the vehicle crossings serving car parks have a width greater than 6m as these carparks also provide informal loading spaces, hence are designed to accommodate simultaneous movement of an 8m Medium Rigid truck and a B85 design vehicle entering/exiting the carpark. As such, the additional width is required to improve the safety and operation both within the carpark and along the road corridors.

Lot C Signalised Intersection

- The northern vehicle crossing into Lot C represents the eastern arm of the Road 25/Road 13 signalised intersection, and therefore has a proposed width of approximately 21m. Given that this vehicle crossing exists as the eastern arm of a signalised intersections, and facilitates movements of both customer vehicles and larger delivery vehicles accessing the loading zone located at the rear of the proposed building, the wide vehicle crossing is considered to be appropriate for the site despite the non-compliance.

Lot E

- The eastern vehicle crossing serving Lot E has a proposed width of approximately 10m, hence exceeds the maximum permissible width of 6m as outlined in the AUP. It is understood that this vehicle crossing will frequently facilitate movement of 11.5m Large Rigid trucks as the proposed loading zone serving the retail activity is located within the carpark. The 11m wide vehicle crossing has been designed to accommodate simultaneous movement of the B85 design vehicle and the 11.5m Large rigid truck. As shown in Figure 31 below, the full 10m width is required for these movements to occur simultaneously, hence it is not possible to reduce the vehicle crossing width to 6m and achieve compliance with AUP.

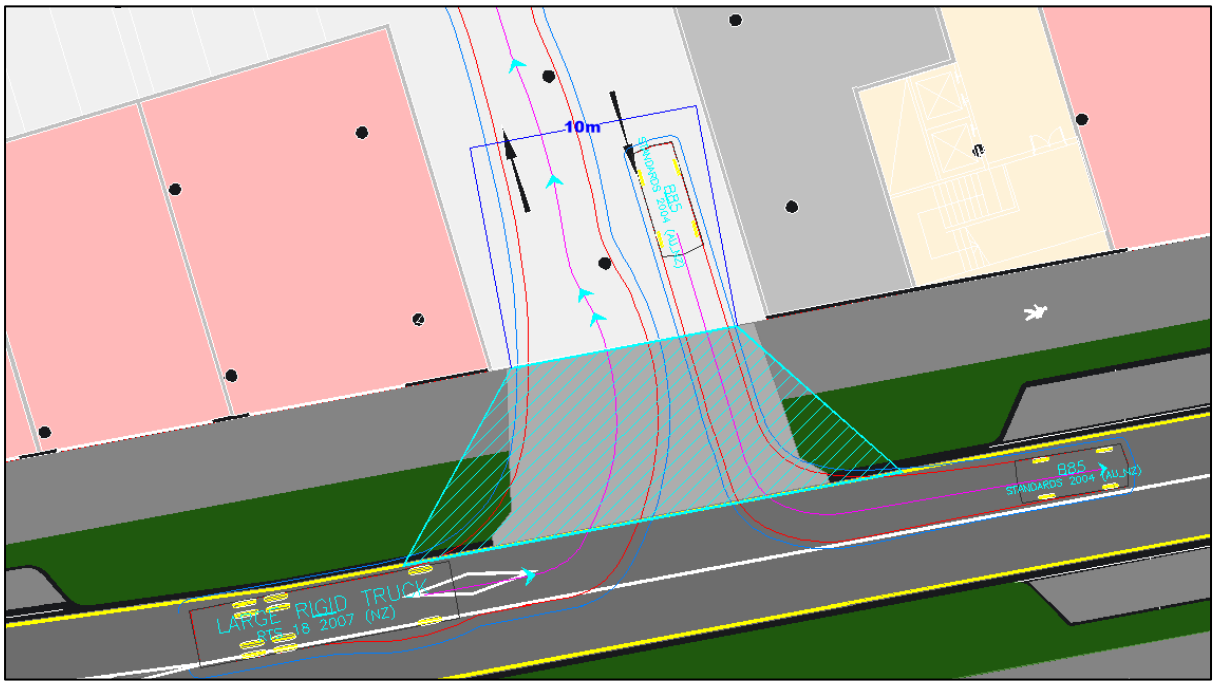


FIGURE 31: LOT E - VEHICLE TRACKING

As shown above, despite the proposed vehicle crossings not complying with the specific design constraints outlined in the operative AUP, they have been designed as such to provide safe and highly efficient vehicle movements both into and out of the car parks. Additionally, these non-compliances are unlikely to have any adverse effects on the safe and efficient operation of the road corridor.

In addition to the proposed vehicle crossings within the Drury Centre Stage 2 site, the Drury Centre Stage 1 site will also have several vehicle crossings to serve the 13 super lots proposed to undergo further subdivision into 292 individual lots. This includes provision for several JOALs. It is expected that all JOALs within the Stage 1 precinct will serve 10 or more parking spaces and will therefore have a legal width of 8m and a vehicle crossing width of 6m at the property boundary. As discussed in section 4.4.8, the accessway width will increase to either 6.2m or 6.6m along the length of the JOAL itself as shown in Figure 32 below. As such, the vehicle crossing width of all proposed JOALs within the subject site will comply with the requirements outlined in the AUP.

Apart from the proposed JOALs, individual formalised assessment of the proposed vehicle crossings serving individual lots cannot be completed at this stage as the exact locations and sizes of these vehicle crossings is yet to be confirmed (and do not form part of this consent). As such, assessment of these vehicle crossings serving individual lots are not currently shown on the masterplan as they will be addressed in future resource consents for dwellings within those lots. However, it is expected that vehicle crossings serving most lots will comply with width requirements as outlined in the AUP.

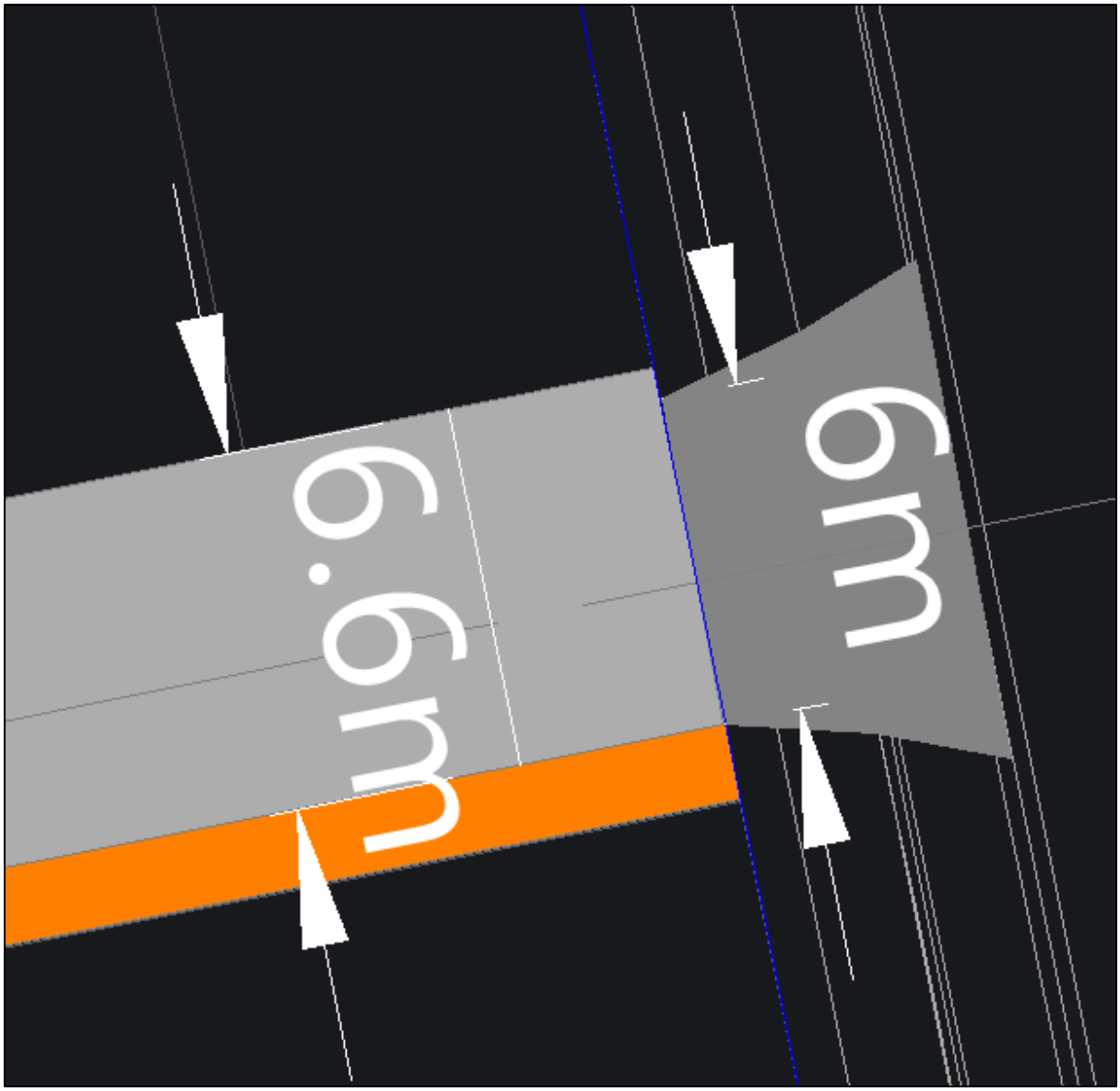


FIGURE 32: JOAL VEHICLE CROSSING WIDTHS

4.5.2 Vehicle Crossing Separation

Table E27.6.4.2.1 of the AUP states that all sites are permitted to have a maximum of one vehicle crossing per 25m of road frontage or part thereof. Additionally, vehicle crossings serving adjacent sites must either be combined (with maximum width of 6m) or achieve a minimum separation of 2m, and vehicle crossings serving the same site must achieve a minimum separation of 6m from an adjacent vehicle crossing. Each proposed lot within the Drury Centre Stage 2 development will be treated as an individual site.

Each lot included within the Drury Centre Stage 2 site will provide multiple vehicle crossings to allow for efficient circulation of vehicles both into/out of and within the lots. Table 3 below assesses the vehicle crossing separation for each individual lot and discusses the non-compliances (if any).

TABLE 3: PERMITTED NUMBER OF VEHICLE CROSSINGS AND SEPARATION REQUIREMENTS

Lot	Road Frontage	Permitted number of vehicle crossings	Number of vehicle crossings provided	Vehicle Crossing Separation

A	Greater than 500m (along four sides)	20	4	Minimum separation of 4.7m (along Road 1)*
B	Greater than 600m (along four sides)	24	4	Minimum separation of 34m (along Road 1)
C	Greater than 250m (along two sides)	10	2	Separation of more than 200m between vehicle crossings.
D	Greater than 300m (along three sides)	12	4	Minimum separation of 12m (along Road 13)
E	Greater than 550m (along four sides)	22	3	Minimum separation of 55m (along Road 13)
F	Greater than 400m (along three sides)	16	3	Minimum separation of 80m (along Flanagan Road)
G	Greater than 250m (along three sides)	10	2	Only one vehicle crossing provided to serve G1 and G2 respectively
H	Greater than 200m (along two sides)	8	3	Minimum separation of 45m (along Flanagan Road)
J	Greater than 150m (along two sides)	6	1	Only one vehicle crossing provided to serve the subject site.
K	Greater than 350m (along one sides	14	4	Minimum separation of 76m (along Road 25 / private accessway)

As outlined in Table 3 above, the vehicle crossings serving Lot A do not comply (*) with the minimum separation requirements as outlined in the AUP. Along the southern boundary of the lot, the vehicle crossing serving the customer carpark, and the loading zone entry access achieves a separation distance of approximately 4.7m, hence does not meet the minimum 6m separation requirement between vehicle crossings serving the same site. However, as shown in Figure 33, at the footpath, the two vehicle crossings provide approximately 2m separation which is sufficient space for a pedestrian to safely wait between the two vehicle crossings if in use. Further, footpath and cycle lanes along this road will remain at a constant vertical grade, and priority will be maintained to active modes over vehicles using the driveways.

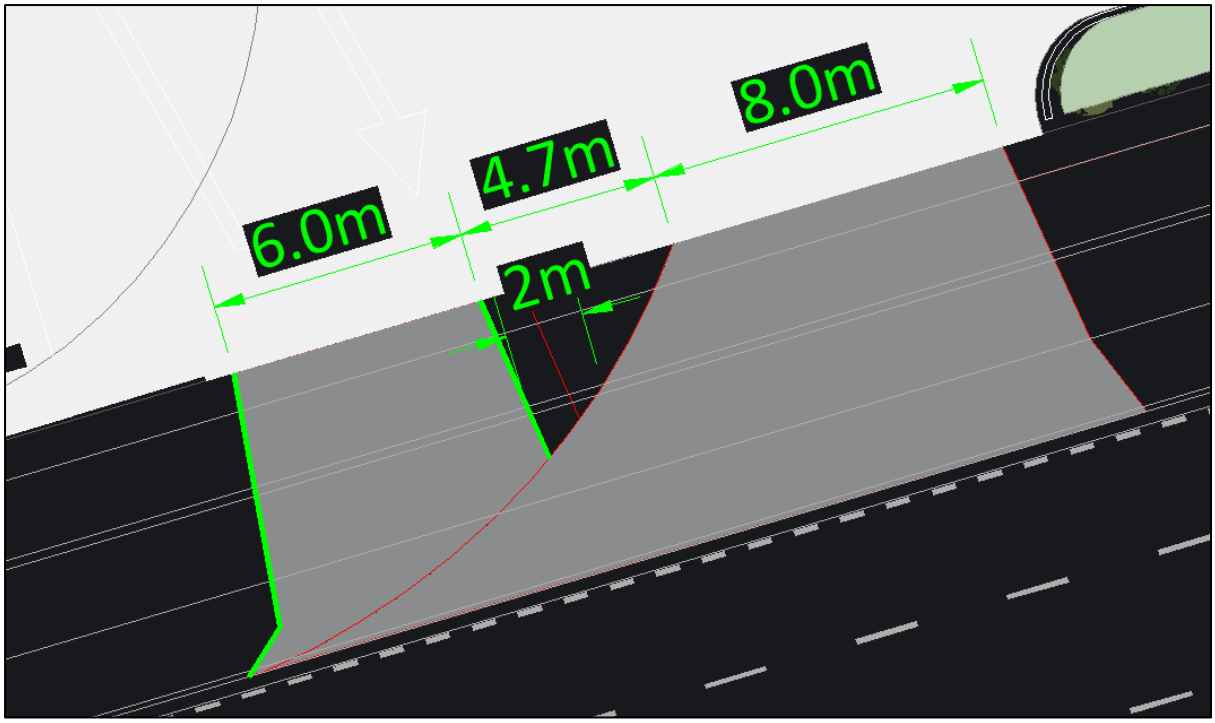


FIGURE 33: LOT A VEHICLE CROSSING

All other vehicle crossings proposed within the Drury Centre Stage 2 site comply with the minimum separation, and maximum number of vehicle crossing requirements as outlined in Table E27.6.4.2.1.

The JOALs serving the proposed 292 individual lots within the Drury Centre Stage 1 site have also been assessed to determine compliance with separation and number of vehicle crossing requirements. All proposed JOALs within the residential development in the Drury Centre Stage 1 site achieve minimum 2m separation from adjacent JOALs, hence complying with the requirements outlined in the AUP.

As stated above, exact vehicle crossing locations for individual lots have not yet been determined, however it is expected that most vehicle crossings will be designed to comply with minimum separation requirements wherever possible. There may be some vehicle crossings where it is not possible to achieve compliant separation due to geometric or road constraints. Such vehicle crossings and any potential adverse effects of this non-compliance will be assessed individually at a subsequent resource consent to enable dwellings within the lots.

4.5.3 Intersection Separation

Figure E27.6.4.1.1 of the Unitary Plan requires vehicle crossings to have at least 10m separation from the nearest intersections. Table 4 below summarises the minimum separation between a vehicle crossing and the nearest intersection for each individual lot within the Drury Centre Stage 2 Precinct.

TABLE 4: INTERSECTION SEPARATION

Lot	Nearest intersection to a proposed vehicle crossing.	Separation from nearest intersection
A	Road 2/Road 1	30m
B	Road 25/Road 1	25m
C	Road 13/Road 25	0m (Vehicle crossing represents an arm to the cross-roads signalised intersection)*
D	Road 13/Road 2	20m

E	Road 13/Road 25	35m
F	Road 3 / Flanagan Road	30m
G	Road 11/Road 3	65m
H	Road 3 / Flanagan Road	7m*
J	Road 6 / Road 25	60m
K	Road 11 / Road 25	30m

As shown above (*), the vehicle crossings serving Lot C (onto Road 25), and Lot H (onto Road 3) do not comply with the minimum intersection separation requirements. As discussed in section 4.5.1, the vehicle crossing serving Lot C represents the eastern arm of the Road 25/Road 13 signalised cross-roads intersection, hence is located directly opposite this intersection. As such, it is impossible for this vehicle crossing to comply with minimum separation requirements. The vehicle crossing serving lot H is also located in close proximity to the Flanagan Road / Road 3 intersection. However, given that both these road corridors are either currently or expected to be classed as a Local Road (as shown in Figure 13), and provide good visibility in all directions, this non-compliance is unlikely to have a material effect on the road corridor. Additionally, it is not uncommon for vehicle crossings to be located directly opposite a T-intersection between two local roads. As such, these two non-compliance are not expected to have any adverse effects on the safe and efficient movement of vehicles along the road corridor.

4.5.4 Provision for Passing Bays

Table E27.6.4.3.1 of the AUP states that passing bays must be provided at 50m intervals where the length of the accessway exceeds 50m, and the width of the accessway is less than 5.5m. This passing bay must have a formed width of access to 5.5m over 7m with 45 degree tapers. Most proposed accessway within the Drury Centre Stage 2 site, and all the proposed JOALs within the Drury Centre Stage 1 site provide a minimum accessway width of 6m, and can therefore sufficiently accommodate simultaneous two-way vehicular movement, hence do not require passing bays. The only exception being the accessway within the northern section of Lot K (north of Road 6). This accessway has a length of 60m, and a width of 3.5m, hence is required to provide at least one passing bay. However, it is understood that this accessway only caters to one-way vehicular movement with all vehicles entering via the southern vehicle crossing and exiting via the northern vehicle crossing onto Road 25, hence does not actually require a passing bay. As such, this non-compliance is only technical in nature and does not actually have any material adverse effect on the safe and efficient operation of the road corridor or accessway.

4.6 Parking

4.6.1 Vehicle Parking

The AUP does not specify minimum vehicle parking requirements for the proposed residential, community centre, commercial, retail and visitor accommodation activities, but provides a maximum parking rate of 1 per 30sqm GFA for the office activity. Section I450.6.3 from the I450 Drury Centre Precinct outlines specific requirements around the maximum number of parking spaces for the office activity. These are outlined below:

- Up to 19,000m^2 – 1 space per 35m^2 GFA
- Between 19,001 m^2 – 47,000 m^2 – 1 space per 50 m^2 GFA
- Greater than 47,000 m^2 – 1 space per 60 m^2 GFA

As such, parking spaces for the office activity have been designed in accordance with the Precinct provisions outlined above, however parking spaces for the other activities (residential, commercial etc.) have been provided based on a practical assessment.

Given the large extent of the subject site, and the different activities proposed within each lot, parking requirements have been assessed independently for each lot. These individual lots are shown in Figure 34 below.

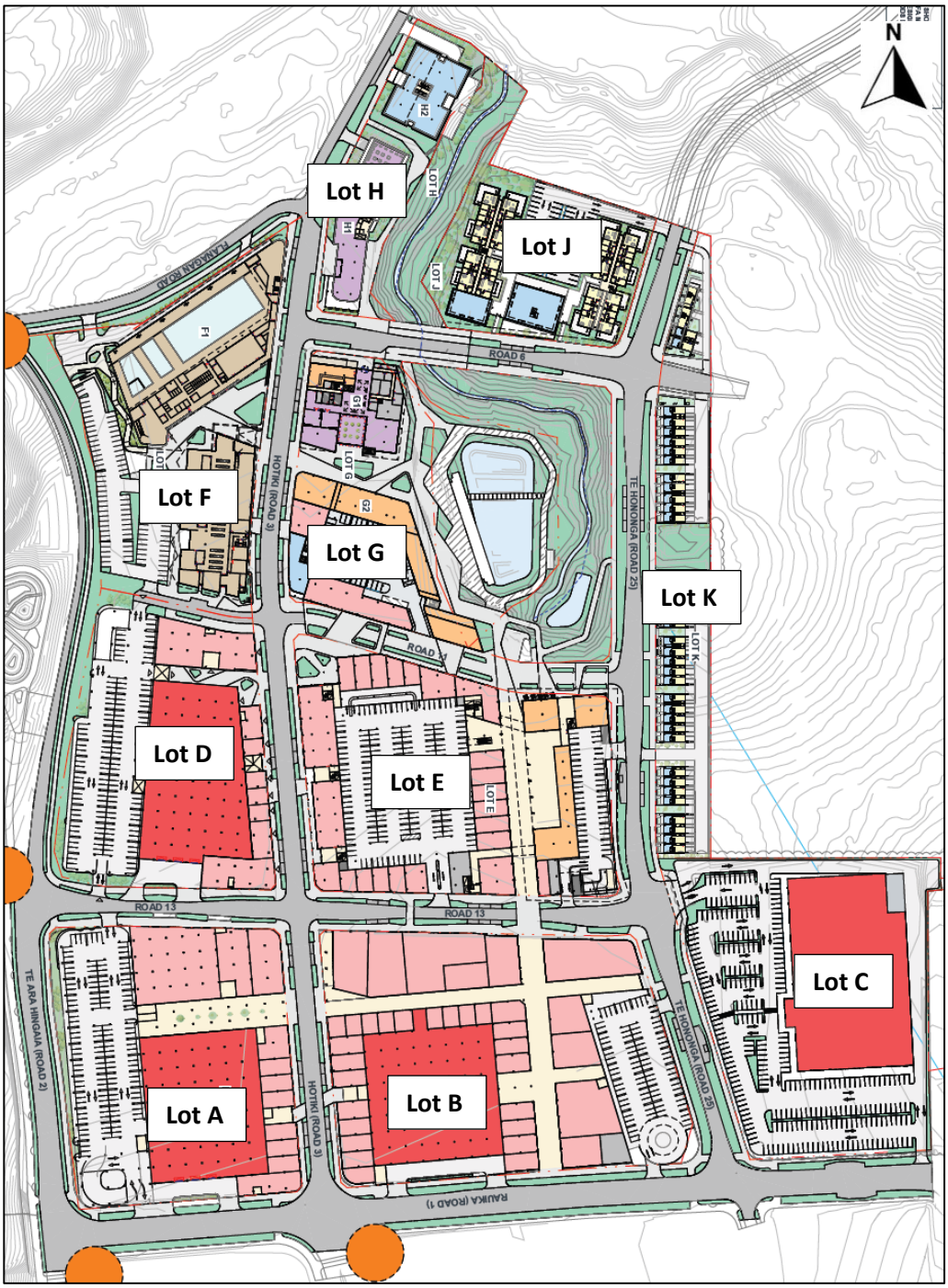


FIGURE 34: INDIVIDUAL LOTS

Table 5 below provides a breakdown of the proposed activities, parking requirements (if any), and parking provision within each lot. As mentioned above and shown in the table, only the commercial activity has a maximum parking requirement. The exact number of parking spaces for the different proposed activities within each lot have not yet been determined, however it is expected that the allocation of parking spaces

for the commercial activity will be in accordance with the requirements outlined in both E27, and I450.6.1.3 from the Precinct provisions table. As such, the proposed parking will comply with both E27 and the precinct provisions.

TABLE 5: PARKING PROVISION

Lot	Proposed Activity	GFA (sqm)	Parking Requirement	Parking Provision (Spaces)	Accessible Parking Requirement – Table 1 (PC79) (spaces)	Accessible Parking Provision (spaces)
A	Retail	8,971	-	417	10	10
	Commercial	2,523	Maximum 1 per 30sqm = 84			
B	Retail	24,714	-	364	9	9
	Commercial	4,200	Maximum 1 per 30sqm = 140			
C	Retail	5,845	-	271	7	7
D	Retail	7,187	-	408	10	10
	Commercial	2,422	Maximum 1 per 30sqm = 81			
E	Retail	14,115	-	493	13	13
	Commercial	4,966	Maximum 1 per 30sqm = 166			
F	Community Centre (Aquatic Library)	6,938	-	121	5	5
	Community Centre (Library)	3,278	-			
G	Visitor Accommodation	9,033	-	285	7	7
	Retail	2,715	-			
	Commercial	12,652	Maximum 1 per 30sqm = 421			
H	Visitor Accommodation	8,135	-	74	4	4
	Commercial	6,285	Maximum 1 per 30sqm = 210			
J	Residential	64 units (apartments)	-	63	3	3

K	Residential	38 units (townhouses)	-	76	3	0

4.6.2 Accessible Parking

The operative AUP does not outline specific rerquirements for accessible parking spaces. It refers to the NZS4121-2001 *Design for Access and Mobility – Buildings and Associated Facilities* standard which states that a carpark providing between 21-50 parking spaces, must provide a minimum of two accessible parking spaces. For every additional 50 parking spaces, one additional accessible parking space must be provided within the carpark. The total number of parking spaces and accessible parking spaces within each lot is outlined in Table 5 above. As shown, the proposed number of accessible parking spaces complies with the minimum requirements for parking spaces as outlined in NZS4121-2001. Additionally, as shown in Figure 35, these accessible parking spaces have been provided at various locations within the proposed carparks to make it easier for users to easily access different parts of each lot.

Rule E27.6.3.2(A) from Plan Change 79 (PC79) states that accessible parking demands for non-residential land uses should be determined either using Appendix 23 or using Table 1, whichever is the higher. Accordingly, requirements for accessible parking spaces have been calculated using both methods, with Appendix 23 resulting in a greater number of parking spaces. However, the accessible parking requirements outlined in Appendix 23 were deemed to be excessive, and would reduce the number of regular parking spaces, therefore having an adverse effect on other customers and motorsits visiting the Drury Centre site. As such, accessible parking is provided in accordance with the requirement using Table 1 from PC79. These requirements and accordingly the provisions are outlined in Table 5 above. As such, despite being a non-compliance against Rule E27.6.3.2(A), the proposed accessible parking spaces comply with the requirements outlined in E27 and the NZS4121-2001 document, and are therefore deemed to be appropriate to serve the subject site.

PC79 also outlines a minimum accessible parking requirement for residential activities. Residential activities proposing between 30-50 dwellings are required to provide at least three accessible parking spaces, and one additional parking spaces for every additional 25 dwellings.

As such, Lot J and K are required to provide a minimum of three accessible parking spaces each. It is proposed to provide three accessible parking spaces within Lot J, hence complying with the requirements outlined in the AUP. However, there is no provision for any accessible parking spaces within Lot K given that all proposed carparks are located within garages and therefore not accessible for visitors or general public. Additionally, the 13 super lots consented as part of the Stage 1 consent are proposed to undergo further subdivision into approximately 292 lots with each lot containing a single dwelling. PC79 only requires accessible parking spaces to be provided if more than 10 dwellings are proposed within each lot. As such, it does not apply to any of the lots proposed within the Stage 1 development.

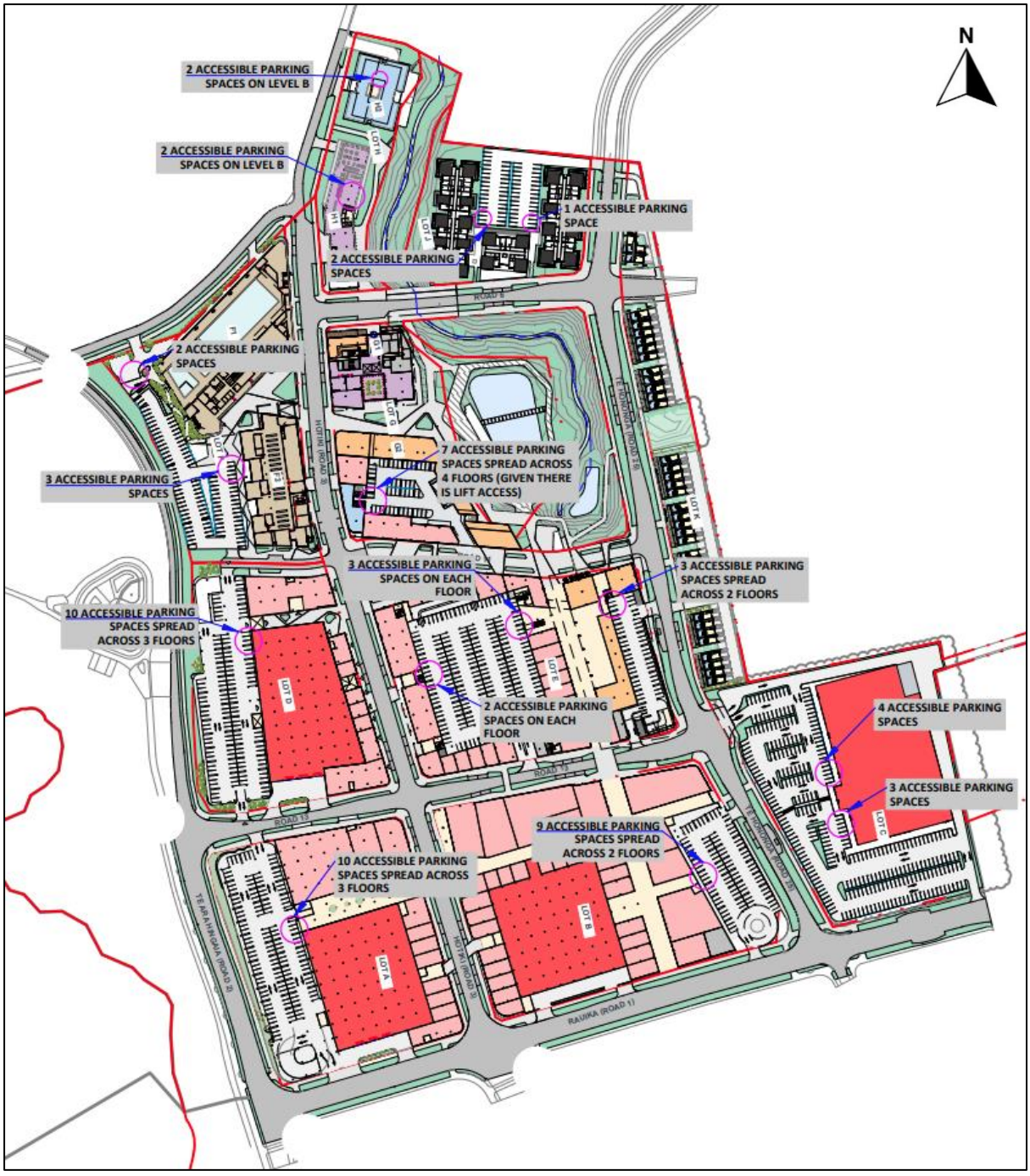


FIGURE 35: ACCESSIBLE PARKING PROVISION

4.6.3 Parking Dimensions

Table E27.6.3.1.1 requires 90-degree parking spaces (for casual users) with a width of 2.6m to provide a minimum depth and manoeuvring space within the aisle of 5m, and 7m respectively. Most parking spaces within each of the carparks are located at a 90-degree angle and provide a minimum width, depth and manoeuvring space of 2.6m, 5m and 7m respectively. As such, all proposed parking spaces comply with the minimum dimension requirements outlined in the AUP.

As discussed in section 4.4, some internal road corridors (mostly collector roads within the site) will provide on-street parallel parking facilities within the road reserve. The AUP requires parallel parking spaces to have a minimum length of 6m, width of 2.1m from a kerb and a minimum manoeuvring space of 3.7m

(overall width of 5.8m). All proposed on-street parallel parking spaces provide a minimum length of 6m, and an overall width of at least 5.8m, hence complying with the requirements outlined within the AUP.

4.6.4 Bicycle Parking

Table E27.6.2.5 of the AUP outlines the required bicycle parking rates for the proposed retail, commercial and residential activities. These are summarised below:

- Retail activities with GFA up to 500m^2 do not require any visitor (short-stay) parking space. Retail activities with a GFA between 500m^2 and 5,000m^2 require one visitor bicycle parking per 500m^2 GFA. Retail activities with a GFA greater than 5,000m^2 require one visitor bicycle parking per 750m^2 of GFA. All retail activities require one secure (long-stay) parking space per 300m^2 GFA.
- Food and beverage activities with a GFA of up to 350m^2 have no minimum requirement for visitor parking spaces. Beyond a GFA of 350m^2, it is required to provide a minimum of one visitor bicycle park. Additionally, one secure bicycle parking space is required per 300m^2 GFA.
- Community facilities require one visitor bicycle parking space per 200m^2 of GFA and one secure parking space per 500m^2 of GFA.
- The requirement for bicycle parking varies in the AUP and PC79:
    - Table E27.6.2.5 of the AUP requires residential developments of 20 or more dwellings to provide one visitor bicycle parking space per 20 dwellings and one secure parking space per dwelling without a dedicated garage.
    - Rule E27.6.2.6 of PC79 states that all residential developments with more than 20 dwellings are required to provide 1 visitor bicycle parking space per 20 dwellings, and one secure bicycle parking space for each dwelling without a dedicated garage or basement parking space. This bicycle parking space must not be part of any required outdoor living space, be directly accessible from the road, vehicle access, or pedestrian access, fully sheltered form the weather and be lockable and secure.
- Commercial activities (offices) up to 200sqm have no minimum requirement for visitor parking spaces. Offices with a GFA between 200m^2 and 10,000m^2 are required to provide a minimum of one visitor space plus one additional space for every 1,000m^2 GFA, and one secure bicycle park per 300m^2 of office. Offices with a GFA greater than 10,000m^2 require a minimum of 10 parking spaces plus one space for every 2,000m^2 above 10,000m^2.
- The hotel activity (considered as visitor accommodation within the AUP) requires a minimum of one visitor bicycle parking space and an additional visitor space per 20 rooms, and one secure parking space per 10 full-time equivalent (FTE) employees.

Section I450.6.4 of the I450 Drury Centre Precinct Plan also outlines specific bicycle parking requirements. This includes:

- In addition to the bicycle parking requirements in standard E27.6.2(6), at least one secure (long stay) bicycle park must be provided for every dwelling.
- For multi-unit development, at least one visitor (short stay) bicycle space must be provided for every 20 dwellings.

Similar to Table 5 above which assessed the provision of accessible parking spaces, Table 6 below provides a breakdown of the proposed activities, bicycle parking requirements, and bicycle parking provision within each lot. It should be noted that the provided architectural plans do not contain specific layouts of the retail stores, hence it has been assumed that 5% of the total retail activity area consists of office space for employees. Additionally, it has also been assumed that the proposed visitor accommodation (hotel

activities) provide 0.5 employees per hotel room, so a 140 room hotel would have approximately 70 employees.

TABLE 6: BICYCLE PARKING REQUIREMENTS

Lot	Proposed Activity	GFA (sqm)	Bicycle Parking Requirement	Resulting Requirement	Provision
A	Retail	8,971	1 visitor/750sqm GFA 1 secure/300sqm GFA of office	12 visitor 2 secure	14 visitor 10 secure
	Commercial	2,523	1 visitor + 1 visitor/1,000sqm 1 secure/300sqm of office	2 visitor 8 secure	
B	Retail	24,714	1 visitor/750sqm GFA 1 secure/300sqm GFA of office	33 visitor 4 secure	37 visitor 18 secure
	Commercial	4,200	1 visitor + 1 visitor/1,000sqm 1 secure/300sqm of office	4 visitor 14 secure	
C	Retail	5,845	1 visitor/750sqm GFA 1 secure/300sqm GFA of office	8 visitor 1 secure	8 visitor 1 secure
D	Retail	7,187	1 visitor/750sqm GFA 1 secure/300sqm GFA of office	10 visitor 1 secure	12 visitor 9 secure
	Commercial	2,422	1 visitor + 1 visitor/1,000sqm 1 secure/300sqm of office	2 visitor 8 secure	
E	Retail	14,115	1 visitor/750sqm GFA 1 secure/300sqm GFA of office	18 visitor 2 secure	23 visitor 19 secure
	Commercial	4,966	1 visitor + 1 visitor/1,000sqm 1 secure/300sqm of office	5 visitor 17 secure	
F	Community Centre (Aquatic Library)	6,938	1 visitor/200sqm GFA 1 secure/500sqm GFA	35 visitor 14 secure	51 visitor 21 secure
	Community Centre (Library)	3,278	1 visitor/200sqm GFA 1 secure/500sqm GFA	16 visitor 7 secure	
G	Visitor Accommodation (142 rooms)	9,033	1 visitor + 1 visitor/20 rooms 1 secure/10 FTE employees	8 visitor 7 secure	24 visitor 50 secure
	Retail	2,715	1 visitor/500sqm GFA 1 secure/300sqm GFA	5 visitor 1 secure	

	Commercial	12,652	10 visitor + 1 visitor/2,000sqm 1 secure/300sqm of office	11 visitor 42 secure	
H	Visitor Accommodation (140 rooms)	8,135	1 visitor + 1 visitor/20 rooms 1 secure/10 FTE employees	8 visitor 7 secure	14 visitor 28 secure
	Commercial	6,285	1 visitor + 1 visitor/1,000sqm 1 secure/300sqm of office	6 visitor 21 secure	
J	Residential	64 units (apartments)	1 visitor/20 dwellings 1 secure/dwelling without a dedicated garage.	3 visitor 3 secure	3 visitor 64 secure
K	Residential	38 units (townhouses)	1 visitor/20 dwellings 1 secure/dwelling without a dedicated garage.	2 visitor 0 secure	2 visitor 0 secure

Table 6 above outlines the minimum bicycle parking requirements, and also the bicycle parking provision provided within each of the proposed lots. Figure 36 below outlines the proposed locations of these bicycle parking spaces within each lot. As demonstrated, the proposed bicycle parking provision are spread throughout the site to make it more user-friendly, and meet the minimum requirement for each individual lot, hence achieving overall compliance with the requirements outlined in the AUP and the Drury Centre Precinct provision requirements.

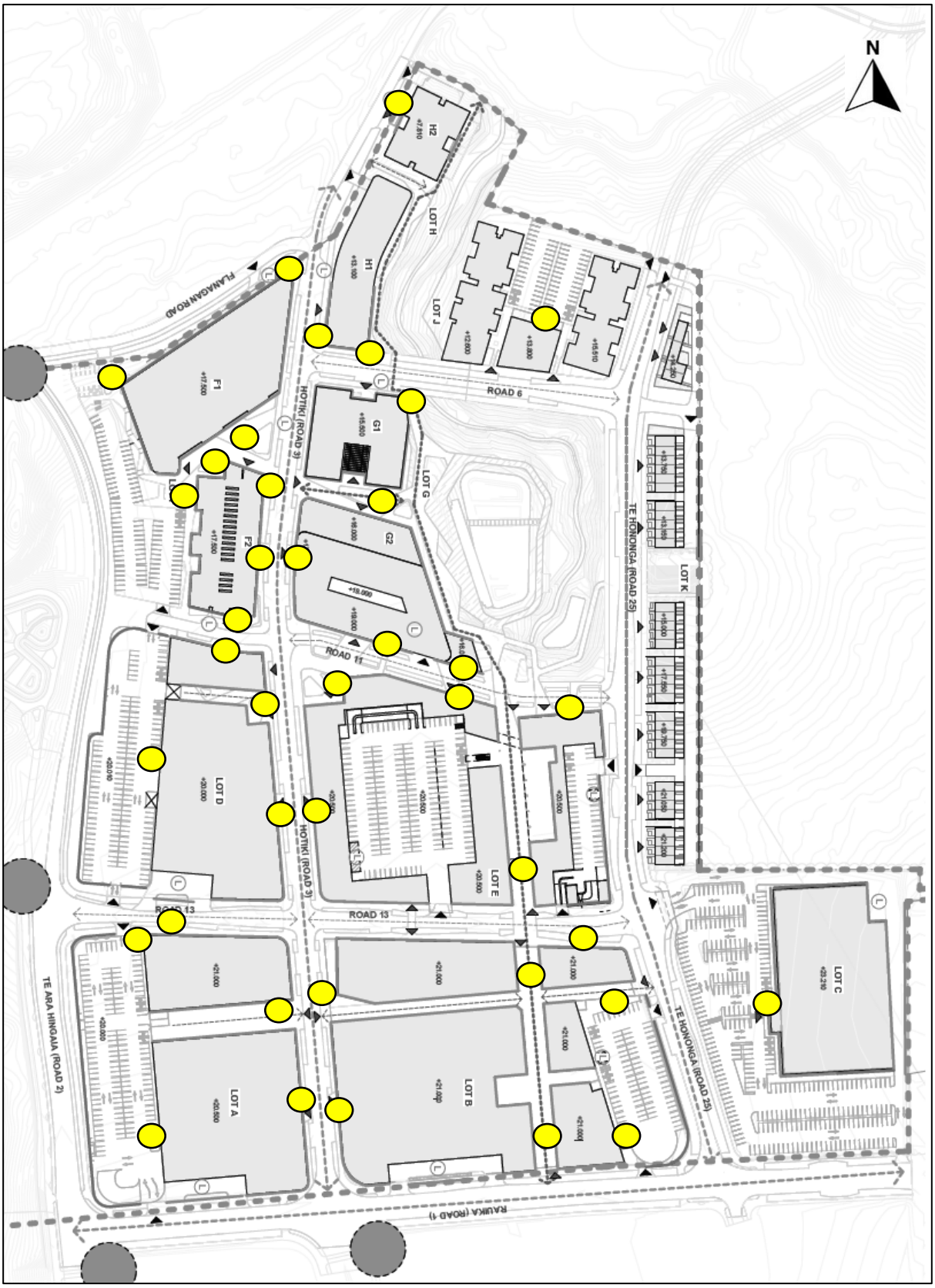


FIGURE 36: LOCATION OF BICYCLE PARKING

4.7 Servicing

4.7.1 Loading Spaces

Table E27.6.2.7 of the AUP outlines the minimum loading space requirements for activities based on their respective GFA's. The AUP requires retail activities with a GFA between 300sqm and 5,000sqm to have one loading space. The requirement increases to two loading spaces for a floor area between 5,000sqm and 10,000sqm, and three loading spaces for a GFAs above 10,000sqm plus 1 space for every additional 10,000sqm. All other activities with a GFA of up to 5,000m^2 are not required to provide a loading space, activities with a GFA between 5,000m^2 and 20,000m^2 are required to provide a minimum of one loading space, and activities with a floor area greater than 20,000sqm are required to provide a minimum of two loading spaces.

Table 7 below outlines the minimum loading space requirements and provisions for each individual lot within the Drury Centre Stage 2 site. The location of these loading spaces is represented by the yellow and blue circles in Figure 37 below. The lots proposed to undergo further subdivision within the Drury Centre Stage 1 site do not require loading spaces, as each lot is expected to be a residential activity of less than 5,000m² in GFA.

TABLE 7: LOADING SPACE ASSESSMENT

Lot	Proposed Activity	GFA (sqm)	Loading Space Requirement	Loading space Provision (no. of spaces)	Compliance
A	Retail	8,971	2	One space. (articulated truck)	Two spaces required, only one provided. *
	Commercial	2,523	-		
B	Retail	24,714	3	One space. (articulated truck)	Three spaces required, only one provided. *
	Commercial	4,200	-		
C	Retail	5,845	2	One space (8m truck)	Two spaces required, only one provided. *
D	Retail	7,187	2	One space (8m truck)	Two spaces required, only one provided. *
	Commercial	2,422	-		
E	Retail	14,115	3	One informal space in the eastern carpark, and formal space in the western carpark (both 8m truck).	Three spaces required, only two provided.*
	Commercial	4,966	-		
F	Community Centre (Aquatic Library)	6,938	1	One space (8m truck)	One space required, and two provided.
	Community Centre (Library)	3,278	-		
G	Visitor Accommodation	9,033	1	One space along Road 6 and in Lot G2 carpark (8m truck).	Three spaces required, only two provided. *
	Retail	2,715	1		
	Commercial	12,652	1		

H	Visitor Accommodation	8,135	1	One space along Road 3 (8m truck)	One space required, and provided.
	Commercial	6,285	1	One space outside building frontage (8m truck)	One space required, and provided.
J	Residential	64 units (6,211sqm)	1 small loading space	One space within carpark	One space required, and provided.
K	Residential	38 units (4,996sqm)	-	No loading space required or provided.	No space required, and none provided.

As outlined in Table 7 above (*), Lots A, B, C, D, E and G have non-compliances due to the number of loading spaces provided not complying with the requirements for minimum number of loading spaces as stated within the AUP.

It is understood that all loading will be restricted to occur outside of typical shopping centre opening hours, and loading operations will be managed by a body corporate which will likely allocate specific loading times for each retail store. This will ensure that two or more loading vehicles serving separate stores do not arrive to the site at the same time. However, in the unlikely scenario that a second loading vehicle does arrive within the carpark, this vehicle can temporarily park anywhere within the carpark given that most of the car park will be empty as it will be outside typical operating hours. As such, this non-compliance is unlikely to have a significant adverse impact on the safe and efficient operation of vehicle movements within the site.

Figure 37 below shows the proposed locations of the loading spaces within the Drury Centre Stage 2 site. The formal (marked) and informal (unmarked) loading spaces are represented by the yellow and blue circles respectively. It is proposed that the loading within Lot B (eastern carpark), G, H, and J will occur via an unmarked loading bay within the carpark. Despite existing as an unmarked loading space within these carparks, these loading spaces are unlikely to adversely affect the safe and efficient operation of the carpark as all loading will occur outside of typical operating hours, hence the carpark will largely be empty at the time of loading.

Lot F will be served by two marked, on-street parking spaces, one along the private accessway (eastern section of Road 11), and one along Road 3. The location of these loading spaces is shown in Figure 37 below.

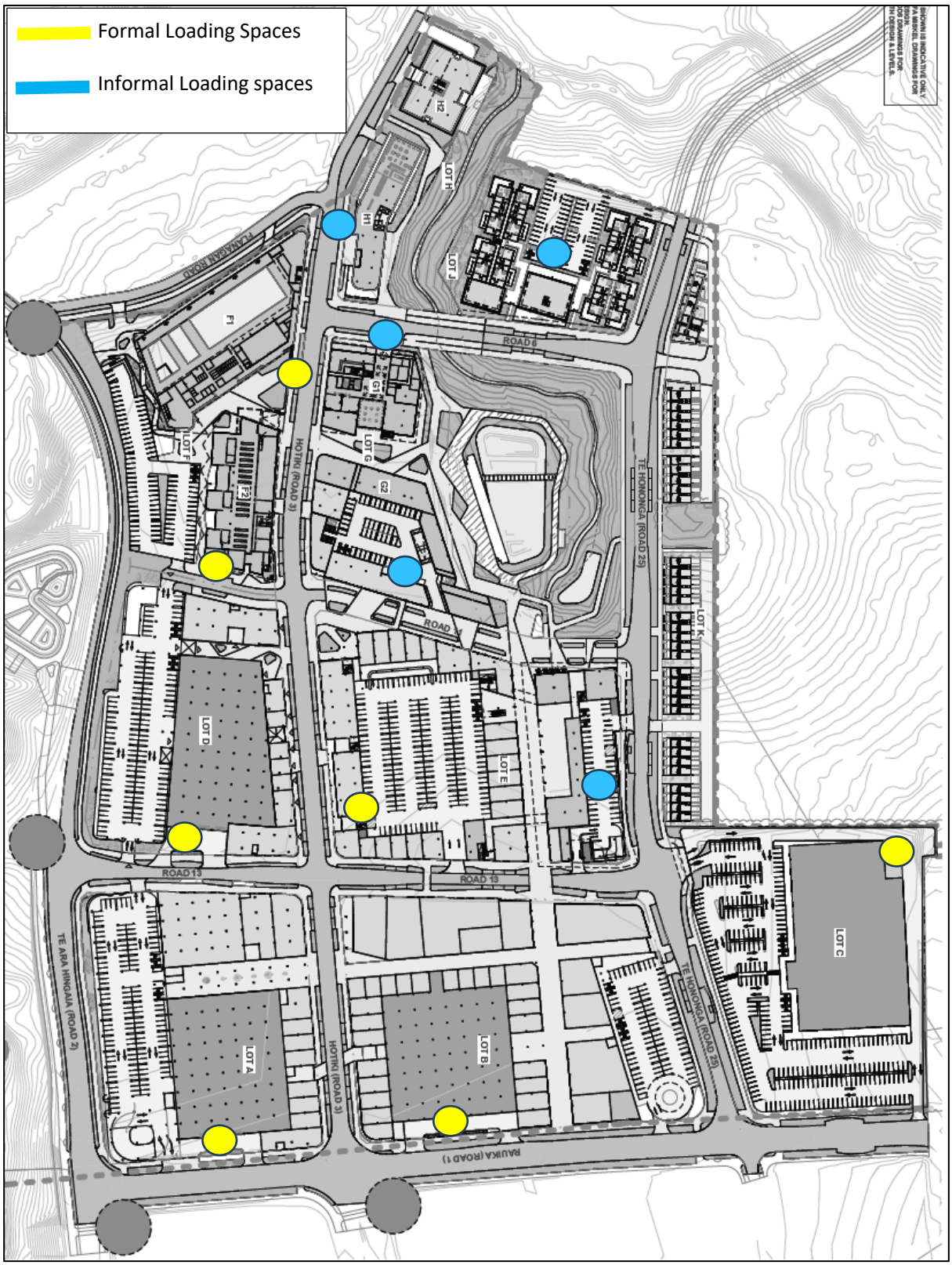


FIGURE 37: LOCATION OF LOADING SPACES

Table E27.6.3.2.1 of the AUP requires non-industrial activities to provide a loading space with minimum dimensions of 8m in length, and 3.5m in width. Sites which are designed to accommodate articulated vehicles must provide a minimum loading space length of 18m, and width of 3.5m. Only Lots A and B within the Drury Centre Stage 2 site are proposed to be accessed by articulated vehicles, with all other loading

spaces only serving the 8m Medium Rigid Truck or 11.5m large Rigid Truck design vehicles. Figure 38 and Figure 39 below provide the proposed location of the loading space within Lot A and B. which complies with the dimensions outlined above.

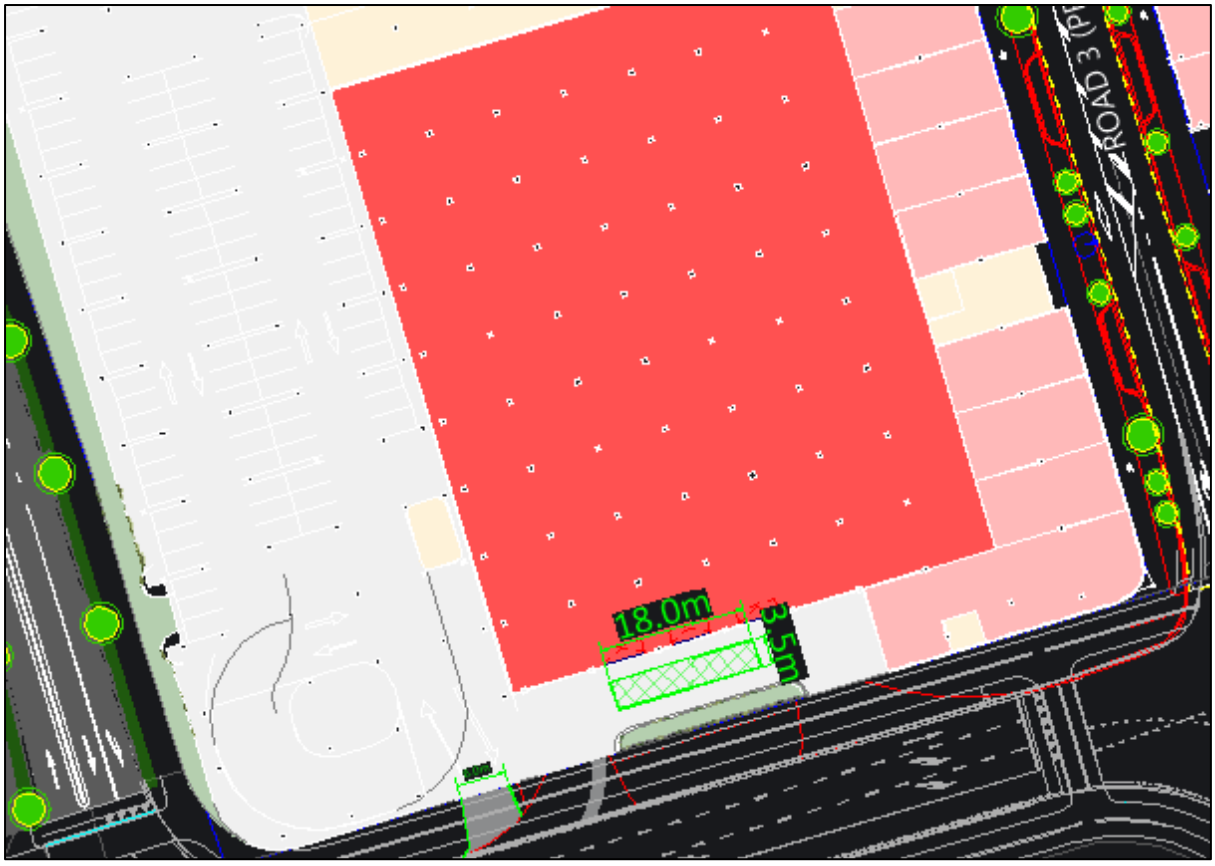


FIGURE 38: LOT A FORMAL LOADING SPACE

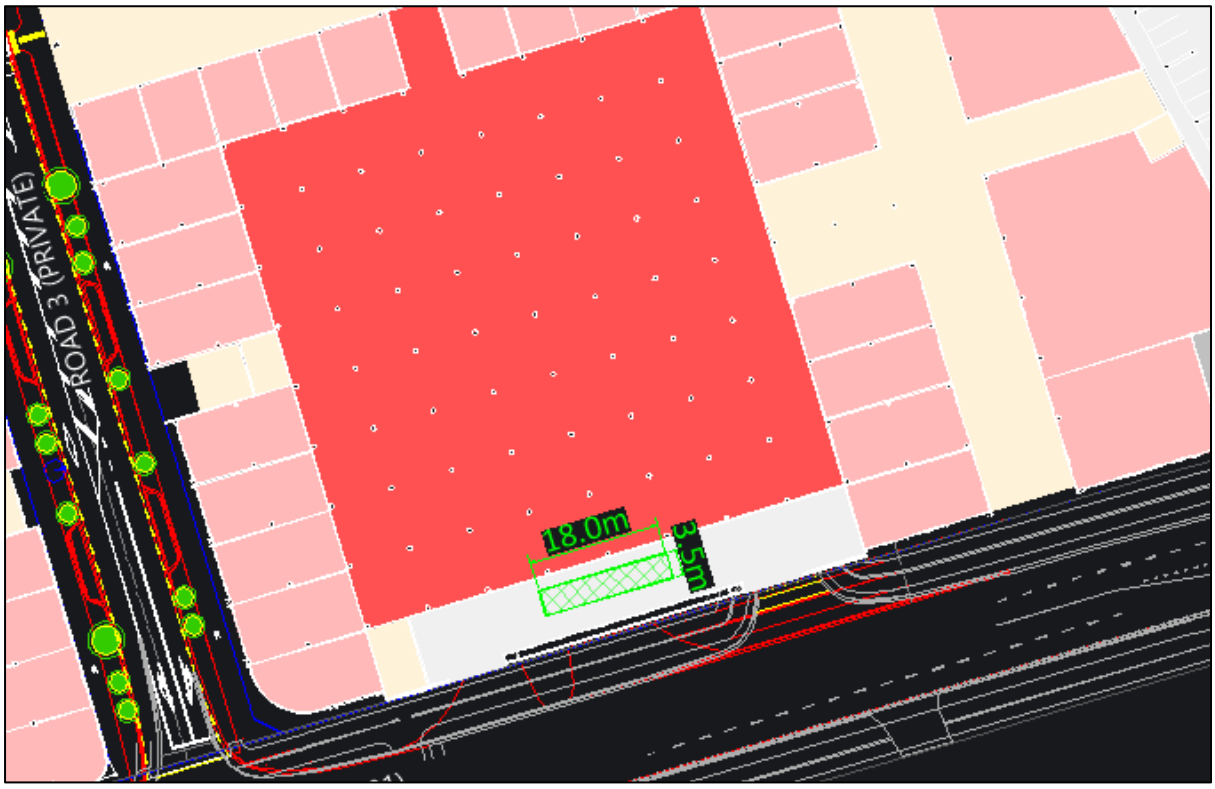


FIGURE 39: LOT B FORMAL LOADING SPACE

PC79 introduced an additional minimum acceptable small loading space with length of 6.4m and width of 3.5m. Table E27.6.2.7A of PC79 outlines that developments of more than 9 dwellings, up to 5,000sqm without individual pedestrian access directly from a public road, and with frontage to an arterial road corridor require one small loading space. Lot J and Lot K provides 64 apartments and 38 townhouses respectively, however, the total floor area in both lots exceeds 5,000sqm, and both lots do not provide frontage to an arterial corridor hence there is no requirement for a small loading space as specified in PC79. Instead a regular loading space as outlined in E27 will be required to achieve compliance with the AUP. As shown in Figure 37 above, an unmarked loading space will be provided in Lot J to serve the 64 apartments, however no loading space will be provided in Lot K. It is understood that each dwelling proposed within Lot K will have an allocated parking space, which can be used when residents of a particular dwelling require a loading space (e.g. when moving houses, or receiving furniture deliveries etc.)

As shown in Figure 37 above, Lots C, D and E all have formal (marked) loading spaces that will likely facilitate movements of either the 8m Medium Rigid Truck or 11.5m Large Rigid Truck design vehicle. These loading spaces have been marked out in green for each respective lot as shown in Figure 40– Figure 42 below.

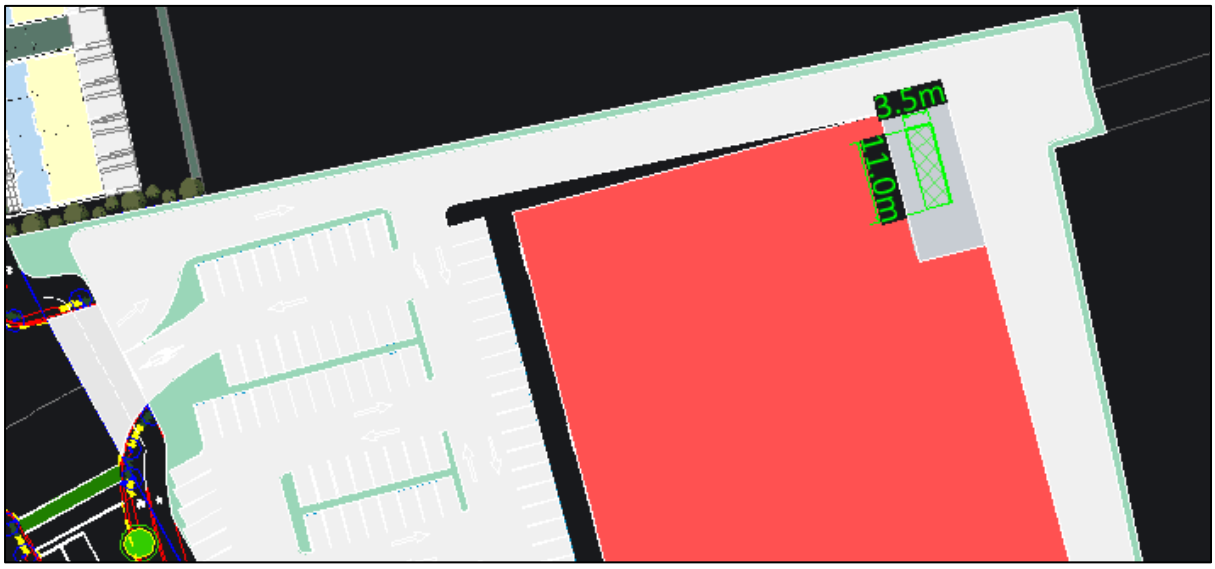


FIGURE 40: LOT C LOADING ZONE

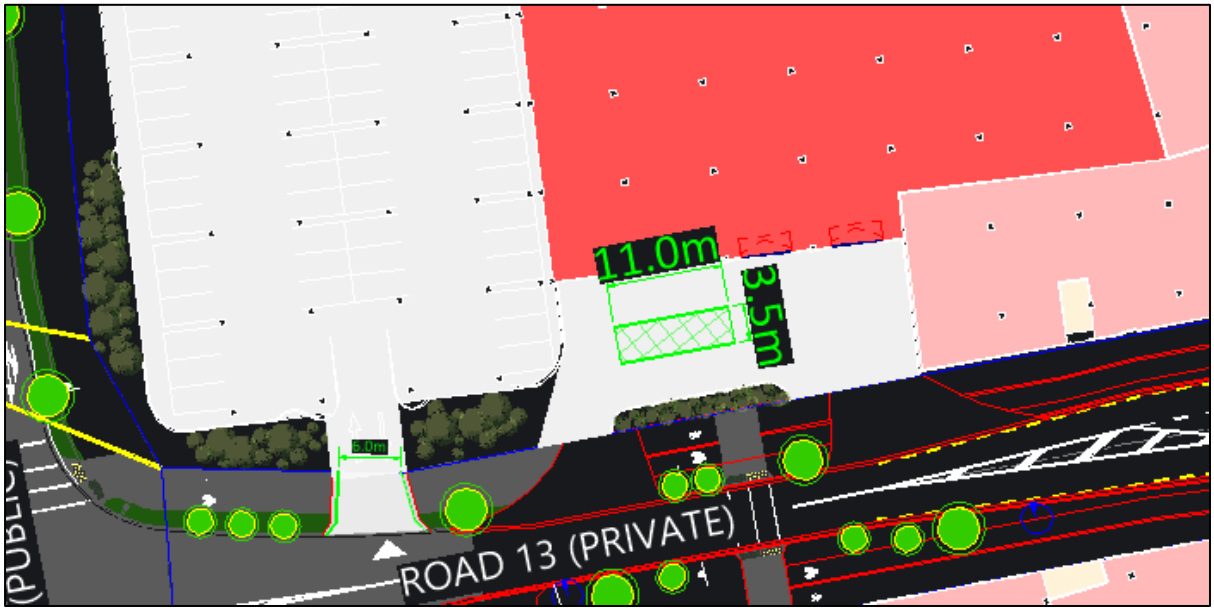


FIGURE 41: LOT D LOADING ZONE

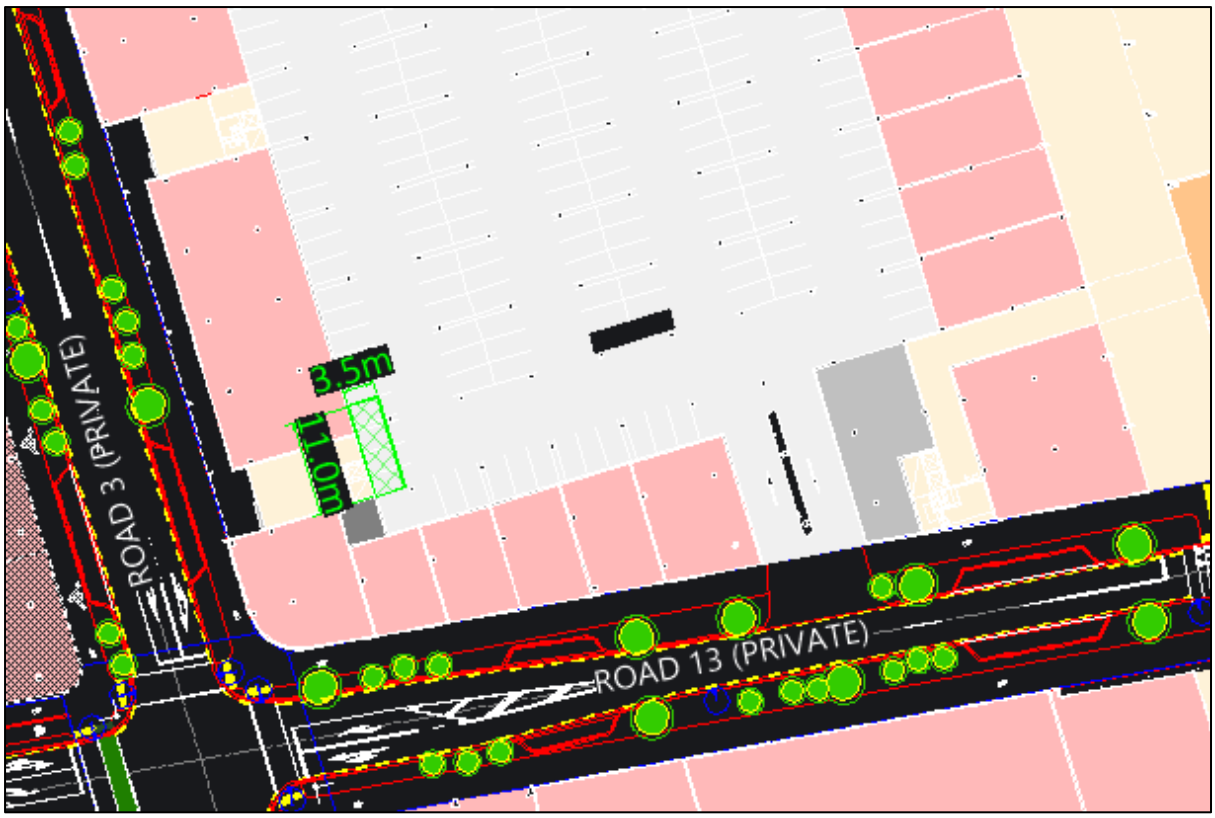


FIGURE 42: LOT E LOADING ZONE

A swept-path analysis showing the specific design vehicles (for each lot) tracking into and out of each of these loading zones is shown in Figure 43 to Figure 56 below. The vehicle tracking undertaken for each lot provides a red line which represents the body of the vehicle and the blue outlines a 0.5m buffer to ensure there is sufficient space between the vehicle and any adjacent wall/fences/vehicles etc. The orange lines represent the vehicle crossing and splays to accommodate each loading vehicle.

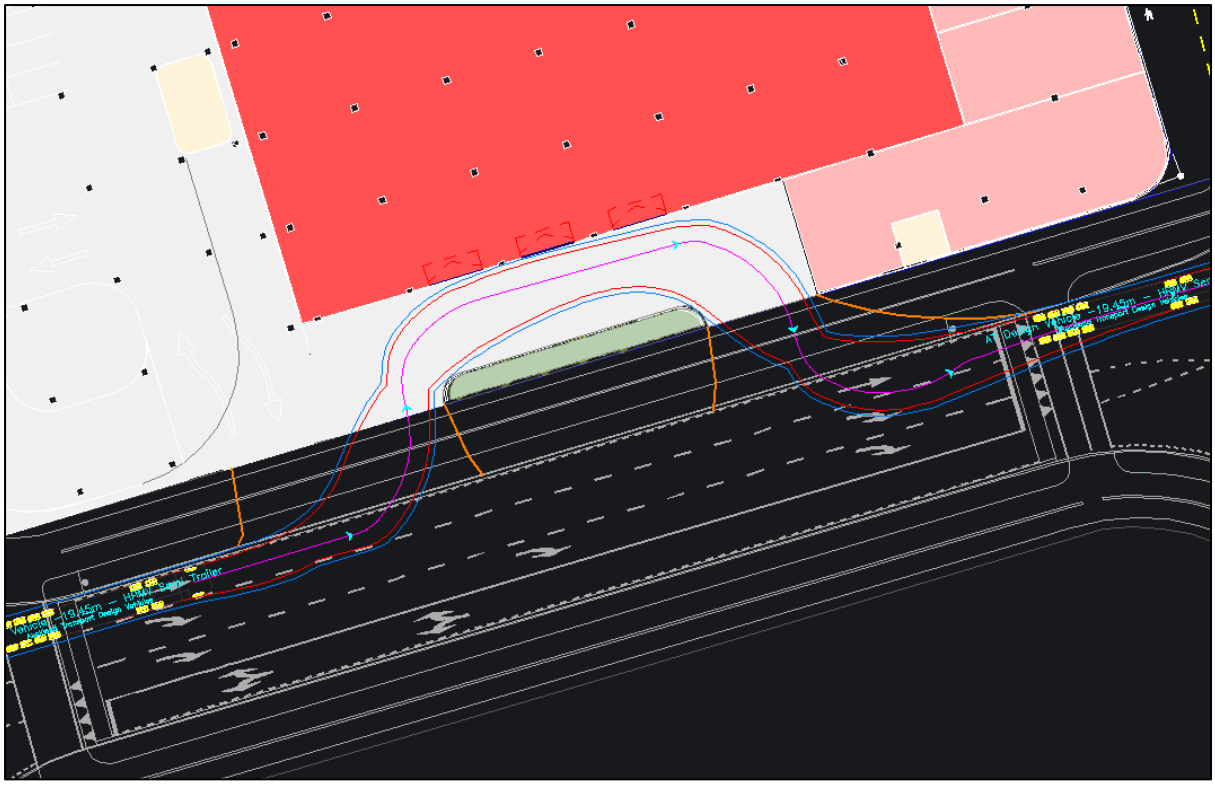


FIGURE 43: 19.45M TRUCK TRACKING FOR LOT A

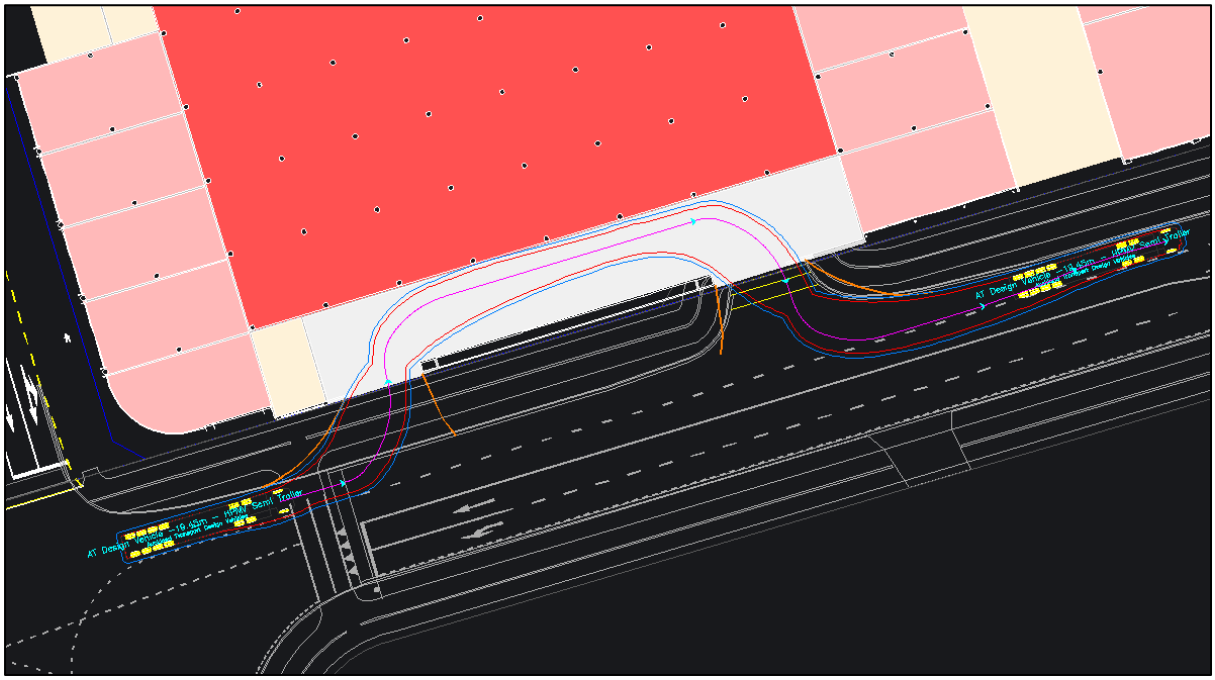


FIGURE 44: 19.45M TRUCK TRACKING FOR LOT B

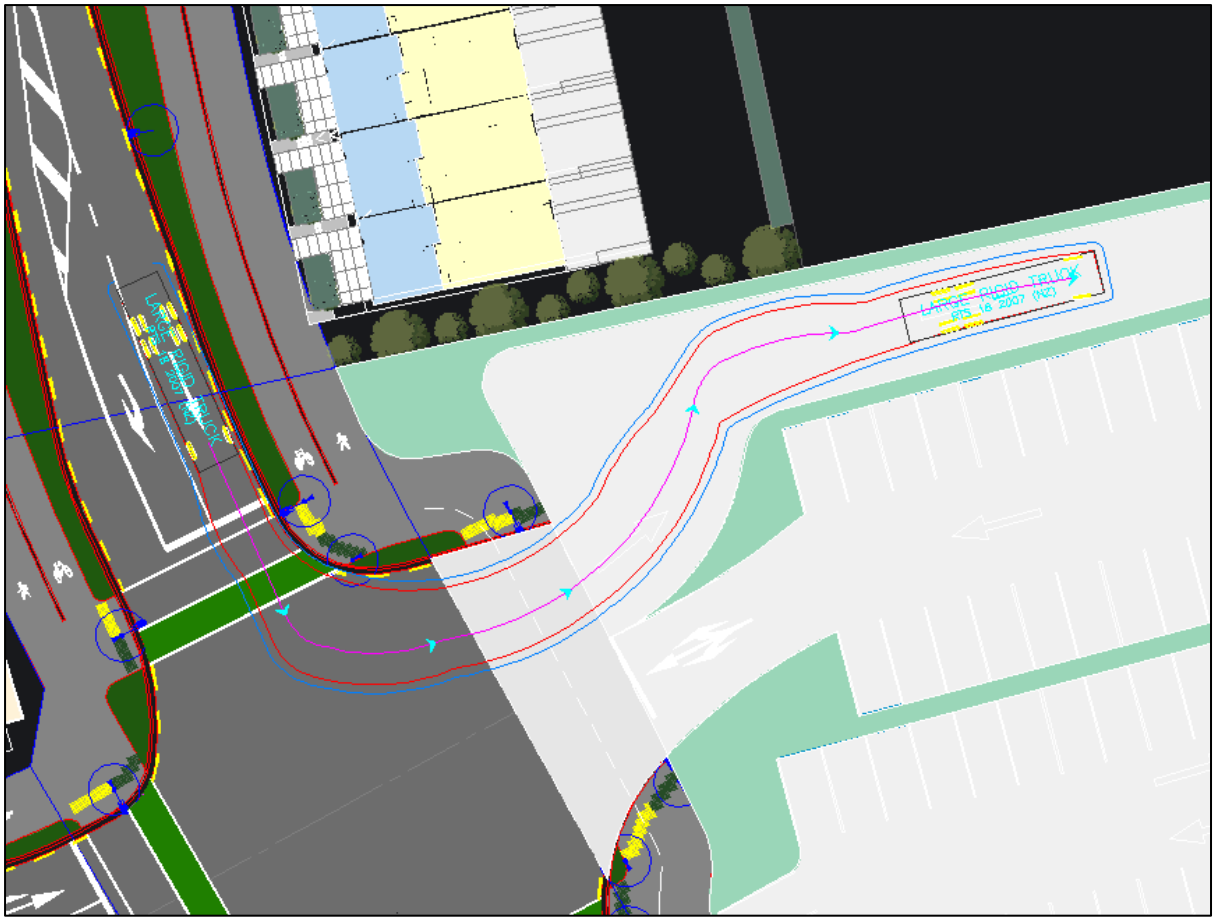


FIGURE 45: 11.5M TRUCK TRACKING FOR LOT C ENTRY

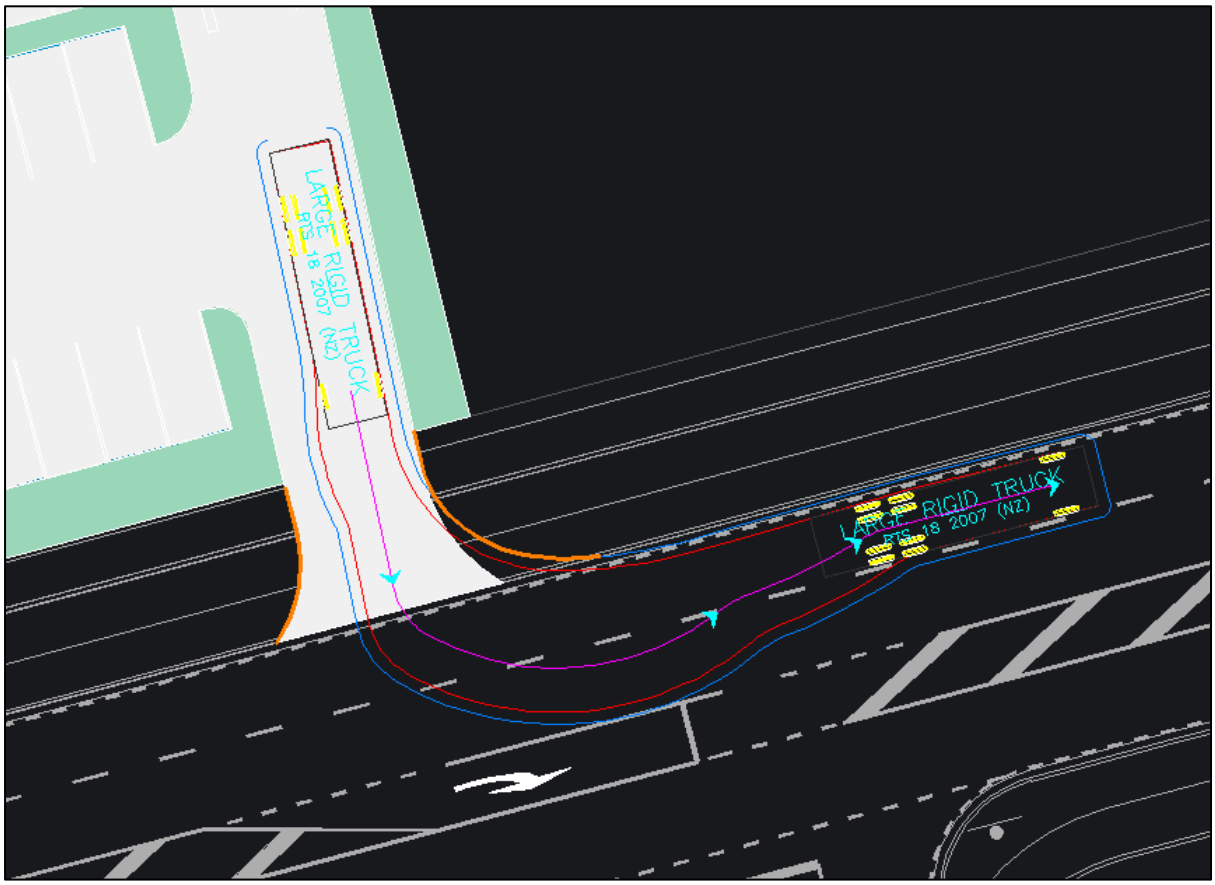


FIGURE 46: 11.5M TRUCK TRACKING FOR LOT C EXIT

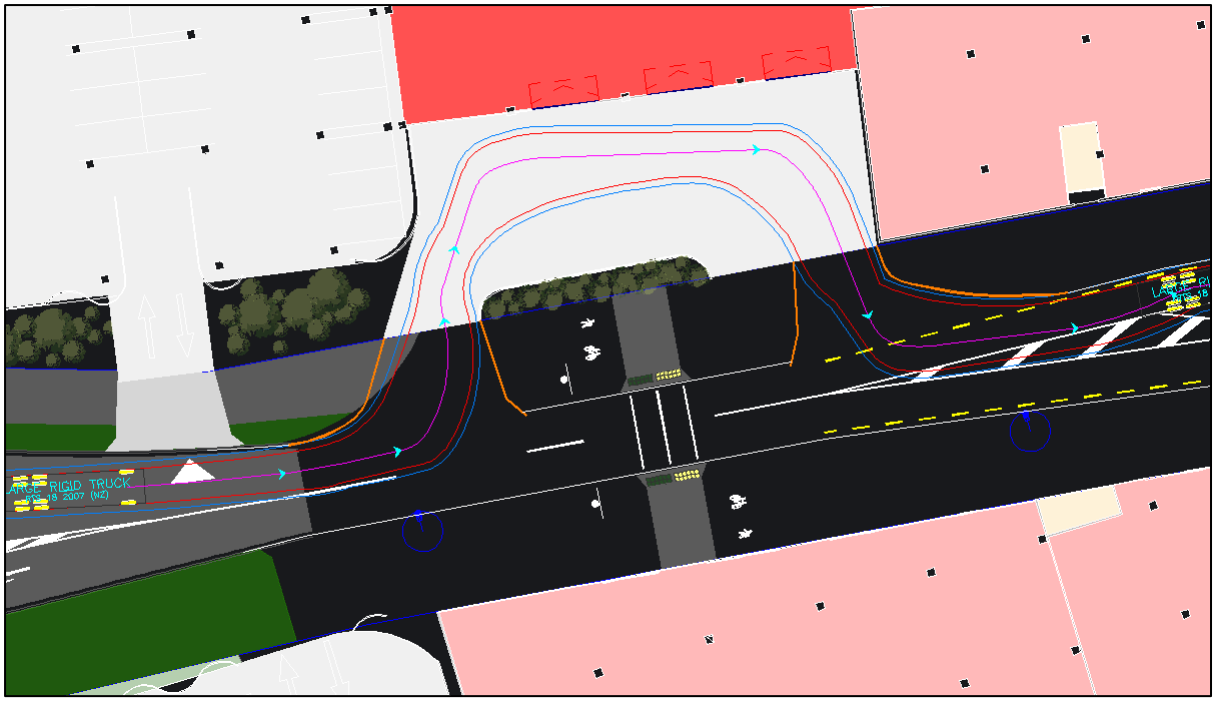


FIGURE 47: 19.45M TRUCK TRACKING FOR LOT D

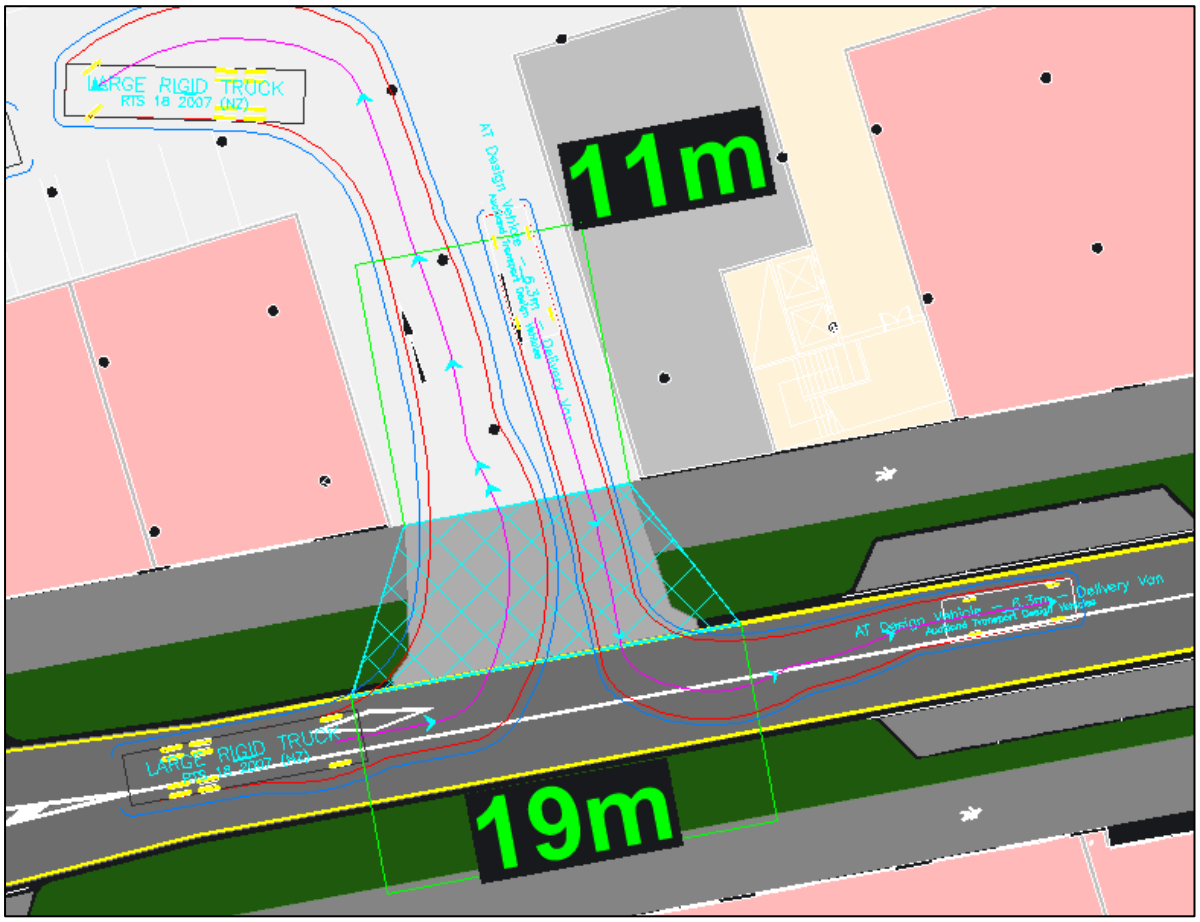


FIGURE 48: 8M RIGID TRUCK TRACKING FOR LOT E

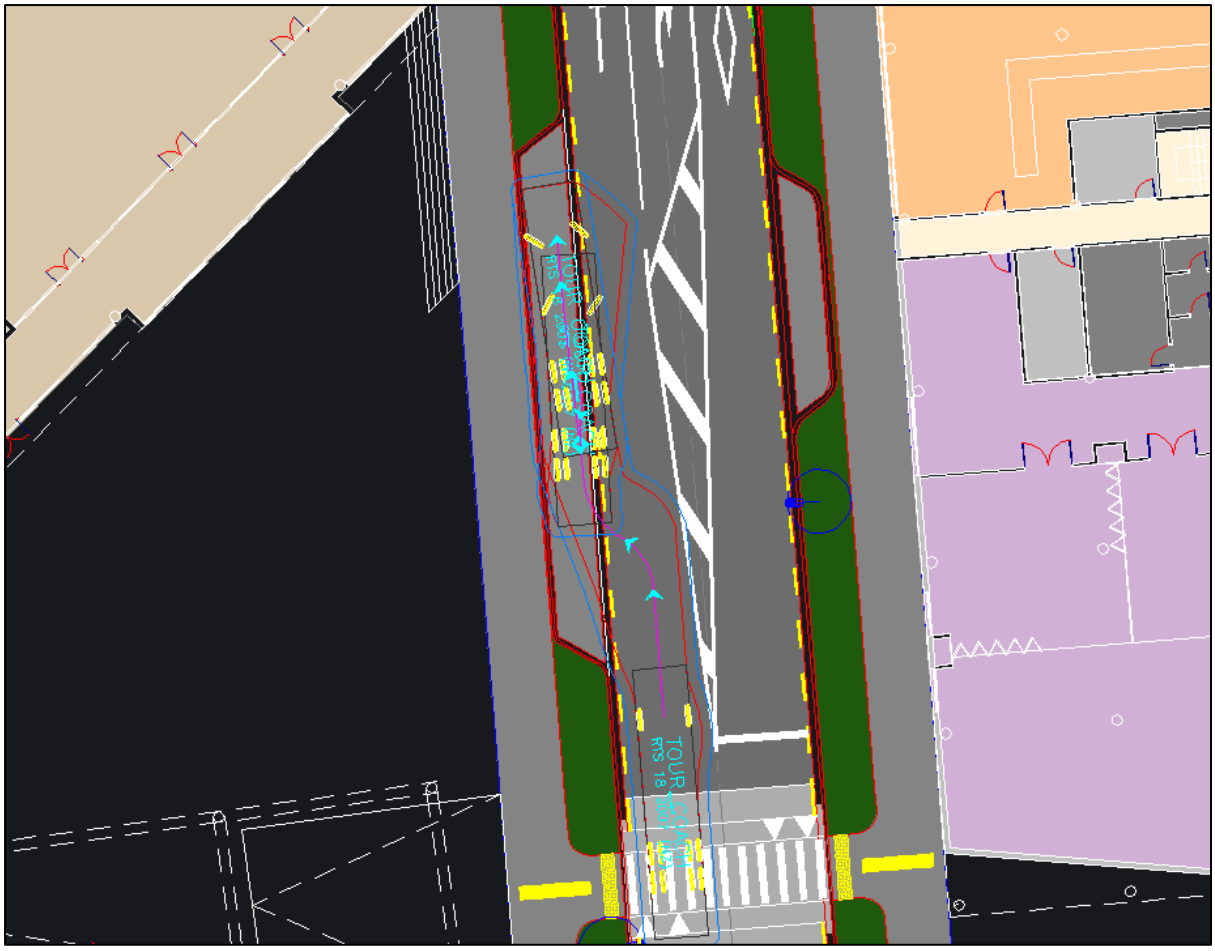


FIGURE 49: TOUR COACH LOADING TRACKING FOR LOT F1 ENTRY

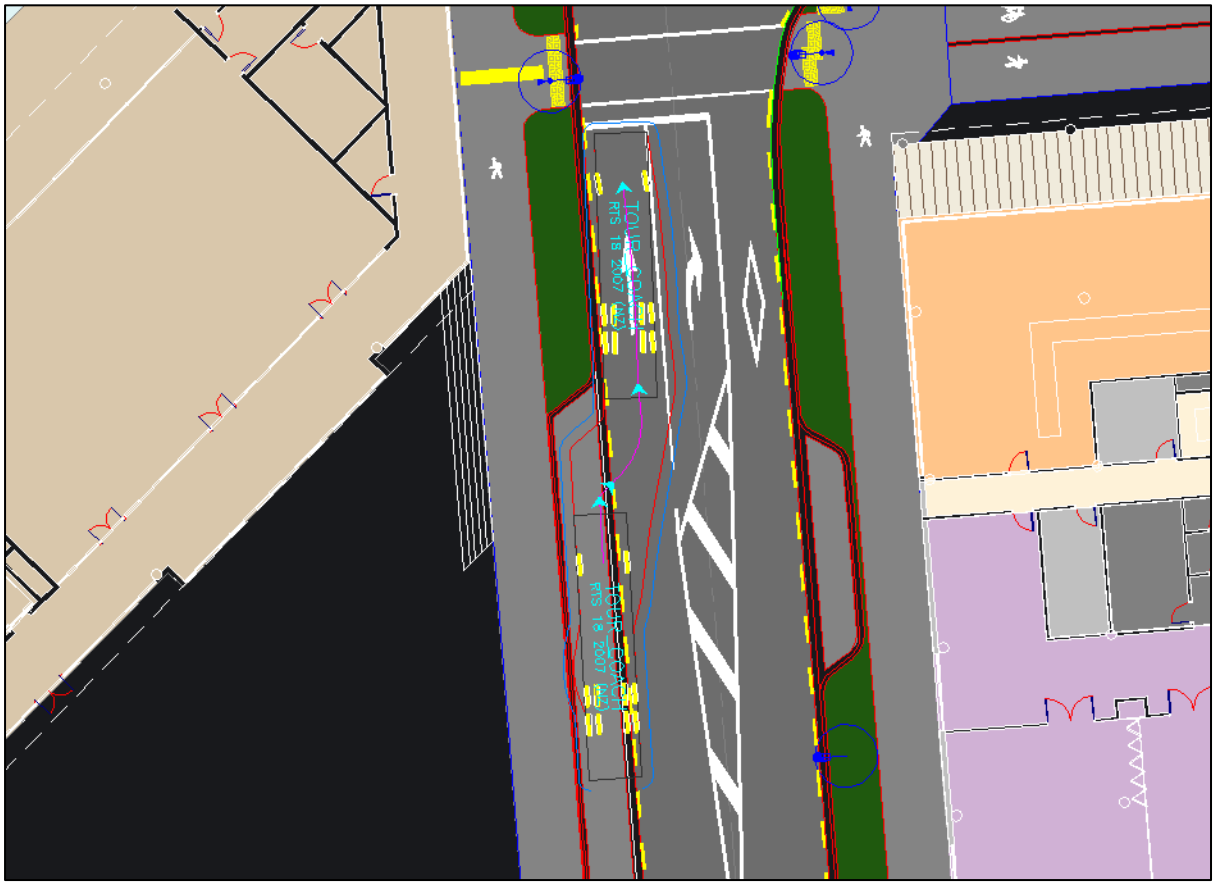


FIGURE 50: TOUR COACH LOADING TRACKING FOR LOT F1 EXIT



FIGURE 51: LOADING TRACKING FOR LOT F2

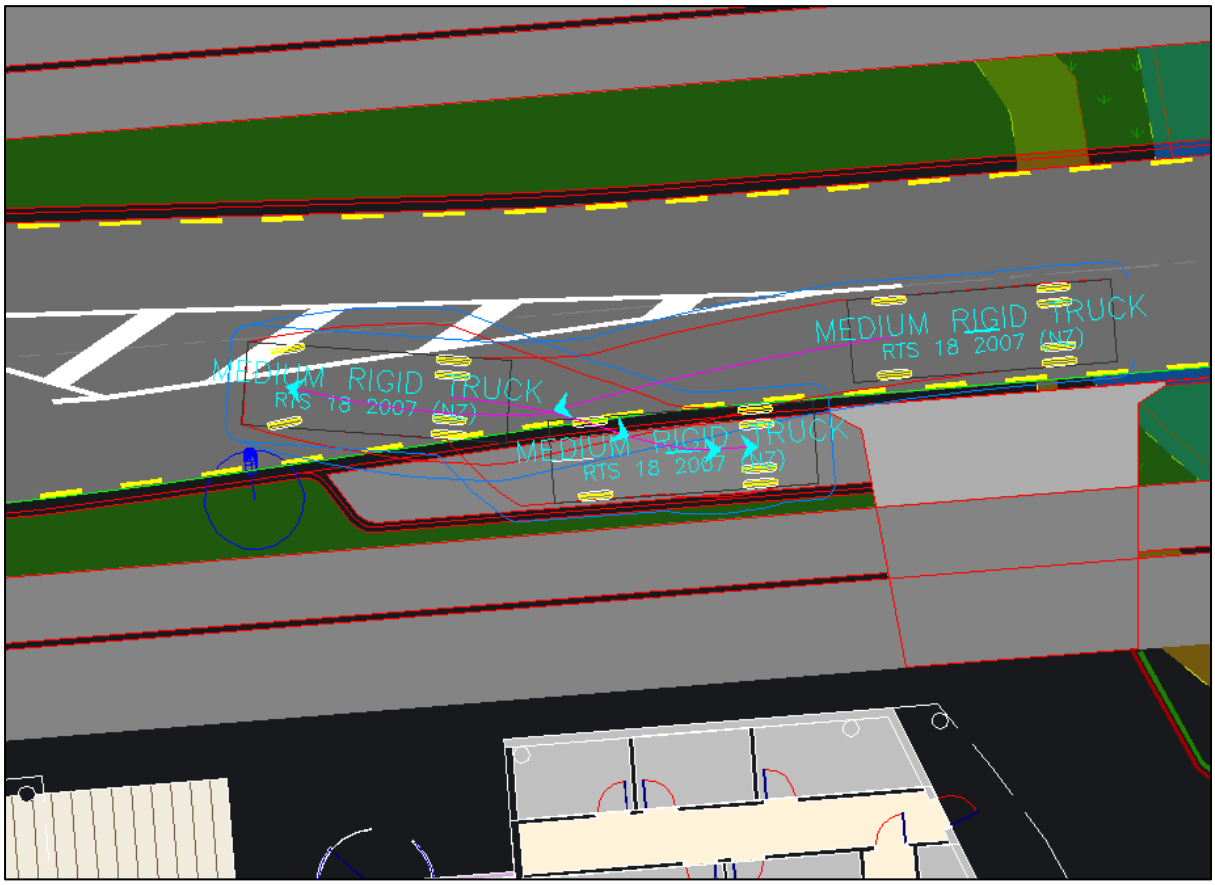


FIGURE 52: 8M RIGID ON-STREET TRUCK TRACKING FOR LOT G1 ENTRY

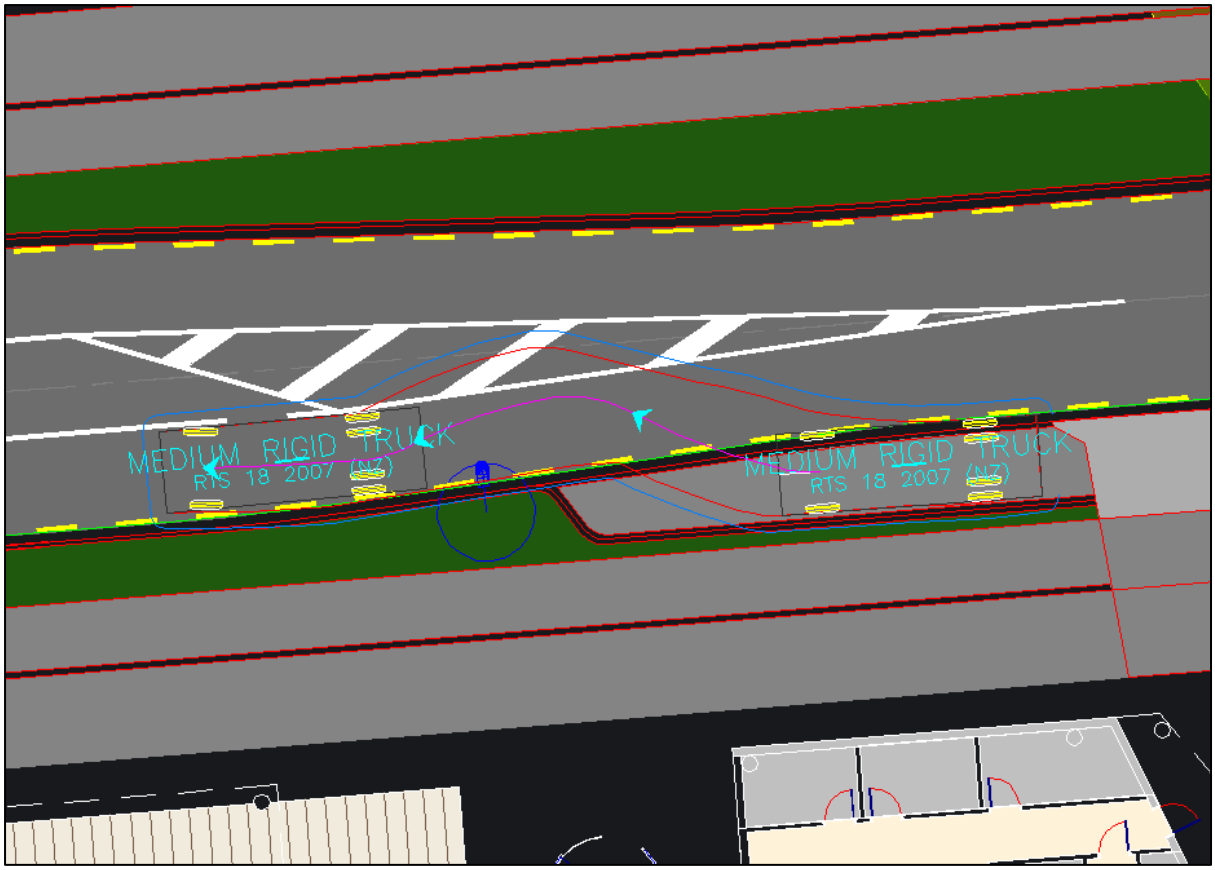


FIGURE 53: 8M RIGID ON-STREET TRUCK TRACKING FOR LOT G1 EXIT

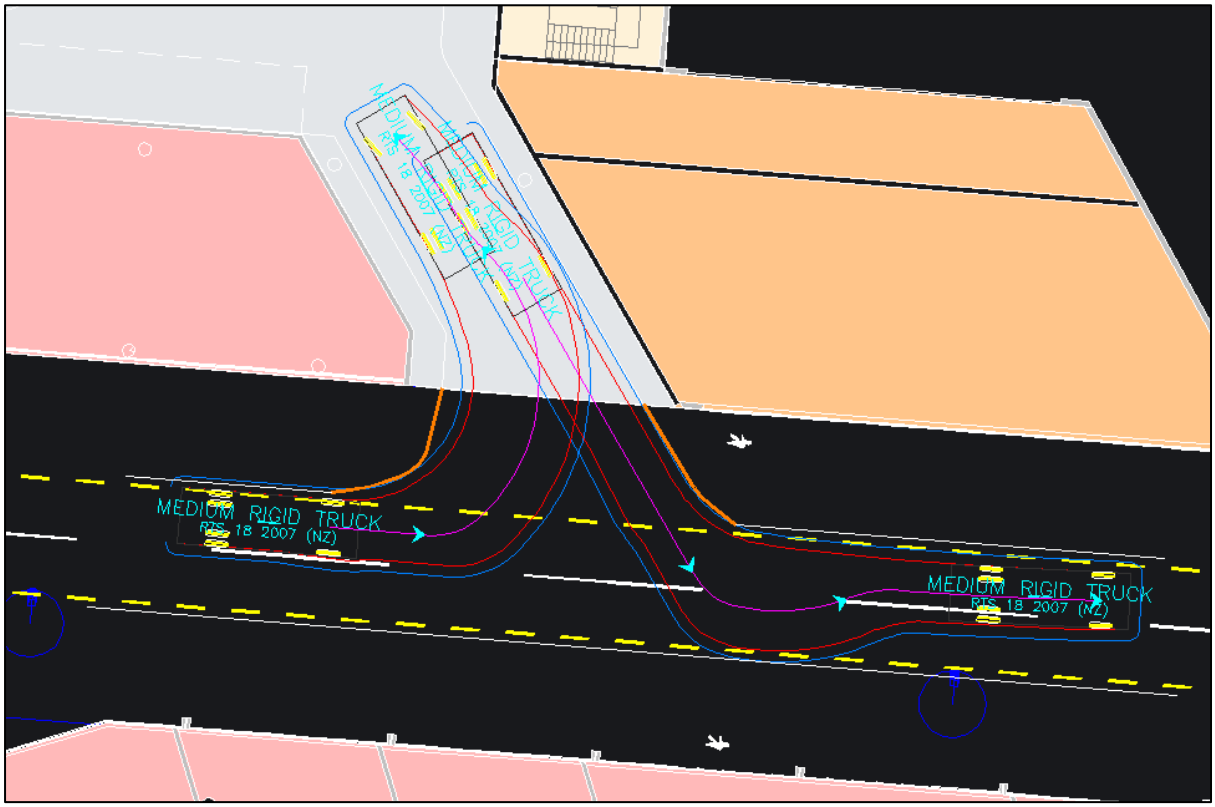


FIGURE 54: 8M RIGID TRUCK TRACKING FOR LOT G2

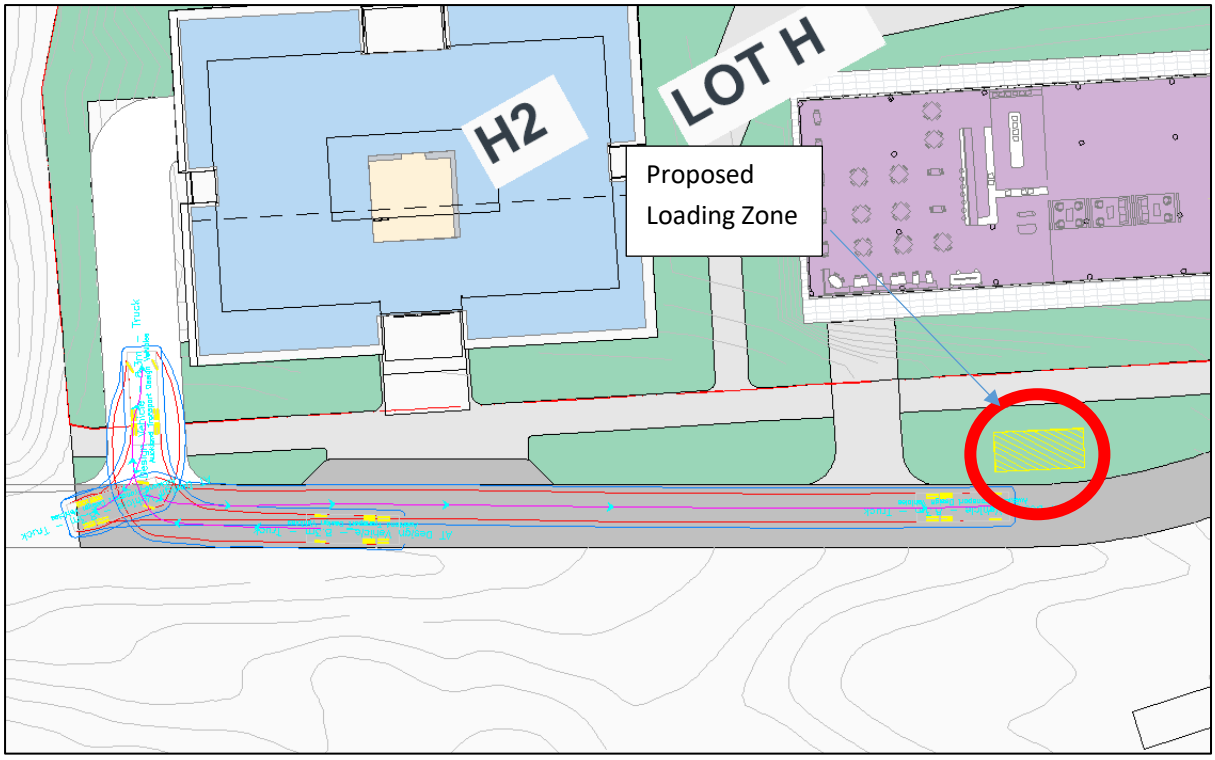


FIGURE 55: 8M RIGID TRUCK TRACKING FOR LOT H

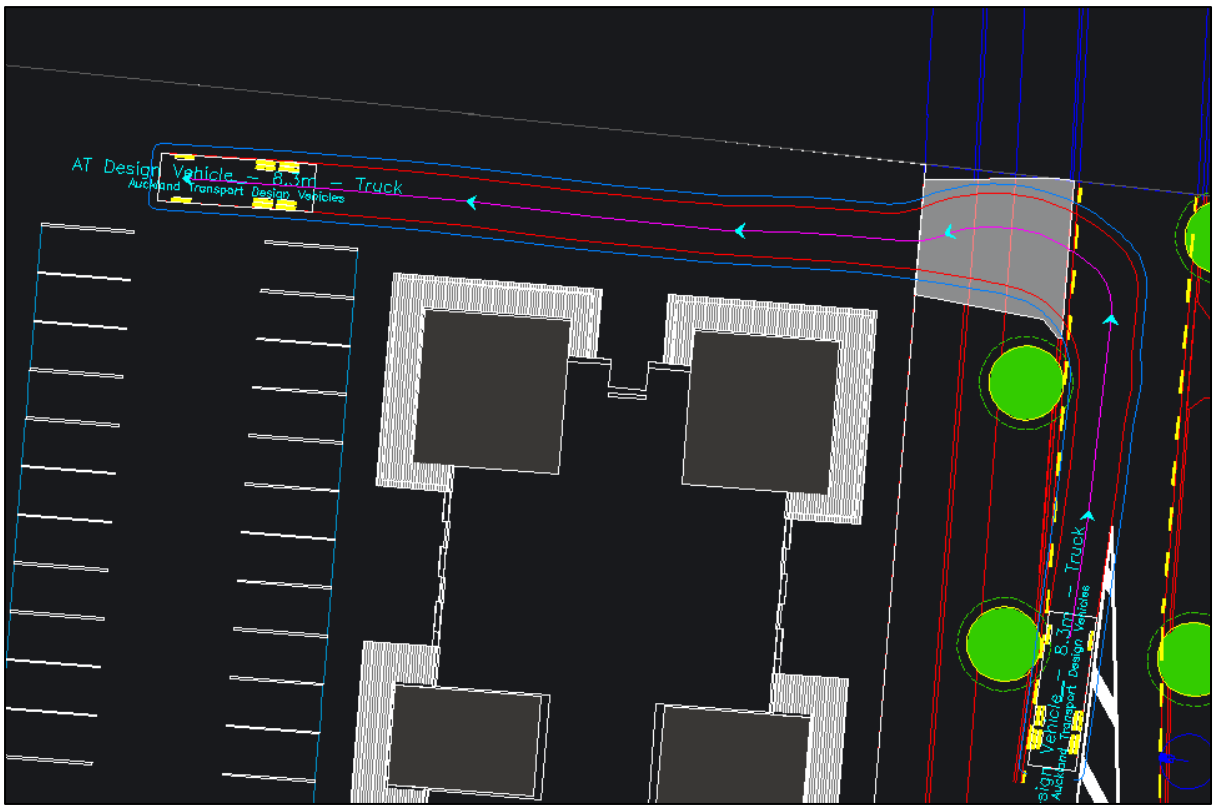


FIGURE 56: 8M RIGID TRUCK TRACKING FOR LOT J

As shown in Figure 51 above, the loading space to serve Lot F2 has been provided on the northern side of Road 11 (west of the Road 3/Road 11 intersection). As such, it is proposed that all delivery vehicles intending to use the loading zone will turn into the western section of Road 11, and travel through the Lot F2 carpark as shown in Figure 51 above before parking temporarily within the loading zone. The proposed on-street loading space will have a length of 8m and width of 3.5m, hence complying with the dimensions outlined in Table E27.6.3.2.1 from the operative AUP.

As shown in Figure 55above, the proposed loading space for Lot H1 and H2 is located on the eastern side of the Road 3 corridor. However, it is understood that vehicles are unlikely to be able to approach from the north, and therefore must approach from the south along Road 3. As such, northbound loading vehicles will be required to travel past the loading zone and turn into the accessway serving Lot H2 to turn around and access the loading space. Evidently, this results in a non-compliance as the loading vehicle will have to perform a reversing manoeuvre onto/off the road corridor. However, it should be noted that the vehicle crossing serving Lot H2 is located at the northern end of the development and will only be frequently accessed by the temporary bus routes, resulting in low vehicle volumes in proximity of the site. Additionally, pedestrian volumes in proximity of this subject site are expected to be very low given that the active mode connection does not extend beyond the northern boundary of the site. As such, given the low vehicle and pedestrian volumes in the vicinity of this vehicle crossing, the reversing manoeuvre onto/off the road is unlikely to have significant major adverse effects on the safe and efficient operation of vehicles or pedestrians travelling along Road 3.

It is also proposed to provide an on-street loading zone along Road 11 west of the Road 11/Road 3 intersection

Rule E27.6.3.2 of PC79 also states that any loading space must not exceed a crossfall of 2% in all directions. It is expected that all off-street loading spaces will be located on flat surfaces with a cross-fall of less than 2% in any direction, hence complying with the requirements outlined in PC79. Although the gradients of the roading corridors (and as such the on-street parking spaces) will only be determined in subsequent design stages, it is expected that they will be designed to comply.The vehicle tracking undertaken at the access of each lot demonstrates that vehicle crossings can be suitably formed to allow for efficient and safe manoeuvring of loading vehicles while maintaining a 0.5m buffer between the vehicle and any adjacent walls/fences/vehicles etc.

4.8 End-of-trip facilities

Table E27.6.2.6 of the AUP requires end-of-trip facilities to be provided for offices, education facilities and hospitals, but does not state any requirements for retail, community or commercial activities. As outlined in section 3, there are no education facilities or hospitals proposed within the site, hence the requirement for end-of-trip facilities only applies to the proposed commercial (office activity). The AUP requires offices with a GFA between 500m^2 and 2,500m^2 to provide one shower and changing area, offices with a GFA between 2,500sqm to 7,500sqm to provide two showers and changing areas, and two additional showers and changing areas for every additional 7,500sqm.

Table I450.6.5.1 of the I450 Drury Centre Precinct provisions also outlines the minimum number of end-of-trip facilities for commercial and community activities. It should be noted that the thresholds and criteria outlined in the Precinct provisions is the same, with the only difference being the land use extends to include community activities as well.

Table 8 below outlines the commercial and community floor areas within each lot of the Drury Centre Stage 2 site. It should be noted that the lots proposed to undergo further subdivision within the Drury Centre Stage 1 site are for residential activities only, and as such have no requirements for end-of-trip facilities. As shown, end-of-trip facilities will be provided in accordance with the requirements outlined in E27.

TABLE 8: END-OF-TRIP FACILITIES PROVISION

Lot	Proposed Activity	GFA (sqm)	End-of-trip facilities requirement	End-of-trip facilities provision
A	Commercial	2,523	2	2
B	Commercial	4,200	2	2
C	Retail	29,417	0	0
D	Commercial	2,422	2	2
E	Commercial	4,966	2	2
F	Community	10,216	2	At least 2
G	Commercial	12,652	2	At least 2
H	Commercial	6,285	2	2

As such, the end of trip facilities provision will satisfy the requirements.

4.9 Intersection Design

The Stage 1 Fast-track ITA provided a detailed design and modelling assessment of all internal intersections proposed within Stage 1 of the Drury Centre development, and also several external intersections in vicinity of the Drury Centre precinct.

The proposed Drury Centre Stage 2 development includes seven signalised intersections within the site. It is expected these signalised intersections will enhance safety for pedestrians and cyclists across all legs of these intersections while also accommodating larger design vehicles which are required for the loading and unloading to service the proposed retail and commercial buildings. Pedestrian crosswalks are provided across all intersection legs for intersections along Road 3. Separate cycle and pedestrian crossing facilities are also provided across all legs for intersections along Road 25 which has provision for uni-directional cycle lanes and footpaths on both sides of the road corridor as discussed in section 4.4.1.

Figure 57 below shows the overview plan of the signalised intersections throughout the Drury Centre Stage 2 area of Drury Centre. It should be noted that all three intersections along Road 1 were consented as part of the initial Stage 1 Fast-track application, and hence will not be extensively discussed within this report. As part of the initial application, each of these three intersections (Road 1/Road 2, Road 1/Road 3, and Road 1/Road 25) were consented to temporarily exist as signalised T-intersections, with future provision to upgrade these to cross-roads intersections as part of the Drury Centre Stage 2 development. As such, the proposed development will upgrade these consented T-intersections into cross-roads intersections.

Additionally, the Road 3/Flanagan Road intersection will be constructed towards the end of the project timeframe. As such, the precise form of this intersection is yet to be determined, and will be decided during a subsequent design phase in coordination with Auckland Transport and the applicant. However, it is anticipated that Flanagan Road Southwest will form the minor arm of a T-intersection with Road 3 / Flanaghan Road northwest existing as the major southern and northern approaches.

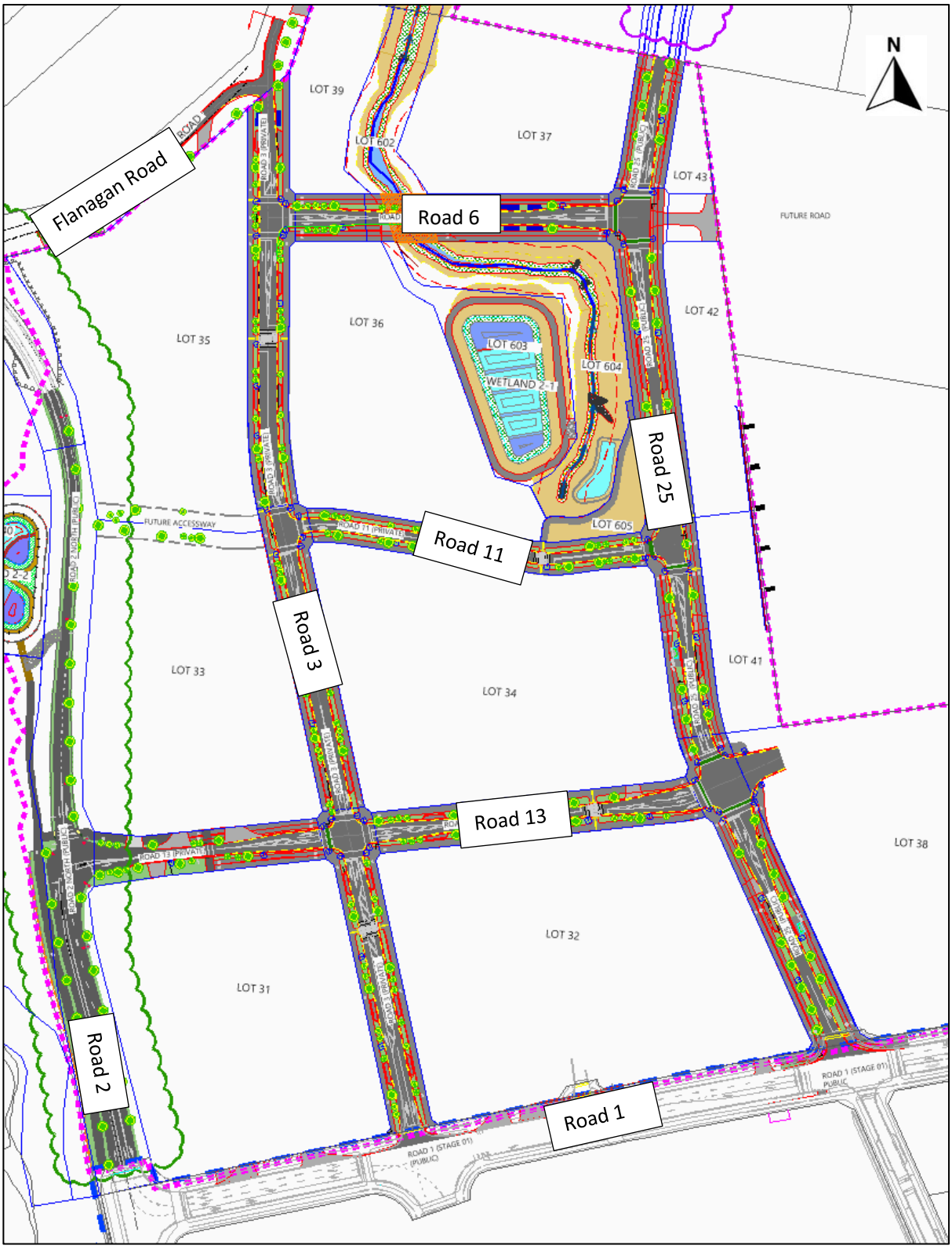


FIGURE 57: OVERVIEW OF SIGNALISED INTERSECTIONS

As shown above, two approach lanes are proposed for all signalised intersections shown above (except Road 11 which was considered to be lightly trafficked and therefore constrained). Right-turn lanes are always separated where applicable while the kerbside lane will cater for the remaining (through and left-turn) movements to improve the intersection performance.

4.9.1 Road 3 / Road 13 Intersection

Figure 58 below shows the Road 3 / Road 13 signalised intersection concept. All approaches have a through and turning lane on each approach, with a single departure lane on each. . Signalised pedestrian crossings are provided across all four legs of the intersection, and an assisted cycle crossing facility is provided across the eastern approach lane to allow cyclists to connect to the uni-directional cycle lanes along the eastern section of Road 13.

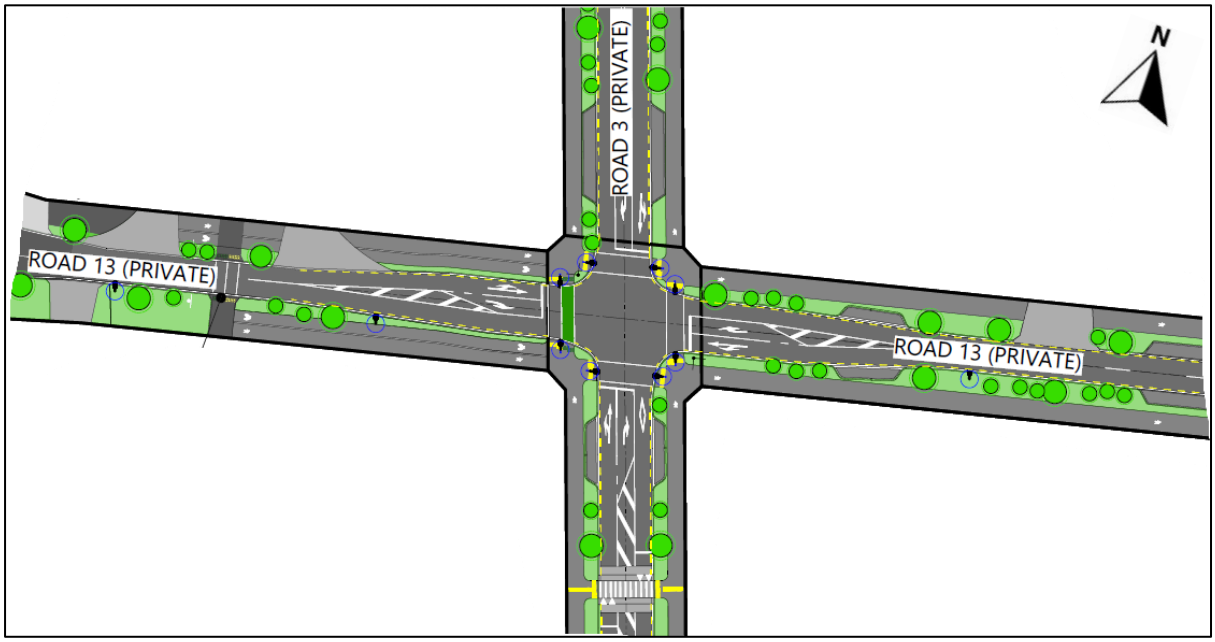


FIGURE 58: ROAD 3/ROAD 13 INTERSECTION

4.9.2 Road 3 / Road 11 Intersection

Figure 59 below shows the Road 3/Road 11 intersection. As stated in section 4.4.5, the western section of Road 11 will not be developed as part of this consent application, hence the Road 3/ Road 11 intersection has been shown as a signalised T-intersection in the interim, however, provision will be made for creating a fourth arm of this intersection in the future. Road 3 provides separate through and turns lanes on both approaches, but Road 11 only provides a single lane approach.

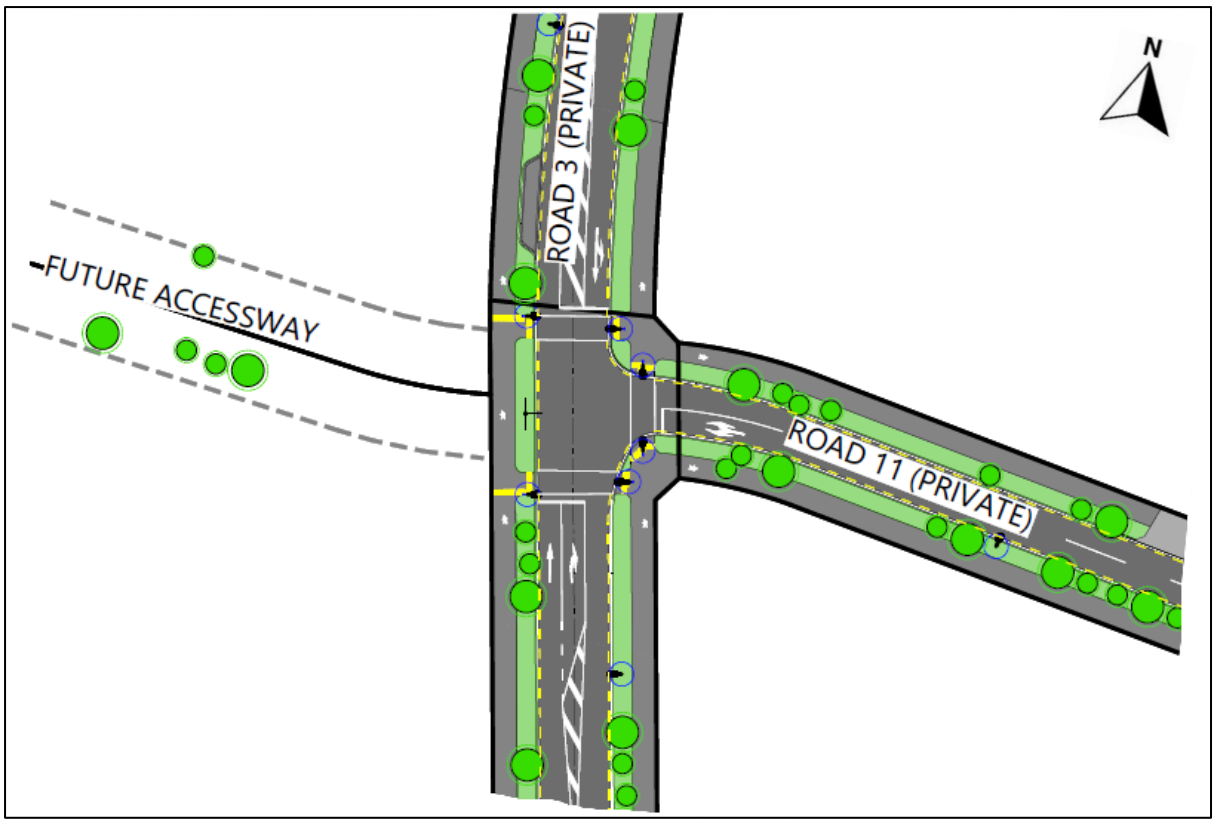


FIGURE 59: ROAD 3/ROAD 11 INTERSECTION

4.9.3 Road 3 / Road 6 Intersection

Figure 60 shows the signalised Road 3 / Road 6 T- intersection. The western section of Road 6 will not be developed as part of this consent application, hence the Road 3/ Road 6 intersection has been shown as a signalised T-intersection in the interim, however, provision will be made for creating a fourth arm of this intersection in the future. Each approach has separate through and turning lanes, with single departure lanes, with signalised pedestrian phases on all arms.

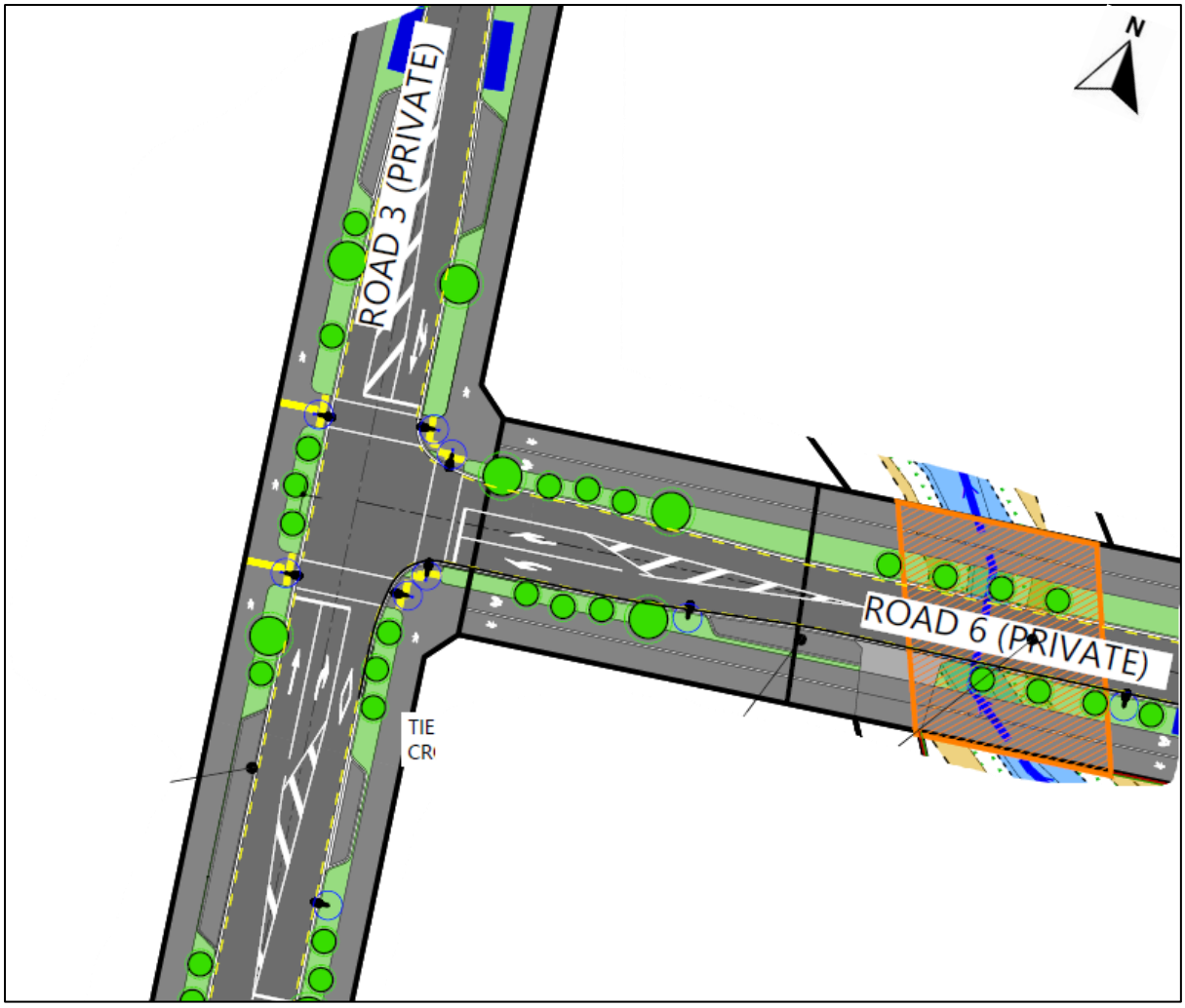


FIGURE 60: ROAD 3/ ROAD 6 INTERSECTION

4.9.4 Road 25 / Road 6 Intersection

Figure 61 below shows the Road 25 / Road 6 intersection. It is proposed that the eastern leg will temporarily just exist as a private accessway, given that land to the east of this intersection is owned primarily by a third party developer. As such, when land to the east of the subject site is developed in the future, the Road 6 corridor will extend east beyond the intersection and the eastern boundary of the subject site. As such, is not included as part of this consent application the roading layout of this road corridor will be determined in future development stage(s). As shown in Figure 61 below, the northern approach of Road 25, and the western approach of Road 6 have combined left-turn and through movements, and a separate right-turn lane. The southern approach of Road 25 provides a combined right-turn and through movement lane and a separate left-turn lane.

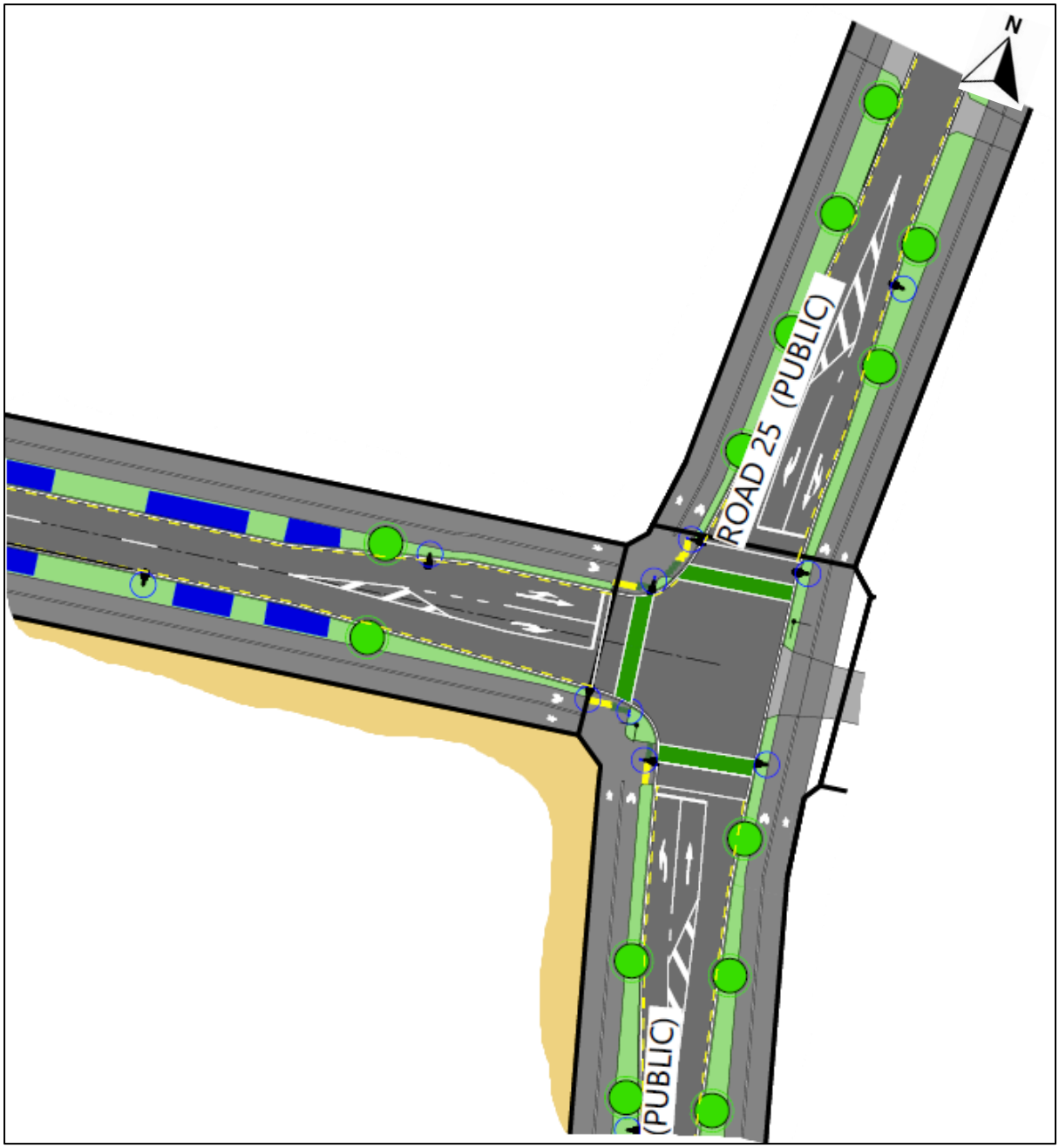


FIGURE 61: ROAD 25/ROAD 6 INTERSECTION

4.9.5 Road 25 / Road 11 Intersection

Figure 62 below shows the Road 25 / Road 11 T-intersection. As shown, each road corridor has a single approach and exit lane. The southern approach of Road 25 and the Road 11 approach provide a combined through and turning movement lane. The northern approach of Road 25 divides the single approach lane into a separate right-turn and through lane.

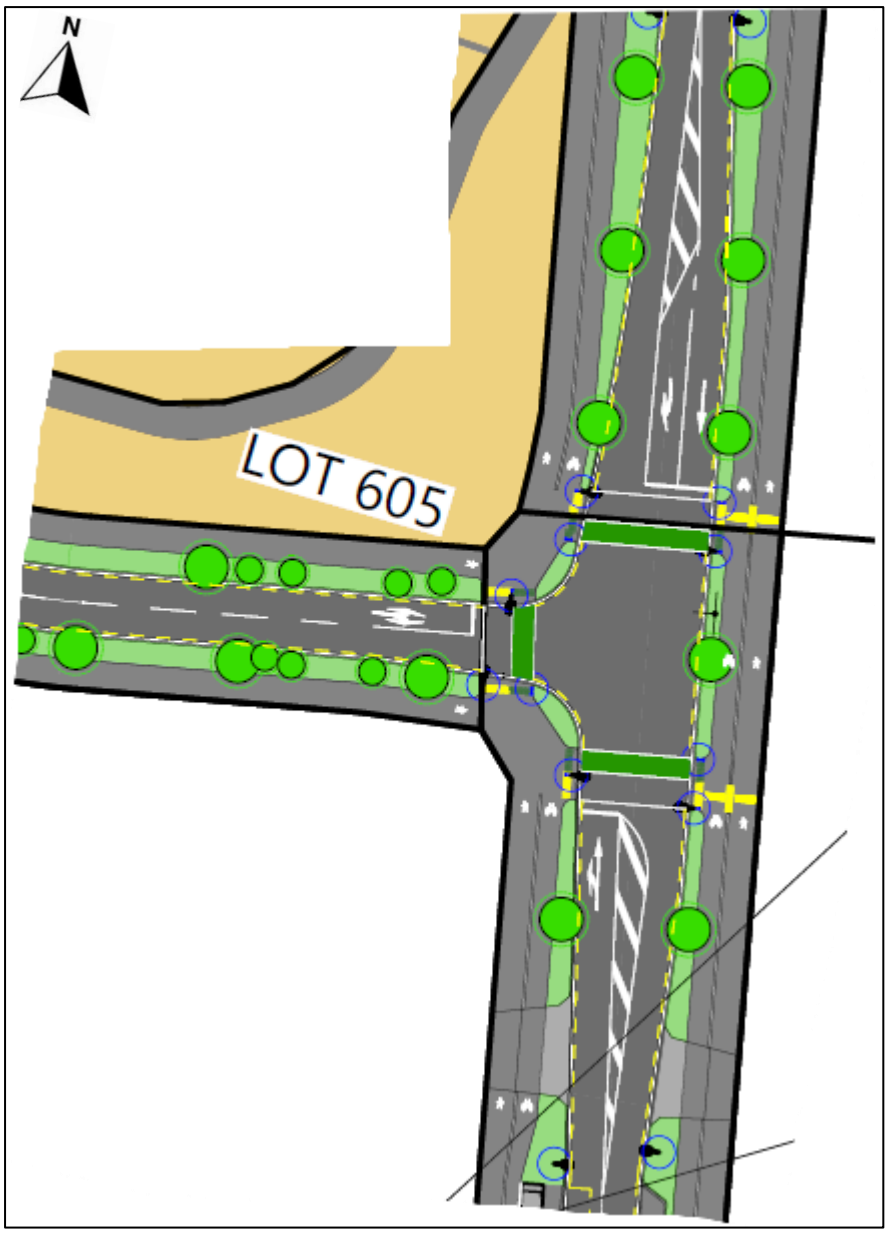


FIGURE 62: ROAD 25/ROAD 11 INTERSECTION

4.9.6 Road 25 / Road 13 Intersection

Figure 63 below shows the Road 25 / Road 13 intersection. The eastern leg provides site access to Lot C, which will also be signalised. It was considered that a fourth eastern leg would be more appropriate to provide access to Lot C instead of a regular vehicle crossing. The primary reason for this is that Lot C would be regularly accessed by large vehicles which would be more easily accommodated via a signalised intersection than a regular vehicle crossing.

As shown, all three approaches to this intersection provide a combined left-turn and through lane and a separate right-turn lane.

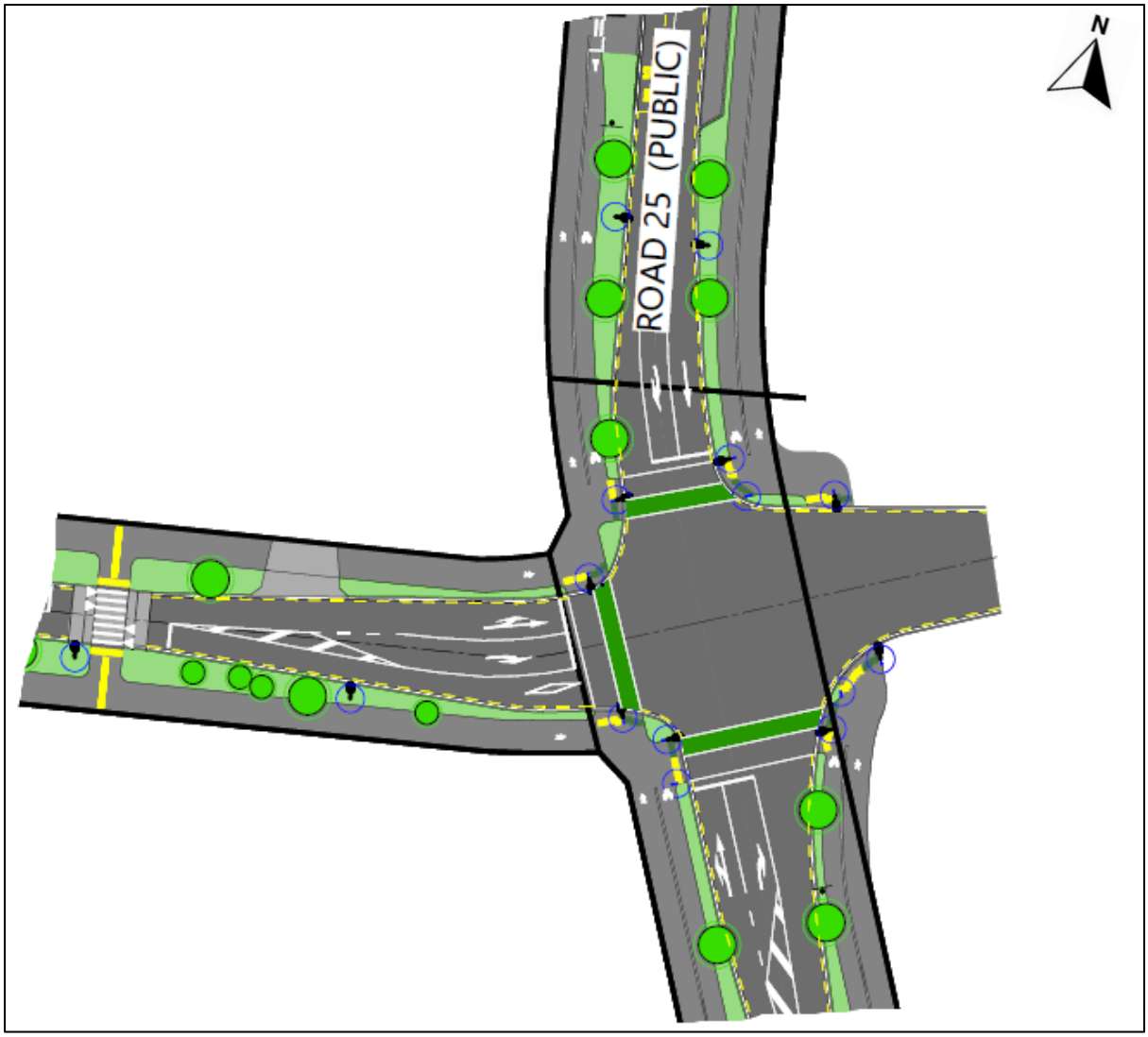


FIGURE 63: ROAD 25/ROAD 13 INTERSECTION

4.9.7 SH Off-ramp / Road 13 / Road 2 Intersection

Figure 64 below shows the intersection design for the SH1 offramp/Road 13/Road 2 intersection. The northern leg forms the SH1 off-ramp and will only allow southbound vehicles exiting the State Highway Network to enter the Drury Centre Precinct. Road 13 provides a single left-turn only approach lane, given that the northern Road 2 approach does not have an exit lane. A solid median will also be provided to re-enforce the left-turn only movement. Road 2 provides a single approach lane for right-turn movements (into Road 13), and two exit lanes given the two approach (through) lanes from Road 2 (north).

It should also be noted that the pedestrian and cycling crossing facility along Road 13 has been located approximately 60m east of the signal based on NZTA consultation. This is because during pre-application meetings with NZTA, concerns were raised that activation of the pedestrian and cycle crossing facilities could cause queueing on the off-ramp given that one of the lanes consists of a shared left-turn and through movement. As such, the crossing facility has been shifted east to reduce any adverse queueing effects on the off-ramp. As described earlier, a shared path is provided on the northern side of Road 13 to the west of the mid-block active mode crossing facility, to enhance active mode connections to the shared path to the west of the intersection and Road 2. As such, the only active mode crossing at this intersection will be

on the northern leg, which will be activated when right turns into Road 13 and left turns out of Road 13 are being undertaken.

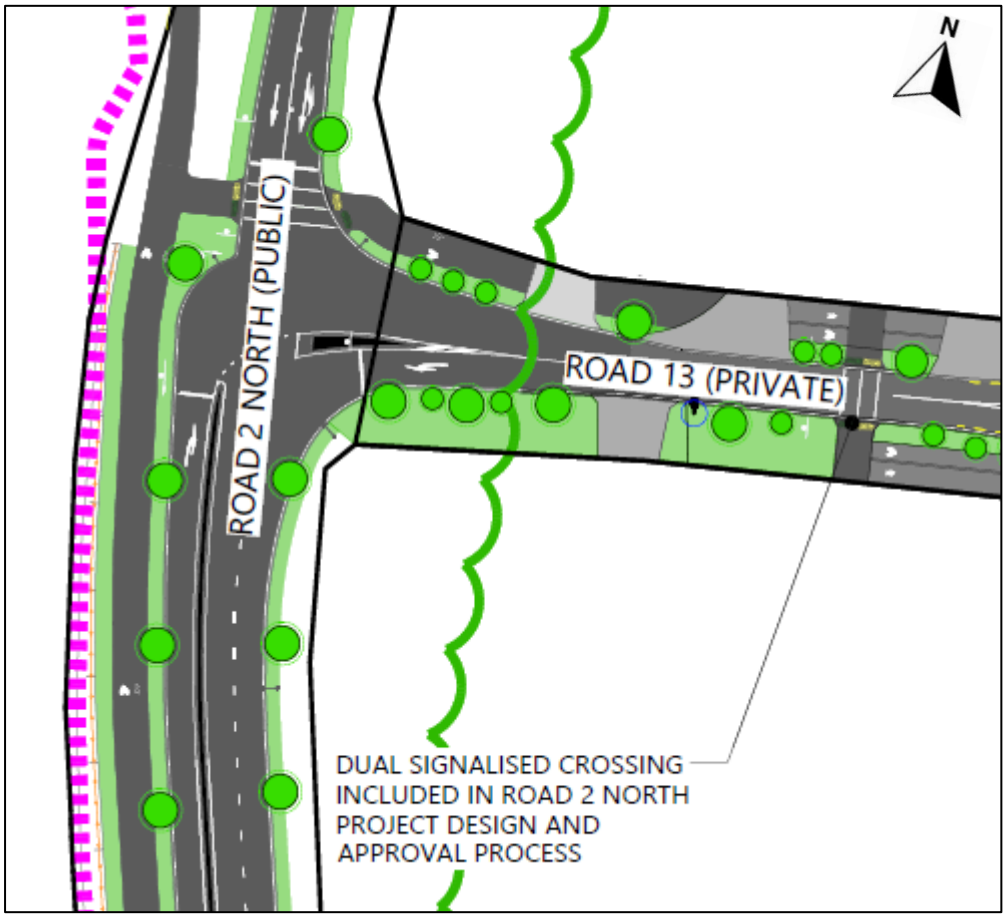


FIGURE 64: SH OFF-RAMP/ROAD13/ROAD 2 INTERSECTION

5 Traffic Effects

5.1 Background

5.1.1 Plan Changes 48,49 and 50

Plan Change 48 (PC48), Plan Change 49 (PC49) and Plan Change 50 (PC50) rezoned land in the Drury Centre, Drury East, and Waihoehoe Precincts respectively. The plan changes were notified in August 2020 and became operative on 16 December 2022 to successfully rezone 328ha of land from Future Urban Zone (FUZ) to a mix of Residential, Business, and Open Space zonings.

As part of these three plan changes, a 'Threshold for Subdivision and Development' table ("trigger table") was included in the respective precinct provisions outlining the specific transport upgrades required to support the different activities, development or subdivision within the Drury East transport staging boundary at specific thresholds for specific land uses. This also reflected the potential timing and staging of upgrades known at that time. These tables are labelled Table I450.6.2.1, Table I451.6.2.1, and Table I452.6.2.1, and are identical across the three Drury East precincts. Table 9 below shows the content of the trigger tables as they appear within each of the precincts' provisions, and also includes a trip generation limit for each of the trigger points that was included in the Plan Change ITAs but did not appear in the precinct provisions trigger table. This trip generation limit was derived through iterative testing of the surrounding transport network, and relates only to (internal and external) trip generation of activities contained within the three Drury East precincts.

TABLE 9: PLAN CHANGE TRIGGER TABLE

Row	Transport Infrastructure	Level of Development enabled by Transport Infrastructure				
		Residential (Dwellings)	Retail (GFA)	Commercial (GFA)	Community (GFA)	Drury East Peak Hr Trip Gen
(a)	Interim Waihoehoe Road upgrade, incl interim signals at GSR / Waihoehoe Intersection	Up to 710 units	-	-	-	Up to 400 trips
(b)	SH1 Six-laning Papakura to Drury	710 to 1,300 units	Up to 24,000sqm	up to 6,400sqm	Up to 800sqm	400 to 2,000 trips
(c)	SH1 direct connection Drury Central Rail Station	1,300 to 1,800 units	24,000 to 32,000sqm	6,400 to 8,700sqm	800 to 1,000sqm	2,000 to 2,500 trips
(d)	Waihoehoe Road RoRS upgrade incl full GSR/Waihoehoe signalisation	1,800 to 3,300 units	32,000 to 56,000sqm	8,700 to 17,900sqm	1,000 to 2,000sqm	2,500 to 3,800 trips
(e)	Mill Road southern connection (Fitzgerald to SH1 (incl. Drury South Interchange)	3,300 to 3,800 units	56,000 to 64,000sqm	17,900 to 21,000sqm	2,000 to 2,400sqm	3,800 to 4,300 trips
(f)	Mill Road northern connection Opaheke northern link	3,800 to 5,800 units	64,000 to 97,000sqm	21,000 to 47,000sqm	2,400 to 10,000sqm	4,300 to 5,600 trips

The methodology used to derive each of these thresholds was described in detail within the Integrated Transportation Assessments (ITAs) that accompanied each of the three plan changes, and a Modelling Report that was attached to each. That methodology is briefly summarised as follows:

- The traffic modelling was undertaken initially by Supporting Growth Alliance (SGA) as part of its Drury Infrastructure Funding and Finance (DIFF) study.
- The SGA modelling assumptions, such as trip generation rates, mode share splits, trip assignment, internalisation assumptions and refined zoned system, were adopted by the Plan Change modelling.
- Testing was undertaken at the future scenario years of 2028, 2038 and 2048, with some interpolation between those as required.
- Through the plan change modelling it was established that the Great South Road / Waihoehoe Road intersection was the key location within the network that constrains the level of development within Drury East. Other infrastructure upgrades also affect the amount of traffic travelling through that intersection.
- Through the Plan Change modelling, a Network Capacity Criteria (NCC) was developed and agreed with the Authorities (SGA, Auckland Transport, Auckland Council, NZTA) to ensure that traffic congestion is managed rather than completely avoided. The NCC ensured that:
- The average queue lengths during the peak hours are considered acceptable as long as average queue lengths at the intersection does not overspill onto an adjacent intersection; and
- The operation of the intersection was better than level of Service (LOS) F during the interpeak hours.

5.1.2 Subsequent Consents

In 2022, the three Drury East precincts each separately applied for Stage 1 developments under the Covid 19 Recovery (Fast track Consenting) Act 2020, and all three (Fast Track Consents) were granted. In 2023, a further consent was sought within the Drury Centre precinct for additional retail area, which was also subsequently granted. Table 10 below summarises the granted consents within the respective Drury East precincts' areas:

TABLE 10: GRANTED CONSENTS WITHIN DRURY EAST PRECINCTS

Developer	Actual Residential Dwellings Granted	Retail (GFA)

Kiwi Property	-	32,000 sqm
Fulton Hogan	235	-
Oyster Capital	357	-
Totals	**592**	**32,000 sqm**

With 32,000sqm GFA retail activities, the total amount of retail that currently have granted consents corresponds to Row (c) within the trigger table. Row (c) requires the following infrastructure upgrades to be in place prior to activities becoming operational:

- Interim Waihoehoe Road upgrade;
- SH1 Six-Laning between Papakura and Drury;
- Drury Central Rail Station; and
- SH1 Direct Connection.

It is noted that none of these upgrades are yet constructed. The first three are fully funded and in varying stages of construction / design. However, as there is some uncertainty around the timing of the SH1 Direct Connection, the Fast Track consent ITAs (and the subsequent consent application for a further 8,000sqm GFA of retail) assessed the effect of that upgrade not being in place. With the removal of the commercial and community elements within Row (c) and the resultant reduction in overall trip generation, the assessment established that the SH1 Direct Connection was not required at that time. This methodology was accepted by Auckland Transport and Auckland Council as reviewers of the consent application and the local authority that approved the consent. Accordingly, there is a consent condition that requires the completion of the Interim Waihoehoe upgrade, the SH1 six-laning and the train station to be completed prior to those activities becoming operational.

The total combined Stage 1 and Stage 2 Drury Centre developments will extend into Row (f) of the Plan Change trigger table. None of the upgrades listed in Row (f) or those up to that point are yet constructed and are not likely to be in place for many years. However, it is understood that the implementation of the consents will take place incrementally over several years, as the surrounding urban areas are developed, and the centre's catchment matures.

Accordingly, the quantum of activities that could appropriately be implemented and commenced before the necessary infrastructure upgrades are completed has been calculated and presented below. The application proposes to include conditions that effectively amount to a revised trigger table that reflects the analyses presented. That is, activities beyond specified thresholds will only be able to be implemented once specified infrastructure improvements are in place.

5.2 Recent Changes to Infrastructure Timings

Since the Fast Track Consents were granted, some changes to the timing of infrastructure construction programmes have occurred that create consequential anomalies with the transport trigger table in the precinct provisions. Accordingly, further model testing was carried out to understand the potential development yield at each stage of infrastructure completion. Although the precinct provisions trigger table cannot be changed without a new plan change process, the testing provided a revised trigger table to assess the resultant non-compliant consents against which have been discussed with Auckland Transport and Auckland Council.

The revised infrastructure timing changes are summarised below:

5.2.1 Drury Central Rail Station

The timing for the Drury Central Rail Station (included within Row (c) of the precinct provisions trigger table) has been confirmed. Site clearance and earthworks have already started, with construction of the station expected to commence in early 2025, and completion expected late 2025 / early 2026.

5.2.2 Waihoehoe Road Upgrade

The Waihoehoe Road Ultimate Upgrade sits within Row (d) of the precinct provisions trigger table. In May 2024, the New Zealand Government announced a package of Roads of Regional Significance (RoRS) and Roads of National Significance (RoNS). The western end of the Waihoehoe Road Ultimate upgrade (between and incorporating the Great South Road and Kath Henry Lane intersections) was announced within the RoRS package, and confirmed as fully funded. Further, it is understood that the three Drury East consent holders are intending to enter into an Infrastructure Funding Agreement (IFA) with Auckland Transport to fund the remaining eastern link of the Ultimate Waihoehoe Road upgrade (between Kath Henry Lane and Fitzgerald Road, including the upgrade of the Fitzgerald Road intersection). As such, Auckland Transport is currently undertaking a detailed design and land procurement process, and the Ultimate Waihoehoe Road upgrade is now expected to commence construction in late 2025 / early 2026, with a 2-2.5 year construction programme (taking the programmed opening date to mid-2028).

Accordingly, the interim Waihoehoe Road upgrades (as per Row (a) of the precinct provisions trigger table) are no longer considered necessary. This has been confirmed by Auckland Transport.

Sensitivity testing was carried out to establish that the total development yield within Drury East that can be accommodated by the existing Waihoehoe Road / Great South Road intersection is 600 dwellings and 5,000sqm GFA of retail. A separate resource consent for each of the Fast-Track consents to infringe Row (a) of the trigger table is currently being sought. A letter setting out the methodology and results of this testing is provided as Appendix 2 to this report.

5.2.3 The SH1 Six-laning

The SH1 six-laning upgrade between Papakura and Drury was also identified within the RoRS package, and funding to construct has also been confirmed. However, the construction contract for that upgrade is now expected to be carried out over a six-year period, so completion of the upgrade is expected in early 2030.

5.2.4 The SH1 direct connection

The SH1 direct connection is anticipated to be built within the same timeframe as the SH1 six-laning project. However, it has been designed as such that it can be constructed independently (either before or after) from those works, if required. As the project is led by this consent applicant, the timeframe therefore cannot be guaranteed at this stage.

5.3 Traffic Modelling to Reflect Infrastructure Timing Changes

To reflect the above changes to infrastructure timing, further traffic model sensitivity testing was carried out to establish a new development / infrastructure sequencing table to use as a guide of how much development can be enabled during each infrastructure stage.

The traffic model sensitivity testing processes used the same base assumptions and traffic model as the Plan Change modelling, including trip rates, trip distribution, background traffic from other developments, and the Network Capacity Criteria described earlier.

To establish the development yield achievable once the Ultimate Waihoehoe Road upgrade and the Drury Central Rail Station are in place, the Plan Change Saturn Model was rerun, with the SH1 six-laning and the

SH1 Direct Connection removed from the network. Once the Saturn model reallocated development trips onto the network, iterative Sidra testing was undertaken with gradual decreases in development trip generation until the Waihoehoe Road / Great South Road intersection met the NCC (i.e that average peak hour queues did not reach adjacent intersections).

This testing established that once the upgraded Waihoehoe Road / Great South Road intersection is in place, the transport network could support up to 2,000vph of Drury East development trips in the peak hours before queues exceeded the threshold. It is noted that the Covid Fast Track Consents were granted on the basis of this 2,000vph peak hour threshold, which established that up to 1,100 residential units and 32,000sqm GFA of retail could be supported. A condition is therefore proposed that ensures that development beyond this threshold does not occur until further infrastructure upgrades are provided. SIDRA outputs of this test are provided as Appendix 3.

Further, due to the uncertainty of timing around the SH1 Direct Connection, a test was undertaken to establish the benefit in terms of development yield that could be achieved without that upgrade in place. To do this, the SH1 Direct Connection was added to the network described above that established a 2,000vph peak hour threshold (i.e. with the Ultimate Waihoehoe Road upgrade and the Rail Station in place, but without the SH1 six-laning).

The test established no discernible benefit, in terms of additional development yield, was achieved with the addition of the SH1 Direct Connection at that infrastructure stage. The reason for this is that the limiting factor to Drury East development yield is the performance of the Great South Road / Waihoehoe Road intersection during the PM peak hour, in particular the number of trips that can exit to that intersection from the eastern (Waihoehoe Road) approach. As the SH1 Direct Connection only provides additional inbound trip capacity, it has little to no effect on the outbound capacity during the critical time. Although fewer incoming Drury East development trips are evident during the PM peak hour with the SH1 Direct Connection in place, the Saturn model reallocates any benefit to other background traffic unrelated to Drury East, in effect diverting background latent demand through the intersection to replace the potential incoming trips using the SH1 Direct Connection.

However, it is understood that the traffic model testing undertaken during the Plan Change process established that for later trigger threshold levels (once Mill Road connections are made that provide greater network distribution choices), the SH1 Direct Connection becomes more effective at enabling additional Drury East development yield. Accordingly, the SH1 Direct Connection was removed from the trigger points for the funded / imminent infrastructure upgrades described above, but retained in later triggers.

Once the SH1 six-laning is in place, the list of upgrades corresponds to Row (d) of the precinct provisions trigger table, which supports 3,800vph peak hour trips. This trigger threshold could therefore be adopted without further modelling, and a condition is therefore proposed that ensures that development beyond this trip generation threshold does not occur until further infrastructure upgrades are provided.

5.4 Changes to Land Use Mix

Using the existing and newly established vehicle trip generation thresholds described, a further exercise was undertaken to reallocate the corresponding land use activities listed in the precinct provisions trigger table to reflect the current development demand in Drury East. This was done by analysing the trip rates used within the modelling (i.e. those selected by SGA in its DIFF model that were subsequently adopted in the Plan Change modelling) and shuffling the land use mix whilst retaining the total trip generation threshold.

For instance, Row (d) of the Plan Change / precinct provisions table has a trip generation threshold of 3,800vph that enables up to 3,300 dwellings; 56,000sqm GFA of retail; 17,900sqm GFA of commercial; and 2,000sqm GFA of community activities. Using the same trip generation threshold, up to 2,660 residential units and 65,000sqm GFA of retail can be enabled, with no commercial or community GFA allocation. The trip rates used can be referenced within the Stantec Plan Change Modelling Report and the SGA DIFF ITA, both of which are provided as appendices to the Fast Track ITA provided in Appendix 1. A condition is therefore proposed that ensures that development beyond this yield does not occur until further infrastructure upgrades are provided.

5.5 Work From Home (WFH) Adjustment

Since the Covid-19 Pandemic, working habits have changed globally, with more people working remotely from home, either full or part time. This has led to many changes to travel characteristics, most notably a reduction in travel from home to employment.

To reflect these changes, a manual adjustment was made to the residential trip rates to determine the effect this has on Drury East development yield. This was done because the Plan Change model was prepared using the SGA DIFF Saturn model, the results of which were presented in the SGA DIFF ITA dated July 2021, i.e. during the Global Covid-19 pandemic years of 2020 to 2022, so the trip rates used in that model and the subsequent Plan Change model used pre-covid travel assumptions.

To establish a suitable adjustment factor to account for this change, a comparison between 2018 and 2023 census data was analysed. A Radio New Zealand article dated 10 October 2024[2] discusses changes to WFH habits, sourced from 2018 and 2023 census data[3]. Figure 6 below illustrates the changes by city / region:

[2] https://www.rnz.co.nz/news/what-you-need-to-know/530410/workers-called-back-to-the-office-as-census-data-shows-a-growing-wfh-preference

[3] https://www.stats.govt.nz/information-releases/2023-census-population-dwelling-and-housing-highlights/#travelwork

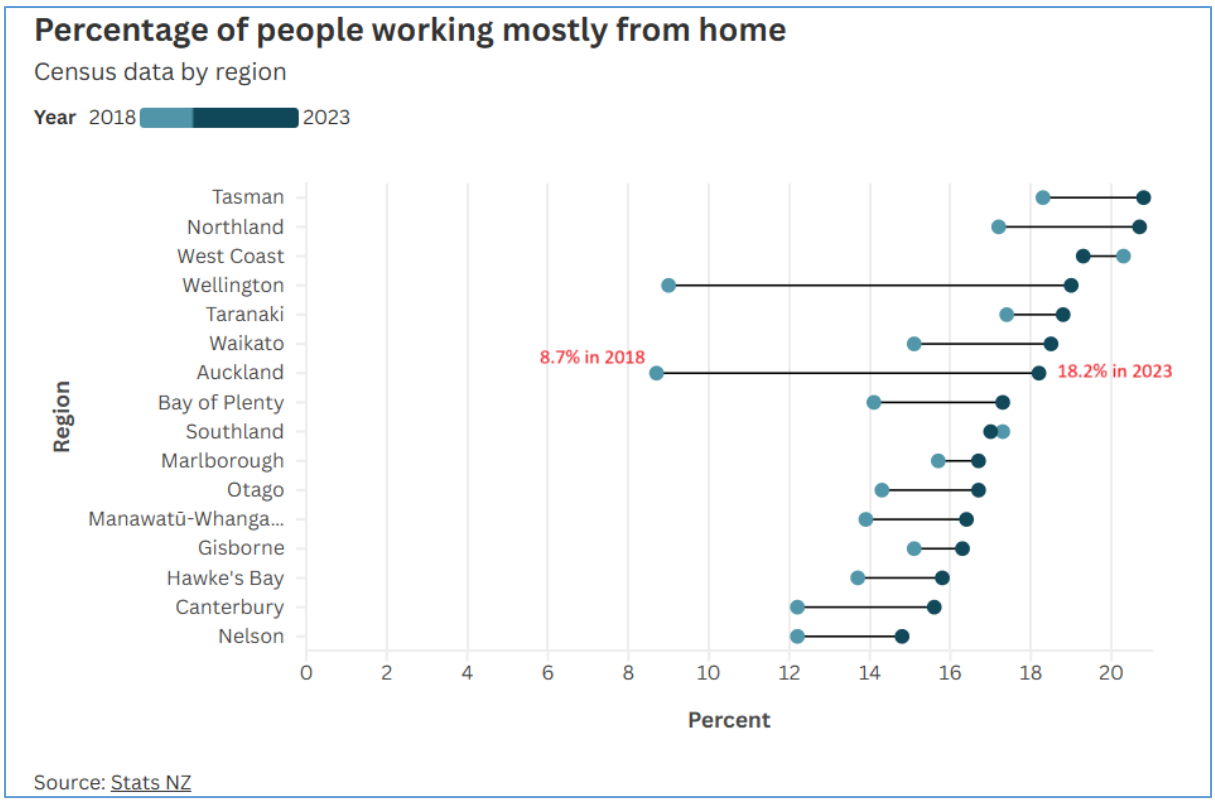


FIGURE 65: CHANGES IN WFH BY CITY/REGION

The data shows a 9.5% increase in people mostly working from home between the 2018 and 2023 census capture. To ensure a conservative test, a 9% reduction in residential trip rates was therefore introduced to the SGA trip rates used throughout the modelling, and the Drury East development yield was adjusted accordingly, although the first two rows were not adjusted as development up to that threshold already has resource consent through the Fast Track Consents. It is noted that this data does not take into account people who only occasionally work from home, i.e. those hybrid working. As these working habits would significantly further reduce residential trip generation, the analysis undertaken without taking those into account is considered to be conservative.

5.6 Results from Further Testing

Following the above further testing, a new development / infrastructure sequencing table to be used as a guide of how much development can be enabled during each infrastructure stage is shown in Table 5 below:

TABLE 11: DEVELOPMENT/INFRASTRUCTURE SEQUENCING TABLE

Row	Transport Infrastructure	Expected Completion	Level of Development enabled by Transport Infrastructure				
			Residential (Dwellings)	Retail (GFA)	Commercial (GFA)	Community (GFA)	Drury East Peak Hr Trip Gen
(a)	Existing GSR / Waihoehoe roundabout	N/A	Up to 600 units	Up to 5,000sqm	-	-	Up to 800 trips
(b)	Waihoehoe Road Ultimate upgrade incl full GSR/Waihoehoe signalisation Drury Central Rail Station	Early - mid 2028 Late 2026	600 to 1,100 units	5,000 to 32,000sqm	-	-	800 to 2,000 trips
(c)	SH1 Six-laning Papakura to Drury.	2030	1,100 to 2,660 units	32,000 to 73,000sqm	-	-	2,000 to 3,800 trips
(d)	Mill Road southern connection (Fitzgerald to SH1 (incl. Drury South Interchange) SH1 direct southbound connection	Not programmed Not programmed	2,660 to 3,300 units	73,000 to 83,000sqm	up to 6,000sqm	Up to 600sqm	3,800 to 4,300 trips
(e)	Mill Road northern connection Opaheke northern link	Not programmed Not programmed	3,300 to 5,800 units	83,000 to 97,000sqm	6,000 to 47,000sqm	600 to 10,000sqm	4,300 to 5,600 trips
(f)	Assessment of PT uptake required	N/A	5,800 to 6,400 units	97,000 to 108,000sqm	47,000 to 60,000sqm	10,000 to 16,000sqm	5,600 to 6,000 trips

5.7 Proposal Traffic Assessment

Table 6 below shows a summary of the currently granted and sought activity areas within the Drury Centre Precinct:

TABLE 6: DRURY CENTRE PRECINCT CONSENTS / PROPOSALS

Activity	Stage 1		Stage 2	Total
	Consented	Proposed	Proposed	
Retail (sqm GFA)	32,000sqm	-	63,547	95,547
Commercial (sqm GFA)	-	-	33,048	33,048
Community (sqm GFA)	-	-	10,216	10,216
Hotel (rooms)	-	-	282	282
Residential (units)	-	292	102	394

The proposed consent presents a long-term development vision for the Drury Centre Precinct. As such, the development will be constructed gradually over several years. To ensure that development can be supported by the surrounding transport environment, the development staging will follow the sequencing set out in the Development / Infrastructure Sequencing Table. Accordingly, the following development staging is anticipated at this time:

- As per Row (a) of the Development / Infrastructure Sequencing Table, prior to the Waihoehoe Road Ultimate Upgrade being constructed, up to 5,000sqm GFA of retail can be supported, therefore a single large format store is likely to become operational. During that time, 50 residential lots may be completed, although it is noted that a further resource consent would be required to enable dwellings to be built on those lots. The remainder of the 600 residential units that can be accommodated at that stage would be allocated to other developments within Drury East.
- As per Row (b) of the Development / Infrastructure Sequencing Table, once the Waihoehoe Ultimate Upgrade is completed, a total of 32,000sqm GFA of retail (including the initial 5,000sqm

GFA) can become operational, which represents either the full Stage 1 consent that has already been granted, or a mix of some Stage 1 areas and some Stage 2. The remainder of the 1,100 supportable residential units would be allocated to other developments in Drury East.

- As per Row (c) of the Development / Infrastructure Sequencing Table, once the SH1 six-laning is in place, a total of 73,000sqm GFA of retail (including the initial 32,000sqm GFA) can become operational. At that time, up to 400 residential lots can be constructed (including the initial 50), with the remainder of the 2,660 supportable residential units being allocated to other developments in Drury East. This represents the full 394 residential lots being sought in this consent, although it is noted that a further resource consent would be required to enable dwellings to be built on those lots.
- As per Row (d) of the Development / Infrastructure Sequencing Table, once the SH1 Drury South Interchange with a connection to Drury South is provided, a total of 83,000sqm GFA of retail (including the initial 73,000sqm GFA) can become operational, alongside the first 6,000sqm GFA of commercial activities, and the first 600sqm of community activities. It is anticipated that the SH1 direct connection will have been provided by this time, but if not, a further assessment would be required to establish if its absence restricts the supportable development yield. As such, a new consent would be required to assess the effect of the SH1 direct connection not being in place.
- As per Row (e) of the Development / Infrastructure Sequencing Table, once the full Mill Road route is constructed (between Waihoehoe Road and suburbs to the north), a total of 97,000sqm GFA of retail (including the initial 83,000sqm GFA) can be supported, which represents the full 63,547sqm GFA being sought in this consent, plus the 32,000sqm GFA of retail already consented. At that time, up to 47,000sqm GFA of commercial activities can be supported, which encompasses the full 33,048sqm being sought in this consent. Further, a total of 10,000sqm GFA of community activities can be provided, which broadly aligns with the 10,216sqm being sought in this consent. The extra 216sqm is considered to have a negligible effect, particularly as the full allocation of commercial activity is not being sought in this consent. As outlined above, a new consent would be required to assess the effect of the SH1 direct connection not being in place..

Although the proposed development timing will align with the Development / Infrastructure Sequencing Table, it will not align with the Thresholds for Development and Subdivision Table (Table I450.6.2.1) within the precinct provisions. As such, departing from Rows (a) to (c) of the Thresholds for Development and Subdivision table represents a non-complying consent, while departing from rows (c) in relation to the SH1 Direct Connection and rows (d) to (f) represents a discretionary consent. However, as the development will align with the Development / Infrastructure Sequencing Table presented in this assessment, it can be concluded that the surrounding transport network can support the levels of development outlined. Consent conditions will be proposed to ensure that this alignment will occur.

Overall, the traffic modelling tests undertaken in this report, and the Plan Change modelling that established the current Thresholds for Development and Subdivision – both of which were based upon the original SGA DIFF modelling assumptions – take into account that mode shift from cars to active modes and public transport will continue to occur through the life of the project. Also, as development progresses, so does the ability of trips to become increasingly contained within the internal Drury East network, leading to fewer external trips. As such, the new development/infrastructure sequencing table accounts for this gradual change in predicted travel habits.

Further, beyond what has already been assessed, transport trends and infrastructure upgrades may change in the future that could potentially affect the quantum of development that can be accommodated by the

network. This has been anticipated in the Drury Centre Precinct Provisions, including the following subclauses under I450.9 Special Requirements:

d. Whether increased use of public transport within the Drury Centre precinct or the wider area, has provided additional capacity within the transport network including by implementing travel demand management measures set out in a travel plan, which has been prepared in accordance with IX.9(4).
e. Whether the proposal would have a similar or lesser trip generation and similar effects on the surrounding road network to the development mix provided for in the Table IX.6.1.1 Threshold for Subdivision and Development;
f. Whether residential development is coordinated with retail and commercial development within the wider Drury East area shown on Precinct Plan 2 to minimise trips outside of the precinct providing additional capacity within the transport network;
g. Whether the actual rate of development in the wider area is slower than anticipated and provides additional capacity in the transport network;
h. The effect of the timing and development of any other transport upgrades or transport innovations not anticipated by the Drury Centre precinct;

Accordingly, the Precinct Provisions provide an opportunity to revisit the amount of development enabled within the precinct in the future, based upon future transport trends and infrastructure changes. This is beyond the scope of this assessment, but provides the ability to reexamine the development yield in the future using a new consent application at that time.

Overall it is considered that the proposal to impose conditions tied to the Development / Infrastructure Sequencing presented above is a sound and sensible approach at this stage, albeit one that may warrant adjustment in the future.

6 Construction Effects

A Construction Traffic Management Plan (CTMP) has been developed and provided outlining management of construction vehicles travelling to/from and within the subject site throughout the construction phase of the project.

The CTMP includes the following:

- Construction estimated dates and hours of operation including any specific non-working hours for traffic congestion, noise, etc;
- Discussion on routes trucks will use to travel to and from the site; and
- Details of site access / egress over the entire construction period noting that all access points to be located so that appropriate visibility is achieved onto the adjacent road network.

Based on construction planning and traffic management associated with similar developments, it is considered that construction activities can be managed appropriately to avoid any significant adverse traffic effects on the road corridor. Additionally, it should be noted that any potential adverse effects caused by the construction activities will be temporary in nature.

7 Auckland Unitary Plan and Precinct Plan Assessment

As stated in section 3, the proposed development includes provision for a combination of retail, commercial, community and visitor accommodation activities the Drury Centre Stage 2 site, and proposed further subdivision of the 13 super lots consented within the Drury Centre Stage 1 development into 292 lots. An assessment of the proposed development against the relevant transportation rules in section 27 of the AUP and Plan Change 79 (PC79) rules is provided below.

7.1 E27 Transport Standards

An assessment of the proposed Drury Centre Stage 1 and Stage 2 subdivision has been undertaken against the relevant operative transportation rules in section E27 of the Unitary Plan. This is provided in Table 12 below.

TABLE 12: E27 ASSESSMENT

Criteria	Compliance	Comment
Trip Generation		
E27.6.1(1) Where a proposal (except where excluded in Standard E27.6.1(2)) exceeds the thresholds listed, resource consent for a restricted activity is required.	N/A	N/A. As per I450.6(2), standard E27.6.1 does not apply to the Drury Centre Precinct
Number of Parking and Loading Spaces		
E27.6.2(1) The number of parking spaces must meet the minimum rates and not exceed the maximum rates specified which apply to the zone or location specified in Table E27.6.2.4	Complies	As per Table E27.6.3.2 from the AUP, parking rates for the office activity must not exceed the maximum rate of 1 per 30m^2 GFA. Parking spaces allocated for the office activity will be at or below this maximum rate. No minimum or maximum rates apply for the other proposed activities
E27.6.2(3) For the purposes of meeting the requirements for vehicle parking rules, a parking space includes those provided for in a garage or car port or any paved area provided for the sole purpose of parking a motor vehicle.	Complies	Each car park has the sole purpose of catering for a vehicle.
E27.6.2(6) The activities specified in Table E27.6.2.5 must provide the minimum number of bicycle parking spaces specified	Complies	The proposed bicycle parking spaces for the Drury Centre Stage 2 site comply with the minimum requirements. See section 4.6.4 for more detail. Each lot within the Drury Centre Stage 1 site will have sufficient space to comply with minimum bicycle parking requirements for dwellings.
E27.6.2(7) The activities specified in Table E27.6.2.6 must provide end-of-trip facilities as listed below	Complies	Proposed end of trip facilities comply with the minimum required. See section 4.8 for more detail.
E27.6.2(8) All activities must provide loading spaces as specified in Table E27.6.2.7	Does not comply	Loading space provision for Lots A, B, C, D, E and G does not meet the minimum requirements outlined in the AUP. Most of these lots require two or three loading spaces, however, only one or two loading spaces provided. See section 4.7.1 for more detail.

Criteria	Compliance	Comment
E27.6.2.(9) Where the calculation of the required or permitted parking results in a fractional space, any fraction that is less than one-half will be disregarded and any fraction of one-half or more will be counted as one space. If there are different activities within a development, the parking required or permitted for each activity must be added together prior to rounding.	Complies	Rounding has been undertaken accordingly
Design of Parking and Loading Spaces		
E27.6.3.1(1) Every parking space must: a) comply with the minimum dimensions given in Table E27.6.3.1.1 and Figure E27.6.3.1.1; and b) be located on the same site as the activity to which it relates; and c) not be used for any other purpose; and d) be kept clear and available at all times the activity is in operation, except where stacked parking is permitted by Standard E27.6.3.3(3); and e) be located outside any area designated for road widening; and f) parking located in part of any yard on the site must not impede vehicular access and movement on the site and must not infringe any open space and landscape requirements for the relevant zone; and g) not to be sold or leased separately from the activity for which it provides parking as an accessory activity unless a resource consent is granted to an alternative arrangement such as shared parking or off-site parking	Complies	All proposed parking spaces including within the carparks and on-street will comply with minimum dimensions outlined in E27.
E27.6.3.2(1) Every loading space must: a) comply with the minimum dimensions given in Table E27.6.3.2.1; and b) be located on the same site as the activity to which it relates and be available at all times while the activity is in operation; and c) be located outside any area designated for road widening; and d) comply with the following when any yard of a site is used to provide the loading space: i) ensure that the footpath or access to the rear of the site or access to an adjacent property is not blocked at any time; and ii) the use of the loading space does not create a traffic hazard on the road at any time.	Complies	Lots A, B, C, D and E provide formal (marked) loading spaces within the lot boundaries, which comply with or exceed the requirements outlined in E27. Lots G1, F and H are proposed to be served by on-street loading spaces, however these have been designed to ensure they do not create a traffic hazard on the road at any time. The unmarked loading spaces provided in Lot E, Lot G2,and Lot J are provided within the carpark, away from the road corridor, and therefore do not create any adverse effects for vehicles travelling along the road corridor. See section 4.7.1 for more detail.
E27.6.3.3.(1) Every parking space must have driveways and aisles for entry and exit of vehicles to and from the road, and for vehicle manoeuvring within the site. Access and manoeuvring areas must accommodate the 85 percentile car tracking curves in Figure E27.6.3.3.1	Complies	All accessways and aisles have been designed appropriately to accommodate the B85 design vehicle.
E27.6.3.3.(2) For every loading space accommodating heavy vehicles, the access and manoeuvring areas associated with that loading space must comply with the tracking curves set out in the NZTA guidelines: RTS 18: NZ on-road tracking curves (2007)	Complies	Vehicle tracking for all proposed loading spaces has been completed according to the largest design vehicle expected to use these spaces. and all loading spaces can appropriately accommodate the largest design vehicle.
E27.6.3.3.(3) Where a dwelling provides more than one parking space, these may be stacked.	N/A	No tandem parking spaces are proposed.

Criteria	Compliance	Comment
E27.6.3.4.(1) Sufficient space must be provided on the site so vehicles do not need to reverse off the site or onto or off the road from any site	Non-compliance	In order to access the on-street loading space serving Lot H, the design vehicle will turn into the accessway serving H2, and reverse onto the road corridor before accessing the loading space. See Figure 55 and assessment below for more detail.
E27.6.3.5.(1) To ensure vehicles can pass safely under overhead structures to access any parking and loading spaces, the minimum clearance between the formed surface and the structure must be: a) 2.1m where access and/or parking for cars is provided for residential activities; b) 2.3m where access and/or parking for cars is provided for all other activities; c) 2.5m where access and/or accessible parking for people with disabilities is provided; or d) 3.8m where loading is provided.	Complies	A minimum clearance of 2.1m will be provided for all garages serving the proposed dwellings. A minimum clearance of 2.3m will be provided for all other activities. A minimum clearance of 2.5m will be provided for all carparks containing accessible spaces. All loading spaces proposed within the carparks in Lot E, G2, and J will provide a minimum vertical clearance of 3.8m, hence complying with the minimum requirements.
E27.6.3.6.(1) Except for Standard E27.6.3.6.(2), the whole area of parking and loading spaces, and manoeuvring areas and aisles must be formed, drained, provided with an all-weather surface to prevent dust and nuisance, and be marked out or delineated. This must be done before the activity to which those parking and loading spaces relate commences and maintained for as long as that activity is continued.	Complies	All parking and loading areas will be suitably formed with an all-weather surface.
E27.6.3.6.(2) Parking and loading spaces and manoeuvring areas and aisles do not need to be provided with an all-weather surface in the following zones: a) Rural – Rural Conservation Zone; b) Rural – Rural Coastal Zone; c) Rural – Mixed Rural Zone; and d) Rural – Rural Production Zone.	N/A	Site is not in rural area
E27.6.3.6.(3) The gradient for the surface of any parking space must not exceed a) 1 in 25 in any direction for accessible spaces for people with disabilities; or b) 1 in 20 (five percent) in any direction for other spaces	Complies	It is expected that all parking spaces will comply with gradient requirements.
E27.6.3.6.(4) The gradient for the manoeuvring area must not exceed 1 in 8.	Complies	It is expected that all manoeuvring spaces will comply with gradient requirements.
E27.6.3.7.(1) Lighting is required where there are 10 or more parking spaces which are likely to be used during the hours of darkness. The parking and manoeuvring areas and associated pedestrian routes must be adequately lit during use in a manner that complies with the rules in Section E24 Lighting.	Complies	All proposed carparks providing 10 or more parking spaces will be adequately lit to comply with the requirements outline in Section E24 Lighting.
Access		
E27.6.4.1.(1) Vehicle Access Restrictions apply and new vehicle crossings must not be constructed to provide vehicle access across that part of a site boundary which is subject to: a) a Vehicle Access Restriction – General Control as shown on the planning maps in the Business – City Centre Zone; or	N/A	No vehicle access restrictions apply.

Criteria	Compliance	Comment
b) a Key Retail Frontage Control as shown on the planning maps		
E27.6.4.1.(2) Standard E27.6.4.1(3) below applies in any of the following circumstances: a) a new vehicle crossing is proposed; b) a new activity is established on a site; c) there is a change of type of activity; or d) a building(s) is constructed, or additions to buildings that are not permitted activities in Table H8.4.1, Table H9.4.1, Table H10.4.1, Table H11.4.1, Table H12.4.1, Table H13.4.1, Table H14.4.1, or Table H15.4.1	Applies	Several new vehicle crossings and new activities are proposed to be established on-site. Therefore, standard E27.6.4.1(3) applies and is assessed below.
E27.6.4.1.(3) Vehicle Access Restrictions apply and vehicle crossings must not be constructed or used to provide vehicle access across that part of a site boundary which: a) is located within 10m of any intersection as measured from the property boundary, illustrated in Figure E27.6.4.1.1; b) is subject to the following types of Vehicle Access Restriction as identified on the planning maps in the zones listed in Table E27.6.4.1.1; c) has frontage to an arterial road as identified on the planning maps; or d) is located closer than 30m from a railway level crossing limit line	Non-compliance	The vehicle crossing serving Lot C and Lot H does not comply with the minimum requirements for separation from an adjacent intersection as they only achieve 0m and 7m separation from the nearest intersections. See section 4.5.3 for more detail.
E27.6.4.2.(1) The maximum number of vehicle crossings permitted for any site and separation distance between crossings is specified in Table E27.6.4.2.1	Non-compliance	The vehicle crossings serving the customer carpark within Lot A and the entry access into the loading zone do not comply with minimum separation requirements. All other vehicle crossings comply with maximum number and minimum separation distances. See section 4.5.2 for more detail All proposed vehicle crossings comply with the maximum permitted number and also with the
E27.6.4.2.(2) The width of a vehicle crossing(s) must meet the minimum width and not exceed the maximum width as specified in Table E27.6.4.3.2	Non-compliance	As stated in Table 2, Several vehicle crossings serving Lots A, B, C, D, E and G2 do not comply with the vehicle crossing width requirements. All other vehicle crossings comply with the vehicle crossing width requirements. See section 4.5.1 for more detail.
E27.6.4.2.(3) With the exception of vehicle crossings on unsealed roads, all vehicle crossings must be designed and constructed to maintain the level, colour, and materials of the footpath to clearly identify to vehicles that pedestrians have priority	Complies	Vehicle crossings will be designed and constructed to compliant standards.
E27.6.4.2.(4) Vehicle crossings on unsealed roads: a) where the vehicle crossing is served by an access steeper than 1 in 8, the vehicle crossing must be sealed for 6m between the site boundary and the unsealed road. b) vehicle crossings not covered by Standard E27.6.4.2.(3)(a) must be formed using materials similar to the existing road surface or better	N/A	All roads within the site will be sealed.
E27.6.4.2.(5) Where a vehicle crossing is altered or no longer required, the crossing, or redundant section of crossing, must	N/A	There are no existing or redundant vehicle crossings.

Criteria	Compliance	Comment
be reinstated as berm and/or footpath and the kerbs replaced. The cost of such work will be borne by the owner of the site previously accessed by the vehicle crossing		
E27.6.4.3.(1) Every on-site parking and loading space must have vehicle access from a road, with the vehicle access complying with the following standards for width: a) passing bays are provided in accordance with Table E27.6.4.3.1; and b) meeting the minimum formed access width specified in Table E27.6.4.3.2	Complies	The accessway serving the northern portion of Lot K has a length greater than 50m, but does not provide a passing bay. However, this accessway only facilitates one-way vehicular movement, hence no passing bays required or provided. See section 4.5.4 for more detail.
E27.6.4.3.(2) Access must be designed so that vehicles using or waiting to use fuel dispensers, ticket vending machines, remote ordering facilities and devices, entrance control mechanisms, or other drive-through facilities do not queue into the adjoining road reserve or obstruct entry to or exit from the site	N/A	No vehicle entrance mechanisms proposed
E27.6.4.4.(1) The gradient of the access must not be steeper than specified in Table E27.6.4.4.1	Complies	Gradients are not expected to exceed maximum requirements.
E27.6.4.4.(2) To avoid the underside of the car striking the ground, as illustrated in Figure E27.6.4.4.2, access with a change in gradient exceeding 1 in 8 (greater than 12.5 percent change) at the summit or a 1 in 6.7 (15 percent change) at a sag must include transition sections to achieve adequate ground clearance, refer to Figure E27.6.4.3.3. Typically, a transition section requires a minimum length of 2m	Complies	It is expected that transition sections will be provided where required.
E27.6.4.4.(3) All vehicle accesses must be designed so that where the access adjoins the road there is sufficient space onsite for a platform so that vehicles can stop safely and check for pedestrians and other vehicles prior to exiting. This is illustrated in Figure E27.6.4.4.4. The platform must have a maximum gradient no steeper than 1 in 20 (5 percent) and a minimum length of 4m for residential activities and 6m for all other activities	Complies	Platform gradients are not expected to exceed 1 in 20.
E27.6.4.5.(1) Sites subject to sightlines for level crossings are identified on the planning maps by the Level Crossings with Sightline Control. If alarms and/or barrier arms are subsequently installed at a level crossing with Stop or Give Way signs, the Approach sight triangle in Figure E27.6.4.5.1 below ceases to apply	N/A	No level crossings proposed in vicinity of site.
E27.6.4.5.(2) Approach sight triangles (refer to Figure E27.6.4.5.1) a) on sites adjacent to Level Crossings with Sightline Control buildings and other visual obstructions, cannot be located within the approach sight triangles identified on the planning maps. b) the approach sight triangles are calculated by reference to Figure E27.6.4.5.1. For a single set of railway tracks, the sight triangles are defined by a triangle taken 30m from the outside rail and 320m along the railway track. For each additional set of tracks, 25m is added to 320m along the railway track	N/A	No level crossings proposed in vicinity of site.
E27.6.4.5.(3) Restart sight triangles (see Figure E27.6.4.5.2) a) on sites adjacent to the Level Crossings with Sightline Control, buildings and other visual obstructions, cannot be located within the restart sight triangles identified on the planning maps. The restart triangle applies to all level crossings. b) the restart sight triangles are calculated by reference to Figure E27.6.4.5.2. For a single set of tracks, the sight triangles	N/A	No level crossings proposed in vicinity of site.

Criteria	Compliance	Comment
are defined by a triangle taken 5m from the outside rail and 677m along the railway track. For each additional set of tracks, 50m is added to the 677m along the railway track		
Design and Location of Off-road Pedestrian and Cycling Facilities		
E27.6.5.(1) The design and location of the proposed facility is to ensure good connections to existing facilities.	Complies	The proposed cycle lanes and footpaths align with what has been previously proposed and consented as part of the Drury Centre Precinct Fast-track ITA.
E27.6.5.(2) The width of the path is designed to accommodate the anticipated number and type of users.	Complies	All proposed footpaths will have a minimum width of 1.8m.
E27.6.5.(3) The surface of the path is designed to safely provide for the anticipated number and type of users.	Complies	Surface of footpaths will be different to vehicle manoeuvring areas.

The assessment has identified five non-compliances with the transportation rules of the Unitary Plan. These non-compliances relate to the width of some of the proposed vehicle crossings, separation distances between adjacent vehicle crossings, separation distances between vehicle crossings and intersections, reversing manoeuvres into/out of a site and the provision for number of loading spaces.

The first non-compliance relates to the width of the proposed vehicle crossings not complying with the maximum 3.5m and 6mm width requirements as stipulated within the AUP. As discussed in section, 4.5.1, these vehicle crossing widths provide access to carparks containing informal or formal loading spaces, hence will frequently serve loading vehicles. As such, the additional width at these vehicle crossings has been provided to accommodate simultaneous movement of a 8m Medium rigid truck / 11m Large Rigid truck and the B85 design vehicle. However, it is expected that these non-compliances are unlikely to have any material adverse effect on the safe and efficient operation of the road corridor.

The second non-compliance relates to the vehicle crossing separation between two adjacent vehicle crossings serving the customer carpark and the inbound entry to the loading zone within Lot A. The AUP requires adjacent vehicle crossings serving the same site to have a minimum separation of 6m, however the proposed vehicle crossings only provide a 4.7m separation. As shown in Figure 33, due to vehicle crossing splays, the separation reduces to approximately 2m at the footpath. However, this is considered to be sufficient space for a pedestrian to wait safely between the two vehicle crossings if in use by vehicles. Given that there is sufficient space for a pedestrian to wait safely between the adjacent crossings, the non-compliant separation is unlikely to have any material adverse effects on the safety of motorists or pedestrians using the vehicle crossings or travelling along the road corridor.

The third non-compliance relates to the separation between a vehicle crossing and the nearest intersection. The AUP requires vehicle crossings to have a minimum separation of 10m from the nearest intersection. It is not possible for the vehicle crossing into Lot C to comply with this requirement as the vehicle crossing serves as the eastern arm of the Road 25/Road 13 intersection. The vehicle crossing serving Lot H only achieves approximately 7m separation from the nearest intersection between Road 3 and Flanagan Road, however given that both these roads are classified as Local roads, and vehicles volumes on both corridors are expected to be relatively low, this non-compliance is unlikely to have any significant adverse effect on the safe and efficient operation of the road corridor or the vehicle crossing.

The fourth non-compliance relates to the loading vehicles reversing onto the vehicle crossing serving H2. The AUP states that sufficient space must be provided within the site so vehicles do not need to reverse off the site. In this instance, the reverse manoeuvre is required as the loading space for Lot H is provided

on the eastern side of the road corridor, however it is not possible for the loading vehicle to travel southbound along Road 3, hence the design vehicle must travel north along Road 3, and turn around to access the on-street loading space. However, there is insufficient space for the vehicle to turn around within the road reserve, hence it is only possible to turn around using the accessway serving lot H2 which requires a reverse manoeuvre either off or onto the road corridor. It should be noted that vehicle and pedestrian volumes in proximity of the Lot H2 accessway are expected to be very low given it is located against the northern boundary of the subject site, and the proposal does not provide any further development north of this vehicle crossing. As such, the magnitude of any potential adverse effects caused by this non-compliance is likely to be relatively low.

The final non-compliance relates to the provision of loading spaces within Lots A, B, C, D, E, and G. Given the proposed GFA of activities, Lots A-D require provision of two loading spaces, however only one formal loading space has been provided for each of these lots. Lots E and G require provision for a minimum of three loading spaces, however only two loading spaces are provided to serve each lot, consisting of one formal (marked) loading space, and one unmarked space. As discussed above, the loading operations will be managed by a body corporate, and given that most loading is expected to occur outside of typical business operating hours when the carparks will largely be empty, the non-compliance of providing fewer than required loading spaces is unlikely to have a noticeable impact on the safe and efficient movement of vehicles within the site.

7.1.1 Subdivision Urban Standards

Table 13 below provides an assessment of the proposal against the key, relevant, transport-related standards in Section E38 Subdivision - Urban of the Unitary Plan.

TABLE 13: SUBDIVISION STANDARDS ASSESSMENT

Criteria	Compliance	Comment
E38.6.2. Access and entrance strips		
(1) All proposed sites must be provided with legal and physical access to a road, unless they meet one of the following:	Complies	All sites will be provided legal access to a road.
E38.9.2.3. Vacant Sites subdivision		
(4) Entrance strips and accessways for rear sites must comply with Table E27.6.4.3.2 Vehicle crossing and vehicle access widths	Complies	Several JOALs proposed within the Drury Centre Stage 1 development site serve more than ten proposed rear sites. All JOALs have a minimum formed width of 6.2m, legal width of 8m and service strip width of 1.4m.

The assessment has identified no non-compliance with the transportation related rules of section E38 of the Unitary Plan.

7.2 PC79 Summary

The proposed development of the Drury Centre Stage 1 and Stage 2 sites has also been assessed against the decisions version of the relevant transportation rules in PC79 and is provided in Table 14.

TABLE 14: PLAN CHANGE 79 RULES ASSESSMENT

Criteria	Compliance	Comment
E27.6.1 Trip Generation		

Criteria	Compliance	Comment
(1) Where a proposal (except where excluded in Standard E27.6.1(2)) exceeds one of the following thresholds:, a) A new development or subdivision in Table E27.6.1.1; b) 100v/hr (any hour) for activities not specified in Table E27.6.1.1 requiring a controlled or restricted discretionary land use activity consent in the applicable zone where there are no requirements for an assessment of transport or trip generation effects. This standard does not apply to development activities provided for as permitted in the applicable zone resource consent for a restricted activity is required. **(2)** Standard E27.6.1(1) does not apply where: a) a proposal is located in the Business – City Centre Zone, Business – Metropolitan Centre Zone, Business – Town Centre Zone, or Residential – Terrace Housing and Apartment Building Zone or Centre Fringe Office Control as shown on the planning maps; c) the activity is permitted in the H7 Open space zones; or d) there are requirements to assess trip-generation effects for the activity in any applicable zone rules or precinct rules for any controlled or restricted discretionary land use activities	N/A	N/A. As per I450.6(2), standard E27.6.1 does not apply to the Drury Centre Precinct.
E27.6.2 Number of Parking and Loading Spaces		
(6) Bicycle parking: the activities specified in Table E27.6.2.5 must provide the minimum number of bicycle parking spaces specified; aa) for residential developments, the required secure long-stay bicycle parking must be located and designed in a manner that (is): i) Not part of any required outdoor living space or landscaped area ii) In a location accessible from either the road, vehicle access, pedestrian access or car parking area iii) Sheltered from the weather iv) Lockable and secure xii) The following bicycle parking requirements apply to new buildings and developments	Complies	Appropriate bicycle parking provisions have been provided to serve the proposed residential development within the Drury Centre Stage 1 site, and Lot J and K in the Drury Centre Stage 2 site. See section 4.6.4 for more detail.x
(8) Number of loading spaces: a) All activities must provide loading as specified in Table E27.6.2.7. b) residential activities where part of the site has frontage to an arterial road as identified on the planning maps, must provide loading as specified in Table E27.6.2.7A.	N/A	All proposed residential dwellings within the Drury Centre Stage 2 site have a GFA greater than 5,000sqm, hence no minimum small loading space requirements. No residential activities have frontage to an arterial road corridor.
(9) Fractional spaces: a) where the calculation of the permitted parking results in a fractional space, any fraction that is less than one-half will be disregarded and any fraction of one-half or more will be counted as one space. If there are different activities within a development, the parking permitted for each activity must be added together prior to rounding.	N/A	Rounding is not required.
E27.6.3.1 Size and location of parking spaces		
(1) Every parking space must: a) comply with the minimum dimensions given in Table E27.6.3.1.1 and Figure E27.6.3.1.1; except accessible parking dimensions and accessible route requirements must be designed in accordance with the New	Complies	All proposed parking spaces comply with Table E27.6.3.1.1.

Criteria	Compliance	Comment
Zealand Standard for Design for Access and Mobility – Buildings and Associated Facilities (NZS: 4121-2001); and …..		
E27.6.3.2 Size and location of loading spaces		
(1) Every loading space must: … 1) comply with Table E27.6.3.2.1 following when any yard of a site is used to provide the loading space (where it is permitted within the zone): i. … ii. the use of the loading space does not create a traffic hazard on the road at any time; and e) have a maximum crossfall of 1:50 (2%) in all directions.	Complies	All proposed loading spaces comply with minimum dimensions.
E27.6.3.2(A) **(1)** Accessible parking must be provided for all new activities, changes of activity type, and / or the expansion or intensification of an existing activity in all zones, except for those listed below in E27.6.3.2(A)(2); (2) Accessible parking is not required in the following zones, unless car parking is provided on site, in which case the required number of accessible parking spaces must be determined in accordance with Table 1 or Table 2 below, whichever is relevant: Business Zones: a) Business – City Centre Zone: b) Business – Metropolitan Centre Zone c) Business – Town Centre Zone d) Business – Local Centre Zone e) Business – Mixed Use Zone f) Business – Neighbourhood Centre Zone Residential Zone: a) Residential – Terrace Housing and Apartment Buildings Zone (3) For residential developments in residential zones (excluding the Terrace Housing and Apartment Buildings Zone unless car parking is provided on site), accessible parking spaces must be provided for developments of 10 or more dwellings on a site. (4) The required number of onsite accessible parking spaces provided must be calculated using the following method: i. For non-residential land uses; Step 1 – Use the Parking Demand Guidelines in Appendix 23 to determine the theoretical parking demand Step 2 – Use Table 1 – Number of accessible parking spaces – Non-residential, below to determine the required number of accessible car park spaces based on either the number of parking spaces that are proposed to be provided or the theoretical parking demand calculated in step 1, whichever is the higher. ii. For retirement villages, supported residential care, visitor accommodation and boarding houses: The same method for calculating the required number of onsite accessible parking spaces for non-residential uses in 4(i) applies. iii. For residential land uses: The required number of accessible parking spaces must be in accordance with Table 2 below.	Non-compliance	Accessible parking spaces have been provided in accordance with the requirements outlined in Table 1, operative AUP and NZS4121:2001, however the provisions do not comply with Appendix 23 of PC79. Lot K proposes 38 terrace houses, resulting in a minimum requirement of three accessible parking spaces. No accessible parking spaces are proposed within this lot as all parking spaces are provided within garages. See section 4.6.2for more detail.

Criteria	Compliance	Comment
E27.6.3.3 Access and manoeuvring		
(2A) For every loading space required by Table E27.6.3.2.1.(T137A) the access and manoeuvring areas associated with that loading space must accommodate the 6.4m van tracking curves set out in Figure E27.6.3.3.3.	Complies	All formal (marked) loading zones can accommodate atleast the 8m Medium Rigid Truck design vehicle.
E27.6.3.4A Reverse manoeuvring		
1) Where a site in a residential zone provides heavy vehicle access it must provide sufficient space on the site so an 8m heavy vehicle does not need to reverse onto or off the site or road, with a maximum reverse manoeuvring distance within the site of 12m. 2) Heavy vehicle access and manoeuvring areas associated with access required by E27.6.3.4A.(1) must comply with the tracking curves set out in the Land Transport New Zealand Road and traffic guidelines: RTS 18: New Zealand on-road tracking curves for heavy motor vehicles (2007).	Complies	Site is not zoned as residential. All loading spaces have been designed appropriately to at least accommodate movement of the 8m Medium Rigid truck design vehicle.
E27.6.3.5 Vertical Clearance		
(1) To ensure vehicles can pass safely under overhead structures to access any parking and loading spaces, the minimum clearance between the formed surface and the structure must be: … c) 2.5m where access and/or accessible parking is provided and/or required; ca) 2.8m where loading is required for residential activities denoted with an asterisk (*) in Table E27.6.2.7A; cb) 3.8m where heavy vehicle access in Standard E27.6.3.4A is provided; or d) 3.8m where loading is required in Table E27.6.2.7	Complies	All loading spaces within the carparks will provide 3.8m vertical clearance. All accessible parking spaces will have minimum 2.5m vertical clearance.
E27.6.3.7 Lighting		
2) Lighting is required, in residential zones to primary pedestrian access, vehicle access, parking and manoeuvring areas, where any of the following apply: a) There are four or more dwellings accessible from a primary pedestrian access which is not adjacent to a vehicle access; b) There are 10 or more parking spaces; or c) There are 10 or more dwellings. Adequate lighting must be provided during the hours of darkness in a manner that complies with the rules in Section E24 Lighting.	N/A	The project area is not located within a residential zone.
E27.6.4.3 Access		
E27.6.4.3.(1) Every on-site parking and loading space must have vehicle access from a road, with the vehicle access complying with the following standards: a) Passing bays are provided in accordance with Table E27.6.4.3.1; and b) Meeting the minimum formed access width specified in Table E27.4.3.2 (Vehicle crossing and vehicle access widths) and c) meeting the minimum speed management measure spacing specified in Table E27.6.4.3.3 (speed management requirements); *Note: Where heavy vehicle access and speed management measures are required, the design of speed management measures should include consideration of heavy vehicle requirements.*	Complies	The accessway within the northern section of Lot K is required to provide on passing bay, however this has not been provided. See section 4.5.4 for more detail. No speed management required as subject site does not exist within residential zones.

Criteria	Compliance	Comment
Note 1: Emergency responder access requirements are further controlled by the Building Code. Plan users should refer to the Building Code to ensure compliance can be achieved at building consent stage. Granting of a resource consent does not imply that waivers of Building Code requirements will be granted. Fire and Emergency New Zealand publishes guidance in the context of Building Code requirements.		
E27.6.6 Design and location of pedestrian access in residential zones		
(1) Where two or more dwellings are proposed in residential zones, primary pedestrian access must be provided which meets the following: c) (a) have the minimum pedestrian access width and separation specified in Table E27.6.6.1 for its full length have a gradient no greater than: i. 1 in 12 for pedestrian access which is not adjacent to vehicle access; ii. the maximum vehicle access gradient as specified in Table E27.6.4.4.1 where the pedestrian access is adjacent to vehicle access; e) have a surface treatment which is firm, stable and slip resistant in any weather conditions; f) provide direct and continuous access to the dwellings from a public footpath; g) be free from permanent obstructions and have a clear height of at least 2.1m for its full length **(2)** A minimum clear width of 3m and a minimum clear height of 2.1m for its full length is required for primary pedestrian access where not adjacent to vehicle access and serving: a) up to three dwellings and has a length greater than 50m; or b) four or more dwellings **(3)** For the purposes of (2) above, the clear width may include: a) the minimum 1.8m formed primary pedestrian access width; b) landscape treatment with a maximum mature height of 600mm c) lighting infrastructure **(4)** Standards E27.6.6(1). (2) and (3) above do not apply where: a) up to three dwellings are proposed on a site and vehicle access is provided to each dwelling: or b) a dwelling directly fronts and has direct access to a street **(5)** For four or more dwellings in residential zones, pedestrian access must be provided to each parking space within a parking area (excluding garages) consisting of four or more parking spaces served by the same vehicle access and: a) have a minimum width of 1.2m; b) be vertically separated from trafficable areas as shown in Figure E27.6.4.3.1; c) connect to the primary pedestrian access or the dwellings associated with those parking spaces; d) have a surface treatment which is firm, stable and slip resistant in any weather condition; and e) be free from permanent obstructions and have a clear height of 2.1m for its full length. This standard does not apply where the pedestrian access forms part of a primary pedestrian access.	N/A	Site does not exist within residential zone.

Criteria	Compliance	Comment
Note: Emergency responder access requirements are further controlled by the Building Code. Plan users should refer to the Building Code to ensure compliance can be achieved at building consent stage. Granting of a resource consent does not imply that waivers of Building Code requirements will be granted. Fire and Emergency New Zealand publishes guidance in the context of Building Code requirement		
E27.6.7 Provision for Electric Vehicle Charging		
Purpose: to ensure that any undercover car parks for new semi-detached dwellings or for new dwellings within a terrace or apartment building are provided with the capability to install Electric Vehicle Supply Equipment. **(1)** Any new dwellings with car parking (with the exception of new detached dwellings) must provide each undercover car park with the capability to install Electric Vehicle Supply Equipment with designated space for the necessary conduit, circuit and metering between the car park and an electrical distribution board on the same building storey, or ground level if the car parking space is at ground level. Note: a) This standard does not apply to any car parking permanently allocated to visitors. Refer to the following standards and guidelines: - Australian/New Zealand Wiring Rules AS/NZS 3000:2018 - SNZ PAS 6011:2021 Electric Vehicle Charges for Residential Use - SNZ PAS 6011:2012 Electric Vehicle Chargers for Commercial Applications - WorkSafe EV charging safety guidelines 2nd addition plus addendums 1 and 2	Complies	Any undercover parking spaces associated with Stage 2 dwellings will have capability to install electric vehicle supply equipment.

The proposed development has one non-compliance related to the provision of parking spaces for residential land uses. As shown, Lot K will provide 38 townhouses, hence requires a minimum of three parking spaces.

7.3 Drury Centre Precinct Provisions

An assessment of the proposed development has been undertaken against the I450 Drury Centre Precinct Provisions. This is provided in Table 15.

TABLE 15: DRURY CENTRE PRECINCT PROVISIONS

Criteria	Activity Status	Comment
I450.4. Subdivision and Development		
(A1) Subdivision, or new buildings prior to subdivision, including private roads	Restricted Discretionary	The project involves subdivision and new buildings
(A5) Subdivision and/or development that does not comply with Standard I450.6.2 Staging of Subdivision and Development with Transport Upgrades with respect to the following elements of Table I450.6.2.1: i. Upgrades in rows (a) and (b) ii. The upgrade in row (c) relating to Drury Central train station	Non-Complying	As described in Section 5, non compliance against rows (a) and (b) due to changes in infrastructure timing. See section 5 for more detail.
(A6) Subdivision and/or development that does not comply with Standard I450.6.2 Staging of Subdivision and Development with Transport Upgrades with respect to the following elements of Table I450.6.2.1:	Discretionary	As described in Section 5, non compliance against rows (c) to (e) due to changes in infrastructure

Criteria	Activity Status	Comment
i. The upgrade in row (c) relating to the Direct connection from State Highway 1 to the Drury Centre ii. Upgrades in rows (d) to (f)		timing. See section 5 for more detail.
(A7) Subdivision and/or development that does not comply with Standard I450.6.6(1) Road Design and Upgrade of Existing Rural Roads	Restricted Discretionary	The proposed Drury Centre Stage 2 development does not include upgrading any existing rural roads.
(A8) Subdivision and/or development that does not comply with Standard I4506.6(2) Road Design and Upgrade of Existing Rural Roads	Discretionary	Upgrades to all existing rural roads will be completed as part of the Drury Centre Stage 1 Development. As such, the proposed Drury Centre Stage 2 development does not include upgrading any existing rural roads.
(A9) Any application to amend an existing resource consent that gives rise to non-compliance with Standard I450.6.2 Staging of Subdivision and Development with Transport Upgrades and Table I450.6.2.1	Non-Complying	Upgrades to all existing rural roads will be completed as part of the Drury Centre Stage 1 Development. The proposed Drury Centre Stage 2 development does not comply with Standard I450.6.2. However, an updated assessment has been provided in this report. See section 5.2 for more detail.
I450 Standards		
6.3 Maximum Parking Rate Purpose: Promote a mode shift to public transport and active modes by limiting the supply of commuter parking progressively over time. (1) Any proposal for office activities must provide information in accordance with the Special Information Requirements in I450.9(5). (2) The maximum number of parking spaces for office activity are as follows: a) Up to 19,000m2 – 1 space per 35m2 GFA; b) Between 19,001 – 47,000m2 – 1 space per 50m2 GFA; **c)** Greater than 47,000m2 – 1 space per 60m2 GFA.	Complies	Proposed parking provisions complies with the maximum parking rate outlined in the Precinct provisions. See section 4.6.1 for more detail.
6.4 Minimum Bicycle Parking (1) In addition to the bicycle parking requirements in standard E27.6.2(6), at least one secure (long stay) bicycle park must be provided for every dwelling. (2) For multi-unit development, at least one visitor (short stay) bicycle space must be provided for every 20 dwellings.	Complies	Proposed number of bicycle parking complies with the maximum parking rate. See section 4.6.4 for more detail.
6.5 End-of-trip Facilities Purpose: Promote a mode shift to public transport and active modes by requiring end-of-trip facilities for all commercial and community activities. (1) End-of-trip facilities: a) the activities specified in Table I450.6.5.1 must provide end-of-trip facilities as listed below; and	Complies	Proposed end-of-trip facilities complies with the requirements outlined in section 4.8.

<table>
<tr><th>Criteria</th><th>Activity Status</th><th>Comment</th></tr>
<tr><td>b) the following end-of-trip facilities requirements apply to new buildings and developments
Table I450.6.5.1 Required end-of-trip facilities (intended for staff use)
<table>
<tr><th>Land Use</th><th>GFA</th><th>No. of showers and changing facilities required</th></tr>
<tr><td rowspan="4">Commercial and community activities</td><td>Up to 500m²</td><td>No requirement</td></tr>
<tr><td>Greater than 500m² up to 2,500m²</td><td>One shower and changing area with space for storage of clothing</td></tr>
<tr><td>Greater than 2,500m² up to 7,500m²</td><td>Two showers and changing area with space for storage of clothing</td></tr>
<tr><td>Every additional 7,500m²</td><td>Two additional showers and changing area with space for storage of clothing</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>6.6 Road Design and Upgrade of Existing Rural Roads
Purpose: To ensure that any activity, development and/or subdivision complies with Appendix 1: Road Function and Design Elements Table, and that existing rural roads are progressively upgraded to an urban standard.
(1) Any activity, development and /or subdivision that includes the construction of new roads, or the upgrade of existing roads, must comply with Appendix 1: Road Function and Design Elements Table.
(2) Fitzgerald Road and/or Brookfield Road must be upgraded to an urban standard where vehicle access is proposed for any new activity, development and/or subdivision to or from either of these roads, and where the upgrade has not already occurred. The portion of road to be upgraded must extend from the proposed vehicle access to the intersection of Waihoehoe / Fitzgerald Roads.</td><td>Non-compliance</td><td>Road 2 does not comply with Appendix 1: Road Function and Design Elements Table, as it has been designed in accordance with the NZTA off-ramp design. See section 4.4.3 for more detail.

All other roads will comply with the requirements outlined in the Appendix 1: Road Function and Design Elements Table.

As part of the Stage 1 development, Fitzgerald Road and Brookfield Road will be upgraded to an urban standard prior to occupation of the proposed development.</td></tr>
</table>

Table 16 below is an assessment against the relevant Drury Centre assessment criteria for the infringements/reasons for consent identified above.

TABLE 16: ASSESSMENT CRITERIA

Criteria	Comment
(1) Subdivision, or new buildings prior to subdivision, including development of private roads:	
Locations of Roads: (a) The extent to which the collector road network, the Key Retail Street and the potential connection to Drury Centre are provided generally in the locations shown on I450.10.2 Drury Centre: Precinct Plan 2 to achieve a highly connected street layout that integrates with the surrounding transport network and responds to landform.	The proposed roading network generally aligns with the Precinct Plan. See Figure 13 and section 4.1 above.
(b) Whether an alternative alignment provides an equal or better degree of connectivity and amenity within and beyond the precinct may be appropriate, having regard to the following functional matters:	Proposed roading network is appropriate to serve the site, and enables efficient development within the site, and provides access to all properties within the site.

Criteria	Comment
i) Landowner patterns and the presence of natural features, natural hazards, contours or other constraints and how these impact on the placement of roads; ii) The need to achieve an efficient block structure and layout within the precinct suitable to the proposed activities; and iii) The constructability of roads and the ability for them to be connected beyond any property boundary.	Additionally, the roading network has been designed to allow for an efficient connection beyond the Stage 2 boundaries.
(c) Within Sub-precinct D, whether development precludes the construction of any connection between Brookfield Road and Quarry Road over Hingaia Stream.	Development does not preclude construction of connection between Brookfield Road and Quarry Road, although it is maintained that this connection is not necessary to support the wider Drury East development.
(d) Whether a high quality and integrated network of local roads is provided within the precinct that provides a good degree of accessibility and supports a walkable street network. Whether roads and pedestrian and cycle paths are aligned to provide visual and physical connections to open spaces, including along the stream network, where the site conditions allow	The proposed local road network provides a well-connected and integrated pedestrian connection.
(e) Whether subdivision and development provides for collector roads and local roads to the site boundaries to coordinate with neighbouring sites and support the integrated completion of the network within the precinct over time;	All proposed lots have direct frontage and access to/from either a local or a collector road corridor.
Design of Roads: (f) Whether the design of new collector and local roads accords with the road design details provided in I450.11 Drury Centre: Appendix 1;	Road 2 does not comply with Appendix 1: Road Function and Design Elements Table, as it has been designed to the north of Road 13 in accordance with the NZTA off-ramp design. To the south of Road 13, a more suitable interface design has been adopted to provide a seamless connection between the off-ramp and the internal roads within the Drury Centre development. See section 4.4.3 for more detail. All other roads will comply with the requirements outlined in the Appendix 1: Road Function and Design Elements Table.
(g) Whether the layout of the street network provides a good degree of accessibility and supports a walkable street network. As a general principle, the length of a block should be no greater than 180m, and the perimeter of the block should be no greater than 500m;	The proposed roading network is highly accessible and provides a pedestrian connection along all corridors to encourage walking.
(h) Whether Station Road is designed as a low-speed environment that provides pedestrian accessibility between the Drury Central train station and the Key Retail Street.	Station Road is designed as a 40kph collector road (private) with protected cycle lanes and footpaths as required in Appendix 1: Road Function and Design Elements Table. It will connect to the Train Station via Road 3, which is a 30kph traffic-calmed local road with separated footpaths and suitable for cyclists sharing the road, then will connect to the shared path on Flanaghan Road that is required to be introduced as part of the Stage 1 Covid Fast Track Consent.
Connections to the Drury Central train station (i) Whether the street network provides direct, safe and legible pedestrian and cycle connections to the operational Drury Central train station as development occurs over time. In particular, whether the following is provided, or an alternative is provided that achieves an equal or better degree of connectivity: i) Development in Sub-Precinct B and D has a connection to the Drury Central train station via Drury Boulevard or the Key Retail Street shown on Precinct Plan 2	The street network provides for safe and legible pedestrian and cycle connections to and from the Tran Station, however, there are some direct links that are unable to be provided as part of this consent. i. Drury Boulevard is provided as Road 25 through the development, but it is unable to continue to the north to connect to the train station due to third party land ownership. However, Key Retail Street (Road 3) connects to Flanaghan Road, which is required to

Criteria	Comment
ii) Development in Sub-Precinct A has a connection to the Drury Central train station via the Key Retail Street and/or any connecting local or collector roads and/or open spaces; iii) Development in Sub-Precincts C and E has a connection to the Drury Central train station via Drury Boulevard and any connecting local or collector roads and/or open spaces	provide an active mode connection to the train station as part of the Stage 1 covid Fast Track consent. ii. As above, Key Retail Street (Road 3) does connect to the train station via Flanaghan Road. iii. As above, Drury Boulevard (Road 25) cannot continue north due to third party land ownership, but alternative routes to the train station are provided until Drury Boulevard is extended by others.
Sequencing of upgrades to the existing road network (j) Whether a further upgrade to the intersection of State Highway 22 / Great South intersection beyond what is required by the Drury South Precinct (I410.8.2(1)(f)) is necessary, to ensure it can operate safely and efficiently. This will be assessed for development exceeding the level set out in I450.6.2.1(a), but prior to the full upgrade of Waihoehoe Road required by I450.6.2.1(d). If required, the further upgrade will provide an additional right turn lane from Great South Road.	The traffic modelling does not suggest that a further upgrade to SH22 / Great South Road is required.
(k) Whether a temporary unsealed active modes connection, within the existing road reserve, has been provided to Drury South Precinct along Fitzgerald Road to Quarry Road (except for sections where impracticable due to constraints).	An unsealed active mode connection was provided as part of the Drury Centre Stage 1 project.
(l) Prior to the upgrade of Fitzgerald Road, south of Brookfield Road, to an urban standard, whether any works are required within the existing road reserve, to ensure Fitzgerald Road is of a suitable condition to maintain safe traffic movement including any shoulder widening, localised widening, safety works and/or interim intersection upgrades, having regard to the additional traffic on that road generated by the Drury Centre Precinct.	As stated above, all upgrades to Fitzgerald Road and Brookfield Road will be provided as part of the Stage 1 development. As such, it is expected that Fitzgerald Road and Brookfield Road will be of suitable quality prior to construction commencing.

7.3.1 I450.9. Special Information Requirements

An assessment of the proposed development has also been undertaken against section 3,4, 5, and 6 in I450.9 Special Requirements within the Drury Centre Precinct. This is provided in Table 17 below.

TABLE 17: SPECIAL INFORMATION REQUIREMENTS ASSESSMENT

Criteria	Compliance	Comment
(3) Travel Plan		
A travel plan is required for offices greater than 500m2 and integrated retail development, or where development infringes standard I450.6.2. A travel plan must be prepared by suitably qualified and experienced person and include: (a) operational measures to be established on-site to encourage reduced vehicle trips, including car sharing schemes, public transport use incentives, flexitime, staggered working hours; (b) operational measures to be established to restrict the use of any employee parking area(s) during peak periods, including the allocation of on-site parking between staff, company cars and visitors;	Complies	A travel plan has been provided and includes such details. This has been provided as part of the consent application

Criteria	Compliance	Comment
(c) details of the management structure within the building or site in which the activity is to be located which has overall responsibility to oversee the implementation and monitoring of travel management measures; (d) the methods by which the effectiveness of the proposed measures outlined in the travel plan can be independently measured/monitored and reviewed by a suitably qualified and experienced traffic engineer, including a commitment to undertake travel surveys at the time of building occupation or as otherwise required to provide on-going information regarding travel behaviour; (e) the design of transport infrastructure proposed as part of the development that encourages a mode shift; (f) an objective or target for mode share or travel associated with offices, retail or commercial activities.		
(4) Integrated Transport Assessment		
An application to infringe standard I450.6.2 Staging of Subdivision and Development with Transport Upgrades must be accompanied by an integrated transport assessment prepared by suitably qualified transport planner or traffic engineer prepared in accordance with the Auckland Transport Integrated Transport Assessment Guidelines in force at the time of the application. The integrated transport assessment must include a register of development and subdivision that has been previously approved under standard I450.6.2 Staging of Subdivision and Development with Transport Upgrades. Without limiting the scope of the integrated transport assessment, the integrated transport assessment must assess and provide details of the following: (a) Whether the proposal is in accordance with Policies I450.3 (7), I450.3 (8), I450.3 (16), I450.3 (17), I450.3 (18), I450.3 (19) and I450.3 (21) in addition to any other relevant AUP policy;	Complies	As discussed, there is an infringement against standard I450.6.2, hence an integrated transportation assessment has been provided by way of this report. This includes a detailed assessment of the infringement to standard I450.6.2 as provided in section 5.
(b) Whether public transport routes that connect to the Drury Central train station and the Drury Centre can operate effectively and efficiently at all times;	Complies	See section 4.3 for more detail.
(c) Whether the Waihoehoe/Great South Road intersection can operate safely and with reasonable efficiency during the inter-peak period, being generally no worse than a Level of Service D for the overall intersection;	Complies	Refer to section 5 for more detail.
(d) Whether increased use of public transport within the Drury Centre precinct or the wider area, has provided additional capacity within the transport network including by implementing travel demand management measures set out in a travel plan, which has been prepared in accordance with I450.9(4);	Complies	This was completed as part of the modelling assessment carried out for the Fast-track ITA.
(e) Whether the proposal would have a similar or lesser trip generation and similar effects on the surrounding road network to the development mix provided for in the Table I450.6.2.1 Threshold for Subdivision and Development;	Complies	Refer to section 5 for more detail.

Criteria	Compliance	Comment
(f) Whether residential development is coordinated with retail and commercial development within the wider Drury East area shown on Precinct Plan 4 to minimise trips outside of the precinct providing additional capacity within the transport network;	Complies	The proposed development contains residential development and provision for retail stores and commercial offices within the subject site which will reduce trips outside of the precinct.
(g) Whether the actual rate of development in the wider area is slower than anticipated and provides additional capacity in the transport network;	Complies	The traffic model assumes the same level of external development that was assumed through the Plan Change process.
(h) The effect of the timing and development of any other transport upgrades or transport innovations not anticipated by the Drury Centre precinct;	Non-compliance	Updated traffic modelling has been completed due to a change in external transport upgrade timing which could affect the Drury Centre Precinct. See section 5 for more detail.
(i) Whether the integrated transport assessment supporting the application documents the outcome of engagement with the road controlling authority;	Complies	Consultation has been carried out with Auckland Transport and Auckland Council through multiple pre-application meetings.
(j) Whether the proposal demonstrates methods that promote the increased use of public transport, including details of how those methods would be implemented, monitored and reviewed so as to contribute to a reduction in vehicle trips;	Complies	Complies. Refer to section 4.3 of this report.
(k) Whether the intersection of Great South Road/Quarry Road and the Drury South Precinct roads can operate safely and efficiently prior to the full upgrade of Waihoehoe Road between Fitzgerald Road and Great South Road;	Complies	As described in Section 5, updated traffic modelling has been completed due to a change in external transport upgrade timing. No issues were identified within the Drury South network or the GSR / Quary Road intersection.
(l) Whether the surrounding transport network can operate safely and efficiently when considering traffic generated by construction activities within the Precinct Plan 4 area.	Complies	Traffic effects associated with construction activities will be assessed in the Construction Traffic Management Plan that will be provided at a later date.
(5) Monitoring of Rule I450.6.1 Staging of Subdivision and Development with Transport Upgrades		
(a) Any proposal for dwellings, retail, commercial and/or community activities must demonstrate compliance with rule I450.6.2 Staging of Subdivision and Development with Transport Upgrades. Any application must contain details of the maximum number of dwellings or amount of retail, commercial or community GFA proposed to be enabled (as well as anticipated dwellings/GFA for any subdivision proposal involving superlots). (b) Any proposal for office activities must demonstrate compliance with rule I450.6.3 Maximum Parking Rate. Any application must contain details of the amount of office GFA proposed to be enabled where relevant.	Non-compliance	As discussed in section 5, due to infrastructure timing changes, the development does not comply with the necessary table, but an updated assessment is presented to demonstrate how the network will operate under the new infrastructure construction timeframes. A summary of subdivision and development that has been applied for within the Transport Staging Boundary across the Waihoehoe, Drury East and Drury Centre Precincts are summarised in the AEE. Parking spaces for the proposed office activity complies with Rule I450.6.3. See section 4.6.1 for more detail.
(6) Transport Design Report		
Any proposed new road intersection or upgrading of existing road intersections must be supported by a Transport Design Report and Concept Plans (including forecast transport modelling and land use assumptions), prepared by a suitably qualified transport engineer confirming the location and design of any road and its intersection(s) supports the safe and efficient function of the existing and future (ultimate) transport network and	Complies	Proposed intersections and road corridors support the safe and efficient function of the interim and future transport network. See section 4.4and 4.9 for more detail.

Criteria	Compliance	Comment
can be accommodated within the proposed or available road reserves. This may be included within a transport assessment supporting land use consent. In addition, where an interim upgrade is proposed, information must be provided, detailing how the design allows for the ultimate upgrade to be efficiently delivered.		

8 Compliance with Policy and Other Frameworks

An ITA requires an assessment of compliance with national policy and other frameworks, and in particular a review against the Auckland Unitary Plan objectives, policies and rules. As such, a variety of national, regional and local transport planning and policy documents have been reviewed. The proposed masterplan has been assessed against these documents:

- Government Policy Statement on Land Transport Funding 2024-2034 (GPS 2024)
- Auckland Unitary Plan (AUP)
- Regional Land Transport Plan (RLTP)
- Regional Public Transport Plan (RPTP)
- Transport Emissions Reduction pathway (TERP)

8.1 Government Policy Statement on Land Transport Funding (2024-2034)

The Government Policy Statement (GPS) on Land Transport sets out the Government's desired outcomes and priorities for the land transport sector. It describes what the Government expects to achieve through the National Land Transport Fund and the manner in which funding is allocated to upgrade and maintain the land transport network. it has the following four desired transport outcomes:

- Economic growth and increased productivity – reduced journey times, less congestion and increased patronage on public transport, improved access to markets and areas that contribute to economic growth, more efficient supply chains for freight and unlocked access to greenfield land for housing development and supporting greater intensification
- Increased maintenance and resilience – more kilometres of the road network resealed and rehabilitated each year, fewer potholes, and a more resilient network
- Improved safety – reduction in deaths and serious injuries and increased enforcement.
- Value for money – better use of existing capacity and less expenditure on temporary traffic management.

Development of the subject site will support these national policy directions by meeting each of the four desired outcomes stated above. The proposed development will transform the existing greenfield site into urban development and significantly increase commercial land uses within the Drury Centre precinct, hence will support economic growth. The subject site is also located in close proximity to the proposed Drury Railway Station which improves public transport connectivity for people travelling to/from the proposed development and provides an alternative mode of transport to private vehicles.

Furthermore, the proposed development is located in close proximity to the residential development located in Drury East and Waihoehoe precinct. This will help minimise journey times for residents travelling between the sites and provide improved access.

8.2 Auckland Unitary Plan (AUP)

The Auckland Unitary Plan (AUP) has been operative in part since November 2016, and has the following objectives with regards to the regions transport infrastructure:

Land use and all modes of transport are integrated in a manner that enables:

a) The benefits of an integrated transport network to be realised;
b) The adverse effects of traffic generation on the transport network to be managed;

An integrated public transport, walking and cycling network is provided for;

- Parking and loading 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 priorities; and
- Road / rail crossings operate safely with neighbouring land use and development

The proposed development will align with the AUP as it provides an integrated public transport, walking and cycling network, both within and around the Drury Centre Precinct site. A combination of active mode facilities including cycle lanes, shared paths and footpaths, and public transport facilities such as dedicated bus lanes are provided on various road corridors in vicinity of the subject site. The subject site is also located in close proximity to the Drury Railway Station. This ensures that commuters have access to an integrated transport network and will therefore reduce reliance on private vehicle trips.

Additionally, as discussed in section 4.6 and 4.7 appropriate parking and loading provisions are provided within the site to minimise any adverse impacts on the road corridor. The proposed development is expected to integrate well with the surrounding transport network and land uses.

Pedestrian safety and amenity has also been closely considered with internal footpaths provided on both sides of all corridors within the site. These footpaths will connect to the Dury Railway Station as well as the wider footpath network in the vicinity of the site resulting in a well-connected active mode network for pedestrians. Additionally, it is proposed that all intersections within the site will be signalised and therefore provide safe crossing facilities for pedestrians using the footpath network.

8.3 Regional Land Transport Plan (RLTP)

The Regional Land Transport Plan prepared by Auckland Transport with NZTA, KiwiRail and Auckland Council identifies the priority of a number of region-wide transport projects over a 10-year period. The current RLTP was adopted in 2024 for a duration of 10 years, however it is reviewed every three years. The current RLTP outlines the following key items:

- Existing public transport services, along with improvements such as more rail services enabled by the CRL and the expansion of the frequent bus network
- Completing projects that are already committed to and in progress, for example, the Eastern Busway and CRL
- Renewals and maintenance of local roads, rail and state highway networks to ensure they remain fit for purpose into the future
- Larger rapid transit projects that will provide new high-speed public transport links across Auckland, but will cost more and take longer to deliver

- Smaller projects that can be delivered quickly to improve the speed and reliability of our bus network, including dynamic bus lanes, optimise traffic movement on our road network and motorways, and encourage more sustainable travel from key growth areas
- Major state highway projects that will improve resiliency, reliability and travel times on the motorway network and enhance our links to other regions
- Cycling projects that will increase the size of the cycling network
- Investment in safety infrastructure to reduce transport related deaths and serious injuries.

The proposed development integrates well with the RLTP as it aligns with these strategic themes. The subject site is located in close proximity to the Drury Railway Station, hence allowing commuters to capitalise on the more frequent and improved rail services once the train station is operational. Additionally, the proposed development is located in close proximity to the residential developments located in Drury East and Waihoehoe precinct.

As mentioned above, the proposed development also includes upgrading various road corridors in vicinity of the site. These upgrades include urbanising the road corridor to provide kerb and channel, controlled intersections, dedicated bus lanes and active mode facilities such as cycle lanes, shared paths and footpaths.

Upgraded active mode transport facilities are also provided within the vicinity of the site, connecting the proposed development to these two residential development sites. These upgraded active mode facilities are expected to reduce reliance on private vehicle travel for residents living in these areas as it will result in walking, cycling and public transport becoming an attractive alternative mode of travel.

8.4 Regional Public Transport Plan (RPTP)

The Regional Public Transport Plan (RPTP) outlines how public transport will be managed and improved between 2023-2031, and also states the goals, policies and actions which will shape public transport investment decisions. The vision of the RPTP is "to massively increase public transport use to reduce congestion, improve access for Aucklanders, support the economy and enhance the environment". To achieve this vision, the RPTP outlines five key goals:

- Services providing an excellent customer experience
- Safe and accessible transport for everyone
- Funding and delivering public transport transparently
- Integrating public transport into a growing Auckland
- Enhancing the environment and tackling the climate emergency

The area in vicinity of the subject site currently has poor public transport connectivity with only one bus route and the nearest train station being located approximately 5km away. However, the proposed development is located in close proximity to the new Dury Railway Station which provides a train station in vicinity of the subject site and will greatly enhances public transport connectivity. Furthermore, it is understood bus services will operate to/from the subject site to the nearby residential Drury East and Waihoehoe precinct developments. This will promote public transport use for residents living within these nearby developments to travel to and from the subject site.

8.5 Transport Emissions Reduction Pathway (TERP)

The Transport Emissions Reduction Pathway (TERP) provides a high-level framework to respond to the Government's Emissions Reduction Pathway. By signing the 2016 Paris Agreement, the New Zealand

Government has committed to becoming net zero in carbon emissions by 2050 and to reduce by 50% by 2030. With Transport representing for over 40% of Auckland's carbon emissions, the TERP targets a 64% reduction in transport emissions by 2030.

The TERP sets out six transformations that will be required to enable Aucklanders to walk, cycle and use public transport more, with the remaining transformations relating to adopting low-emission vehicles. These six transformations are outlined below:

- Supercharge walking and cycling
- Use public transport much more
- Prioritise and resource sustainable transport
- Reduce travel where possible and appropriate
- Make neighbourhoods safer with less traffic
- Put things closer to where people live

The proposed development closely aligns with all six of these transformations. As mentioned previously, the proposal includes provisions for active mode facilities consisting of shared paths, cycle lanes and footpaths along the road corridors, and various public transport facilities including dedicated bus lanes along Waihoehoe Road and the Drury Railway Station.

The proposed development is also located in close proximity to the residential development occurring within the Dury East and Waihoehoe precinct. The proposed Drury Centre development will include several amenities such as eateries, takeaways, grocery stores, supermarkets and department stores which will reduce travel times and make active mode options such as walking and cycling a feasible mode of transport between the sites.

9 Conclusion

This Integrated Transportation Assessment has been prepared to assess the transportation related impacts for the subject site located at 64, 68, 108, 120 and 132 Flanagan Road, Drury The Drury Centre Stage 2 development will consist of the construction and subdivision of various dwellings, retail stores, large format retail (LFR) stores, commercial buildings, visitor accommodation and esplanades and reserves. The proposed development also includes provision for various public and privately owned road corridors within the site.

As part of the proposed development of the subject site, several new local and collector road corridors will be constructed within the site which will primarily provide access to the development. The proposed roading infrastructure provides a well-connected and integrated active mode network with provision for uni-directional cycle lanes and footpaths on all collector roads, and footpaths on both sides of all local roads. The proposed road corridors will connect to the Drury Centre Stage 1 roading network consented as part of the initial Fast-track application and have been designed as such to allow for future connections beyond the subject site.

Updated traffic modelling has also been carried out to understand the impact of the additional traffic generated by the proposed development. This traffic modelling shows that the upgraded GSR/Waihoehoe Road intersection can sufficiently accommodate the expected traffic volumes from the subject site once developed. However, as external infrastructure upgrade timing has changed, a technical non-compliance is evident. Updated traffic modelling demonstrates that the effects of the development will be effectively

managed, and a new development/infrastructure sequencing table has been created to ensure that the development proposed in this consent can be supported by infrastructure upgrades as they occur.

The proposal generally complies with the transportation related requirements as outlined in the AUP, PC79, and the Drury Centre Precinct Provisions. Where there are non-compliances, these have been noted and discussed throughout this report. However, it is expected that none of these non-compliances have a significant adverse impact on the safe and efficient operation of the road corridor.

Based on the findings from this report, it is concluded that there are no traffic or transportation related reasons to preclude the approval of the resource consent as requested, provided that development follows the new development/infrastructure sequencing table presented within this report.

CKL

Appendices

Attachment 1: Drury Centre Precinct – Fast-track ITA

Drury Centre Precinct Fast-Track Integrated Transportation Assessment

PREPARED FOR KIWI PROPERTY GROUP | NOVEMBER 2022

We design with community in mind

Stantec

Revision Schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0	30/09/2022	Draft	AD / GS	DH	DH	DH
1	13/10/2022	Second Draft	AD / GS	DH	DJM	DJM
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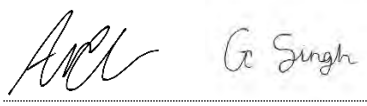
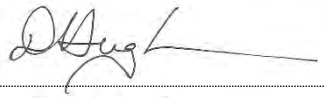
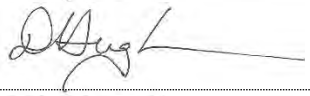
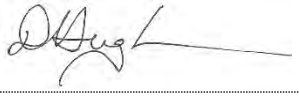
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Quality Statement

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1 Introduction

This report has been prepared in support of the application by Kiwi Property Holdings No 2 Limited (the "**applicant**" or "**Kiwi Property**") for a referred project under the Covid 19 Recovery (Fast track Consenting) Act 2020 ("**the Act**"). In summary, the Drury Centre Precinct project involves subdivision, land use and discharge consents for the development of buildings for large format retail activities up to a maximum gross floor area (GFA) of 24,000m^2, the creation of balance superlots for future development, three open space reserves including restoration and enhancements along the Hingaia Stream, the construction and installation of three waters reticulation, upgrades to existing transport infrastructure and associated enabling bulk earthworks (the "**project**" or the "**proposal**"). The project site is across multiple contiguous properties on Flanagan, Fitzgerald and Brookfield Roads, Drury, Auckland ("**the Site**").

The 48.9 ha site for the Drury Centre Precinct project forms part of a larger land area within Drury which was recently rezoned as part of Private Plan Change – Drury Central ("**PC48**") promulgated by Kiwi Property. PC48 has rezoned the land from its former Future Urban Zone (FUZ) to urban zones which include Business - Metropolitan Centre, Business - Mixed Use and Open Space – Informal Recreation zones under the Auckland Unitary Plan ("**AUP(OP)**"). The relationship of this project and PC48 is detailed in the Assessment of Environmental Effects ("**AEE**") prepared by Barker and Associates ("**B&A**").

Land to the east and north of the site fall within adjacent plan changes by Oyster Capital (Private Plan Change 50 ('**PC50**')) and Fulton Hogan Land Development Limited ('**FHLDL**') (Private Plan Change 49 ('**PC49**')) that rezoned FUZ land to residential zones. Within the respective PC49 and PC50 areas, complementary fast-track applications have been lodged for the Drury East and Waihoehoe Precinct Projects which have been taken into account in this ITA.

An earlier version of this Fast Track Consenting ITA was submitted in 2021. During the processing of the Fast Track Consenting in early 2022, many Requests for Information ("RFIs") were produced and responses from Stantec prepared, leading to several minor changes to the development details originally submitted. This report seeks to update the Fast Track Consenting ITA to reflect all such changes as well as to reflect the change in planning framework since the earlier report was submitted.

This ITA report assesses the transport related issues of the proposal, including:

- The site and its surrounding transport environment;
- The proposal, focussing on key transport-related aspects of the development;
- The design of the local roads proposed to serve the development;
- The design and traffic operation of the proposed interim and final design;
- The adequacy and function of the proposed on-site parking and access for the individual lots within the interim and final design;
- The effect of both the interim and final design on the safety and efficiency of the existing road network; and
- The ability of both stages to meet the relevant AUP(OP) transport requirements, including the Drury Precinct transport requirements (where applicable).

The above points and other matters will be addressed in detail in this report.

2 Existing Transport Environment

2.1 Site Location

The site comprises 28.55 hectares of land at 133, 139, 155, 173 and 189 Fitzgerald Road; 61 and 97 Brookfield Road; and 108, 116, 120, 124, 128 and 132 Flanagan Road, Drury, Auckland (refer Figure **2-1** below). This area is bound by Fitzgerald Road to the east, Brookfield Road to the south and SH1 to the west.



Figure 2-1: Subject Site Subject to this Application in Context with the Local Road Network (Source: Ignite)

Waihoehoe Road, to the north of the site, is currently a rural road with no walking or cycling facilities. The North Island Main Trunk runs north-south to the northwest of the site. The site is located at the confluence of several major roads such as SH1, SH22 and Great South Road. **Figure 2-2** shows the site in the context of the wider road network.

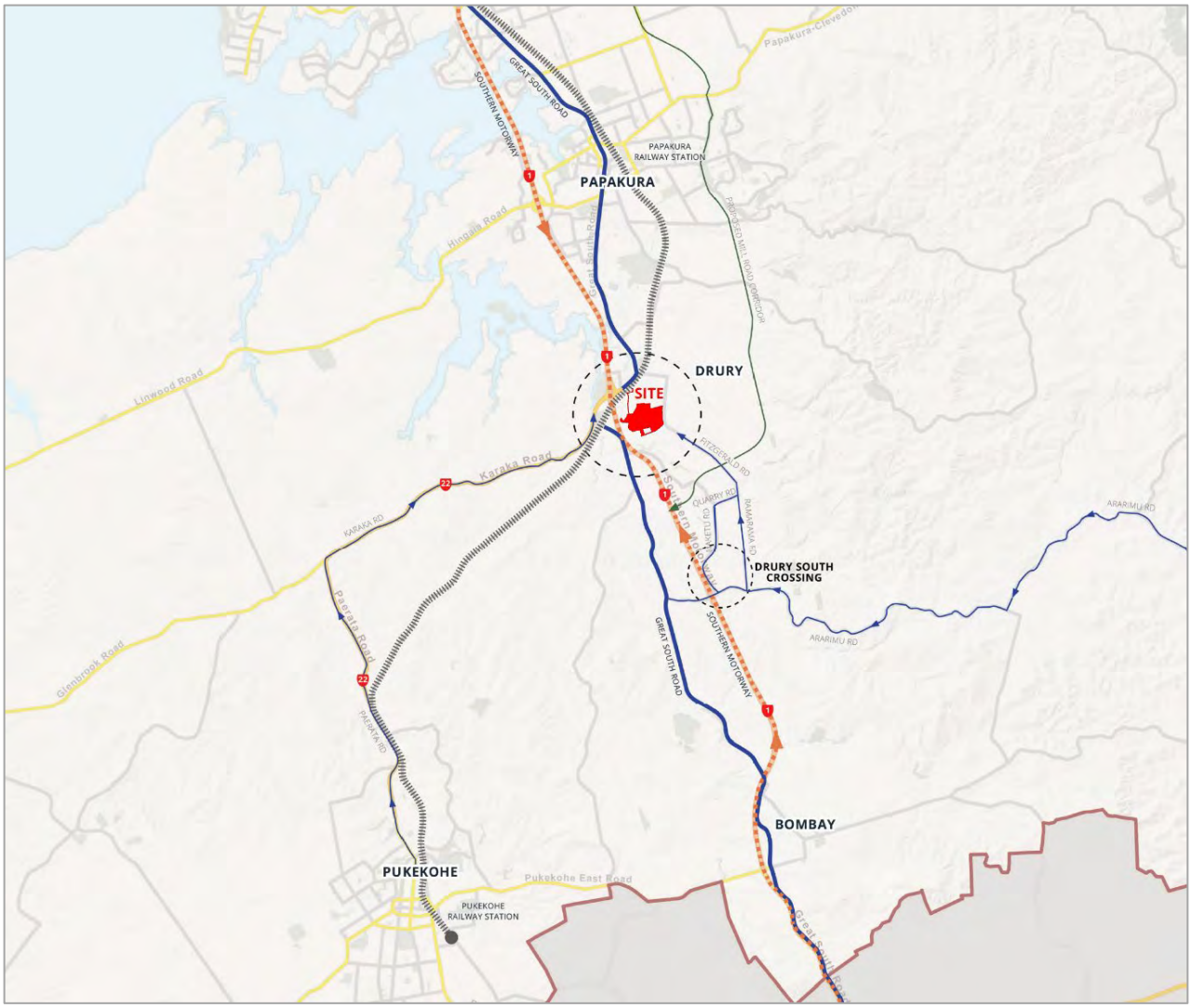


Figure 2-2: The site in context with the wider road network (Source: Ignite)

PC48 has rezoned the land from former FUZ to urban zones which include Business - Metropolitan Centre, Business - Mixed Use and Open Space – Informal Recreation zones under the AUP(OP). The subject site currently accommodates a range of rural and residential lifestyle activities. The site is located approximately 30km southeast of Auckland's central business district,14km southeast of Manukau, 6km south of Papakura, and within 1km of the existing Drury Town Centre.

Predominantly industrial and commercial activities are located to the west (existing Drury Town Centre) of the site. Drury School and Drury School Hall are also located to the west of the site, adjacent Great South Road. Low density residential dwellings are located to the east and west of the site, with the Manukau Harbour located further to the west.

As previously mentioned, there are two other sites within Drury East that are proposed to be developed via the Fast-Track process. The Waihoehoe Precinct is proposed to be developed by Oyster Capital and the Drury East Precinct by FHLDL, these sites in relation to the subject site are shown in **Figure 2-3**.

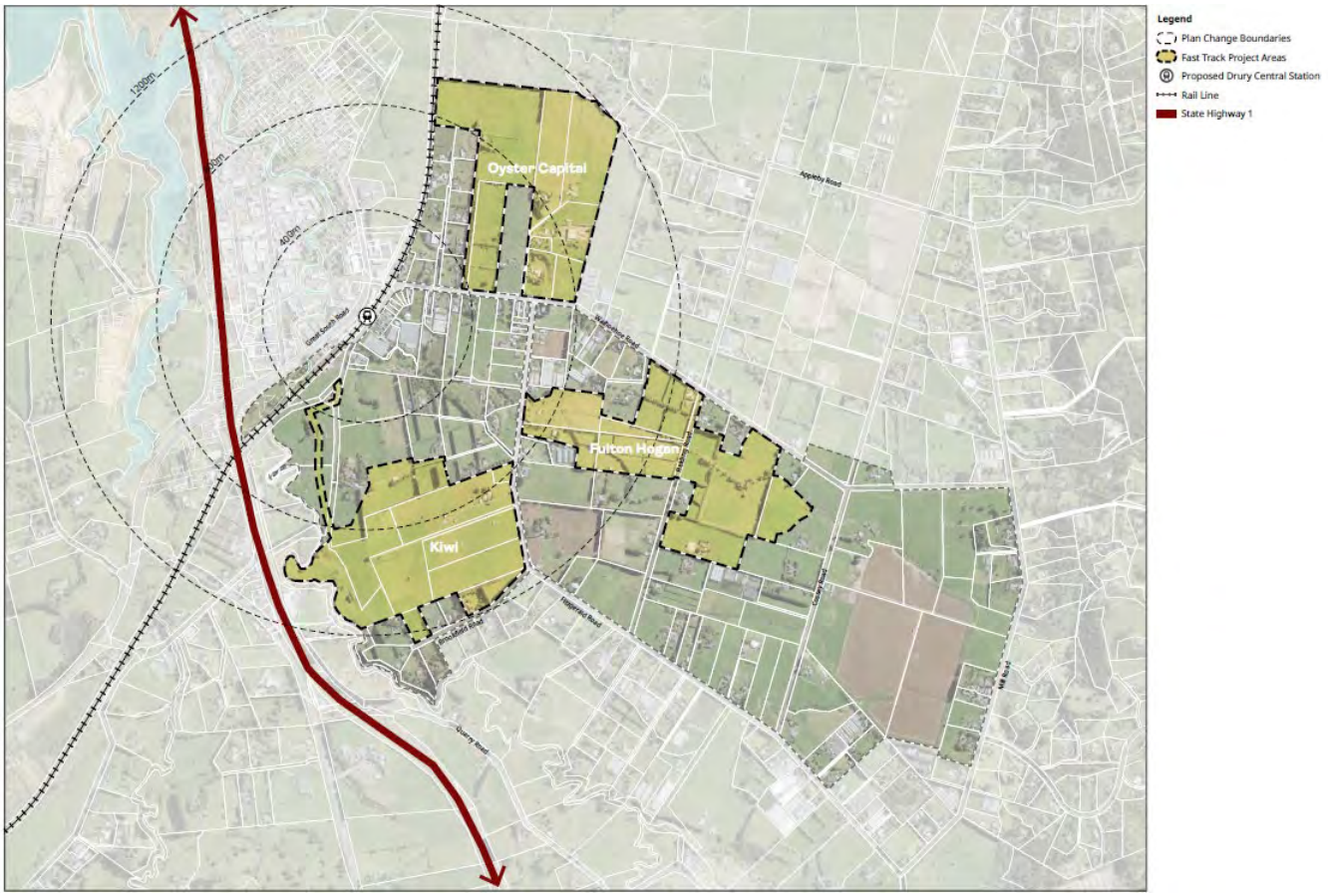


Figure 2-3: The site in context with the other Drury East Fast-Track sites (Source: B&A)

2.2 Road Network

2.2.1 Waihoehoe Road

Waihoehoe Road forms a key east-west road to the north of the proposed development and is also the northern boundary of the neighbouring Fulton Hogan fast track area. It currently has a predominantly collector road function in connecting the eastern side of Drury to the Drury town centre and Great South Road. The cross section of Waihoehoe Road consists of one lane in each direction separated by a solid centreline, and with no kerb lines either side of the carriageway. The road widens to include a right turning bay at the Waihoehoe Road / Fitzgerald Road intersection.

Waihoehoe Road has a posted speed limit of 50km/h just east of Drury Interchange, 60km/h between Flanagan Road and Fitzgerald Road, and 80km/h east of Fitzgerald Road. It crosses the NIMT via a bridge that provides a kerb-to-kerb carriageway width of 10.5m, with a narrow footpath on the northern side of the bridge.

2.2.2 Fitzgerald Road

Fitzgerald Road forms the western and southern frontage of the neighbouring Fulton Hogan Plan Change and fast track area and a portion of the eastern frontage of the site. The Fulton Hogan Plan Change area boundary runs from Waihoehoe Road at its northern end to Drury Hills Road at its southern end. Fitzgerald Road continues south until the Quarry Road intersection.

Fitzgerald Road is currently classified as a collector road connecting low density residential housing and lifestyle blocks in Drury East to Great South Road and the Drury Interchange. The cross section of Fitzgerald Road comprises of one lane in each direction separated by a solid yellow line, with the exception of a right turning bay into Brookfield Road.

2.2.3 Brookfield Road

Brookfield Road runs along the southern frontage of the site and is currently classified as an access road. Fitzgerald Road connects to Brookfield Road at the southeast corner of the site.

2.2.4 Great South Road

Great South Road runs generally north-south through the wider Drury-Ōpaheke area, forming an S-bend where it crosses underneath SH1. Great South Road forms the main arterial route between Wiri / Manukau (to the northwest) and Papakura (to the southeast). The road follows a similar route to SH1 and for this reason is often used as an alternative route to SH1. Great South Road is part of SH22 (until some 600m west of the motorway interchange) and is located on the south-western end of the site.

Great South Road accommodates one lane in each direction to the east of the Drury interchange. The two directions are separated from each other by a solid line for most of the route with the exception of a flush median on the approach to adjacent intersections. The posted speed limit on Great South Road is 60km/h in the interchange area and reduces to 50 km/h entering the existing Drury centre at the creek bridge east of Firth Street. On-street parking is prohibited or unfeasible in most sections in the vicinity, albeit wide and often sealed berms in some areas transition into commercial property sealed forecourt area, resulting in the occasional parking being effectively or partially on-street.

Great South Road carries approximately 15,500vpd on weekdays.

2.3 Public Transport

Access to commuter rail services near the development site is currently via the Papakura train station, which is approximately 5km north of the Drury interchange. Train services connecting Papakura and Britomart (the Southern Line services) operate every 10 minutes during weekday peak morning and evening, between 20-30 minutes outside of the peak periods. However, KiwiRail has secured designations and resource consent for a new Drury Central Rail Station adjacent to the site, which will significantly improve local public transport access to the site. This was approved by the Expert Consenting Panel on 3 February 2022 and is scheduled for opening by late 2025.

Figure 2-5 shows that the only public transport service connecting Drury to Papakura is the bus service 376, which runs along Great South Road every 20 minutes during weekday peak times (6:45am-9:15am and 3:47pm-6:45pm) and every 30 mins during off-peak and weekends. Since August 2021, this service has been extended to Auranga (Drury West).

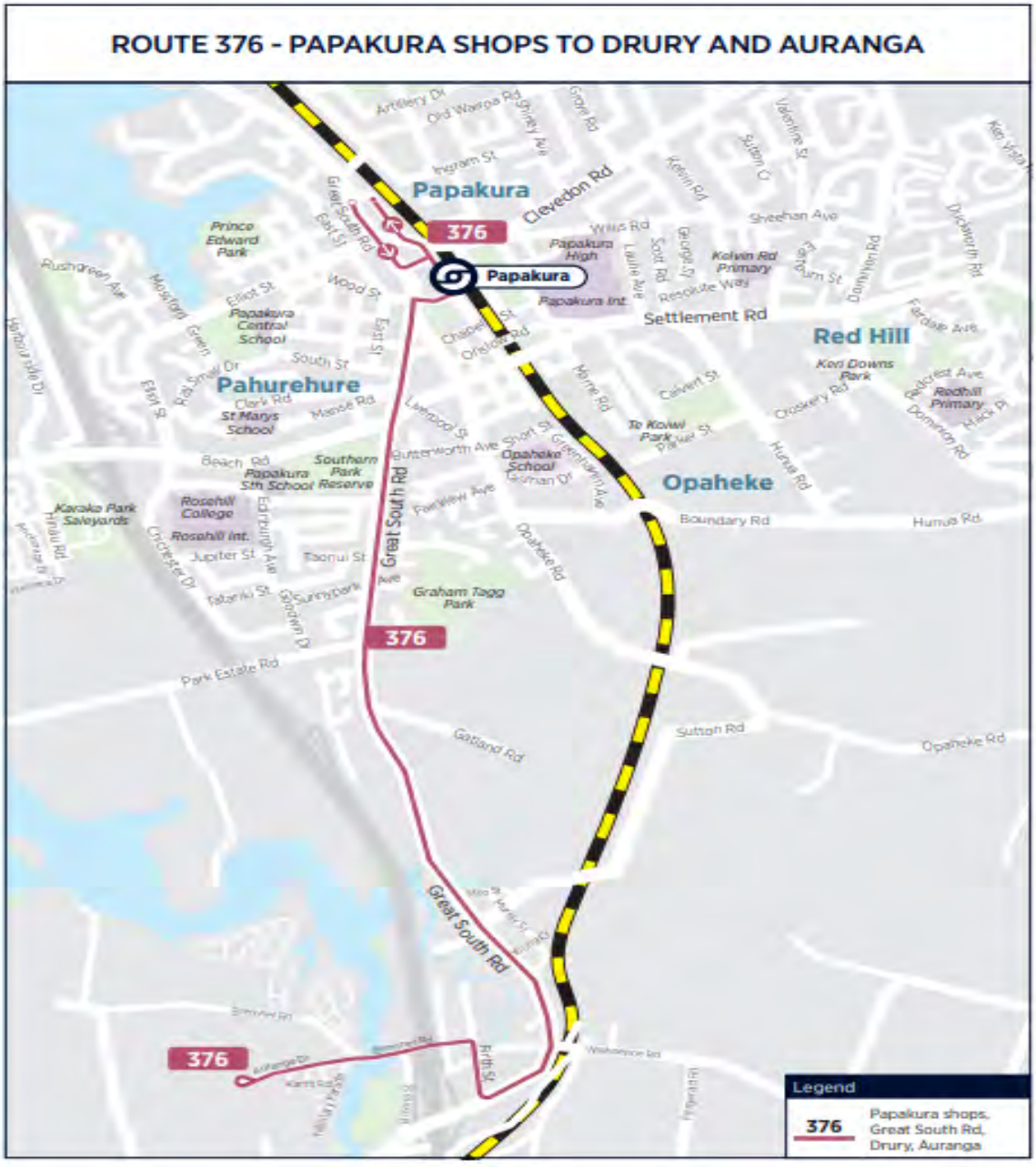


Figure 2-4: Public Transport Network

From Papakura, there are several bus services (in addition to the southern rail line), which operate approximately every 15 minutes during peak hours. These serve the local Papakura area and provide a service to Manurewa and Manukau (refer to **Figure 2-5**).

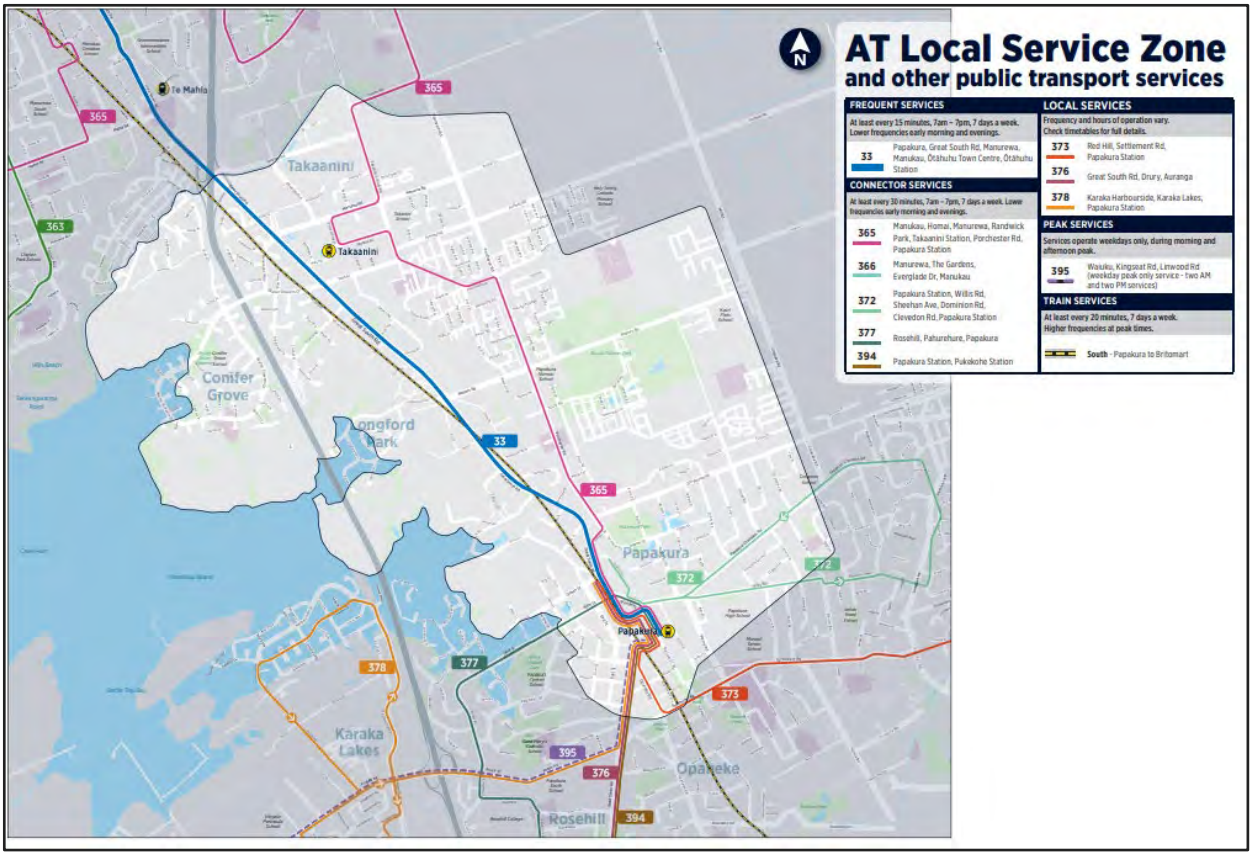


Figure 2-5: Updated 376 Bus Route to Auranga

In general, the bus services are adequate to serve the currently small population in the area.

2.4 Walking and Cycling Provision

The local road network within Drury East does not currently accommodate any cycling or walking provisions. There are no footpaths on any of the roads within the site area.

Waka Kotahi are currently developing an extension of the Southern Pathway (shared path) along the western side of SH1 from its current end at the Papakura interchange southwards as far as the Drury Interchange. This is likely to be completed during 2025.

2.5 Road Safety

A search of the road safety record was undertaken using the New Zealand Transport Agency (**Waka Kotahi**) Crash Analysis System (**CAS**) for the period from 2016 to 2022. Due to the size of the development area, the scope was divided into three zones to assess the major intersections surrounding the proposed Oyster, Kiwi and Fulton Hogan sites. The scope of each zone is outlined below:

Zone 1: West of the Drury Interchange

- 50m radius of Karaka Road / Great South Road intersection
- 50m radius of Great South Road / Pitt Road intersection
- 50m radius of Great South Road / Quarry Road intersection
- Great South Road between Karaka Road and Quarry Road

Zone 2: Along Great South Road

- 50m radius of the Great South Road / Northbound off-ramp intersection
- 50m radius of the Great South Road / Southbound off-ramp intersection
- Great South Road between Karaka Road and Waihoehoe Road

Zone 3: Along Waihoehoe Road

- 50m Radius of Great South Road/ Waihoehoe Road
- 50m radius of Waihoehoe Road / Fitzgerald Road
- 50m radius of Fitzgerald Road / Brookfield Road
- Waihoehoe Road between Great South Road and Brookfield Road

A total of 108 crashes were recorded within all three zones for this period. These were divided into one fatal, eight serious, 25 minor, and 73 non-injury crashes. The reported crashes are summarised in **Table 2-1** below.

Table 2-1: Crash History by Local Search Zone; 2016-2022

Search Zone	Number of Crashes by Crash Severity				
	Fatal	Serious	Minor	Non-injury	Total
Zone 1	1	4	7	15	28
Zone 2	0	2	13	42	57
Zone 3	0	2	5	16	23
Total	**1**	**8**	**25**	**73**	**108**

From the above table, Zone 2 (along Great South Road) had the highest recorded number of crashes of the three crash search zones. This is expected from the higher traffic volumes and complexity of the motorway interchange.

An analysis of crashes in each zone is described in detail below.

2.5.1 Zone 1

The crash search extent for Zone 1 is shown in **Figure 2-6**.



Figure 2-6: Zone 1 - West of the Drury Interchange

Table 2-2 outlines the crashes that occurred in Zone 1 below by severity.

Table 2-2: Crash Severity Summary for Zone 1

Location	Number of Crashes by Crash Severity				
	Fatal	Serious	Minor	Non-injury	Total
Karaka Road (SH 22) / Great South Road Intersection	0	2	1	8	12
Great South Road / Pitt Road Intersection	0	2	5	3	10
Great South Road between Karaka Road and Pitt Road, midblock	1	0	0	2	3
Great South Road between Pitt Road and Quarry Road, midblock	0	0	1	2	3
Total	**1**	**4**	**7**	**15**	**28**

One fatal crash has been incorrectly referenced on CAS. The geographic referencing on the CAS mapping tool shows a fatal crash occurred at the Karaka Road (SH22)/Great South Road intersection, however the description of the crash

states that it occurred at the Mcpherson Road/Karaka Road (SH22) intersection. Since the location of this crash does not fall within any of the study areas, it has been excluded from the analysis.

One fatal rear-end crash occurred on Great South Road between Karaka Road and Pitt Road, where an inexperienced motorcyclist collided with a slowing vehicle. The road rises over the bridge, which may limit visibility.

Four crashes resulting in serious injuries occurred in the search extent, outlined as follows:

- Two crashes occurred at the intersections of Karaka Road / Great South Road and Great South Road / Pitt Road, where the vehicle on the minor road failed to give way and was hit by an oncoming vehicle on the major road;
- One head-on crash occurred at the intersection of Karaka Road/Great South Road, as the driver was intoxicated; and
- One rear-end crash occurred at the intersection of Great South Road / Pitt Road, as a motorcyclist failed to stop in time, thus colliding with a stationary vehicle waiting at the right turn bay.

The four minor-injury crashes are outlined as follows:

- Two occurred due to sunstrike, resulting in a rear-end crash and a head-on collision;
- One at Karaka Road / Great South Road intersection resulting from a failure to give-way to traffic travelling along Karaka Road;
- A loss of control crash on Great South Road between Pitt Road and Quarry Road, involving a vehicle veering onto the wrong side of the road, hitting oncoming traffic;
- Three crashed at Great South Road / Pitt Road intersection due to failing to give-way to traffic travelling along Great South Road.

There were no crashes involving pedestrians or cyclists within the specified six-year period in this zone.

Overall the injury crashes outlined above do not appear to follow a specific pattern that would indicate any inherent safety issues in the design of roads and intersections within Zone 1.

2.5.2 Zone 2

The crash search extent for Zone 2 is shown in **Figure 2-7**.



Figure 2-7: Zone 2 - Along Great South Road

Table 2-3 outlines the crashes that occurred in Zone 2 by severity.

Table 2-3: Crash Severity Summary for Zone 2

Location	Number of Crashes by Crash Severity				
	Fatal	Serious	Minor	Non-injury	Total
Northbound off-ramp / Great South Road	0	0	5	14	19
Southbound off-ramp / Great South Road	0	0	5	10	15
Great South Road between Southbound off-ramp and Waihoehoe Road, midblock	0	2	2	10	14
Great South Road between Karaka Road and Northbound off-ramp, midblock	0	0	1	8	9
Total	**0**	**2**	**13**	**42**	**57**

Twelve injury crashes occurred in this zone, with two serious-injury and ten minor-injury crashes.

The serious injury crashes are outlined as follows:

- A failure to give way at the Great South Road / Firth Street intersection, where the vehicle on the minor road did not notice the oncoming motorcycle on Great South Road; and
- A loss of control crash on Great South Road between the Southbound off-ramp and Waihoehoe Road involved a motorcyclist due to accelerating too quickly.

The minor-injury crashes are outlined as follows:

- Two minor-injury crashes occurred due to driver errors. These occurred at the intersections of Northbound offramp/ Great South Road and Southbound off-ramp/ Great South Road as a result of the driver losing consciousness and crashing into another vehicle/object;
- Two rear-end crashes occurred at the Northbound off-ramp/ Great South Road intersection and on Great South Road between Karaka Road and Northbound off-ramp due to driver distraction and following too closely to the vehicle in front;
- Two incidents involving intoxicated drivers resulted in a rear-end and loss of control crash;
- A lane change crash occurred at the Southbound off-ramp / Great South Road intersection, where a vehicle in the rightmost lane continued through instead of right, colliding with the vehicle turning right;
- One rear-end crash occurred on Great South Road between Waihoehoe Road and the Southbound off-ramp due to road rage;
- One loss of control crash occurred in a stolen vehicle during a pursuit at the Northbound off-ramp / Great South Road intersection;
- A crash involving a cyclist changing lanes was hit by an oncoming vehicle at Great South Road between Firth Street and Waihoehoe Road;
- One rear-end crash occurred at the intersection of the Great South Road and the Great Southbound Off Ramp due to restricted vision caused by foggy windows;
- Rear end crash at the southern end of the Great South Road Off Ramp, where the driver of a stolen vehicle drove recklessly into the rear of a stationary vehicle; and
- Head-on collision while travelling along Great South Road due to reckless driving, it was later identified that the diver was driving a stolen car with a learner's license.

There do not appear to be any recurring crash patterns or inherent road safety defects in Zone 2.

2.5.3 Zone 3

The crash search extent for Zone 3 is shown in **Figure 2-8**.



Figure 2-8: Zone 3 - Along Waihoehe Road and Fitzgerald Road

Table 2-4 outlines the crashes that occurred in Zone 3 below by severity.

Table 2-4: Crash Severity Summary for Zone 3

Location	Number of Crashes by Crash Severity				
	Fatal	Serious	Minor	Non-injury	Total
Great South Road / Waihoehoe Road Roundabout	0	0	3	10	13
Fitzgerald Road between Waihoehoe Road and Brookfield Road, midblock	0	0	1	4	5
Fitzgerald Road / Brookfield Road Intersection	0	1	0	1	2
Waihoehoe Road between Great South Road and Fitzgerald Road, midblock	0	0	1	1	2
Waihoehoe Road / Tui Street Intersection	0	1	0	0	1
Total	**0**	**2**	**5**	**16**	**23**

Of the injury crashes outlined above, there were two incidents resulting in serious injuries. These crashes are outlined as follows:

- One loss of control crash was due to an animal running in front of the oncoming vehicle at the Fitzgerald Road / Brookfield Road intersection.
- One crash involved an intoxicated driver crashing into a retaining wall near the Waihoehoe Road/Tui Street intersection.

The four minor-injury crashes in the specified six-year period involved vulnerable road users (pedestrians or cyclists), all resulting in minor injuries. These crashes are outlined as follows:

- Two involved a failure to give way to cyclists at the Great South Road / Waihoehoe Road roundabout. Contributing factors for such crashes were weather conditions and driver misjudgement of the gap available to enter the roundabout; and
- Two involved vehicles striking pedestrians. One occurred on Fitzgerald Road in between Waihoehoe Road and Brookfield Road and was construction related, where a truck driver and pedestrian were working on the road. The truck driver reversed his vehicle and accidentally hit the pedestrian. The other crash involved a pedestrian running onto the road heedless of traffic at Waihoehoe Road in between Great South Road and Fitzgerald Road.

There do not appear to be any recurring crash patterns or inherent road safety defects in Zone 3.

2.5.4 Summary

Significant safety issues arising from road or intersection designs are not apparent based on the crash searches above. In the majority of cases, the crashes were observed to have occurred due to human factors such as intoxication/medication, distracted driving, and inadequate spatial awareness.

The total number of crashes within all three zones, one fatal, eight serious, 25 minor and 73 non-injury crashes, are typically given the high traffic volumes, proximity to a motorway interchange and the higher surrounding speed limits. It is also noted that crashes involving cyclists and pedestrians are considered relatively low. Therefore, it is considered that there are no inherent safety concerns with the current road design. It is noted that the proposed development and enabled developments aid infrastructure improvements and will enhance pedestrian, cyclist and road user safety.

3 Proposal

3.1 Site Layout

Kiwi Property is proposing the subdivision and development of the site as the first stage of the Drury Centre. The proposal will result in the development of a commercial retail centre in the western part and balance super lots enabling future development to the east of the LFR, and parks/reserves including an open space reserve adjacent the Hingaia Stream. The construction of roads to vest, associated site preparation works and construction of civil infrastructure and landscaping are also proposed.

The site development also includes new roads and upgrades of existing roads to provide multi-modal access, and to connect the activities within the site to the wider network including the new Drury Central train station. This includes the new Pitt Road / Fitzgerald Road intersection and Brookfield / Fitzgerald intersection which will be delivered by Kiwi as the main accesses of the site, as well as road upgrades along Fitzgerald Road north of this intersection, and Waihoehoe Road to Great South Road, jointly undertaken by other fast track applicants (Oyster Capital and Fulton Hogan).

The site layout is shown in **Figure 3-1** below, bound by rural properties to the north, Fitzgerald Road to the east, Brookfield Road and rural properties to the south and the Hingaia Stream and rural properties to the west.

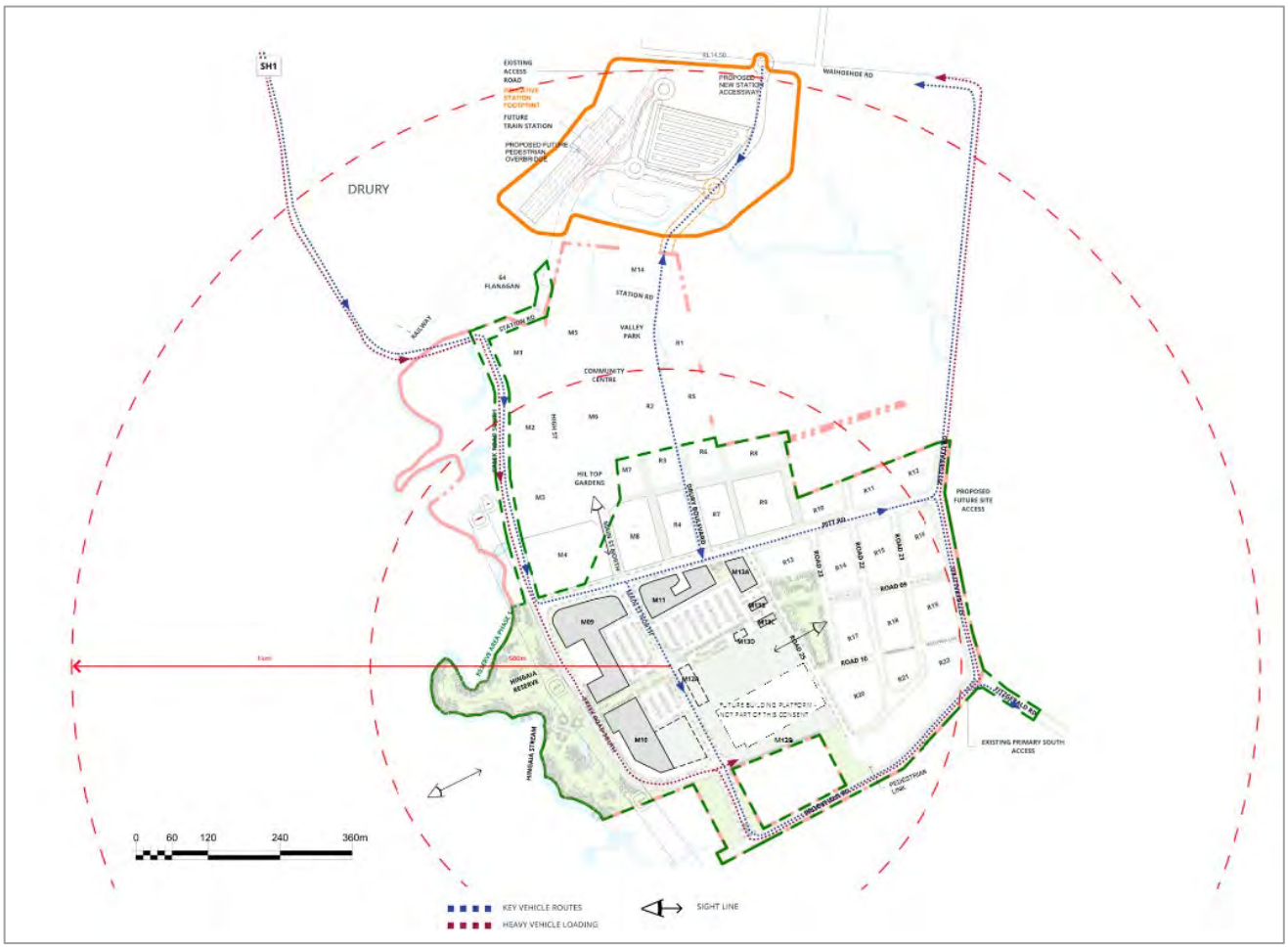


Figure 3-1: Proposed Development Layout (Source: Ignite)

4 Transport Design Report

As described in the introduction to this report, an earlier version of this Fast Track Consenting ITA was submitted in 2021. During the processing of the Fast Track Consent in early 2022, many Requests for Information ("RFIs") were produced and responses from Stantec prepared, leading to several minor changes to the development's design details that were originally submitted. Agreement was subsequently reached with Auckland Transport on the most critical of these design issues through the Environment Court appeals process for Plan Change 48, where both the Auckland Transport and Auckland Council appeals were resolved by consent. This section updates the proposed Fast Track development designs to reflect all such agreed changes, as well describing how the designs evolved through the RFIs and mediation to the outcome now presented.

4.1 General Road Layout

The development will primarily be accessed via two new collector roads: Pitt Road and Main Street South. Pitt Road runs in the east-west direction along the top edge of the fast-track development site. Main Street South passes through the centre of the retail area (in a north-south direction.

Pitt Road will connect the site to Fitzgerald Road to the east, while Main Street South will connect to Creek Road and then terminate at Brookfield Road to the south. Brookfield Road will also function as a collector, albeit in a somewhat more interim format, considering large parts of adjacent frontages on this road are not owned by the applicant and remain in rural or low-density residential usage for the immediately foreseeable future.

It is noted that Main Street South is proposed as a private road to be owned and operated by the applicant as part of the retail centre.

A network of local roads will facilitate access and movement to the retail centre and around the proposed superlots, with this network concentrated in the eastern half of the site. The internal "local roads" within the western part of the site/the commercial retail centre will be private roads / car park aisles and these will not be vested.

The proposed public road layout for the Kiwi fast track development is shown in **Figure 4-1** below.

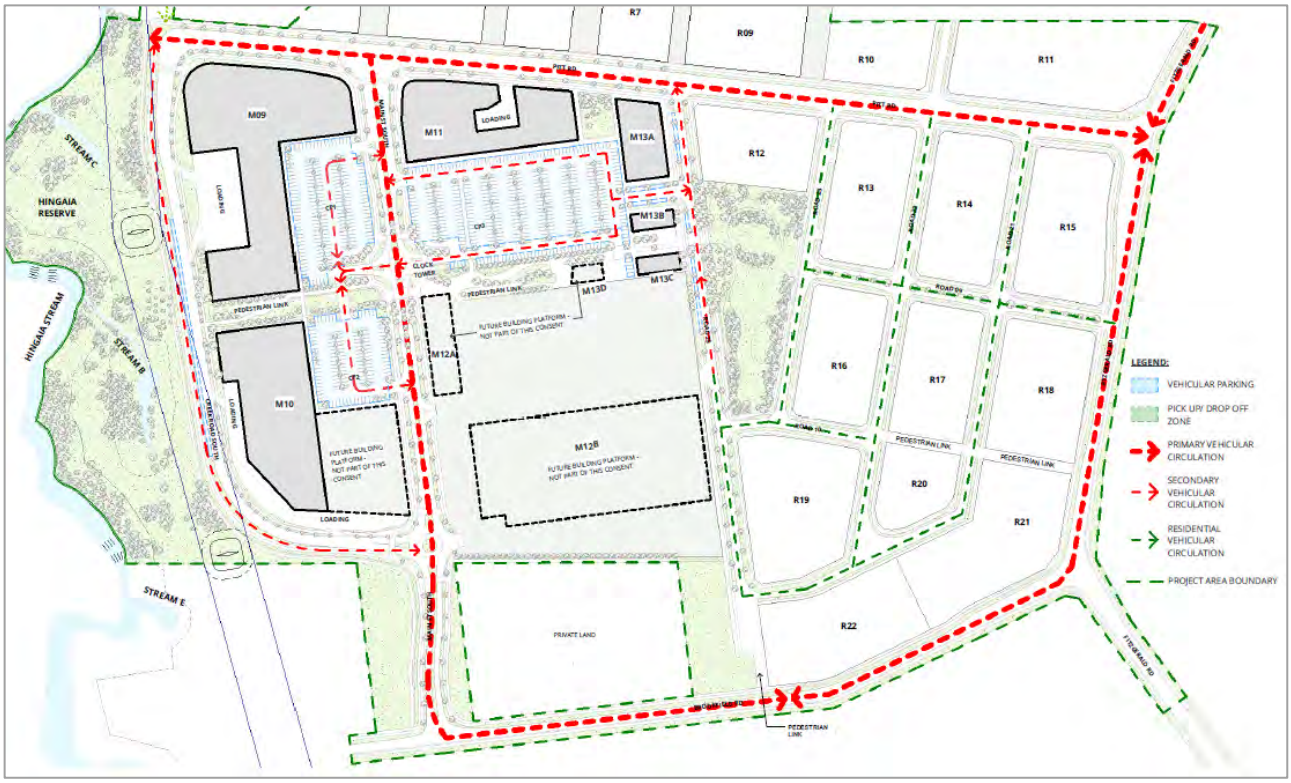


Figure 4-1: Proposed Road Layout (Source: Ignite)

The site will initially be accessible via the two key signalised Pitt Road / Fitzgerald Road and Brookfield Road / Fitzgerald Road intersections, as well as an added left-in / left-out access to the proposed local roads halfway along Fitzgerald Road into the superlot area. In future stages, more access particularly from the north will be enabled (not part of the fast-track application).

The new intersections will allow for efficient and safe movements of traffic, public transport and active modes to and from the site, with the details of the intersections described further later in this report.

The proposed mid-block design of these roads is set out in Sections 4.4.2 to 4.4.7 of this report.

4.2 Active Mode Network

The site and the surrounding roads aim to achieve high standards of level of service and safety for active modes to enable safe and amenable walking, cycling and scootering to and around the fast-track area.

This is generally provided with footpaths and protected one-way cycle lanes on both sides of all collector roads. In combination with safe intersections and slow-speed-design local roads, these paths create a network that will be highly accessible and safe, encouraging travel by active modes and reducing the reliance on private vehicular travel. This will be especially crucial in enabling local trips via cycle and scooter modes for distances of up to several kilometres.

The provision of continuous, high-quality walking and cycling facilities on Fitzgerald Road and Waihoehoe Road, in particular, will overcome issues in ensuring active travel uptake often experienced in other historic development areas. In these areas, cycleways and footpaths were often inconsistent and intermittent, making these routes impractical and unattractive until other developments closed the gaps many years later. Ensuring connectivity from the start – in particular between the three fast track applicant areas[1], the train station / transport interchange and the old Drury town centre – is therefore a key objective.

The starting network of active mode facilities on the main roads will be supported by a north-south temporary shared path connection of approximately 1km between the fast-track area and the new Drury Centre train station / interchange planned near Flanagan Road / Waihoehoe Road (shown in red in Figure 4-2 and in Figure 4-3). This shared path will not initially follow a road, though it will approximately align with the future Creek Road alignment along the western edge of the future development area.

This shared path will enable added active mode connectivity to the main public transport node of Drury in advance of later development in subsequent stages of the Drury metropolitan centre, which will ultimately provide road connections with protected cycle lanes and footpaths (not part of this application).

The pedestrian and cycle connections through the site are shown in **Figure 4-2**.



Figure 4-2: Pedestrian and Cycle Connections

The key walking and cycling routes through and between the sites and the Drury Central train station are shown in **Figure 4-3**

[1] Drury Centre Precinct project, Waihoehoe Precinct project and Drury East Precinct project.

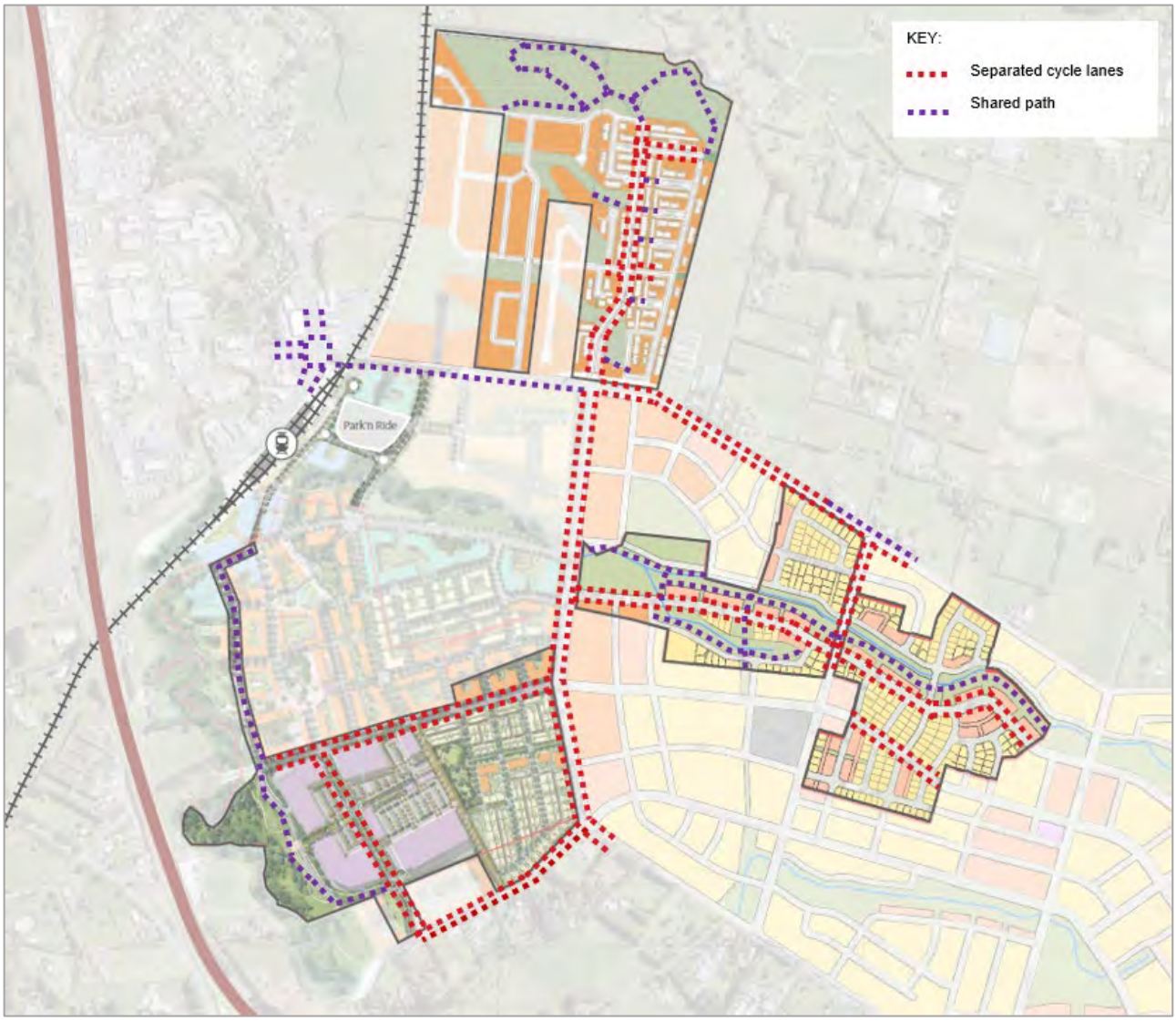


Figure 4-3: Key Walking and Cycling Routes

4.3 Public Transport Network

The future public transport network in the fast-track area has not yet been developed by authorities. This will be further discussed in relation to future network development activities by Auckland Transport. However, certain high-level assumptions can be made.

The core of the public transport network in the Drury plan change / fast track areas is expected to be the Drury Central train station and bus interchange just south of the current intersection of Flanagan Road and Waihoehoe Road. This will provide train service connections to Pukekohe, Papakura, Manukau and Auckland City Centre. With the train route to be electrified in the coming years (confirmed[2]) and with added tracks planned, this will ensure high-quality train services linking the fast-track areas to key surrounding towns as well as the heart of Auckland.

The transport interchange associated with the train station is also expected to be the focus (or, depending on route, at least a key stop) of all future local bus routes serving the fast-track areas and the wider Drury area. The interchange will enable passengers to switch between bus services or between train and bus services.

As the fast-track areas grow, these will also increasingly become destinations in their own right, in particular the new Drury Metropolitan Centre, and it will become increasingly important to provide public transport services connecting this

[2]Listed project Papakura to Pukekohe rail electrification granted by Expert Consenting Panel on 30 July 2021.

metropolitan centre with the train station, and the other Drury East fast track areas, to allow residents to access not just the train station / interchange but also the new metropolitan centre via bus and train.

To support public transport use, two key infrastructure strategies are being pursued in the fast-track area:

- Provision of a network of high-quality active mode facilities that link the fast-track areas with the train station / interchange (See Section 4.2). Together with appropriate intersection facilities this fine-grained network will allow residents, employees and visitors of the fast-track areas to efficiently access the train station by walking, cycling or scootering, ensuring that locals are less reliant on private cars supporting public transport use.
  - Examples include the interim shared path between the Kiwi Property fast track area and the train station (to eventually be replaced by a road with separated cycle and walking facilities as subsequent stages of the metropolitan centre development progresses), the interim shared path on Waihoehoe Road West, as well as the permanent dedicated separated walk and cycle facilities on Opaheke Road, Waihoehoe Road East, Pitt Road, Main Street, Fielding Road and Fitzgerald Road.
- Provision of localised bus priority facilities, to allow bus services to bypass intersection delays at key locations. These provisions range from those proposed to be included as part of the fast track project(s) to those expected to be added later, but (where suitable) future-proofed as part of the fast-track project(s):
  - Examples of facilities proposed to be provided from the start are the westbound bus lane on Waihoehoe Road West approaching the train station / interchange from the east, and the provision of a second left-turn lane from Fitzgerald Road into Pitt Road for buses serving the future metropolitan centre and the train station.
  - Examples of facilities future-proofed include the future bus lanes on Opaheke Road and on the approach to Opaheke Road / Fitzgerald Road via wide grass berms (for later FTN route provision), and the added lane provided on Pitt Road to provide a bus lane (See Section 4.4.4) either westbound or eastbound as appropriate for future services in the centre of the future Drury Metropolitan Centre.

Overall, while public transport routing and provision levels are thus not yet known, it is considered that the fast-track areas are well set up to encourage public transport use.

4.4 Road Cross-Sections

4.4.1 Waihoehoe Road (West)

4.4.1.1 General Mid-Block (20m Interim, 30m Long-Term)

Waihoehoe Road is located to the north of the site and provides access to the site from the wider road network. It is proposed to upgrade the section of Waihoehoe Road between Great South Road to the west of the development and the intersection with Ōpaheke Road / Fitzgerald Road to incorporate walking and cycling facilities. This will be undertaken within the existing road reserve boundaries, consisting of a 20m wide corridor with some localised widening at intersections.

The NoR[3] for Waihoehoe Road West (adjacent to the site) to upgrade the road in the long term to a four lane FTN arterial with active transport facilities was confirmed by Auckland Transport on 23 June 2022[4]. Discussions with Auckland Transport have focused on the ability of the interim design to provide for the necessary capacity, safety and general transport needs (including for active modes), while fitting into the existing (pre NoR-land take) corridor, and also minimising, where possible, the future reconstruction needed when the road is four-laned to FTN arterial form (by SGA).

Further constraints and requirements identified include:

- Significant width required in the corridor to be allocated for stormwater treatment;
- An existing water main under the road which cannot realistically be moved, and which limits the areas where “deep” features such stormwater treatment (rain gardens and swales) can be provided; and
- To ensure public transport reliability along Waihoehoe Road, a westbound bus lane will be provided in the interim layout.

[3] NoR D2 – Jesmond to Waihoehoe West Frequent Transit Network (FTN) Upgrade

[4] Two appeals have been lodged in relation to discrete aspects of the Decision. They seek specified alterations to the conditions of the designation, if it is to be upheld.

These constraints led to a design which limited the ability to provide separated active mode facilities within the interim 20m corridor layout. In particular, separated cycle lanes and footpaths on both sides of the road are not able to be provided in the proposed interim cross-section, unlike the vast majority of the fast track arterial / collector road designs proposed elsewhere.

Walking and cycling will therefore be accommodated in the interim via a proposed 3.5m shared path on the southern side of the road. A 3.5m wide westbound bus lane (including 0.3m channel allowance), a 3.1m wide general traffic westbound lane, and a 3.4m wide general traffic eastbound lane (including 0.3m channel allowance) are also provided. Through the RFI process of the previous Fast Track application and subsequent discussions with Auckland Transport through the plan change appeal mediation process, the resulting agreed design is provided in **Figure 4-4** below.

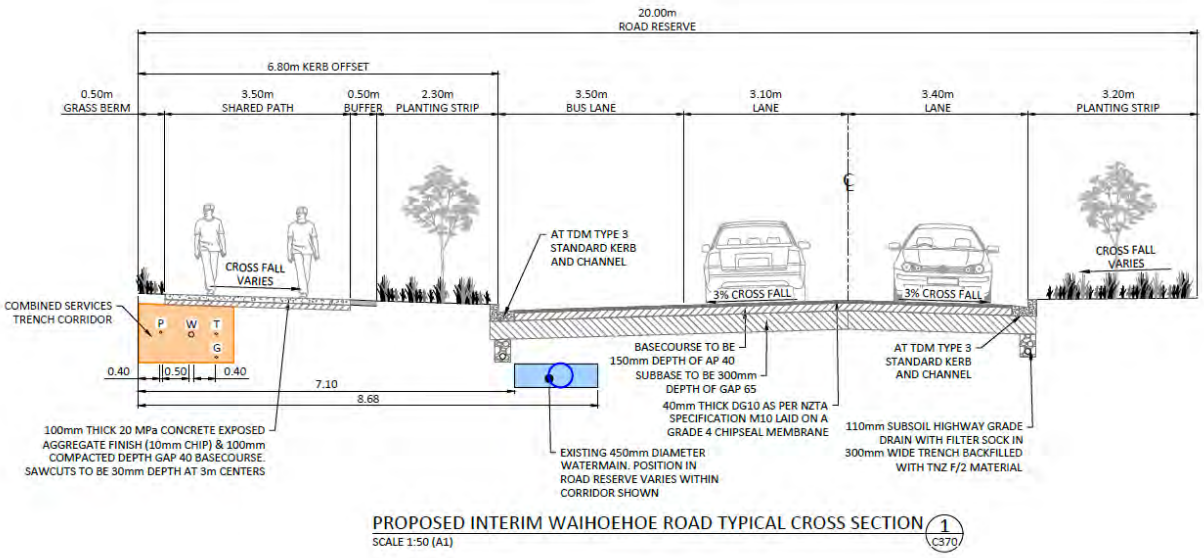


Figure 4-4: Waihoehoe Road – Interim Cross-Section

Auckland Transport initially had reservations about the lack of active mode facilities on both sides of the road. However, with changes to the wording of the Precinct Provisions to ensure that unbroken active mode connections between the train station access and any development occurring along Waihoehoe Road would be provided, those concerns were resolved.

Auckland Transport – and Auckland Council's Traffic Engineer / peer reviewer for the initial Fast Track application – also had initial concerns over the disruption that may be caused to traffic generated by the three Drury East Fast Track developments during the future reconstruction of this section of Waihoehoe Road once the long-term (NOR enabled) design is constructed.

It is acknowledged that upgrading an existing road corridor and bridge whilst retaining current use is an aspect that requires consideration. However, this is best dealt with at EPA stage, when construction methodologies are known. There are many excellent examples of construction methodologies that have overcome such constraints on busier corridors. One example is the Eastern Busway between Panmure and Pakuranga. As with Waihoehoe Road, the Pakuranga Road corridor and new bridge were both constructed alongside the existing corridor, then a series of contra-flow traffic management systems minimised traffic disruption as the old and new sections were completed.

This issue was also taken into consideration during the development of the interim cross section design. The interim layout of the southern kerb and bus lane are located in the same location as in the long-term NoR design (6.8m off-set from the southern boundary), to prevent demolition and reconstruction of the southern side of the road once the final NOR design is implemented. This will also reduce disruption caused by the reconstruction of this section of Waihoehoe Road.

The long-term cross-section for Waihoehoe Road as per the NoR is shown in **Figure 4-5** below.

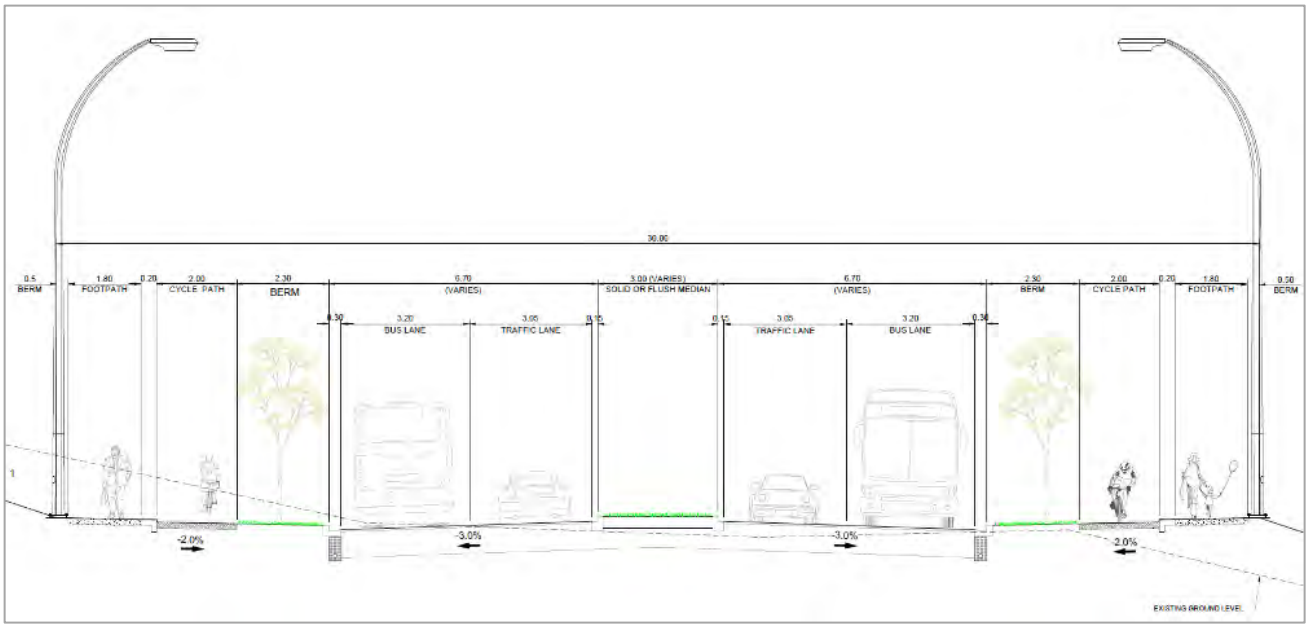


Figure 4-5: Waihoehoe Road NoR Cross-Section (identical to the NoR cross-section for Opaheke Road)

4.4.1.2 Waihoehoe Road West – GSR to Rail Overbridge (Varies)

Between the Great South Road intersection and the rail overbridge, the road cross-section is essentially an extension of the intersection design at the Great South Road roundabout, described further in Section 6.9 of this report.

In terms of active mode provision, the proposal is to remove the narrow, inconsistent footpath on the northern side of the road and install a 3m wide, continuous shared path on the southern side of the road, up to and across the rail bridge. This will be included as part of the upgrades to the roundabout and the general Waihoehoe Road West upgrades proposed as part of this application.

The long-term cross-section in this section will be defined by the future long-term signal design at the intersection of Great South Road / Waihoehoe Road and rail overbridge replacement design (not part of this application). It is expected that the long-term design will provide footpaths and protected cycle lanes on both sides, as well as added lanes for bus priority and intersection queue storage.

4.4.1.3 Waihoehoe Road West – Rail Overbridge

Overview / Existing Layout

The interim rail overbridge design to the west of the site has been the subject of significant conversation with Auckland Transport, both prior to the initial submission, through the RFI process of that application, then in Environment Court appeal mediation. The layout presented in this section (below) is considered the best practicable option within the space available and was accepted by Auckland Transport through the plan change appeal mediation process. The overbridge currently provides one traffic lane in each direction, plus shoulders, and a narrow footpath on the northern side of the road only. The approximate width between railings is estimated to be 10.5m, although a width of 10.4m has been conservatively assumed for design purposes. The current layout provides acceptable conditions for motor vehicles, but very low convenience and safety for people travelling by bicycle or on foot.

Proposed Interim Layout

In the interim, it is proposed to provide improved walking and cycling connections across the bridge by providing a 2.6m wide shared path on the southern side of the bridge (with an additional 0.4m handrail). To accommodate the shared path, the traffic lanes will be narrowed to 3m, with 0.6m channel allowance for the lane directly adjacent to the shared path, and a 1.1m shoulder allowance on the northern side (eastbound). The additional shoulder allowance acknowledges a greater need for physical separation of the westbound lane from the adjacent crash barrier / railing, and also provides an effective 4.1m wide lane for on-road cyclists to be more safely overtaken.

It is noted that the eastbound (northern-side buffer) is located where the narrow northern bridge footpath currently exists. This footpath will need to be removed and sealed at carriageway level as appropriate for vehicle traffic. Should later structural investigations identify that the removal of the footpath and use of this space as a traffic lane shoulder is not

feasible, the northern footpath would likely be retained. This would then require the shared path to be reduced further across the bridge (a length of approximately 35m) to also allow acceptable lane widths across the bridge to be retained.

It is also noted that vehicle tracking constraints in and out of the nearby Flanagan Road intersection to the east will require a short section of the shared path (less than 5m long) at the eastern end of the bridge to be reduced to a minimum of 2.5m.

The proposed interim cross-section across the overbridge is shown in **Figure 4-6**.

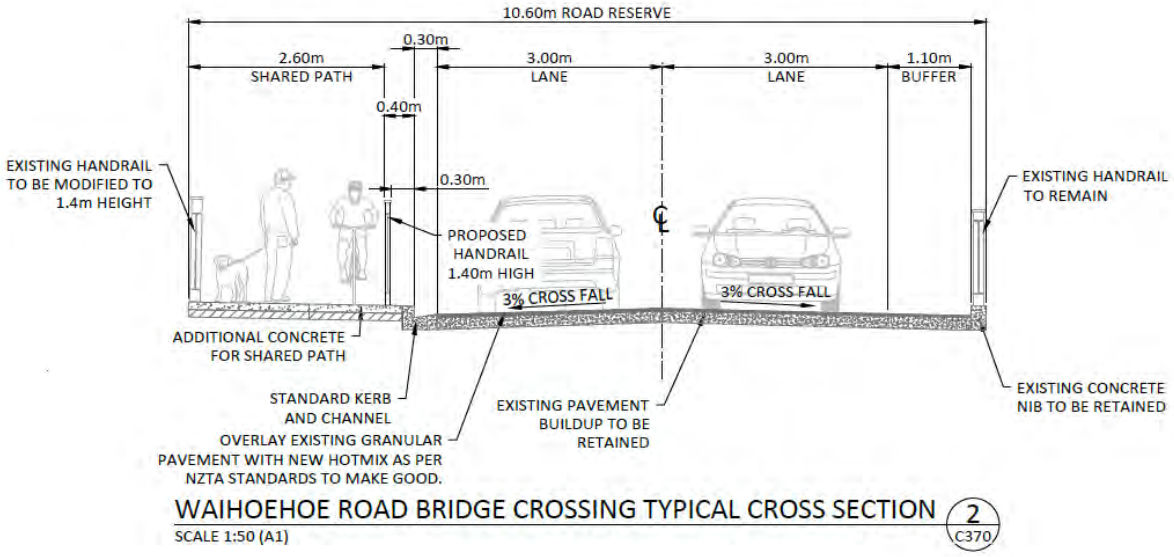


Figure 4-6: Waihoehoe Road – Rail Overbridge Cross-Section (looking west)

Traffic modelling has identified that added lanes are not required for the levels of development proposed in the applications by Kiwi Property, Oyster Capital and FHLDL. Changes proposed to the overbridge proposed as part of the application therefore are limited to improving active mode safety and connectivity as discussed above.

In the long-term, it is expected that the overbridge will be rebuilt to allow the triple / quadruple tracking of the rail line and to allow the long-term layout of the Great South Road/ Waihoehoe Road intersection (all not part of this application). At that time, bus priority lanes and some queue storage lanes are expected to be provided on the overbridge, as well as footpaths and protected cycle lanes on both sides. As this layout is highly dependent on future adjacent intersection design related to Great South Road, the final designs of the rail line bridges, and the layout of the nearby transport interchange planned by SGA, no likely long-term cross-section is provided.

Likely timing of permanent bridge replacement

In the short-medium term, this overbridge requires a substantial rebuild, regardless of the Drury East Plan Changes or Fast Track applications. The main reasons for this are:

- To allow the triple / quadruple-tracking of the North Island Main Trunk (NIMT) rail line.
- To allow the additional traffic lanes as per the intended long term 30m wide Notice of Requirement arterial road layout and nearby intersection layout at Great South Road (to cater for flows beyond those of the current fast-track application area volumes).
- To provide significantly improved walk and cycle facilities of a standard as per the intended long term 30m wide Notice of Requirement arterial road layout on Waihoehoe Road.

It is acknowledged that the timing for the new rail overbridge is not yet confirmed, albeit it is understood as possible that an announcement on this may be made soon by authorities – potentially aimed at constructing the new bridge as part of the nearby Drury Central train station works by early 2025.

Related to this, it is considered relevant that Waka Kotahi has, in February 2022, begun early works on replacing the three motorway rail overbridges over the NIMT, which includes moving the motorway alignment to the east, and providing for a

future quadruple tracking. While these works, due to their extents, are expected to take until 2026/2027, they clearly show that quadruple tracking enabling works are already occurring – only 800m away.

Also related to this is the fact that the electrification of the rail line to Pukekohe (also currently underway) is planned to be complete by the second half of 2024. Until then, the commuter functions of the NIMT to Pukekohe are undertaken by rail replacement buses. The lack of commuter trains, and the fact that any new lines are not yet electrified, mean it would be much easier to construct the new bridge in the short term. In summary, while no timeframes can yet confirmed for the permanent overbridge replacement, it is likely that any interim layout as part of the fast-track application may quickly be superseded by the permanent layout.

Other Interim options considered but Rejected

In reviewing potential interim options for improving walking and cycling safety on the existing overbridge, the alternative options were considered as part of the decision process to select the proposed interim upgrade presented in the fast-track application. However, the alternative options were discounted because they were considered impracticable for various reasons compared to the proposed.

Conclusion

Given the likely timing of the permanent bridge replacement and the difficulty in implementing any other option, it is concluded that the proposed reallocation of space on the rail bridge as described in this proposal is the only practicable solution, which provides a good outcome for active modes and vehicular traffic. With some minor additions to precinct provisions wording, this is generally agreed with Auckland Transport during Environment Court appeal mediation.

4.4.2 Fitzgerald Road (Varies, 20-21.5m)

Fitzgerald Road will serve as a collector road, and the only vehicular route to and from the surrounding road network during the initial fast track stage. As part of this fast-track stage the road will be upgraded from just south of the Brookfield Road intersection up to Waihoehoe Road.

It is proposed to have one traffic lane in each direction, with a design intent to provide suitable widths (including channel allowance) for high traffic volumes and heavy vehicle access (including bus movements) while limiting excessive speed in an edge-of-town-centre area. Footpaths and protected cycle lanes will be provided on both sides of the road. Occasional recessed parking may be provided where beneficial along the road, with compliant cycle door buffer zones.

As part of the fast-track works, there are two general mid-block arrangements for Fitzgerald Road proposed. One arrangement will be applicable where the fast-track applicants have frontage on one side of the road. For this scenario, the applicants will undertake widening of 1.5m into their sites along their development frontages to anticipate the future full cross-section. This equates to half of the widening required to upgrade the overall cross section from 20m existing to 23m long term corridor width.

The other mid-block arrangement will be proposed where there is no fast-track applicant frontage at all (i.e. especially in the northern section of Fitzgerald Road closest to Waihoehoe Road). Here, the upgrade is required to occur within the existing 20m wide road corridor.

In either case, all elements are to be designed and constructed to limit any future roading re-work that may be needed when development (and thus widening) occurs in frontage areas not covered by this fast-track application.

There are no sections along Fitzgerald Road where the fast-track applicants have frontage on both sides. Therefore, no sections will be widened to the full 23m long-term width as part of this fast-track application; however, the below cross-sections enable this to be easily achieved later, without need for significant reconstruction within the road reserve.

Crucially, this approach also enables walking and cycle facilities to be constructed as continuous routes providing good connectivity to and from the wider network from the start, rather than fractious routes limited to development frontage sections only.

4.4.2.1 Fitzgerald Road Cross-Section, Single-Side Development Frontage – Hybrid (21.5m)

Figure 4-7 below shows the cross-section scenario where the applicant has site frontage. This scenario results in a 21.5m wide corridor, with the existing 20m corridor widened 1.5m into the applicant site.

Fitzgerald Road can be classified as a 21.5m Collector Road – with active modes and will be able to accommodate busses as requested by AT. Bus movements are to be facilitated by the 3.5 wide lanes as stated in the Auckland Transport Design Manual (**ATDM)**.

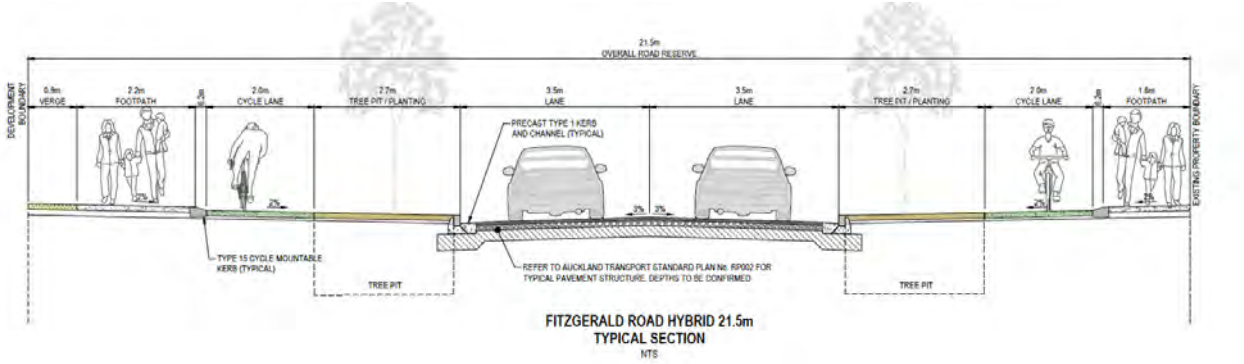


Figure 4-7: Cross Section with One-Sided Fast track Development Frontage on Fitzgerald Road, looking north

As can be seen in the above figure, the cross-section is slightly asymmetrical to ensure that the centre line between the vehicle lanes is located in the same place as the long-term centre of the road (i.e. centred in the 20m and 23m stages, but slightly off-centre during the 21.5m stage). This anticipates widening to occur in later development on the oppose frontage owned by third parties (right hand side in the cross-sections).

Along the site frontage of the applicant side, the additional 1.5m corridor width contributes to a generous 2.4m wide footpath (including Copenhagen kerb) with a 0.9m grassed back berm. This design reflects the fact that Fitzgerald Road will be a primary road at the edge of a busy town centre/medium density housing area.

With the initial Fast Track application, AT noted that the 0.9m back berm represented a TDM shortfall from the required 1.0m. That shortfall is acknowledged but given that this back berm is to provide for services, it is considered practical and adequate from a civil engineering perspective. This is supported in several designs recently produced by AT that show a 0.5m back berm.

4.4.2.2 Fitzgerald Road Cross-Section, No Development Frontage – Interim (20m)

In the section of Fitzgerald Road that does not front the development site and where the road is limited to the existing 20m corridor, footpaths will be narrower and no formal back berms are provided initially. However, all other cross-section elements proposed remain identical and in the same location as the elements described above.

This ensures that the only change at future long term development stages in these sections will be providing footpath widening and addition of back berms for development-related features such as services points. This is shown in **Figure 4-8** below:

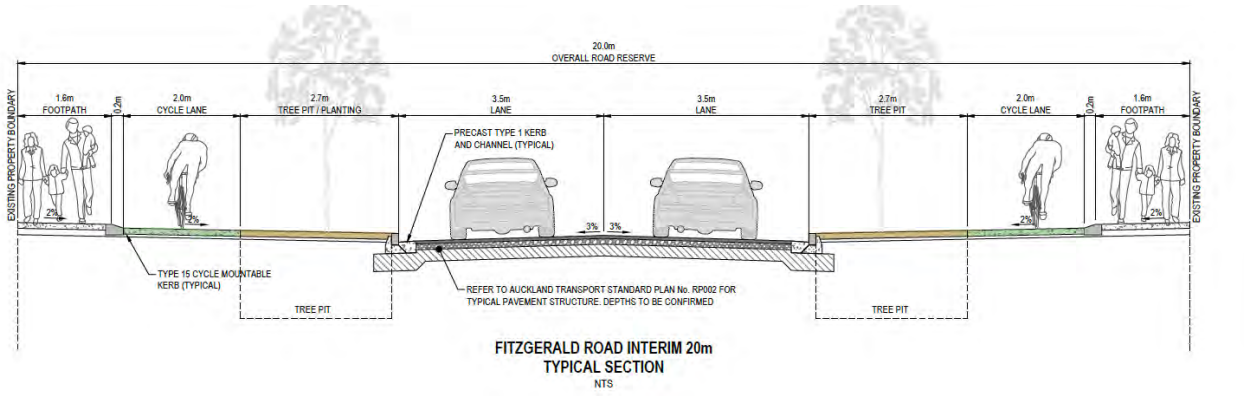


Figure 4-8: Cross Section without Fast Track Development Frontage on Fitzgerald Road, looking north

It is noted that there may be localised sections within the non-widened, third party-adjacent corridor where topography (level differences to adjacent properties) makes the above cross-section unfeasible without significant works within the third-party property areas.

In these sections, no parking will be provided, and the separation between carriageway and cycle lane will reduce as needed. This may be achieved by simply removing the door zone buffer which will be unnecessary without adjacent parking. However, in some locations it may also be required to reduce the separation between the cycle lane and the carriageway edge to a minimum of 1.2m, thus providing some 1.7m extra width to transition into adjacent property levels each side.

While this will reduce the separation between vehicle and cycle traffic, 1.2m is permitted in Auckland Transport's design guidance for retrofit situations (such as this construction of a new-standard road in an existing narrower corridor) and still provides a very high level of safety and amenity compared to historic unprotected cycle lanes.

In the initial Fast Track application, AT noted concerns at the absence of back berms in this cross section. It was established at that time that AT misunderstood that there will only be no back berm where no development frontage occurs. The concern was related to pedestrian safety at development driveways, which was clarified would not occur. Once a development frontage (and driveway) occurs, that frontage would provide a back berm as described in the section above, hence the pedestrian conflict issue would not occur. This issue was therefore resolved in the previous application.

4.4.2.3 Unsealed active mode connection on Fitzgerald Road between Brookfield Road and Drury Hills Road

In the Plan Change 48 ITA and the initial Fast Track ITA submission, it was not proposed to provide upgrades on Fitzgerald Road between Drury East and Drury South. This was considered unnecessary for several reasons:

- The proposed development, and the overall Plan Change 48 upgrades, focus almost all journeys towards the Drury Central train station, the metropolitan centre (to continue north linking to the train station), the other Drury East Plan Change[5] areas and associated Fast Track development proposals, and the external street network via Waihoehoe Road. The traffic modelling established that the vast majority of the demand will be to those destinations, and only a relatively small number of trips (by all modes) will be made to the south;
- There is an existing shared pathway provided along Waihoehoe Road and Drury Hills Road that provides an active mode connection between Drury East and Drury South. Although it may necessitate journey diversions, it does represent an active mode connection should some users prefer to use that route;
- It is considered that connecting this project, and the wider Drury East Plan Changes (48, 49 and 50), to the closest development area in Drury South is unnecessary and beyond the scope of mitigation required for the fast track development;
- It is anticipated that as part of Plan Change 49, further active mode upgrades on Fitzgerald Road to the south of Brookfield Road will be provided as part of subsequent resource consent stages. That Plan Change's precinct provisions ensure that any development fronting any of the collector roads needs to provide active mode upgrades towards the train station and Waihoehoe Road. So as ongoing resource consent or Fast Track applications are submitted that front Fitzgerald Road, the upgrades will move further south; and
- It is anticipated that as Drury East continues to urbanise as anticipated and planned for within the Council's Drury-Opaheke Structure Plan with future subsequent plan change applications to rezone the remaining Future Urban zoned land between Drury East and Drury South that will appropriately address active mode connections between the two destinations.

As such, it was established that providing additional active mode connections on Fitzgerald Road to the south of the proposed development are unjustified and unwarranted for the mitigation of any adverse effects arising from this project.

However, through the RFI and plan change appeal mediation processes a new assessment criteria was added to the Plan change 48 and 49 precinct provisions. This is described in Assessment Criteria IX.8.2 (1) (n) of the Precinct Provisions as follows: *"Whether a temporary unsealed active modes connection, within the existing road reserve, has been provided to Drury South Precinct along Fitzgerald Road to Quarry Road (except for sections where impracticable due to constraints)."*

The design of this bridleway is provided within the Aurecon Civil Engineering plan set for this application. The design provides at least some form of bridleway along the majority of Fitzgerald Road between Brookfield Road and Drury Hills Road. There are two short missing sections between Brookfield Road and Drury Hills Road that were considered unfeasible due to topographical challenges. The further extension within Drury South between Drury Hills Road and Quarry Road was not feasible due to considerable topographical challenges. In any missing sections, active modes will have to share the road with vehicular traffic, as normal in rural environments. Despite these short sections without improvements, it is considered that the bridleway provides an adequate connection for active modes between Drury East and Drury South, and despite being sub-standard in some sections, still represents a significant improvement on existing conditions. Importantly, the facility satisfies the intention of the quoted assessment criteria.

[5] Private Plan Changes 49 and 50.

4.4.3 Brookfield Road (20m & 21.5m)

Brookfield Road is a future collector road in the south of the fast-track area, which provides access to the retail area in particular. As most parts of this road frontage are not currently owned or controlled by Kiwi Property, the proposed treatment is an interim solution until any future development undertaken by others takes place.

The road corridor has 3.5m wide lanes to accommodate bus movements and is to be provided with a footpath on the north side and protected one-way cycle lanes on both sides of the road. It is not proposed to provide a footpath on the southern side of the road as there are only existing low-density dwellings provided in this area and no development is known to be planned. The westbound cycle lane is proposed to be a wide shoulder separated from traffic by a physical separator. This, and the wide grass berm on the southern side of the road, retains flexibility for future upgrades and third-party development.

A 20.0m interim version and the corresponding 21.5m hybrid version are provided below. On the northern side, compliant long-term walk and cycleways are provided, reflecting the development of medium-density residential in the eastern half of this road as part of this application. The 20m typical section shows the layout where there is no development frontage on either side of the road. The 21.5m section adds a 1.5m verge to the northern side along the development frontage. It should be noted that as the position of the existing carriageway of Brookfield Road varies within the road reserve, berms on both sides have varying widths.

This is shown in **Figure 4-9** below:

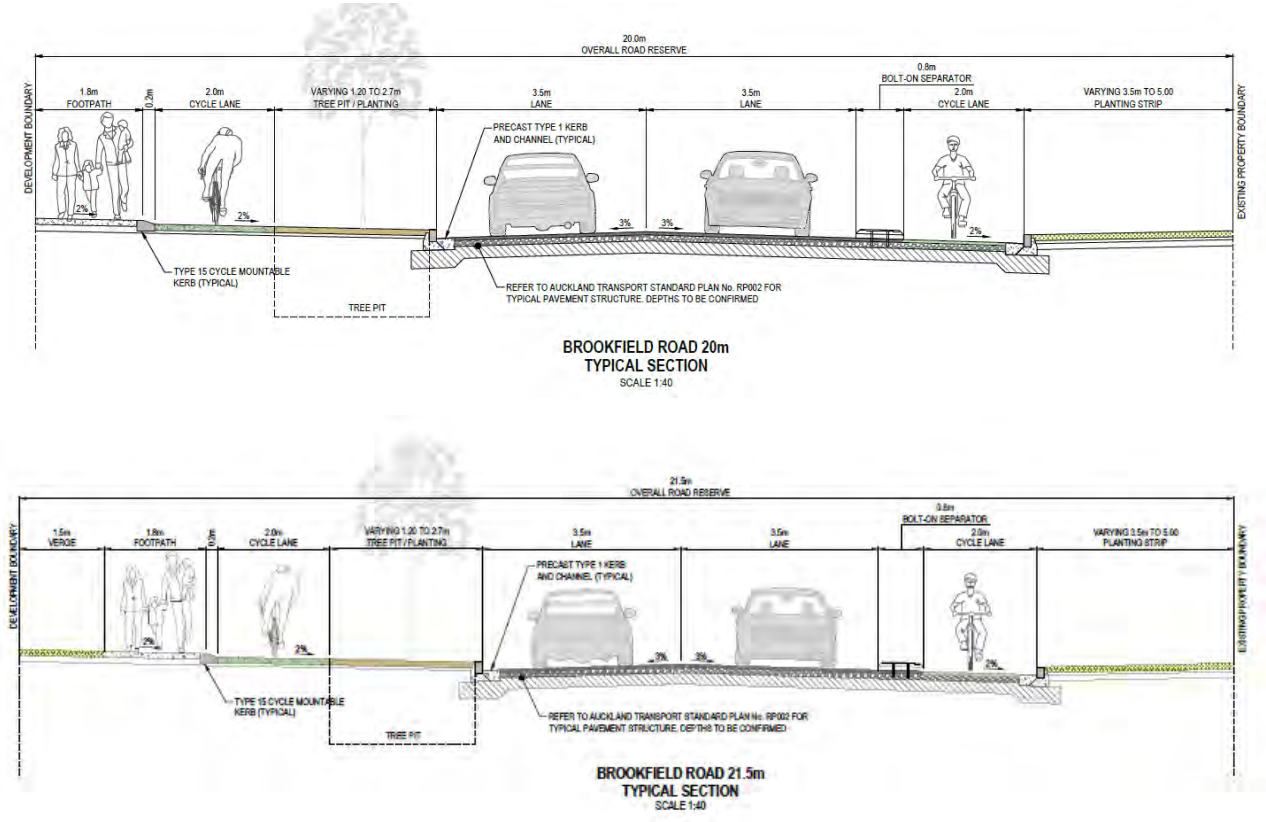


Figure 4-9: Cross Sections of Brookfield Road East of Main Street (South), looking east

4.4.4 Pitt Road (East) (27M)

This collector road forms the primary short and long-term west-east route through the fast-track application area. It provides four lanes in the mid-block, with added lanes largely for public transport priority and turn lane arrangements as discussed below. Footpaths and protected cycle lanes are provided on both sides of the road.

Pitt Road is characterised by having a high number of side roads, including local roads such as those accessing the residential area in the eastern part of the site, as well as various collector roads or roads that will otherwise be very busy in the long term. Examples include Creek Road (South) in the west, Main Road (South) in the western centre, and future retail access streets.

Although not part of this application, there will be future connections on the north side of Pitt Road via Creek Road (North), Main Road and Drury Boulevard as well as local roads as part of the overall Drury Masterplan that has guided the layout of this project. In the long term, Pitt Road may also be continued westwards over SH1.

The resulting closely spaced, high-volume intersections mean that there will be a high demand for turn lanes, particularly for right turns. Additionally, it is expected that the future bus services connecting through the centre will travel along Pitt Road as a key part of their route. This implies a need for localised bus priority, especially on approaches to busy intersections, to assist with service reliability.

Therefore, while there are sections of Pitt Road where one lane in each direction might be feasible, these will be very short. For these reasons, the standard mid-block to be constructed as part of the initial fast track works is proposed to provide four lanes, with two lanes in each direction. Individual turn lane / bus priority arrangements have been accounted for by the 3.5 wide dual turn lanes. The dual turn lanes suggest that one of the lanes is to be a dedicated bus left-turn lane to provide a level of bus priority for northbound Fitzgerald Road services turning west into Pitt Road.

With the initial Fast Track application, AT noted that the 0.9m back berm represented a TDM shortfall from the required 1.0m. That shortfall is acknowledged but given that this back berm is to provide for services, it is considered practical and adequate from a civil engineering perspective. This is supported in several designs recently produced by AT that show a 0.5m back berm.

The cross section of Pitt Road is shown in **Figure 4-10**.

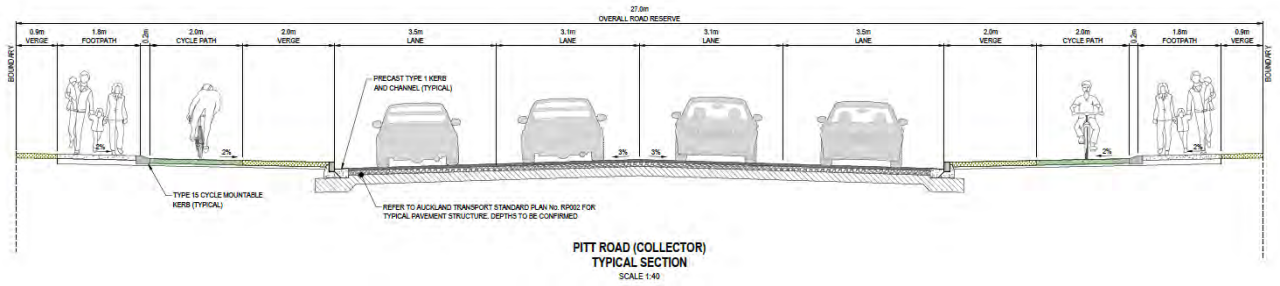


Figure 4-10: Cross Section of Pitt Road

4.4.5 Main Street (South) (24m)

As noted earlier, Main Street (South) is proposed as a collector road connecting north-south through the centre of the western, retail-focused, half of the fast-track application area. It will largely be a private road, with only the section between Creek Road and Brookfield Road proposed to be vested. The carriageway is proposed to consist of one lane in each direction.

Despite its key vehicular function being to provide access to the parking areas proposed in the centre of the retail area, Main Street (South) will also provide high-quality walking facilities that will mainly serve local trips within the retail area, between shops or between car parks and shops. The road will also provide high-quality cycle facilities in the form of protected cycle lanes for both through access, and access to the retail area from the surrounding residential areas in the fast-track applications.

The cross section for Main Street (South) is shown in **Figure 4-11**.

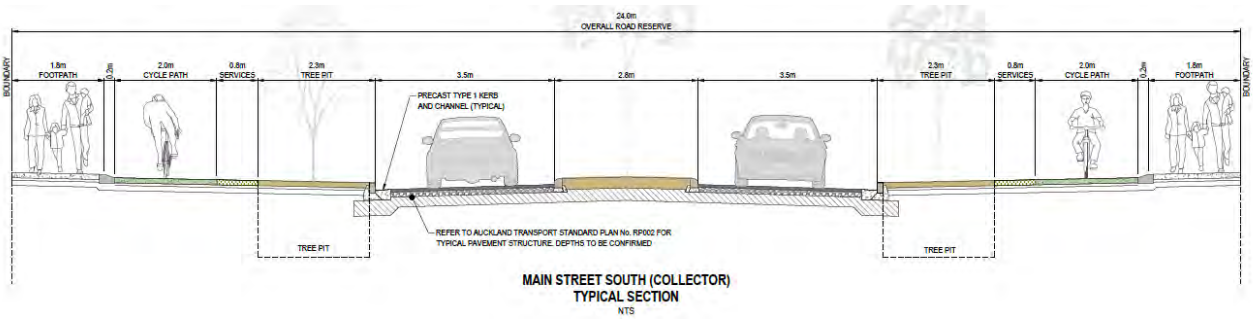


Figure 4-11: Cross Section of Main Street

4.4.6 Creek Road South (20m)

This collector road in the fast-track application primarily provides a “back of house” access route to the retail servicing areas to the west of the retail area. While formally deemed a collector road, it is somewhat narrower in this initial interim arrangement where it serves more the function of a local road (industrial / commercial). As such, it for example does not provide protected cycle facilities. The shared path discussed below is only provided as a creek reserve edge path, and continuation of the interim (see Section 4.2) – the primary dedicated cycle facilities north south through the town centre are formed along Main Street instead.

The initial layout proposed as part of the fast-track application provides one lane in each direction, with lanes the same width as the other collector roads in the area, a footpath on the eastern side, and a shared path on the western side (continuation of the interim shared path connecting to the train station in the north).

With the initial Fast Track application, AT noted that the previous 0.9m back berm represented a TDM shortfall from the required 1.0m. In this case, the back berm was able to be widened to 1.0m.

The cross section of Creek Road is shown in **Figure 4-12**.

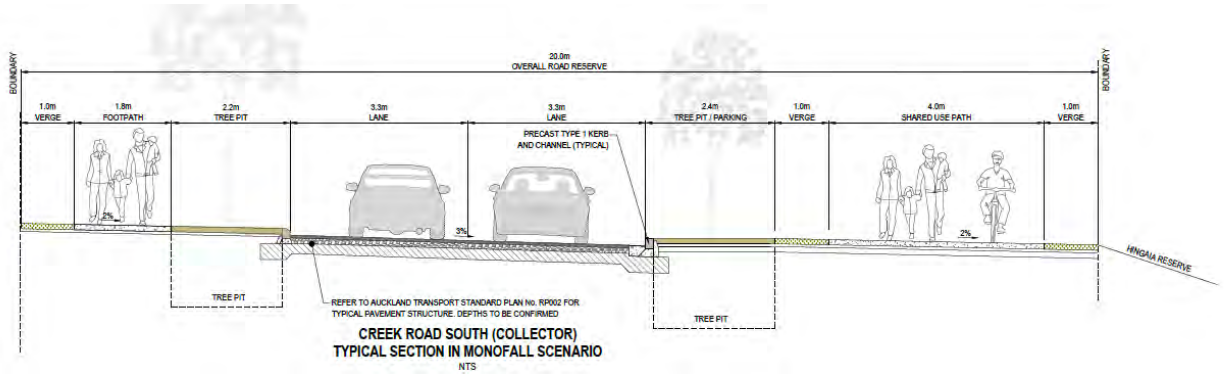


Figure 4-12: Cross Section of Creek Road, looking south

In the longer term (not part of this application) Creek Road will also be extended northwards and upgraded to provide a “bypass” function for traffic exiting the motorway southbound at the future Drury Interchange ramp leading into the town centre, but not entering the town centre. It will then allow traffic to Fitzgerald Road South or the wider Drury South area to bypass the town centre and the retail area via Creek Road and Brookfield Road, without adding through traffic to Pitt Road and Main Street.

4.4.7 Local Roads (16.0m,18.60m and 20m)

Local roads within the fast-track application area are mainly concentrated within the eastern part of the development, to provide access and circulation within these areas. They are designed as narrow, slow-speed roads with road humps at regular intervals and provide footpaths on both sides. Cycling will occur on-road, supported by the low-speed design and generally low-volume (no through roads) layout.

With the initial Fast Track application, AT noted that the previous 0.9m back berm on each of the local road cross sections represented a TDM shortfall from the required 1.0m. For these local roads, the back berms were able to be widened to 1.0m.

The cross section of a typical local road is shown in Figure 4-13.

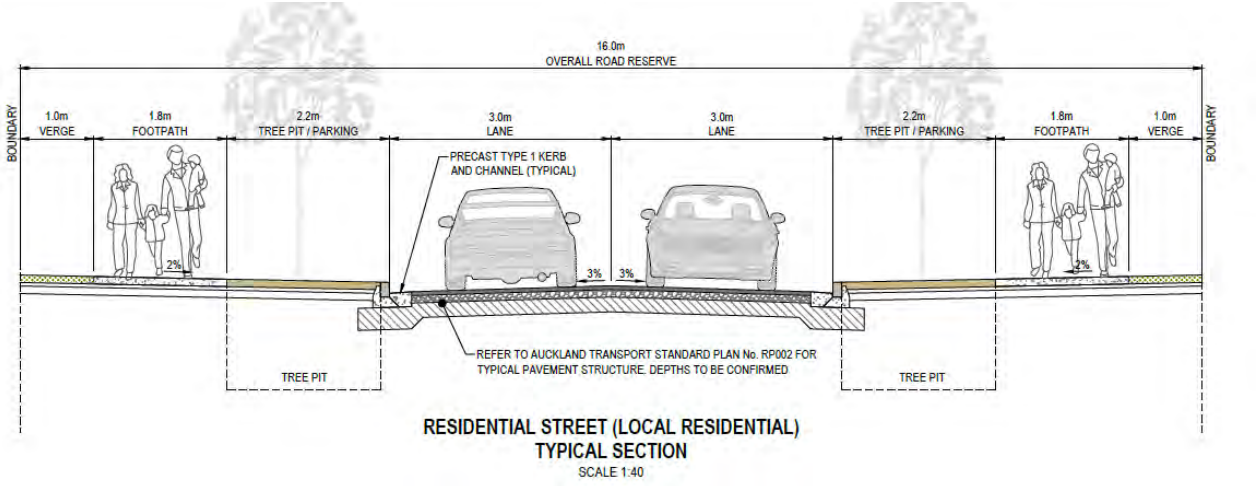


Figure 4-13: Cross Section of typical local road

One exception to the above cross-section will be the west-east local road (Road 09 / "Green Street") travelling through the residential area from Fitzgerald Road westwards. This is intended to have a central landscape island splitting apart the opposing directions, and therefore is slightly wider, but otherwise has the same functions and features.

The cross section of a "Green Street" is shown in Figure 4-14.

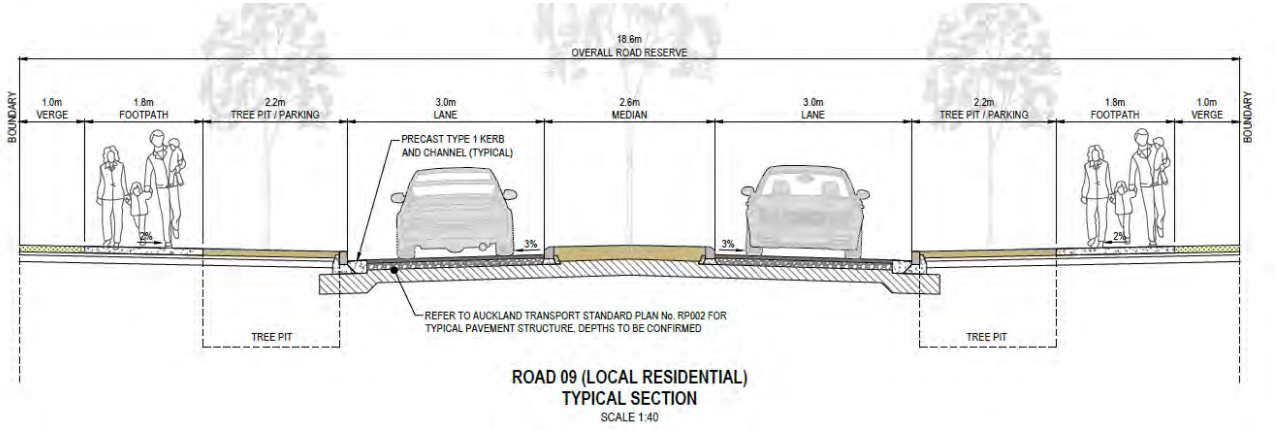


Figure 4-14: Cross Section "Green Street" (Road 09)

Some variant local roads will also be provided within the retail area. However, these will be private roads - and will functionally be more akin to car park access aisles (though often with generous footpath provision). Therefore, these roads are not discussed as separate cross-sections here.

The only other local road cross-section type proposed to be publicly vested is the "local business" local road (Road 25) proposed between the retail area and the superlot area running north south. While proposed to also have two narrow lanes as per the other local roads to restrict volumes and speeds, it will be expected to carry slightly higher traffic flows (providing some secondary routes in and out of the retail car parking areas) as well as providing added landscaping buffers to help transition the environment between the retail and residential areas.

The cross section of a "Local Business" Road is shown in **Figure 4-15**.

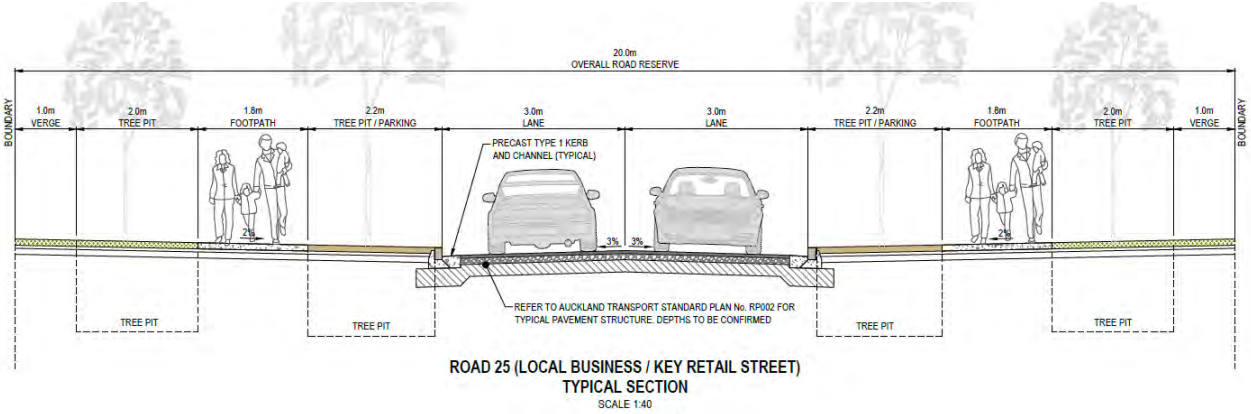


Figure 4-15: Cross Section "Local Business" (Road 25)

4.4.8 Shared Path Connection Between Fast Track Development and Drury Central Rail Station

Once the full Plan Change 48 masterplan is realised, there will be seamless active mode connections between all activities and public transport opportunities. However, due to the separation of this Fast Track development to the site of the Drury Central Rail Station, it is proposed to provide an interim shared path to connect the two. The location of the path is shown in Figure 4-3 above, and the cross section of this shared path is provided in **Figure 4-16** below.

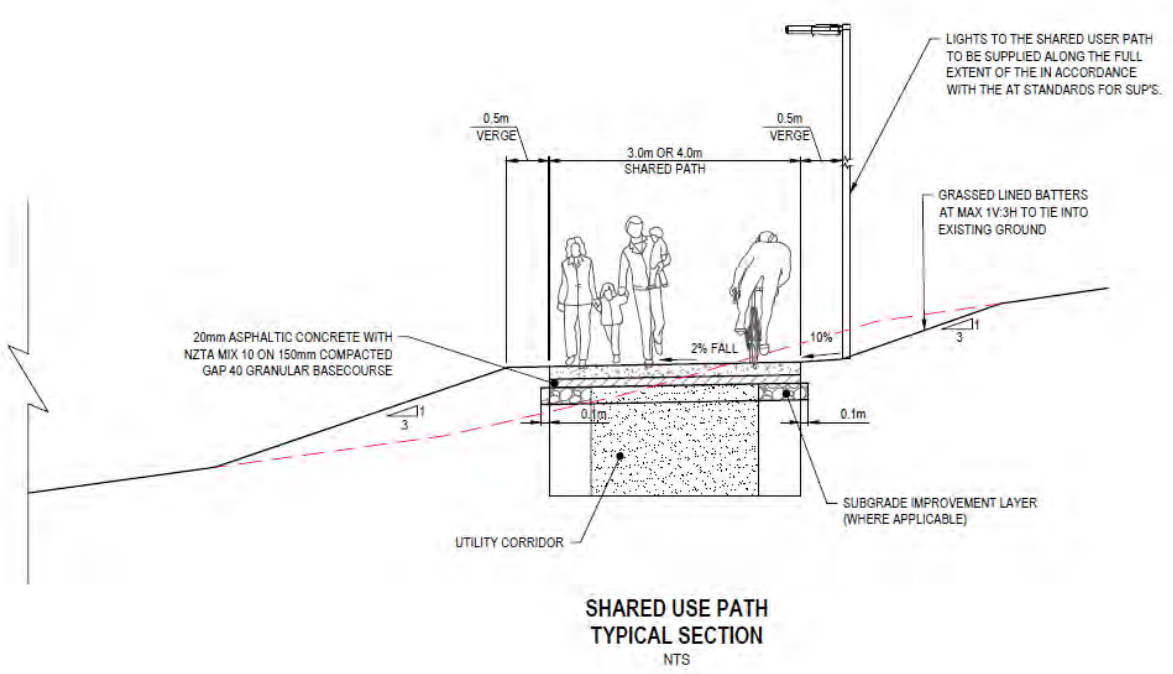


Figure 4-16: Cross Section of Shared Used Path

In the initial Fast Track Application, AT had reservations over the width of the shared path as 3m does not comply with the AT Transport Design Manual.

The TDM identifies 3m as the "minimum" in Table 8, Section 4.4 of the Cycling Infrastructure part of the Engineering Design Code. The 4m referenced is the "preferred", not the required width. The proposed shared path is an interim facility, which is located largely within the future Creek Road corridor. This road (and several other road connections north from Stage 1 towards the train station) will be built with dedicated protected cycle lanes as part of later stages. Additionally, Stage 1 will put reduced user demand on this path compared to the full town centre buildout. As such, a 3m wide path is considered acceptable for a facility that will be progressively removed with future development stages.

It is noted that the shared path will be well lit, and a CPTED assessment has been undertaken, and is included within the application documentation.

AT also noted concerns over the integration of the path with the Drury Central Rail Station. The proposed path now addresses this concern, and the full design is provided in the Aurecon plan set.

4.5 Vehicle Crossings

Vehicle crossings and associated tracking at this stage of design are indicative only. While the proposed locations are fixed, width and design (including internal gradients etc.) are not yet fully resolved. This will occur in a subsequent detailed design stage.

Vehicle crossings will comply with the relevant rules of E27 of the AUP, such as gradients, widths, minimum distances from intersections etc. except where noted otherwise. Generally, non-compliance will relate to crossings that are wider than the relevant AUP rules allow, to allow large servicing vehicles to use them (a typical non-compliance for retail).

The over-width crossings are primarily located on the eastern side of Creek Road, at the western edge of the retail development, serving the back of house and loading areas for the M09 and M10 LFR buildings, as well as north onto Pitt Road at M11. The indicative crossing widths proposed are:

- M9 onto Creek Road South (left turn in): This crossing is approximately 9m in width, exceeding the maximum by 3m. The indicative width proposed (which may be refined in detailed design to a reduced width) is due to the need to have large articulated trucks turn into a narrow dock area along the western edge of the retail area.
- M9 onto Creek Road South (left turn out): This crossing is approximately 8m in width, exceeding the maximum by 2m.
- M10 onto Creek Road South, one of two: This northern crossing is 10m in width, exceeding the maximum by 4m. However, it is also a one-way crossing provided at an angle, which is part of the reason it exceeds the width despite the single-direction nature.
- M10 onto Creek Road South, one of two: This southern crossing is 11m in width, exceeding the maximum by 5m.
- M11 onto Pitt Road: This crossing is 11m in width, exceeding the maximum by 5m.

It is considered that these non-compliances are acceptable at this design stage for the following reasons:

- Added width is geometrically required to allow large trucks (including articulated trucks and large rigid trucks typical for large format retail stores) to access the servicing areas.
- The added left turn-in and left turn-out vehicle crossings at Building M09, will sway users from taking dangerous turns, which is especially effective when considering large articulated vehicles.
- The separation of entry and exist movements at Building M09, will reduce traffic volumes per crossing.
- Provision of a (light) traffic calming effect in the form of an entry ramp off the road for entering traffic is proposed prior to the crossing at building M09, reducing vehicle entry speed thus improving pedestrian safety.
- Improved safety of the pedestrian crossing facility at building M09 by provision of a (light) traffic calming effect for exiting traffic in the form of a speed bump at the boundary line.
- The crossings on Creek Road South, are located off a “back off house” street, and while they would cross footpaths, the eastern-side footpaths are considered to be low-volume pedestrian routes both in the short and long term.
- The vehicle crossings will (at the detail design stage) be reviewed to ensure they are not wider than needed for the layout of the servicing areas and expected service vehicles, and to incorporate features such as mountable aprons, splitter islands and raised tables to improve safety. The crossings need to be reviewed with a view to further optimising safety and minimising width (while remaining appropriate for the design vehicles intended to use them) could form a condition of consent.
- No vehicle crossings are being proposed at this stage for the superlots at this stage (as no buildings / dwellings are being applied for).

4.6 Parking

4.6.1 Parking Numbers

The Unitary Plan parking requirements are referenced in Chapter E27 Transport. Recently, the Ministry for the Environment and the Ministry of Housing and Urban Development announced the removal of minimum parking

requirements by major urban local authorities, other than for mobility parking spaces. This is provided for within the National Policy Statement for Urban Development 2020 (NPS-UD) document, and as a consequence Auckland Council has removed all minimum parking requirements and there are no maximum parking requirements applying to residential and commercial developments.

With no requirement for minimum or maximum provision of parking spaces for the development, it will be ensured that the practical need for parking spaces will be provided. A total of 718 parking spaces are proposed to be provided. The parking arrangements are deemed sufficient to meet the requirements of the development.

As per the referenced NZS: 4121-2001, for every 50 car parking spaces, one of the spaces for the retail activities is required to be a mobility space, plus one initial base mobility space. For the 718 retail car parking spaces, this translates to 14 spaces needing to be mobility spaces, which is complied with. The proposed parking arrangements for the superlots area will be separately assessed in the future at the time of development on those balance lots because no land use or development are proposed on these lots in this application.

4.6.2 Parking Layout and Design

Standard E27.6.3 (1) in the AUP states the manoeuvring aisle space required for the proposed 90-degree parking spaces in the retail area is 7m, for 2.6m x 5m spaces used by “casual users”. This will be provided, with generally 7.5m manoeuvring aisle depth, exceeding the requirement.

Any parallel parking spaces proposed in the retail area will also meet the AUP requirement of 6.0m length and 3.7m manoeuvring space. No angled car parks are proposed. On-street parking (all parallel parking) on the local roads and (where suitable) on the collector roads has not yet been completely designed and will be refined as part of future detailed design, complying with the requirements.

4.6.3 Bicycle Parking

Retail has to provide visitor and secure bicycle storage spaces as per Table E27.6.2.5 Required bicycle parking rates of the AUP. For this assessment, the rate applied was 1 per 750 sqm for all buildings associated with retail activities which have a GFA greater than 5,000 sqm, 1 per 500m for buildings with a GFA between 500 sqm and 5,000 sqm and if the building has a GFA is less than 500 sqm then no parking spaces are required. Since at this stage the use of the office spaces have not yet been established, the parking rates for office related activities have not been used.

Table 4-1: Bicycle parking required spaces (Table E27.6.2.5 in the AUP)

Building	Area (sqm GFA)	Requirement rate (Table E27.6.2.5)	Resulting Requirement
M09	10,200	1 visitor space / 750 sqm 1 secure space / 300 sqm	14 visitor spaces 34 secure spaces
M10	6,400	1 visitor space / 750 sqm 1 secure space / 300 sqm	9 visitor spaces 22 secure spaces
M11	5,000	1 visitor space / 500 sqm 1 secure space / 300 sqm	10 visitor spaces 17 secure spaces
M13A	1,650	1 visitor space / 500 sqm 1 secure space / 300 sqm	4 visitor spaces 6 secure spaces
M13B	375 (F&B)	1 visitor space / 350 sqm 1 secure space / 300 sqm	2 visitor spaces 2 secure spaces
M13C	375 (F&B)	1 visitor space / 350 sqm 1 secure space / 300 sqm	2 visitor spaces 2 secure spaces
	TOTAL area: **24,000 sqm**		TOTAL: 41 visitor spaces 83 secure spaces **124 bicycle parking**

As shown above, 41 visitor spaces (i.e., 21 double-sided racks)) and 83 secure parking spaces are required. Upon the completion of the development, a total of 124 bicycle spaces will be provided in total across the retail centre which will meet the minimum parking requirements for this stage and all future stages of the development.

The architect's plans show indicative placement of visitor bike racks, and the final location of these spaces will be determined as part of the detailed design phase.

The provision of secure spaces will be defined in a future stage, as part of the building consent. Due to the impracticality of providing even smaller secure bike storage for the various buildings individually, it is proposed that the secure spaces for staff will be arranged in one location (noting that no part of the retail area is more than some 300-400m away from any other part, it is considered acceptable to centralise the secure bike parking and place it under the control of the general centre management, rather than be arranged by individual tenants or buildings.

As noted earlier, at this stage only superlots (without buildings/dwellings) are being applied for in the Mixed-Use zone areas, as such no bicycle parking requirements exist yet for these future activities.

4.7 Servicing

Retail has to provide loading spaces as per Table E27.6.2.7 Minimum loading space requirements of the AUP.

For the proposed buildings, this results in the following requirements, and the proposed provision:

Table 4-2: Required loading spaces (Table E27.6.2.7 in the AUP)

Building	Area (sqm GFA)	Requirement rate (Table E27.6.2.7)	Proposed Provision	Comment
M09	10,200	3 minimum spaces + 1 space for every 10,000 sqm (T111)	2 x 18m by 3.5m loading spaces	In service area, accessed off Creek Road
M10	6,400	2 minimum spaces (T110)	3 x 18m by 3.5m loading spaces	In service area, accessed off Creek Road
M11	5,000	1 minimum space (T109)	2 x 11 by 3.5m loading space	In service area, accessed off Pitt Road
M13A	1,650	1 minimum space (T109)	1 x 8 by 3.5m loading space	On internal (private) road as parallel parking
M13B	375	1 minimum space (T109)	1 x 8 by 3.5m loading space	On internal (private) road as parallel parking
M13C	375	1 minimum space (T109)	1 x 8 by 3.5m loading space	On internal (private) road as parallel parking
	TOTAL area: 24,000 GFA		Total number of loading spaces provided: 10	

As shown, the proposed loading complies with the AUP requirements.

Vehicle tracking and loading zones are shown – indicatively - on the architect's plans of the application set, "200" series, especially plan RC206. These areas, the associated vehicle tracking and the resulting vehicle crossings will be refined further in detailed design.

As noted earlier, at this stage only superlots (without buildings/dwellings) are being applied for in the residential areas, as such no servicing requirements exist yet for these future activities.

However, it is noted that the proposed (public) local roads and associated intersections have been designed to suit 10.3m waste collection trucks.

4.8 End-of-Trip Facilities

Standard IX.6.2C of the Precinct Provisions addresses end-of-trip facilities. Table IX.6.2C.1 states that for 24,000sqm of commercial activities (including retail), that seven showers and changing areas with space for storage of clothing are required. These are provided within the application, as shown on the IGNITE application set.

Table 4-3: Required end-of-trip facilities (Table IX.6.2C.1 in the Drury Centre Precinct Plan)

Land Use	GFA	No. of showers and changing facilities required
Commercial and community activities	Up to 500m^2	No requirement
	Greater than 500m^2 up to 2,500m^2	One shower and changing area with space for storage of clothing
	Greater than 2,500m^2 up to 7,500m^2	Two showers and changing area with space for storage of clothing
	Every additional 7,500m^2	Two additional showers and changing area with space

5 Traffic Effects

5.1 Background

Extensive investigations and transport modelling of Drury have been undertaken by Stantec to inform the Integrated Transport Assessments supporting PC48. The extent of this background analysis includes the site area for this application and can therefore be relevantly applied to transportation considerations for the proposed subdivision and development of the land. The various background assessments undertaken for PC48 and informing our conclusions and recommendations for the application are summarised in the following sections.

At the Plan Change 48, 49 and 50 hearings, Auckland Transport expressed reservations over the traffic modelling undertaken to support the Plan Changes. These concerns were not shared by other traffic engineering experts within the traffic engineering caucusing sessions, and ultimately, the Independent Plan Change Hearings Panel rejected those concerns when approving the plan changes in early 2022, which was further ratified by the Environment Court by consent order in October 2022.

However, AT reiterated concerns relating to traffic modelling in its RFI response for the initial Fast Track application. These concerns were generally in relation to:

- The fact that the Fast Track traffic modelling assesses the effect of all three Drury East Fast Track applications together, rather than on an individual basis; and
- the traffic modelling did not assess the effect of construction activities.

Regarding the cumulative effects assessment of all three Drury East Fast Track application, it is correct that the traffic modelling has been undertaken on the assumption that all three Drury East Fast Track applications will be implemented at the same time, and it is not possible to assess the individual effects with this methodology. However, it is not considered necessary to do so. The effect of only this Fast Track development in isolation without the other two Drury East Fast Track applications will clearly be significantly less than the effect of all three combined. Assuming that all three will be in place – as this application has done – is an assessment of the absolute worst-case scenario from a traffic modelling perspective. It is considered to be entirely appropriate to provide for an assessment of cumulative traffic effects on the environment and identification of an integrated suite of traffic mitigation measures to avoid and mitigate adverse effects on the environment.

Further, it is acknowledged that without the mitigation required for all three developments being provided, none of the developments can go ahead. Therefore, there is no risk that only part of the upgrades will be provided, or development can occur without upgrades.

Regarding the construction effects, it is considered that such effects can be managed through coordination of Construction Traffic Management Plans (CTMP) for each of the fast track developments, as enabled through the precinct provisions. Although a CTMP for this development is attached to this report, better coordination will be undertaken by contractors at later development stages. Overall, it is considered that the construction traffic effects will be significantly less than the effects of the developments themselves and can be accommodated by conditions relating to construction activities.

5.1.1 Plan Change 48, 49 and 50

Traffic modelling has been undertaken to assess the traffic effect of the developments enabled by the Drury East Plan Changes. The modelling has therefore considered the developments enabled by Kiwi Property, Fulton Hogan, and Oyster Capital.

The traffic modelling has been undertaken using a three-tiered approach, consisting of a macro strategic model (MSM), a mesoscopic project model (SATURN), and a localised intersection operational model (Sidra Intersection). The assessment period spans three decades, between the beginning of the developments in 2023 through to 2048.

In November 2019, Stantec undertook traffic modelling and prepared a modelling report to assess the traffic effects of the proposed developments within Drury East. The modelling considered the SGA future transport network, as reported in the SGA ITA for the Drury-Opaheke and Pukekohe-Paerata areas, with land use assumptions adjusted to align with Kiwi, Fulton Hogan and Oyster Capital's desired build rates. This modelling assumed mode share assumptions consistent with the MSM model, which was conservative noting a lower mode share for Drury East than Drury West.

Subsequent to the above modelling, in January 2020 the Government announced funding and delivery timeframes of the New Zealand Upgrade Programme (NZUP) including several key projects that are influential to the outcomes of the Plan

Change traffic modelling. Notably this included the construction of Drury South Interchange by 2025 and the full length of Mill Road by 2028. Moreover, Auckland Council shared a number of relevant projects within indicative timeframes.

Stantec undertook revised modelling to include the infrastructure upgrade announcements and assumptions, to reassess the traffic effect of the proposed developments on the future network. This modelling was presented in the ITA for Kiwi Property and Oyster Capital, dated March 2020. It is noted that the Fulton Hogan land parcel was included in the traffic modelling however the ITA was prepared by Mott McDonald and utilised the Stantec traffic model.

In March 2021, Stantec received the Drury Infrastructure Funding and Financing Study (DIFF) SATURN model prepared by SGA. Upon review of the model, the decision was made to utilise this model for the Plan Change traffic modelling. By doing so, any ambiguity surrounding trip generation rates, mode share splits, internalisation assumptions and the refined zone system were resolved.

In June 2021 Stantec produced a Modelling Report based on the SGA model, and this was provided to the parties involved in the Drury East plan changes traffic caucusing. Shortly thereafter, a further announcement was made by the government regarding the NZUP projects. Of particular relevance was the removal of the Takanini, Papakura and Drury sections of the Mill Road project, and the Papakura to Drury South Stage Two project, including the Drury South interchange, from NZUP.

Stantec therefore revised its modelling to change the assumptions regarding when these projects would be implemented and assessed the development thresholds relevant to these projects.

Refer to the Drury East Traffic Modelling Report (Rev D, dated 30 September 2021) in Appendix A for full detail of the traffic modelling undertaken to support PC48. The modelling report describes the revised modelling methodology used and the land use assumptions for Drury East, outlines the various scenarios investigated, and discusses the effects on the relevant surrounding road network. The modelling has considered specified magnitudes of land use in relation to assumed infrastructure upgrades in terms of dwellings, commercial and retail Gross Floor Area (GFA).

A summary of the plan change traffic modelling is presented below.

5.2 Plan Change Modelling Outcome

Extensive traffic modelling of the future network has been undertaken to investigate and understand the effects of various infrastructure scenarios on the surrounding road network. There are a number of uncertainties related to infrastructure upgrade timing, especially for the infrastructure that does not have allocated funding. Modelling of this infrastructure timing was indicative and instead of focusing on when each element of infrastructure can be introduced, an estimate of the capacity that each element of infrastructure relevant to the Drury East development can provide was assessed.

A list of assumed infrastructure with indicative timeframes when an infrastructure piece can be built is listed in Table 5-1 below. The timeframes are identified simply to inform the assumptions regarding background development and traffic conditions outside the PC 48, 49 and 50 area. These timings are based upon those provided in SGA's 2019 ITA to support Council's Drury-Opaheke Structure Plan.

Table 5-1: Infrastructure Upgrade Assumptions

Decade	SGA / Stantec Assumed Infrastructure	Funding Source
2025-2028	SH1 3-laning Papakura to Drury, including upgraded Drury Interchange	NZUP
	Rail Electrification Papakura to Pukekohe	NZUP
	New Drury Central, West and Paerata Stations	NZUP
	Minor Improvements to the GSR/Waihoehoe Road roundabout	Drury East Developers
2028-2038	Waihoehoe Road West ATAP improvements, including the signalisation of the GSR/Waihoehoe Road intersection	ATAP
	Construction of southern connection from Fitzgerald Road to SH1 (similar or alternative to previously planned Mill Road South) including Drury South Interchange	Planned (SGA)
	SH1 3-laning from Drury Interchange to Drury South Interchange	Planned (SGA)
	Connection from Drury South Interchange to GSR	Planned (SGA)

Decade	SGA / Stantec Assumed Infrastructure	Funding Source
2038-2048	SH1 3-laning from Drury South Interchange to Bombay First northern connection to Papakura (similar or alternative to Mill Road North link between Waihoehoe Road and Ponga Road) Second northern connection (similar or alternative to north-south arterial – Opaheke Road extension to Ponga Road)	Planned (SGA) Planned (SGA) Planned (SGA)
2048+	Third Main Rail Line Pukekohe to Papakura Pukekohe Expressway full Route (SH1 to Pukekohe)	Planned (SGA) Planned (SGA)

The modelling calculated the point at which the development yields / traffic generated cause the Network Capacity Criteria to be exceeded. Network Capacity Criteria was developed that defined poor intersection performance and an assessment point of network operation. The criteria focused on:

- Peak hour queue lengths at the critical intersection (Great South Road / Waihoehoe Road). In particular the intersection operation was acceptable if the average queue during the peak hours was sustained within the available storage length and on average does not overspill into an adjacent intersection;
- Public transport delays at key locations of the network. Whilst enabling intersection queuing, consideration was given to delays along specific public transport routes, especially where no bus lanes are provided;
- Interpeak delays. In particular, if the above criteria are met then network operation is considered acceptable so long as interpeak intersection operation was better than Level of Service F.
- Northbound queuing on SH1 and whether this queue extends to Drury Interchange. These queues were monitored to understand potential overspill into the local network as a result of on-ramp signal operation; and
- Average daily link flows for roads connecting to the Great South Road / Waihoehoe Road intersection to ensure these were acceptable in comparison to other arterial roads within the Auckland city network.

The results show the development yields / traffic generated that perform within the capacity thresholds as the Point of Assessment. The Point of Assessment is defined as the level of development that can be enabled by the transport infrastructure prior to exceeding the network criteria. To enable further development beyond that which is shown as the Point of Assessment, either additional infrastructure is required, or an Integrated Transport Assessment is required to assess the traffic conditions at that specific point in time. These results are shown in Table 5-2.

Further explanation and clarification on the infrastructure upgrades are included in the modelling report in **Appendix A**.

Table 5-2: Points of Assessment for Infrastructure Upgrades

Transport Infrastructure	Level of Development Enabled by Transport Infrastructure				
	Residential (Dwellings)	Retail (GFA)	Commercial (GFA)	Community (GFA)	Drury East Trip Generation
Interim upgrade to Waihoehoe Road between and including the Great South Road roundabout and the Fitzgerald Road intersection.	Up to 710 units	-	-	-	Up to 400 trips (AM peak)
SH1 Widening – Stage 1B	Up to 1,300 units	Up to 24,000m2	Up to 6,400m2	Up to 800m2	400 to 2,000 trips (PM peak)
Drury Central Station Direct connection from SH1 to Town Centre	1,300 to 1,800 units	24,000 to 32,000m2	6,400 to 8,700m2	800 to 1,000m2	2,000 to 2,500 trips (PM peak)
Waihoehoe Road ATAP upgrade including signalisation of GSR/Waihoehoe intersection	1,800 to 3,300 units	32,000 to 56,000m2	8,700 to 17,900m2	1,000 to 2,000m2	2,500 to 3,800 trips (PM peak)
Southern connection between Fitzgerald Rd and SH1 (incl. Drury South Interchange)	3,300 to 3,800 units	56,000 to 64,000m2	17,900 to 21,000m2	2,000 to 2,400m2	3,800 to 4,300 trips (PM peak)
Mill Road northern connection and Opaheke northern link	3,800 to 5,800 units	64,000 to 97,000m2	21,000 to 47,000m2	2,400 to 10,000m2	4,300 to 5,600 trips (PM peak)
Assessment of PT uptake required	5,800 to 6,400 units	97,000 to 108,000m2	47,000 to 60,000m2	10,000 to 16,000m2	5,600 to 6,000 trips (PM peak)

5.3 Plan Change Modelling Update

As a result of discussions at the Drury East Plan Changes 48,49 & 50 Traffic Expert Caucusing, the modelling for the Drury East development was revised. The key change for the updated modelling assessment was the introduction of an interim signalised intersection to replace the previously proposed upgraded roundabout layout at the intersection of Great South Road and Waihoehoe Road.

The results of this revised modelling are shown in **Appendix B**.

5.4 Fast Track Application Traffic Modelling

As per the Plan Change modelling, the proposed Kiwi Property Fast-track development has been modelled in conjunction with the proposed Fast-track development applications by Oyster and FHLDL. The development yields of the proposed Fast-track developments in Drury East are outlined in **Table 5-3**.

Table 5-3: Fast-Track Development Yields

Developer	Actual Residential Dwellings Sought by Fast Track Applications	Number of Superlots (potential residential lots)	Total Potential Residential Yield	Retail (GFA)
Kiwi Property	-	13 (600)	600	24,000 sqm
Fulton Hogan	248	28 (460)	708	-
Oyster Capital	357	9 (270)	627	-
Totals	**605**	**50 (1,330)**	**1,935**	

Therefore, the combined three Fast Track consent applications would enable 605 residential properties, 50 superlots (without any residential yield at this stage), and 24,000m^2 GFA of retail activities. This corresponds to Row 2 within Table 5-2. However, to ensure a robust analysis, the SATURN model was updated to reflect the yields and infrastructure assumptions within Row 3 (1,800 households residential, 32,000sqm GFA retail etc), although the SH1 direct connection to the metropolitan centre was not included in that test. As per the Plan Change modelling methodology, key intersections within Drury East and the surrounding area were modelled in Sidra utilising the traffic volumes from the SATURN model.

The results of the modelling showed that all intersections performed satisfactorily and within the Network Capacity Criteria as outlined in Section 5.2 and therefore the proposed network is adequate to cater for the proposed Fast-Track development across the three sites. The outcome of the modelling of key intersections being upgraded as part of this application are provided in Section 6. The results of the wider network intersection modelling are shown in **Appendix C**.

5.5 Traffic Effects Summary

Prior to any development on the Kiwi Fast-Track site, the following infrastructure needs to be provided:

- An interim signalised intersection of Great South Road / Waihoehoe Road (as outlined in Section 6.9).
- An interim upgrade to Waihoehoe Road that includes a westbound bus lane (as outlined in Section 4.4.1)
- An interim signalised intersection of Waihoehoe Road / Opaheke Road / Fitzgerald Road (as outlined in Section 6.8).

As per Table 5-2, this set of upgrades will enable up to 700 households to be constructed, which encompasses all of the proposed Oyster Fast Track development yield, and that of the neighbouring Fulton Hogan Fast Track Development.

To enable the 24,000sqm GFA retail within the Kiwi Fast Track application, the following additional upgrade will be required:

- 3-Laning of SH1 between Papakura and Drury.

With this piece of infrastructure, a yield of 1,300 dwellings and 24,000sqm GFA retail can be accommodated across the three sites, as outlined in Table 5-2. The table also allows for 6,000m^2 other commercial GFA and 800m^2 community GFA.

Neither of these activities are being sought in this application (or the other two Drury East fast track applications), therefore there is a further level of conservatism assumed in the modelling results.

In addition to the above infrastructure, walking and cycling facilities within the road corridor will be provided in association with the development, to enable access from the development to the wider walking and cycling facilities being provided to access Drury Central station and the other Drury East precincts. This includes Brookfield Road to the east of Main Street South and Fitzgerald Road to the north of Brookfield Road.

The proposed infrastructure from the outset, and to be provided progressively as development continues is adequate to facilitate the safe and efficient operation of the transport network.

6 Intersection Design

This section of the ITA addresses Special Information Requirement IX.9(6) Transport Design Report of Drury Centre Precinct provisions. For all intersection designs, please refer to the Aurecon civil engineering set of the application package. The excerpt figures in this section are provided for context to the descriptions only. All intersection performance results are based on Row 3 of Table 5-2, which provides a high-level of futureproofing to their design even though the level of development in this application does not exceed those listed in Row 2. These intersection forms were also tested within the SATURN model for the 2038 and 2048 future years to ensure that all potential demands can be accommodated.

Several minor changes were made to these designs to respond to comments from Auckland Transport and the EPA's transport engineering advisor through the RFI process for the initial fast track submission, and the updated designs include all agreed changes.

6.1 Fitzgerald Road / Pitt Road

6.1.1 Interim Layout

The proposed design for this signalised T-intersection provides two approach lanes for Pitt Road and Fitzgerald Road (North), and three approach lanes for Fitzgerald Road (South). It provides a single departure lane on all roads except on Pitt Road, where the westbound departure provides two lanes. This relates to the extra left turn lane from the south, which is intended for a bus priority short lane, which can then lead into a westbound bus lane as and where required for future bus priority on the future Pitt Road alignment.

Walking and cycling is provided as separated paths on all sides of the intersection, albeit owing to the fact that there is no development yet on the eastern side of the intersection, the mid-block separation between the cycleways and the carriageway reduces to 1.2m in the intersection vicinity to allow the turning requirements of large articulated trucks. This is considered to provide significant protection even at this reduced width. The intersection design is shown in **Figure 6-1**.

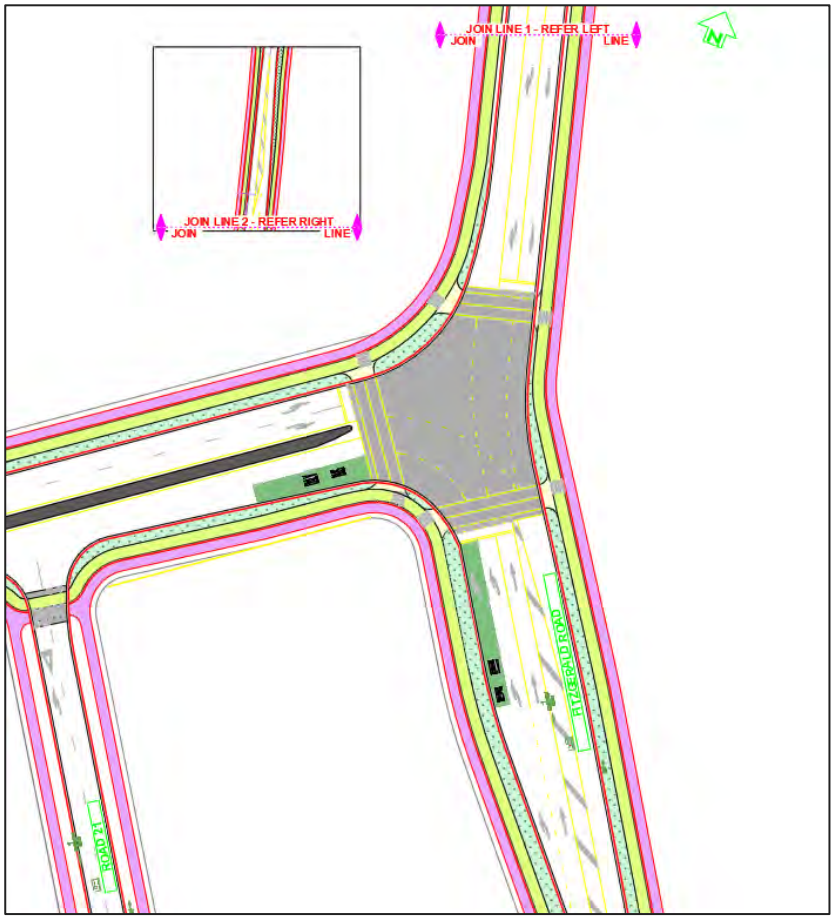


Figure 6-1: Pitt Road / Fitzgerald Intersection Layout

It is noted that the intersection at this stage does not provide connectivity to the east, into the future residential area of Proposed Plan Change 49. This is because the fast-track application for that plan change area connects to Fitzgerald Road only at an intersection further to the north. When, as part of later development (not part of this application), Fitzgerald Road / Pitt Road becomes a four-arm signal, the additional turn lanes required will be provided via widening to the east side, respectively (for the Pitt Road approach) via removal of the solid median.

For safety, the intersection is proposed to be placed on a raised safety platform, extending far enough into all approaches so that the pedestrian / cycle crossings are located on the raised table. The appropriate gradient for the approach ramps would require further discussion during the EPA stage but is recommended to be a 100mm vertical rise at an 1:12-1:14 gradient, acknowledging that the intersection would initially be located in a still largely semi-rural area where steeper safety platforms gradients may not be appropriate.

Provision of a raised safety platform aligns with new Austroads guidance indicating the safety and usability of such devices even on arterial and certainly on collector roads to improve road safety and “Vision Zero” outcomes.

Auckland Transport has previously constructed raised tables even on various arterial road signals, and is currently consulting or has already approved designs for a wide variety of further such raised platform signals, such as in the New Lynn area (several intersections currently being consulted with raised tables on arterial road approaches) on Oteha Valley Road (raised tables on arterial road approaches) and East Coast Road in the Glenvar Road area (two large signals proposed on raised safety platforms).

6.1.2 Intersection Performance

Modelling has been undertaken using SIDRA to assess the performance of the proposed access. The intersection has been assessed using peak hour traffic volumes from the SATURN model as outlined in Section 5.3. These have been input into the SIDRA model and the results of the assessment are summarised in Table 6-1.

Table 6-1: Interim Traffic Signals - SIDRA Modelling Results

Approach	Mvmt	Morning Peak Hour				Evening Peak Hour			
		Delay (s/veh)	LOS	Average queue (m)	DoS	Delay (s/veh)	LOS	Average queue (m)	DoS
Fitzgerald (South)	LT	18.8	B	0.8	0.020	24.9	C	1.0	0.123
	TH	11.5	B	19.7	0.341	14.9	B	2.4	0.110
Fitzgerald (North)	TH	9.8	A	8.3	0.156	17.1	B	16.2	0.635
	RT	27.0	C	2.1	0.094	20.1	C	7.6	0.340
Pitt (West)	LT	21.6	C	1.8	0.052	15.8	B	22.8	0.565
	RT	27.0	C	2.1	0.094	19	B	1.4	0.068

The results show that traffic signals controlling intersection operations results in the intersection operating within an acceptable level of service in both the AM and PM peak.

As can be seen from the above results, the development traffic will not cause queues to encroach on other intersections in the network, and the intersection will operate at an acceptable LOS.

The maximum average queue of 22.8m is associated with vehicles turning left from the Pitt Road west approach in the PM peak, which would not encroach on the intersection approximately 110m to the west. The maximum delay of 24.9 seconds associated with the left-turning traffic from the Fitzgerald Road south approach in the PM peak is not considered to have a material impact on the development network.

Overall it is considered that the design of the Pitt Road / Fitzgerald Road intersection will be able to accommodate additional traffic generated by the Kiwi Property development in 2028.

6.2 Brookfield Road / Fitzgerald Road

The proposed design for this signalised T-intersection has two approach and one departure lane on all legs. Footpaths and cycleways are proposed on both sides of all three legs of the intersection, apart from the southern side of Brookfield Road which only has a cycleway, as discussed in Section 4.4.3. Also shown on this plan are two pedestrian paths through the subdivisions. In the initial application, AT raised concerns that there were no raised crossings at the internal ends of these paths. These have now been added to the plan set.

As with Pitt Road / Fitzgerald Road, space constraints reduce the separator between the cycleway and the carriageway to 1.2m. As per Pitt Road / Fitzgerald Road, the intersection is also proposed to be located on a raised safety platform as described there. Apart from the safety benefit for the intersection itself, this assists with providing a "gateway" location where Fitzgerald Road transitions from a more rural environment to the southeast into a more urban environment associated within the future town centre. The proposed intersection layout is shown in **Figure 6-2**.

AT also raised a concern in the initial application at the configuration of the intersection, being Y-shaped, leading to vehicle tracking difficulties and high speeds.

The intersection shape is existing and bound by third-party land on two of the three sides, and the concerns about added turn radii / safety issues are considered unfounded.

The vehicle tracking space requirements for large trucks left-turning into a single departure lane road design for example are eased by the Y-shaped intersection 45-degree turn compared to a 90-degree turn, and thus result in a smaller intersection. Crucially, there are also the existing road centre lines and the 3rd party property boundaries on all but the northwestern quadrant which fix the intersection into the existing Y-shape.

Further, the intersection is proposed to be on a raised table, which will control excessive speeds, while the y-shape also ensures that crossing pedestrians are in the view of approaching turning drivers earlier.

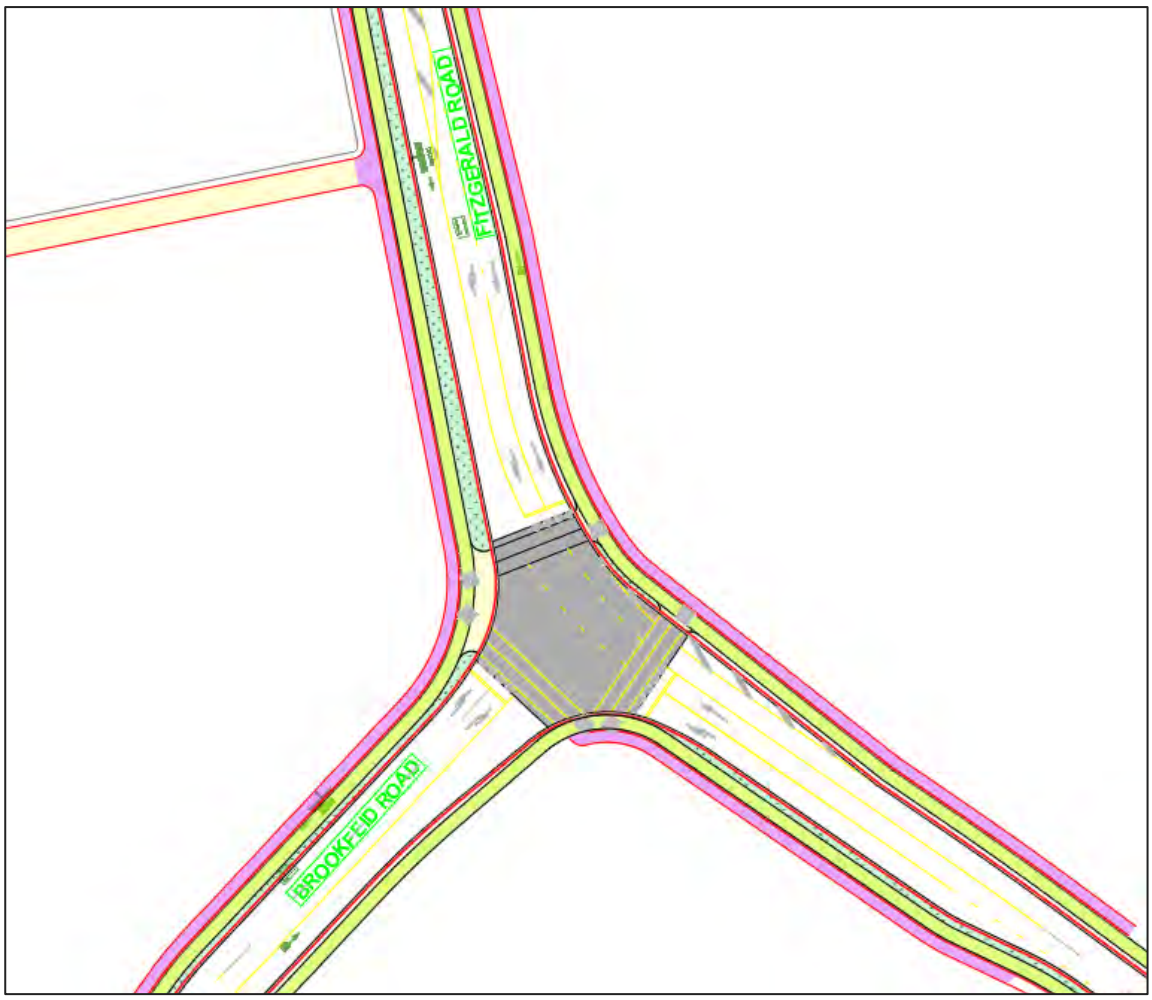


Figure 6-2: Brookfield Road / Fitzgerald Road Intersection Layout

6.2.1 Intersection Performance

Modelling has been undertaken using SIDRA to assess the performance of the proposed access. The intersection has been assessed using peak hour traffic volumes from the SATURN model as outlined in Section 5.3. These have been input into the SIDRA model and the results of the assessment are summarised in Table 6-1.

Table 6-2: Interim Traffic Signals - SIDRA Modelling Results

Approach	Mvmt	Morning Peak Hour				Evening Peak Hour			
		Delay (s/veh)	LOS	Average queue (m)	DoS	Delay (s/veh)	LOS	Average queue (m)	DoS
Fitzgerald (South)	LT	12.7	B	2.1	0.054	13.5	B	10.0	0.236
	TH	18.3	B	23.1	0.683	16.1	B	2.9	0.117
Fitzgerald (North)	TH	15.8	B	9.7	0.327	18.1	B	17.5	0.605
	RT	21.3	C	1.6	0.076	21.3	C	1.6	0.076
Brookfield (West)	LT	27.4	C	2.0	0.227	25.4	C	1.8	0.151
	RT	22.3	C	19.4	0.625	20.9	C	19.8	0.589

The results show that traffic signals controlling intersection operations results in the intersection operating within an acceptable level of service in both the AM and PM peak.

6.3 Main Street (South) / Pitt Road

The proposed design for this signalised T-intersection has two approach lanes except on the western approach where there are three, and one departure lane and one departure lane on all legs except on the south leg, where there are two. The added approach leg (dual right turn) from the west anticipates that as part of the mid-term development of the town centre, a large proportion of traffic will arrive from the northwest via Creek Road (off the motorway – section of Creek Road not part of this application). The dual departure lane allows for this double right turn to be received, but also for a dedicated site-internal turn lane which commences shortly to the south.

Footpaths and protected cycleways are proposed on both sides of all three legs of the intersection. A previous iteration of this designed showed some on-street parking along Main Street, to which Auckland Transport raised concerns. Those on-street parking spaces were subsequently removed.

As per Pitt Road / Fitzgerald Road, the intersection is also proposed to be located on a raised safety platform as described there. Apart from the safety benefit for the intersection itself, this assists with providing a “gateway” location where Fitzgerald Road transitions from a more rural environment to the southeast into a more urban environment associated within the future metropolitan centre.

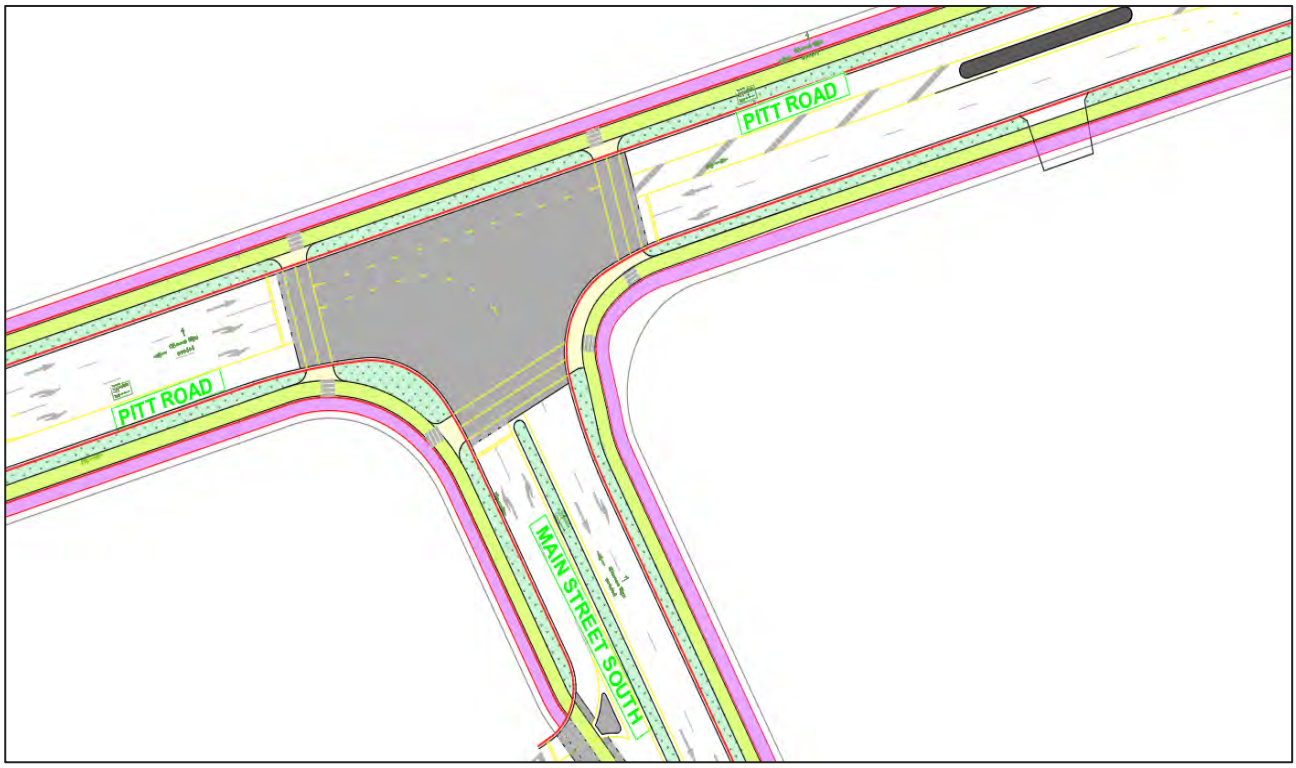


Figure 6-3: Pitt Road / Main Street South Intersection Layout

6.4 Main Street South / Internal Local Road

This intersection is a single-lane roundabout fully within the (private road part) of the retail area, providing the primary access to the adjacent car park areas. It is also designed to allow smaller trucks to undertake all movements, while larger trucks (articulated trucks and similar) can only travel through north south but cannot turn off into the car park areas of the western and eastern legs.

It will provide raised crossings for the separated walk and cycle facilities over all arms. To allow large trucks accessing the retail area to travel north-south through the intersection, it will contain several sections of over-run areas (paver setts or similar) as well as a mountable central apron around the non-mountable island.



Figure 6-4: Pitt Road / Main Street South Intersection Layout

6.5 Main Street South / Creek Road South

This intersection will be a single-lane roundabout intersection for the two collector roads to meet at the southern end of the retail area, and also provide key vehicular and servicing access into the area from the south (Brookfield Road route). Due to constraints in the local environment (property restrictions), it is slightly oval-shaped.

It will provide raised crossings for the separated walk and cycle facilities over all three arms (and over the future eastern fourth arm – not part of the fast-track application). To allow large trucks accessing the retail area to travel around the intersection, it will contain several sections of over-run areas (paver setts or similar) as well as a mountable central apron around the non-mountable island. In the initial Fast Track application, the centre island of the roundabout was too far west to ensure slow through deflections. This has subsequently been addressed in this revised design.

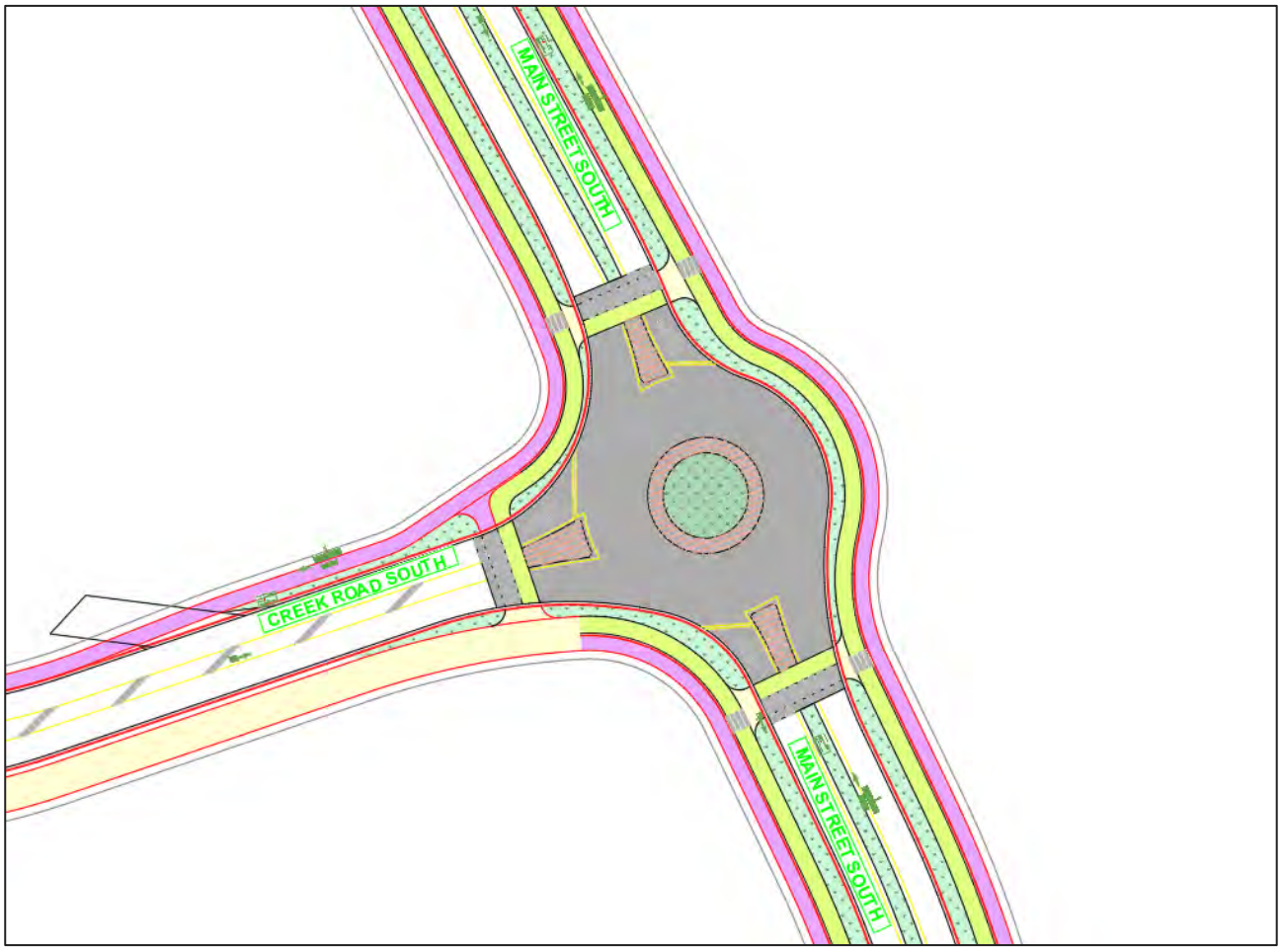


Figure 6-5: Creek Road South / Main Street South Intersection Layout

6.6 Brookfield Road / Main Street (South)

This unsignalised give-way T-intersection connects the southern end of Main Road with Brookfield Road. As this is a key access route for service vehicles of the retail area, it is required to allow large trucks to pass each other. A raised table intersection is proposed to slow vehicle speeds and protect cyclist and pedestrian crossing points.

The initial Fast Track application had a difference configuration for this intersection, to which AT raised concerns. The design has subsequently been revised to address those concerns.



Figure 6-6: Brookfield Road / Main Street South Intersection Layout

6.7 Creek Road South / Pitt Road

In the fast-track application, this intersection has only two legs, i.e. is functionally a curve / road-road connection rather than an intersection. In the longer term (not part of this application), it will connect with Creek Road (North) to the future stages of the proposed plan change area development.

In the fast-track works, the main noteworthy features are that it is already designed space-wise to accommodate future turning lanes for the future northern leg (via flush median provision), and that in the interim (before later becoming a signalised intersection in future applications) it will provide a raised walk/cycle priority crossing over the southern arm to connect to the interim path to the train station in the north.

In the initial Fast Track application, the crossing point was further north, closer to the bend, and AT raised concerns over its position. It was therefore moved further south to address that concern by moving it away from the curve whilst narrowing the crossing distance.



Figure 6-7: Creek Road South / Pitt Road Intersection Layout

6.8 Ōpaheke / Fitzgerald / Waihoehoe

6.8.1 Interim Layout

It is proposed to construct an interim design for the intersection of Ōpaheke Rd/Waihoehoe Rd/Fitzgerald Rd, which acknowledges current constraints due to third-party land ownership particularly on the southern side, and the fact that full build-out (intended for longer term traffic volumes and FTN bus routes not yet present) is not yet required.

This design has been laid out to be able to be efficiently converted at a later stage (by others, or as part of future applications) into a "final" design once third-party land becomes available - in particular through a completed Notice of Requirement (NOR) process and activation of the resulting designation.

The signalised intersection for the interim scenario is shown in **Figure 6-8**. The design incorporates the following key parameters:

- Two approach lanes and a single departure lane on all four approaches – a left-and-through and a right turn lane. Dedicated right turn lanes are to provide approximately the following storage lengths (excl. taper lengths):
  - Opaheke Road: 60m
  - Waihoehoe Road West: 70m
  - Waihoehoe Road East: 60m
  - Fitzgerald Road: 15m
- Provision of a wide (~4.8m) solid median on the northern approach (Opaheke Road) that can be converted to a solid narrow (~1.8m) median and a dedicated bus right turn lane (3m) for the "final" design. This will provide bus priority for the future FTN route south along Opaheke Road, without requiring major road reconstruction.
- Signalised, separated pedestrian and cycle crossings over all arms
  - Due to space constraints in the southwest and southeast quadrants, the design in these quadrants will use "shared path corners", i.e. cycleway and footpath cannot be kept separate as in the northern quadrants where more space is available. At the (very short) tightest locations defined by the existing property boundaries, the shared paths will be at least 2.5m or wider, albeit these constraints will widen out again immediately, and will disappear in the "final" layout post-NOR.
  - Shifting the whole interim intersection northwards to allow an "interim" design without shared path corners is not feasible, due to further third-party land constraints at 112 Waihoehoe in the Northwest.
- It is proposed that the intersection be placed on a raised safety platform, extending far enough into all approaches so that the pedestrian / cycle crossings are located on the raised table. The appropriate gradient for the approach ramps would require further discussion during the EPA stage but is recommended to be a 100mm vertical rise at an 1:12-1:14 gradient, acknowledging that the intersection would initially be located in a still largely semi-rural area where steeper safety platforms gradients may not be appropriate.
- Provision of a raised safety platform aligns with new Austroads guidance indicating the safety and usability of such devices even on arterial roads to improve road safety and "Vision Zero" outcomes. Auckland Transport has previously constructed raised tables at arterial road signals, and is currently consulting or has already approved designs for a wide variety of further such raised platform signals, such as in the New Lynn area (several intersections currently being consulted with raised tables on arterial road approaches) on Oteha Valley Road (raised tables on arterial road approaches) and East Coast Road in the Glenvar Road area (two large signals proposed on raised safety platforms).

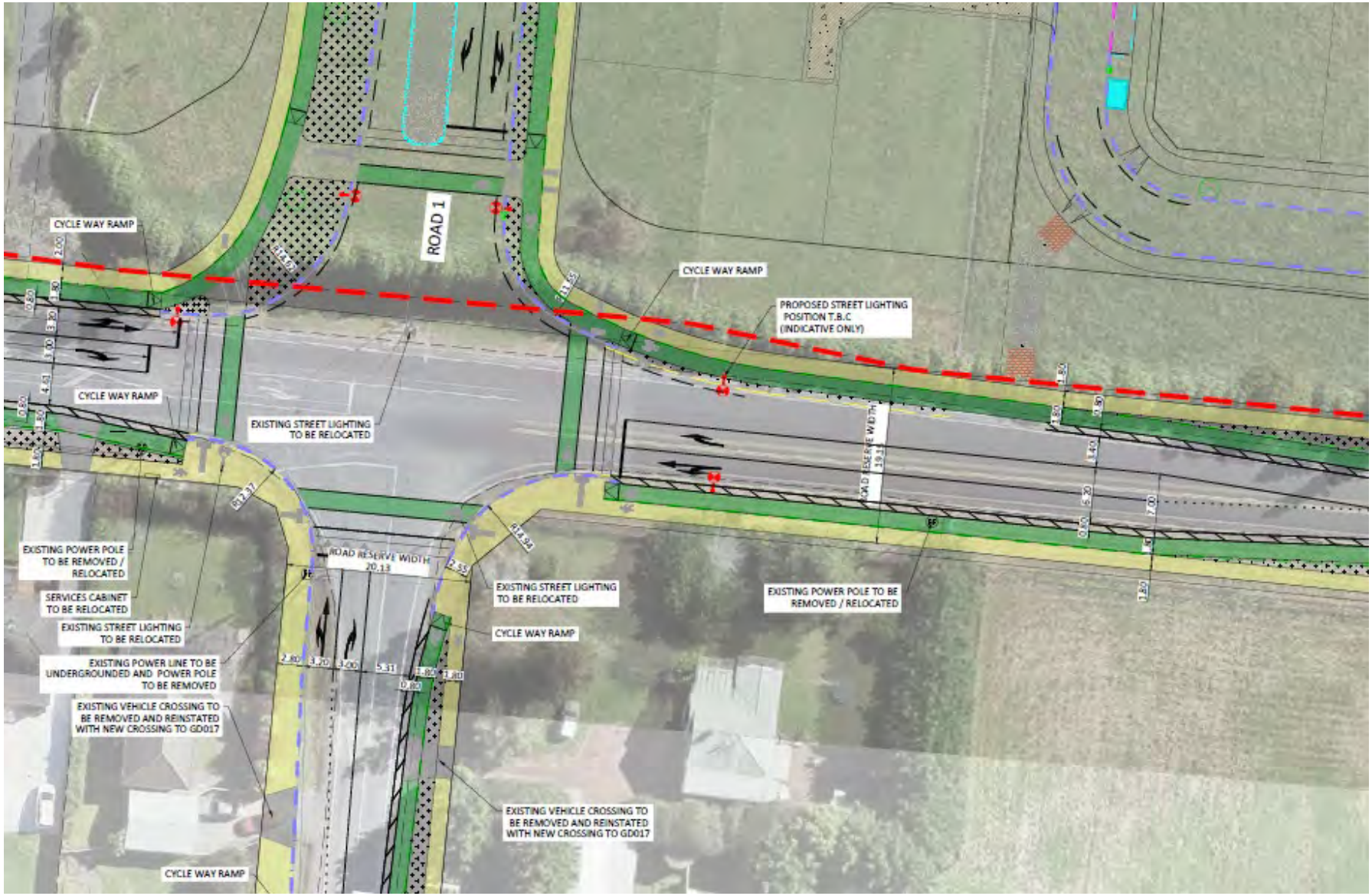


Figure 6-8: Interim Signalised Intersection Design, Opaheke Road / Waihoehoe Road

6.8.2 Interim Intersection Performance

Modelling has been undertaken using SIDRA to assess the performance of the proposed access. The intersection has been assessed using peak hour traffic volumes from the SATURN model as outlined in Section 5.3. These have been input into the SIDRA model and the results of the assessment are summarised in Table 6-1.

Table 6-3: Interim Traffic Signals - SIDRA Modelling Results

Approach	Mvmt	Morning Peak Hour				Evening Peak Hour			
		Delay (s/veh)	LOS	Average queue (m)	DoS	Delay (s/veh)	LOS	Average queue (m)	DoS
Fitzgerald (South)	LT	27.8	C	65.2	0.784	19.3	B	100.3	0.834
	TH	22.0	C	4.8	0.105	54.0	D	9.3	0.222
	RT	26.6	C	4.8	0.105	58.6	E	9.3	0.222
Waihoehoe (East)	LT	38.1	D	29.6	0.757	71.3	E	31.9	0.788
	TH	33.5	C	29.6	0.757	66.7	E	31.9	0.788
	RT	35.0	C	2.6	0.115	62.0	E	5.2	0.170
Opaheke (North)	LT	22.3	C	3.4	0.314	43.2	D	7.7	0.287
	TH	17.7	B	3.4	0.314	38.6	D	7.7	0.287
	RT	38.0	D	20.6	0.689	61.7	E	24.5	0.552
Waihoehoe (West)	LT	31.2	C	20.6	0.488	21.0	C	38.9	0.290
	TH	26.5	C	20.6	0.488	16.3	B	38.9	0.290
	RT	37.4	D	28.9	0.755	55.9	E	186.4	0.963

The results show that traffic signals controlling intersection operations results in the intersection operating within an acceptable level of service in both the AM and PM peak.

6.8.3 Ultimate Layout

To ensure that spatial allowance is provided to allow the upgrade of Waihoehoe Road to a four-lane arterial road (i.e. to confirm that the interim solution will not comprise the ability to deliver the ultimate Waihoehoe Road design), as per the NoR[6], a potential signalised layout has been prepared as shown in Figure 6-9. The proposed potential design incorporates the following parameters:

- Lanes compared to the interim design:
  - Opaheke Road: One additional southbound bus right turn lane for the FTN, for a total of three approach lanes - two right turn lanes and one left-and-through lane, plus an added departure bus lane
  - Waihoehoe Road West: One additional through lane, and one additional left turn bus lane for the FTN, for a total of four approach lanes – one left, one left-and-through, one through and one right turn lane, plus an added bus departure lane
  - Waihoehoe Road East: One additional through lane, for a total of three approach lanes – one left-and-through, one through and one right turn lane, plus an added general traffic departure lane (albeit noting that as per our understanding of the Waihoehoe Road East NOR, this would soon east of the intersection then reduce to only one lane each way.
  - Fitzgerald Road: One added left turn lane (with slip lane control), for a total of three approach lanes – one left turn slip lane, one through lane and one right turn lane, no changes to the single departure lane southwards
    - It is noted that the proposed left-turn slip lane has previously been raised as a possible safety / active mode concern by Auckland Transport. This slip lane was added as this would provide some minor efficiencies for

[6] AT NoR D2 (Jesmond to Waihoehoe West FTN Upgrade)

a significant turn and reduce one signalised crossing distance (over Waihoehoe Road West), while intending to provide adequate active mode safety and convenience via a raised table and active mode formal priority.

  - However, it is noted that the applicant does not consider this slip lane mandatory. It could be modified to provide a standard left turn lane instead, within the signal controls. Final design is in any case subject to separate approvals unrelated to this Fast-track application.

- Narrow solid medians for added road safety on all approaches except Fitzgerald Road (only collector road) which has only a narrow flush median. Depending on the final agreed design of Fitzgerald Road mid-block (separate Fast-Track applications), there likely will be no flush median on this approach at all, albeit that would not significantly change the interim or final designs.
- Signalised, separated pedestrian and cycle crossings over all arms
  - Unlike in the space-constrained interim design, after the NOR provides the ability to widen into the southern quadrants, the intersection is now a fully “protected intersection”, with separation between walking and cycling throughout.
- It is proposed that the intersection be placed (retained from interim design) on a raised platform, extending far enough into all approaches so that the pedestrian / cycle crossings are located on the raised platform.

As noted in discussions with AT, the applicant considered the likely upgrade of this intersection to the ultimate layout would be expected to be some decades away. As such, the specific design – which will have to follow design standards that are likely to change between now and then - is of less importance than showing that identifying that the proposed layout would provide the desired capacity, and that there will be the ability to implement the desired intersection functionality, including active mode facilities, without undue space or cost issues caused by the interim design.

This is considered covered via the modelling that is provided in the modelling report Appendix A and the space allocation for future widening provided by both the applicant design (where available, i.e. on the northern side) and the future NOR designation (on the southern side).



Figure 6-9: Potential Final Signalised Intersection Design, Opaheke Road / Waihoehoe Road

6.9 Great South Road / Waihoehoe Road Intersection

6.9.1 Interim Layout

Consistent with the approach proposed in PCs 49 and 50, an interim upgrade to the Great South Road / Waihoehoe Road intersection will be undertaken prior to any development taking place, and prior to the full upgrade of the intersection proposed through the NOR.

This is proposed to be undertaken by implementing an interim traffic signal, as developed in principle during the plan change caucusing process. . The proposed design includes provision of walk/cycle crossings on all four arms of the crossing, and sections of shared path approaching the interim signals. The layout is shown in the figure below:

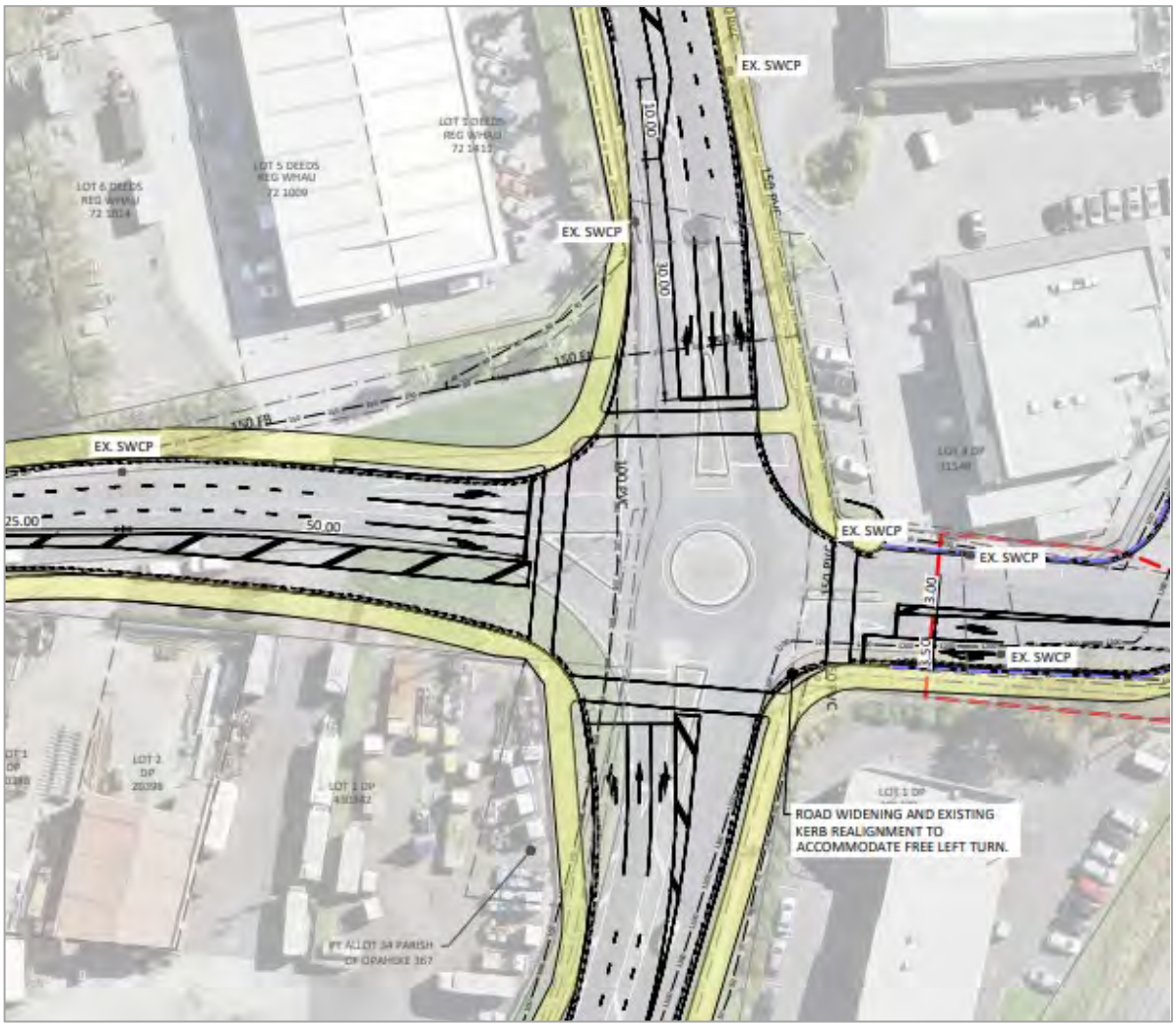


Figure 6-10: Waihoehoe Road / Great South Road / Norrie Road interim layout

The layout is to provide the following lengths of approach lanes, with single departure lanes on all legs (lengths are excluding tapers):

- GSR North approach:
  - LT lane: 50m
  - Through lane: Continuous
  - RT lane: 30m
- Waihoehoe Road approach:
  - LT and through lane: Continuous
  - RT lane: 45m
- GSR South approach:

  - LT lane: 75m
  - Through lane: Continuous
  - RT lane: 75m
- Norrie Road approach:
  - LT turn lane: 100m
  - Through lane: Continuous
  - RT lane: 50m

It is noted that this design has been developed to fit into the existing road boundaries without land take, until the NOR process enables land take by others at a future stage. As such (due to the need of achieving sufficient intersection signal capacity), the active mode facilities will not be to new-build standard. The facilities provided around the interim intersection are proposed to be shared paths, with some localised short pinch-pints as low as 2m at the immediate corners – albeit these occur over distances of 5m or less. Outside of these pinch points, the paths will generally be 3m wide, and in most areas, set back by a 1m grass berms from the carriageway edge.

Considering that the existing roundabout intersection is multi-lane and provides no crossing facilities at all, it is considered that the proposed signalised crossings represent a significant safety improvement for active mode users.

It is also similarly noted that lane widths are somewhat lower than standard on an arterial road intersection. Kerbside lanes are 3.5m wide (including a 0.3m channel allowance), while through lanes and right turn lanes are 3.0m. However, the design has been vehicle-tracked to allow up to 19.45m articulated trucks on all movements. This has been enabled in part by removing solid medians on the approaches, instead using flush median areas that these very large turn vehicles can track over.

For the initial Fast Track consent submission, Auckland Transport considered this interim design insufficient and requested the ultimate design (proposed within the NOR) to be implemented.

The Drury East applicants are unable to construct the ultimate design as they do not own the land adjacent to the intersection required for that upgrade. They also cannot realistically acquire land adjacent to the Great South Road (GSR) / Waihoehoe Road intersection to increase the size of the traffic signals.

However, the design of the interim GSR / Waihoehoe Road intersection and the proposed roading network has been proven to be sufficient to accommodate the demands of the developments enabled by the three Drury East Fast Track applications. The proposed design was discussed in detail during caucusing for the Drury East Plan Changes and experts from all parties (Waka Kotahi, Auckland Council, Drury South and the Drury East developers) – with the exception of Auckland Transport – agreed that the designs were acceptable and appropriate as interim measures prior to the ultimate scheme enabled by the Drury Arterials NORs are realised. This interim design is of a higher standard than many new permanent designs implemented by Auckland Transport throughout Auckland.

6.9.2 Interim Intersection Performance

Modelling has been undertaken using SIDRA to assess the performance of the intersection. The intersection has been assessed using peak hour traffic volumes from the SATURN model as outlined in Section 5.3. These have been input into the SIDRA model and the results of the assessment are summarised in

Table 6-4.

Table 6-4: Interim Traffic Signals - SIDRA Modelling Results

Approach	Mvmt	Morning Peak Hour				Evening Peak Hour			
		Delay (s/veh)	LOS	Average queue (m)	DoS	Delay (s/veh)	LOS	Average queue (m)	DoS
Great South Road (South)	LT	27.0	C	2.2	C	38.1	D	3.4	0.0067
	TH	40.3	D	32.2	D	50.5	D	41.2	0.762
	RT	34.8	C	14.3	C	103.2	F	68.7	1.029
Waihoehoe (East)	LT	16.6	B	18.7	B	23.3	C	75.1	0.739
	TH	12.0	B	18.7	B	18.7	B	75.1	0.739
	RT	36.7	D	58.4	D	76.6	E	139.2	0.986

Approach	Mvmt	Morning Peak Hour				Evening Peak Hour			
		Delay (s/veh)	LOS	Average queue (m)	DoS	Delay (s/veh)	LOS	Average queue (m)	DoS
Great South Road (North)	LT	13.6	B	17.6	B	15.4	B	47.2	0.616
	TH	23.8	C	19.9	C	63.6	E	73.3	0.954
	RT	29.6	C	29.2	C	47.6	D	39.9	0.791
Norrie Road (West)	LT	25.7	C	45.2	C	42.7	D	63.0	0.775
	TH	29.1	C	9.8	C	59.6	E	34.2	0.933
	RT	33.7	C	2.5	C	48.6	D	3.7	0.152

The results show that traffic signals controlling intersection operations results in the intersection operating within an acceptable level of service in both the AM and PM peak.

7 Construction Traffic

It is standard practice as part of the Resource Consent that a Construction Traffic Management Plan (CTMP) is developed to outline how construction deliveries to and from the site will be managed and mitigated. The CTMP should include the following:

- Construction dates and hours of operation including any specific non-working hours for traffic congestion / noise, etc. aligned with normally accepted construction hours in the Auckland Region;
- Truck route diagrams both internal to the site and within the local road network;
- Temporary traffic management signage / details for both pedestrians and vehicles to appropriately manage the interaction of these road users with heavy congestion traffic; and
- Details of site access / egress over the entire construction period. Noting that all egress points to be positioned so that they achieve appropriate site distance as per the RTS-6 document.

Based on experience of constructing similar developments, bearing in mind the capacity within the existing road network, with the appropriate CTMP in place and the above measures implemented, it is considered that construction activities will be able to be managed to ensure an appropriately low level of traffic effects. The construction activities are temporary and with appropriate measures in place will be able to be managed.

Refer to **Appendix D** for the appended CTMP for the proposed development.

8 Auckland Unitary Plan and Precinct Plan Requirements

An assessment of the proposed development against the relevant, transport-related standards within the Unitary Plan Operative in Part are shown in the table below.

Table 8-1: Assessment of relevant Unitary Plan standards

Standard	Description	Compliance
E27.6.1(1)(a)	Where a proposal (except where excluded in Standard E27.6.1(2)) exceeds one of the following thresholds: a new development in Table E27.6.1.1 resource consent for a restricted discretionary activity is required.	**N/A.** The standard does not apply
E27.6.2 (1)	The maximum and minimum parking requirements have been removed from the latest version of the AUP(OP)	**N/A -** See Section 4.6
E27.6.2 (6)	For residential developments of 20 or more dwellings the following minimum bicycle parking must be provided: Visitor (short-term stay): 1 per 20 dwellings Secure (long-stay): 1 per dwelling without a dedicated garage	**Complies (retail)** – See Section 4.6 No dwellings proposed in this application – future consideration and separate assessment
E27.6.3.1	Every parking space must comply with the following minimum dimensions; For 90 degrees regular users: 2.4m width, 5.0m length and 7.1m manoeuvring space	**Complies (retail)** – See Section 4.6
E27.6.3.3 (1)	Every parking space must have driveways and aisles for entry and exit of vehicles to and from the road, and for vehicle manoeuvring within the site. Access and manoeuvring areas must accommodate the 85 percentile car tracking curves in Figure E27.6.3.3.1	**Complies (retail)** – See Section 4.5
E27.6.3.4	Sufficient space must be provided on the site so vehicles do not need to reverse off the site or onto or off the road from any site where any of the following apply: (a) four or more required parking spaces are served by a single access; (b) there is more than 30m between the parking space and the road boundary of the site; or	**Complies (retail)** – See Section 4.5
E27.6.3.6(1)	The whole area of parking and loading spaces, and manoeuvring areas and aisles must be formed, drained, provided with an all-weather surface to prevent dust and nuisance, and be marked out or delineated. This must be done before the activity to which those parking and loading spaces relate commences, and maintained for as long as that activity is continued.	**Will comply (retail)**
E27.6.3.6(3)	The gradient for the surface of any parking space must not exceed: 1 in 25 in any direction for accessible spaces for people with disabilities; or 1 in 20 (five per cent) in any direction for other spaces.	**Will comply (retail)**
E27.6.3.6(4)	The gradient for the manoeuvring area must not exceed 1 in 8.	**Will comply (retail)**

Standard	Description	Compliance
E27.6.4.1(3)	Vehicle Access Restrictions apply and vehicle crossings must not be constructed or used to provide vehicle access across that part of a site boundary which: a) is located within 10m of any intersection as measured from the property boundary, illustrated in Figure E27.6.4.1.1; b) is subject to the following types of Vehicle Access Restriction as identified on the planning maps in the zones listed in Table E27.6.4.1.1; c) has frontage to an arterial road as identified on the planning maps; or (d) is located closer than 30m from a railway level crossing limit line.	**Complies and will comply (retail)** No vehicle crossings are proposed at this stage that would fall under these rules. If any are applied accordingly in a future stage (such as the vehicle crossing to form the fourth, eastern arm of the Creek Road South / Main Street South intersection) then they will be assessed accordingly at that point (not part of this application)
E27.6.4.2 (1)	The maximum number of vehicle crossings permitted for any site and separation distance between crossings is specified in Table E27.6.4.2.1: Maximum number of vehicle crossings per road frontage of the site: 1 per 50m of frontage or part thereof Minimum separation from crossings serving adjacent sites: 2m where two crossings on adjacent sites can be combined and where the combined crossings do not exceed a total width of 6m at the property boundary, no minimum separation distance will apply Minimum separation between crossings serving same site 6m	**Complies (retail)** – See Section 4.5
E27.6.4.2 (2)	The width of a vehicle crossing(s) must meet the minimum width and not exceed the maximum width as specified in Table E27.6.4.3.2: Minimum width of crossing at site boundary: 5.5m (two-way) Maximum width of crossing at site boundary: 6.0m (two-way) Minimum formed access width: 5.5m (providing for two-way movements) provided it is contained within a corridor clear of buildings or parts of a building with a minimum width of 6.5m The formed width is permitted to be narrowed to 2.75m if there are clear sight lines along the entire access and passing bays at 50m intervals are provided.	**Does not comply (retail)** See Section 4.5
E27.6.4.4 (1)	The gradient of the access must not be steeper than specified in Table E27.6.4.4.1, 1 in 5 (20%)	**Will comply (retail)**
E27.6.4.4 (2)	To avoid the underside of the car striking the ground, as illustrated in Figure E27.6.4.4.2, access with a change in gradient exceeding 1 in 8 (greater than 12.5 per cent change) at the summit or a 1 in 6.7 (15 per cent change) at a sag must include transition sections to achieve adequate ground clearance, refer to Figure E27.6.4.4.3. Typically, a transition section requires a minimum length of 2m.	**Will comply (retail)**
E27.6.4.4 (3)	All vehicle access must be designed so that where the access adjoins the road there is sufficient space onsite for a platform so that vehicles can stop safely and check for pedestrians and other vehicles prior to exiting. This is illustrated in Figure E27.6.4.4.4. The platform must have a maximum gradient no steeper than 1 in 20 (5 per cent) and a minimum length of 4m for residential activities and 6m for all other activities.	**Will comply (retail)**

8.1 E38 Subdivision Standards

Table 8-2 below provides an assessment of the proposal against the key, relevant, transport-related standards in Section E38 Subdivision – Urban of the Unitary Plan.

Table 8-2: Assessment of transport-related Unitary Plan subdivision standards

Standard	Description	Compliance
E38.6.2.(1)	All proposed sites must be provided with legal and physical access to a road.	**Complies**

Table 8-3 below provides an assessment against the relevant assessment criteria related to section E38 Subdivision for the infringements/reasons for consent identified above.

Table 8-3: Assessment against E38 Subdivision – Urban of the Unitary Plan Assessment Criteria

Standard	Description	Response
E38.12.2.(k)	The effect of the design and layout of sites on transport infrastructure and facilities within roads. (i) Refer to Policy E38.3(15); and (ii) The extent to which the location and design of driveways and vehicle crossings compromises access to and the operation of transport infrastructure and facilities in roads including on-street parking, bus stops, street trees, network utilities and stormwater infrastructure	The proposal has been designed to be consistent with relevant policies and driveways will not interfere with other street infrastructure.

8.2 IX Drury Centre Precinct Provisions

Table 8-4 below provides an assessment of the proposal against the IX Drury Centre Precinct Provisions.

Table 8-4: Assessment of Drury Centre Precinct Provisions

Standard	Description	Compliance
Activity		
IX.4.1	(A1) Subdivision, or new buildings prior to subdivision, including private roads	**RD**
	(A2) Development of publicly accessible open spaces greater than 1000m2	**RD**
	(A3) New buildings	**RD**
	(A5) Subdivision and/or Development that does not comply with Standard IX.6.2 Staging of Subdivision and Development with Transport Upgrades with respect to the following elements of Table IX.6.2.1: i. Upgrades in rows (a) and (b) ii. The upgrade in row (c) relating to Drury Central train station	**N/A complies**
	(A6) Subdivision and/or development that does not comply with Standard IX.6.2 Staging of Subdivision and Development with Transport Upgrades with respect to the following elements of Table IX.6.2.1: i. The upgrade in row (c) relating to the Direct connection from State Highway 1 to the Drury Centre ii. Upgrades in rows (d) to (f)	**N/A Complies**

Standard	Description	Compliance
	(A7) Subdivision and/or development that does not comply with Standard IX6.2D(1) Road Design and Upgrade of Existing Rural Roads	**N/A Complies**
	(A8) Subdivision and/or development that does not comply with Standard IX6.2D(2) Road Design and Upgrade of Existing Rural Roads	**N/A Complies**
Standard		
IX.6.2B	Minimum Bicycle Parking: (a) In addition to the bicycle parking requirements in standard E27.6.2(6), at least one secure (long stay) bicycle park must be provided for every dwelling.	**Complies.** 83 bicycle parking spaces will be provided for retail activity meeting the minimum secure parking spaces specified in Table E27.6.2.5 in the AUP.
	(b) For multi-unit development, at least one visitor (short stay) bicycle space must be provided for every 20 dwellings.	**Complies.** 41 bicycle parking spaces will be provided for retail activity meeting the minimum visitor parking spaces specified in Table E27.6.2.5 in the AUP.
IX.6.2C	Purpose: Promote a mode shift to public transport and active modes by requiring end-of-trip facilities for all commercial and community activities. (1) End-of-trip facilities: (a) The activities specified in Table IX.6.2C.1 must provide end-of-trip facilities as listed below; and (b) The following end-of-trip facilities requirements apply to new buildings and developments.	**Complies.** Table IX.6.2C.1 states that for 24,000sqm of commercial activities (including retail), that seven showers and changing areas with space for storage of clothing are required. These are provided within the application, as shown on the IGNITE application set.
IX.6.2D	Road Design and Upgrade of Existing Rural Roads Purpose: To ensure that any activity, development and/or subdivision complies with Appendix 1: Road Function and Design Elements Table, and that existing rural roads are progressively upgraded to an urban standard. (a) Any activity, development and /or subdivision that includes the construction of new roads, or the upgrade of existing roads, must comply with Appendix 1: Road Function and Design Elements Table.	**Complies**. The development will front Brookfield Road and Fitzgerald Road, so both roads will be upgraded as per the Road Function and Design Elements Table (RFDET) provided in Appendix 1, as will Waihoehoe Road (west), and the Great South Road / Waihoehoe Road intersection as per the interim design. Creek Road is a new 20m wide collector road that will vary from the RFDET in accordance with note 1 of that table (Typical minimum width which may need to be varied in specific locations where required to accommodate network utilities, batters, structures, stormwater treatment, intersection design, significant constraints or other localised design requirements) due to its reserve edge location. The width will be 20m wide, and a 2-way shared path will run down the reserve edge to prevent conflict between cyclists and loading docks on the eastern side of the road.
	(b) Fitzgerald Road and/or Brookfield Road must be upgraded to an urban standard where vehicle access is proposed for any new activity, development and/or subdivision to or from either of these roads, and where the upgrade has not already occurred. The portion of road to be upgraded must extend from the proposed vehicle access to the intersection of Waihoehoe / Fitzgerald Roads.	**Complies** – these roads are proposed to be upgraded as part of this application (note Fitzgerald Road will be upgraded jointly with Fulton Hogan)

Table 8-5 below provides an assessment against the relevant assessment criteria for the infringements/reasons for consent identified above.

Table 8-5: Assessment against Drury Centre Precinct Assessment Criteria

Standard	Description	Response
IX.8.2(1)	Subdivision, or new buildings prior to subdivision, including development of private roads: (a) The extent to which the collector road network, the Key Retail Street and the potential connection to Drury Centre are provided generally in the locations shown on IX.10.2(1) Drury Centre: Precinct Plan 2 to achieve a highly connected street layout that integrates with the surrounding transport network and responds to landform.	The road network is in general accordance with the precinct plan.
	(b) Within Sub-precinct D, whether development precludes the construction of any connection between Brookfield Road and Quarry Road over Hingaia Stream.	The development does preclude the provision of this link, as it is not required to mitigate the effects of the development. This is demonstrated within the Plan Change ITA modelling.
	(c) Whether a high quality and integrated network of local roads is provided within the precinct that provides a good degree of accessibility and supports a walkable street network. Whether roads and pedestrian and cycle paths are aligned to provide visual and physical connections to open spaces, including along the stream network, where the site conditions allow.	The development provides protected cycleways and separated footpaths along all collector roads, and traffic calmed streets with footpaths on both sides on all local roads. This layout has been extensively discussed with Auckland Transport.
	(d) Whether subdivision and development provides for collector roads and local roads to the site boundaries to coordinate with neighbouring sites and support the integrated completion of the network within the precinct over time.	Connections to adjacent sites are provided where applicable.
	(e) Whether the design of new collector and local roads accords with the road design details provided in IX.11 Drury Centre: Appendix 1.	The development will front Brookfield Road and Fitzgerald Road, so both roads will be upgraded as per the Road Function and Design Elements Table (RFDET) provided in Appendix 1, as will Waihoehoe Road (west), and the Great South Road / Waihoehoe Road intersection as per the interim design. Creek Road is a new 20m wide collector road that will vary from the RFDET in accordance with note 1 of that table (Typical minimum width which may need to be varied in specific locations where required to accommodate network utilities, batters, structures, stormwater treatment, intersection design, significant constraints or other localised design requirements) due to its reserve edge location. The width will be 20m wide, and a 2-way shared path will run down the reserve edge to prevent conflict between cyclists and loading docks on the eastern side of the road.
	(f) Whether the street network provides direct, safe and legible pedestrian and cycle connections to the operational Drury Central train station as development occurs over time. In particular,	The proposal is within Sub-Precincts B and D and therefore provides a good quality (temporary) 3m wide shared pathway between the

Standard	Description	Response
	whether the following is provided, or an alternative is provided that achieves an equal or better degree of connectivity: (i) Development in Sub-Precinct B and D has a connection to the Drury Central train station via Drury Boulevard or the Key Retail Street shown on Precinct Plan 2.	intersection of Pitt Road and Creek Road to connect to the proposed Drury Central Rail Station.
	(g) Whether a temporary unsealed active modes connection, within the existing road reserve, has been provided to Drury South Precinct along Fitzgerald Road to Quarry Road (except for sections where impracticable due to constraints).	An unsealed active mode connection is provided as part of this project and is shown within the Aurecon plan set.
	(h) Prior to the upgrade of Fitzgerald Road, south of Brookfield Road, to an urban standard, whether any works are required within the existing road reserve, to ensure Fitzgerald Road is of a suitable condition to maintain safe traffic movement including any shoulder widening, localised widening, safety works and/or interim intersection upgrades, having regard to the additional traffic on that road generated by the Drury Centre Precinct.	The contractor will ensure that Fitzgerald Road and Brookfield Road will be of suitable quality prior to construction commencing.
IX.8.2(17)	Infringement to standard IX.6.2D(1) Road Design and Upgrade of Existing Rural Roads: (a) Whether there are constraints or other factors present which make it impractical to comply with the required standards. (b) Whether the design of the road and associated road reserve achieves policies IX.3(8), (16), (18) and (19). (c) Whether the proposed design and road reserve: (i) incorporates measures to achieve the required design speeds; (ii) can safely accommodate required vehicle movements; (iii) can appropriately accommodate all proposed infrastructure and roading elements including utilities and/or any stormwater treatment; (iv) assesses the feasibility of upgrading any interim design or road reserve to the ultimate required standard.	**N/A,** The development will front Brookfield Road and Fitzgerald Road, so both roads will be upgraded as per the Road Function and Design Elements Table (RFDET) provided in Appendix 1, as will Waihoehoe Road (west), and the Great South Road / Waihoehoe Road intersection as per the interim design. Creek Road is a new 20m wide collector road that will vary from the RFDET in accordance with note 1 of that table (Typical minimum width which may need to be varied in specific locations where required to accommodate network utilities, batters, structures, stormwater treatment, intersection design, significant constraints or other localised design requirements) due to its reserve edge location. The width will be 20m wide, and a 2-way shared path will run down the reserve edge to prevent conflict between cyclists and loading docks on the eastern side of the road.

8.3 Auckland Unitary Plan – Special Information Requirements

An assessment of IX.9 Special Requirements that specifically addresses IX.9(5) and IX.9(6) of the Drury Centre Precinct is shown in Table 8-6 below.

Table 8-6: Assessment of IX.9 special requirements

Standard	Description	Compliance
IX.9(4)	Without limiting the scope of the integrated transport assessment, the integrated transport assessment must assess and provide details of the following: (a) Whether the proposal is in accordance with Policies IX.3(2), IX.3(3), IX.3(5), (6), (7), (8) and IX.3(10) in addition to any other relevant AUP policy;	**Complies.** refer to section 6 of this report.
	(b) Whether public transport routes that connect to the Drury Central train station and the Drury Centre can operate effectively and efficiently at all times;	**Complies.** refer to section 4 of this report.
	(c) Whether the Waihoehoe/Great South Road intersection can operate safely and with reasonable efficiency during the inter-peak period, being generally no worse than a Level of Service D for the overall intersection;	**Complies.** refer to section 4 of this report.
	(d) Whether increased use of public transport within the Drury Centre precinct or the wider area, has provided additional capacity within the transport network including by implementing travel demand management measures set out in a travel plan, which has been prepared in accordance with IX.9(4);	**Complies.** refer to the travel plan in **Appendix E**.
	(e) Whether the proposal would have a similar or lesser trip generation and similar effects on the surrounding road network to the development mix provided for in the Table IX.6.1.1 Threshold for Subdivision and Development;	**Complies.** refer to section 5 of this report.
	(f) Whether residential development is coordinated with retail and commercial development within the wider Drury East area shown on Precinct Plan 2 to minimise trips outside of the precinct providing additional capacity within the transport network;	**Complies.** refer to section 5 of this report.
	(g) Whether the actual rate of development in the wider area is slower than anticipated and provides additional capacity in the transport network;	**Complies.** refer to section 5 of this report.
	(h) The effect of the timing and development of any other transport upgrades or transport innovations not anticipated by the Drury Centre precinct;	**Complies.**
	(i) Whether the integrated transport assessment supporting the application documents the outcome of engagement with the road controlling authority;	**Complies** this engagement is documented throughout this ITA
	(j) Whether the proposal demonstrates methods that promote the increased use of public transport, including details of how those methods would be implemented, monitored and reviewed so as to contribute to a reduction in vehicle trips;	**Complies.** refer to section 6 of this report.
	(k) Whether the intersection of Great South Road/Quarry Road and the Drury South Precinct roads can operate safely and efficiently prior to the full upgrade of Waihoehoe Road between Fitzgerald Road and Great South Road;	**Complies.** refer to section 6 of this report.

Standard	Description	Compliance
	(l) Whether the surrounding transport network can operate safely and efficiently when considering traffic generated by construction activities within the Precinct Plan 2 area.	**Complies.** refer to section 6 of this report.
IX.9(5)	Monitoring of Rule IX.6.2 Staging of Subdivision and Development with Transport Upgrades and Rule IX.6.2A Maximum Parking Rate. (a) Any proposal for land use or subdivision for dwellings, retail, commercial and/or community activities must demonstrate compliance with rule IX.6.2 Staging of Subdivision and Development with Transport Upgrades. Any application must contain details of the maximum number of dwellings or amount of retail, commercial or community GFA proposed to be enabled (as well as anticipated dwellings/GFA for any subdivision proposal involving superlots).	**Complies.** As discussed in section 5. The proposal can be accommodated within the provided transport infrastructure.
IX.9(6)	Transport Design Report: Any proposed new road intersection or upgrading of existing road intersections must be supported by a Transport Design Report and Concept Plans (including forecast transport modelling and land use assumptions), prepared by a suitably qualified transport engineer confirming the location and design of any road and its intersection(s) supports the safe and efficient function of the existing and future (ultimate) transport network and can be accommodated within the proposed or available road reserves. This may be included within a transport assessment supporting land use consent. In addition, where an interim upgrade is proposed, information must be provided, detailing how the design allows for the ultimate upgrade to be efficiently delivered.	**Complies.** Section 6 of this report provides excerpts of the Aurecon detailed design plan set alongside traffic modelling to demonstrate that the intersection can accommodate traffic flows beyond those envisaged by this proposal. Further, each intersection has been tested for future development years of 2038 and 2048.

9 Integration with Transport Policy

The following section provides a review of established policy and plans in relation to the proposed developments. The documents reviewed comprise:

- Government Policy Statement on Land Transport (**GPS**);
- Auckland Plan;
- Auckland Unitary Plan (**AUP-OP**);
- Auckland Transport Alignment Project (**ATAP**);
- Regional Land Transport Programme (**RLTP**);
- Regional Public Transport Programme (**RPTP**)
- Integrated Transport Programme (**ITP**)
- Future Urban Land Supply Strategy (**FULSS**); and
- Supporting Growth Programme.

9.1 Government Policy Statement on Land Transport (GPS)

The Government Policy Statement (**GPS**) on Land Transport sets out the Government's desired outcomes and priorities for the land transport sector. It describes what the Government expects to achieve through the National Land Transport Fund and the manner in which funding is allocated to upgrade and maintain the land transport network.

The GPS was released in September 2020 and took effect from 1 July 2021. The GPS provides strategic direction for a 10-year period until 2030/2031 to improve the performance of the land transport system.

The four strategic priorities of the GPS are safety, access, environment and value for money. The GPS summarises the objectives of these priorities as follows:

(i) Safety – significantly reducing the number of deaths and injuries that occur on the transport network;

(ii) Access – people's ability to connect with people, goods, services and opportunities;

(iii) Environment – a land transport system that reduce greenhouse gas emissions, as well as adverse effects on the local environment and public health; and

(iv) Value for money – increase the emphasis on value for money to maximise the impact of money spent to achieve the Government's outcomes.

The GPS outlines three themes to assist with effectively delivering upon the strategic priorities. These themes for the draft GPS are described below:

(i) A mode neutral approach to transport planning and investment decisions;

(ii) Incorporating technology and innovation into the design and delivery of land transport investment; and

(iii) Integrating land use and transport planning and delivery.

The Project involves the development of commercial activities and superlots for future residential development. Open space reserves, roading infrastructure and upgrades to existing infrastructure are also proposed as part of the Project, as well as an interim direct walking and cycling connection for pedestrians and cyclists from the retail area to the Drury Central Train station which will eventually link the area with the Metropolitan Centre. The Project is consistent with the land use envisaged for the area under the Council Structure Plan and proposed through Plan Change 48.

The Project supports integrated land use within the project area, and within the context of the future development planned for the wider Drury area. The provision of commercial activities in this location reduces the need for current and future Drury residents to make specific trips to other commercial centres or travel to destinations further away. Shopping is easily accessible by active modes for the future residential area (due to its proximity to those areas, and the provision of walking and cycling connections). It is also increases access to goods and services to the wider community as it is adjacent to a nexus of several key arterial routes such as SH1, SH22 and Great South Road, where existing drivers can readily divert to the development on their way to another destination.

The location of commercial development, the excellent active mode provision within the proposal, and provision of a direct walking and cycling connection to the train station also promotes use of alternative transport modes given its location relative to complementary (future) residential activities as well as proximity to bus routes and the new proposed train station and future centre. The project will support an integrated, sustainable and transit orientated metropolitan centre to be established around the fully funded Drury Central train station programmed for completion in the final quarter of 2025. This provides increased access to social and economic opportunities, as outlined in the GPS.

The proposed project aligns with the strategic priorities of the GPS by:

- reducing the safety risk of drivers as a result of safety enhancements to the existing and planned roads;
- supporting a TOD,
- the promotion of access between the residents and retail goods,
- reducing the impact on the environment by reducing the number and length of vehicular trips on the road network.

It is therefore demonstrated that the proposed project in Drury East integrates very well with the strategic priorities and the themes outlined in the GPS.

9.2 Auckland Plan 2050

The Auckland Plan is a spatial plan for Auckland. It outlines Auckland Council's 30-year strategy to ensure Auckland grows in a way that will meet the opportunities and challenges of the future. Initially produced in 2012, a new plan was released in June 2018. Since the original Plan was released, the AUP (OP) has been introduced and several significant infrastructure developments have been completed. The new Auckland Plan shows how Auckland will prepare for an expected population increase of 39% by 2043, and the key challenges Auckland faces in dealing with this population growth. Other key challenges identified are sharing prosperity with all Aucklanders and reducing environmental degradation.

The Auckland Plan is comprised of six outcomes where significant progress is targeted, one of which addresses transport and access. The Auckland Plan summarises this outcome as "Aucklanders will be able to get to where they want to go more easily, safely and sustainably."

The transport and access outcome outline three directions:

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

The Auckland Plan also includes seven focus areas for the transport and access outcome:

1. Make better use of existing transport networks;
2. Target new transport investment to the most significant challenges;
3. Maximise the benefits from transport technology;
4. Make walking, cycling and public transport preferred choices for many more Aucklanders;
5. Better integrate land use and transport decisions;

6. Move to a safe transport network, free from death and serious injury; and

7. Develop a sustainable and resilient transport system.

Providing a Metropolitan Centre in the Drury East area provides an opportunity for the public transport network to be expanded and further developed, to effectively serve the proposed urbanisation, and this proposal represents the first step in that development process. The proposed Fast Track developments by Kiwi Property and the proposed residential developments by Fulton Hogan and Oyster Capital will enable an integrated transport system to be created over time, which enables people to be connected with places, goods and services. The close proximity of the complementary activities improves the attractiveness of the active transport modes, reducing reliance upon private vehicle trips.

Employees and residents within Drury East will also have more travel options beyond private vehicles such as walking, cycling and public transport due to the proposed infrastructure upgrades and the expected connectivity of the Fast Track area to the external network. The new train stations, rail electrification and additional rail lines, alongside the provision of high frequency bus routes, will create a solid basis for public transport provision throughout the urban zone. This demonstrates that the proposed project integrates well with the transport and access outcomes of the Auckland Plan.

9.3 Auckland Unitary Plan (AUP – OP)

The AUP(OP), which has been operative in part since November 2016, has the following objectives with regards to transport infrastructure:

Land use and all modes of transport are integrated in a manner that enables

a) The benefits of an integrated transport network to be realised; and

b) The adverse effects of traffic generation on the transport network to be managed;

An integrated public transport, walking and cycling network is provided for;

- Parking and loading supports 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 priorities; and
- Road / rail crossings operate safely with neighbouring land use and development.

The proposal will promote strong integration between residential and commercial activities. The subsequent employment opportunities in the area will reduce the effects on the road network by reducing the number and length of trips generated on the wider road network, thus acting as a TOD (a development that has integration with transport choices at its heart). The Fast Track area will be located in close proximity (and with direct walking and cycling connections provided) to a new train station and public transport hub which will further encourage public transport integration. Further infrastructure upgrades are anticipated as a result of this project which will enhance the Fast Track area's integration with various transport modes. This will ultimately provide the benefits of an integrated network by providing residents and employees with transportation choices, thereby reducing the effects of generated traffic by reducing the demand for private vehicle travel.

The construction of numerous network upgrades enables the adverse effects of the traffic generated by the developments to be mitigated. There will be suitable access from the Fast Track areas to the wider road network via new roading onsite and the existing network, which provides access to the surrounding area and wider Auckland. The new road network and upgrades to existing roads (including new dedicated footpaths and cycle lanes) will provide for safe travel for all transport modes.

In summary, the Fast Track area is well located to a variety of transportation modes which means that the proposed developments integrate well with both the objectives of the Unitary Plan and the existing and future transportation network.

9.4 Auckland Transport Alignment Project (ATAP)

Given the growth challenges that Auckland is facing, and the need for some big transport decisions to deal with this, the Government and Auckland Council have agreed on the need for a collaborative approach to improving alignment on a long-term strategic approach to transport in Auckland. Originally released in September 2016, a new edition of the Auckland Transport Alignment Project (ATAP) was released in March 2021 to provide a package to develop Auckland's transport system over the next 30 years. The direction of ATAP is based upon the latest GPS and the Auckland Plan. Compared to the previous edition of ATAP, a greater emphasis has been placed on public transport (including rapid transit), walking, cycling and safety.

Ultimately, ATAP aims to provide Auckland with a transport system that provides safe, reliable and sustainable access. It contains investment to be made in projects to assist growth over the next decade (2021 – 2031), while identifying future priorities beyond 2031. It recommends investment be made in short and medium-term projects to assist growth over the next decade, while working to protect routes for longer term projects.

The recent ATAP release confirms the $243 Million identified in the RLTP for upgrades to support growth in Drury, and itemises the specific schemes within the funding allocation:

- Waihoehoe Road west construction
- SH22 intersection upgrades at Great South Road and Jesmond Road
- Collector road extension of Jesmond Road to Drury West station
- Route protection for future rail corridor and station improvements
- Route protection for Jesmond Road and Bremner Road upgrades

The projects outlined in ATAP will greatly enhance the accessibility of Drury East to all modes. While private vehicles currently have a high level of access due to the proximity of SH1, the emphasis of rail in ATAP will enable increased utilisation of public transport. The projects included in the ATAP throughout the region are intended to improve the safety and efficiency of the transport network which will therefore have a positive benefit for Drury East.

9.5 Regional Land Transport Plan (RLTP)

The Regional Land Transport Plan (**RLTP**) prepared by Auckland Transport with NZTA and Kiwirail, identifies the priority of several key region-wide transport projects over a 10-year period. The current RLTP was adopted in 2021 and covers the period 2021-2031.

The key themes of the RLTP are prioritising high frequency public transport, improving the customer experience and optimising the existing network. The proposed developments integrate well with the RLTP by aligning well these strategic themes. The integration of different land uses allows active modes and public transport to be prioritised as a transport mode. Furthermore, the variety of feasible modes in addition to the expected infrastructure upgrades in Drury East will allow network optimising by providing a variety of alternative routes. This enhances the resilience of the area and better manages congestion.

Further, the Draft Regional Land Transport Plan ("RLTP") 2021-2031 provides a line item for "Drury Supporting Infrastructure Improvements" to the value of $243 million. The description for this fund reads: *"$243 million for local road improvements to support the urban development of Drury including access to new rail stations. This is in addition to the South Auckland package, including rail improvements, funded through NZUP"*

9.6 Regional Public Transport Plan

The Auckland Regional Public Transport Plan (**RPTP**) seeks to deliver an improved public transport network in Auckland by increasing public transport frequency along key transport corridors and simplifying ticketing to improve user experience.

The vision of the RPTP is to deliver "An integrated, efficient and effective public transport network that offers a wider range of trips and valued by Aucklanders". To achieve this vision, Auckland's public transport system needs to deliver:

- Services that align with future land use patterns;
- Services that meet customer needs;

- Increased passenger numbers;
- Increased public transport mode share; and
- Improved value for money.

The Project area is not currently well served by the public transport network with only one bus route in the area and the nearest train station in Papakura. The increased activity within Drury East due to these developments will improve the economic viability of providing additional bus routes to serve the properties in Drury East (including those that are existing). The proposed development does not hinder Auckland Council and Auckland Transport from achieving the deliverables mentioned in the RPTP.

9.7 Integrated Transport Programme (ITP)

Auckland's 2012-2041 Integrated Transport Plan (**ITP**) sets out the 30-year investment programme to meet the transport priorities outlined in the Auckland Plan across travel modes covering the responsibilities of all transport agencies. The ITP provides a consolidated transport investment programme across the transport system over the next 30 years. The programme covers footpaths, cycle facilities, public transport, state highways and local roads, intermodal transport facilities and supporting facilities such as parking and park-and-ride sites. In particular the ITP:

- Guides transport agencies in their detailed planning activities for maintaining, operating, renewing and developing their transport networks;
- Directs transport asset management, corridor and network development, transport service levels and the transport capital portfolio for each of the 10-year periods to 2041; and
- Informs the detailed programming of activities in the RLTP which is a 10-year plan prioritising region wide transport projects currently for 2015-2025.

Projects identified in the ITP which come within the Drury East area include the following:

- Great South Road Upgrade between Waihoehoe Road and SH1 (Manukau Central to Drury);
- Possible new rail station(s); and
- Extension of Rapid Transit Network ("RTN") (electrification) to Pukekohe and additional rolling stock.

Projects identified in the ITP are largely addressed by ATAP, the RLTP and the RPTP, which are all detailed previously in this report. The proposed development does not preclude any of these projects from being completed.

9.8 Future Urban Land Supply Strategy (FULSS)

The purpose of the FULSS is to provide a strategic and proactive 30-year sequence for making 11,000 hectares of future urban land identified under the AUP ready for urban development.

The decision version of the AUP resulted in significant increases in areas zoned FUZ as well as live zoning parts of others. These changes required reconsideration of the sequencing and timing of development in the initial FULSS.

The refresh also presented an opportunity to align the FULSS with recent technical work completed during the Supporting Growth Programme (discussed below) which developed a transport network plan to support development in the future urban areas.

The FULSS currently splits the Drury West area into two distinct stages as shown in Error! Reference source not found.. Stage 1 (north of SH 22) is expected to be development ready by 2022, and Stage 2 (south of SH 22) including the Opaheke and the eastern Drury area scheduled to be development ready between 2028 and 2032.

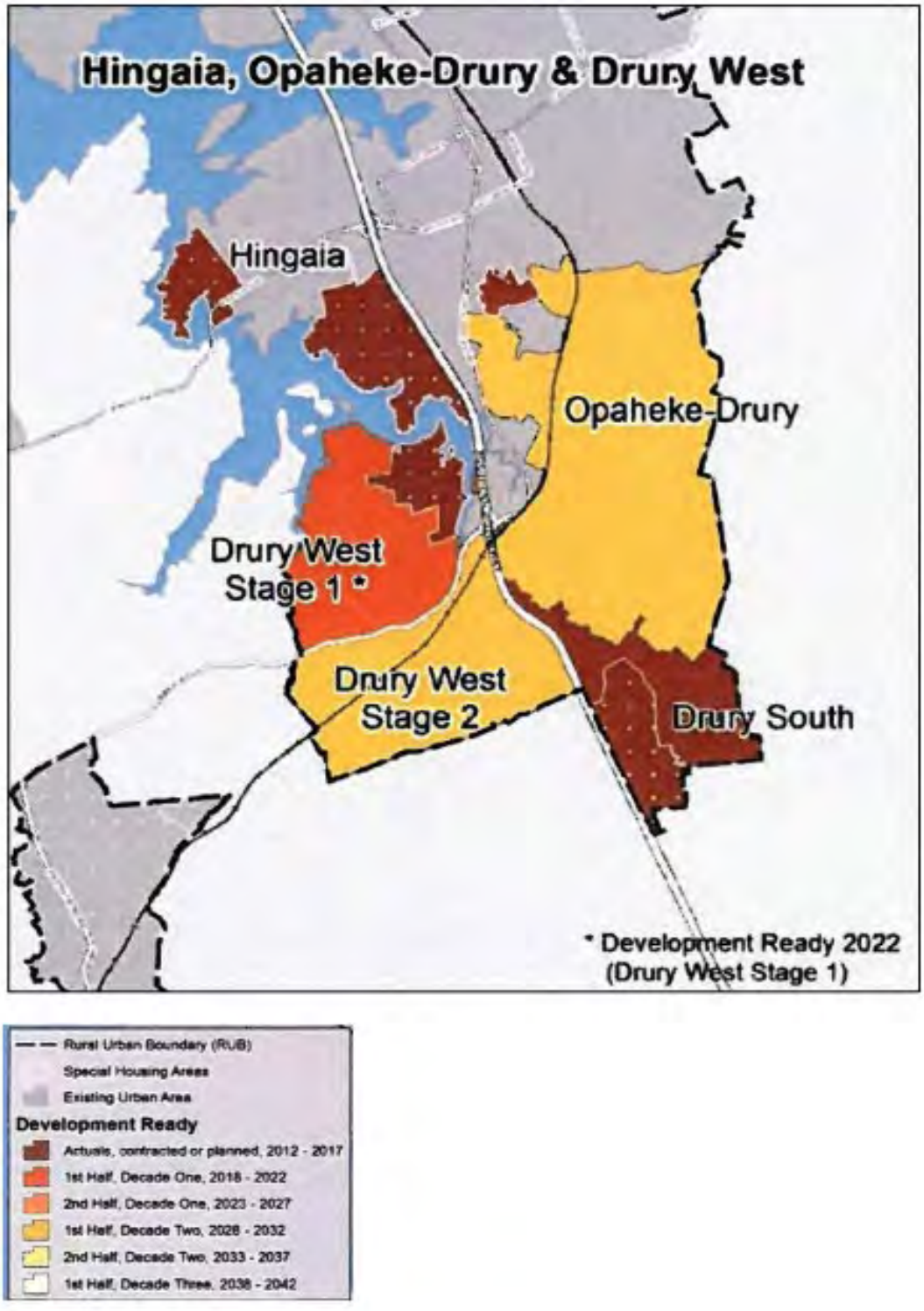


Figure 9-1: Future Urban Areas Sequencing under FULSS

9.9 Supporting Growth Programme

The Supporting Growth Alliance have released the Drury Infrastructure Funding and Financing Study (**DIFF**) Transport Assessment that provides the next level of detail on the southern preferred network including timing of anticipated infrastructure upgrades.

The DIFF Staging Schedule, and the upgrade costs that were subsequently provided by Auckland Council, set out indicative costs and timing for all works considered by SGA to be required in the Drury area to realise the Council Structure Plan and Preferred Network. The DIFF Schedule includes upgrades that can be classified as follows:

- Those anticipated to be provided within each of the Fast Track areas in Drury East, Drury West and Drury South;
- Those with Committed funding from Authorities, such as NZUP and ATAP; and
- Those with no funding currently identified.

The preferred transport network identified for Auckland's southern growth areas links into all other planned transport initiatives and aims to act as an overarching planning tool to guide transport investment, consenting and development.

The programme will begin delivering on some of the key project priorities laid out in the ATAP, and those of greatest relevance to the Drury East area are listed below:

- Extension of RTN network (electrification) to Pukekohe;
- New stations at Paerata, Drury Central and Drury West, and associated Park and Rides;
- Frequent Transit Network priority measures - Drury West to Manukau;
- Third Main Rail Line Papakura to Pukekohe;
- Extension to four-lane road from Drury to Bremner Road and provide a north south arterial link down to Drury West Station;
- Mill Road extension from Alfriston Road in the north to Drury South;
- A potential new additional interchange on SH1 at Drury South;
- Cycling improvements;
- Arterial road improvements; and
- SH1 widening – capacity improvements to Drury South.

9.10 Summary

It has been demonstrated that the future development that would be enabled by the Fast Track has excellent alignment with the various transport-related policy documents relevant to this proposal. Given the close proximity of new residential and commercial developments proposed, the project aligns with the Auckland Plan, the GPS and the AUP(OP) by providing high density development maximising the use of rapid transit and reduced trips. The proximity of the new Drury train station will ensure future residents and employees in the area have access to a high frequency public transport system.

Further, the nature, scale and location of the development will positively influence the viability of and confidence in the public and active transport infrastructure investments that have already occurred and are planned in the area.

Other policy documents such as ATAP and ITP also outline funded and future priority projects which will further enhance the Fast Track area's high level of accessibility to multiple transportation modes and the increased efficiency of the transport network.

10 Conclusion

Based on the assessments and findings discussed within this transportation assessment, it is concluded that:

- Based on the previous transport assessments and the review of the masterplan, it is expected that all anticipated upgrades can be accommodated on the surrounding road network in a sustainable manner and in the existing public road corridor, respectively in applicant land.
- The design of the roads within the development are generally in accordance with the requirements and recommendations of the Unitary Plan and design guidance such as the Transport Design Manual and Engineering Code of Auckland Transport and can appropriately accommodate the relevant design vehicles and road users; and
- The proposal complies with the AUP(OP) transport requirements, with the exception of vehicle crossing widths for the retail area, noting that a number of vehicle crossing, and car parking requirements will only be able to be assessed fully in a subsequent detail design stage.

It is therefore considered that there are no traffic or transport reasons to preclude the approval of the resource consent as requested.

Appendices

We design with community in mind

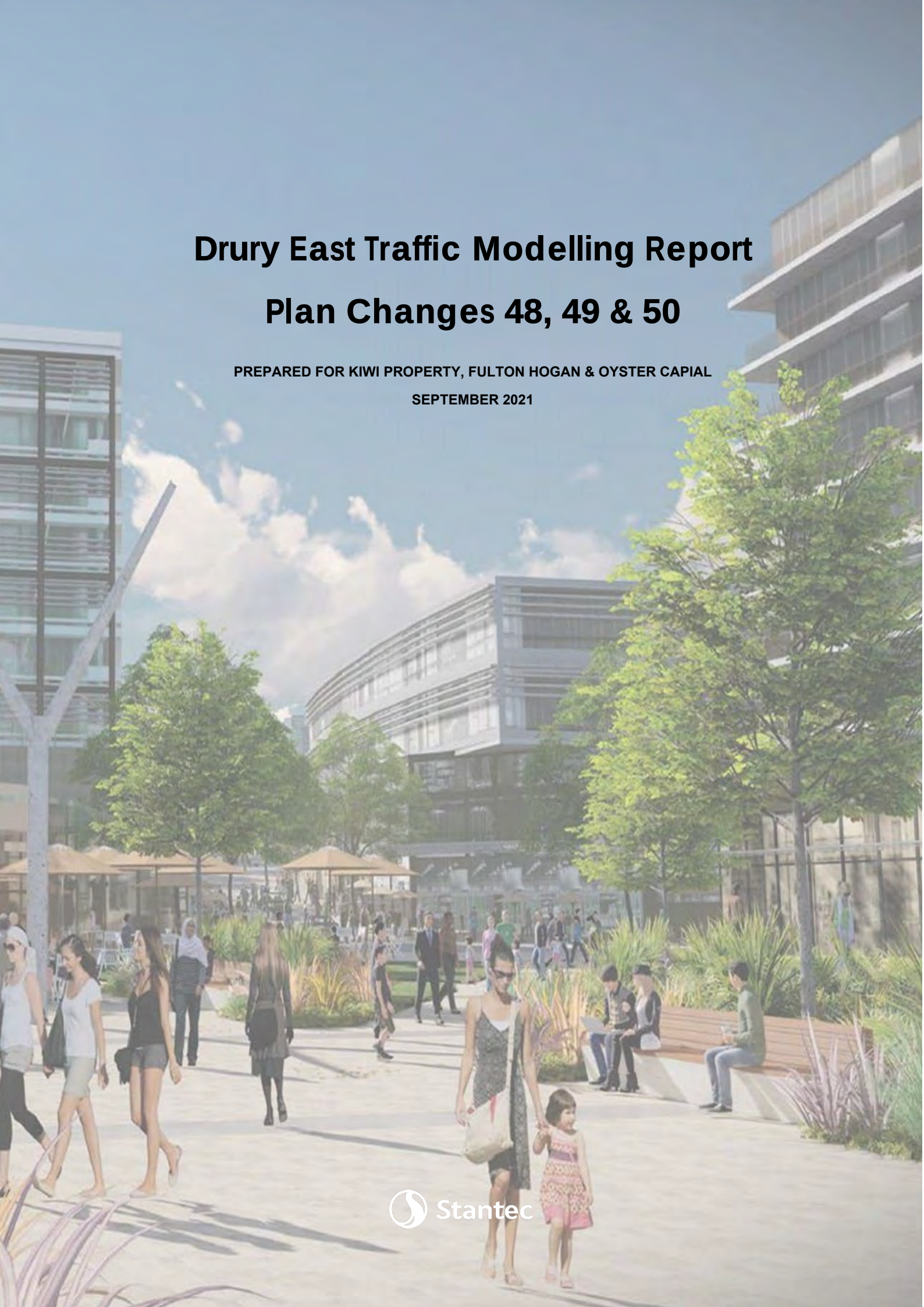
Appendix A Plan Change Modelling Report

Drury East Traffic Modelling Report

Plan Changes 48, 49 & 50

PREPARED FOR KIWI PROPERTY, FULTON HOGAN & OYSTER CAPIAL

SEPTEMBER 2021



Revision Schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	**Checked by**	**Reviewed by**	**Approved by**
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B	30/08/2021	Second Draft	H Papps/S Vingrys	D. Hughes	D. Hughes	D. Hughes
C	02/09/2021	Final	H Papps/S Vingrys	D. Hughes	D. Hughes	D. Hughes
D	30/09/2021	Revised Final	H Papps/S Vingrys	D. Hughes	D. Hughes	D. Hughes

Quality Statement

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This disclaimer shall apply notwithstanding that the report may be made available to Kiwi Property, Fulton Hogan and Oyster Capital and other persons for an application for permission or approval to fulfil a legal requirement.

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Executive Summary

Stantec has undertaken traffic modelling to assess the traffic effect of the developments enabled by the proposed Drury East private plan changes 48, 49 and 50 for Kiwi Property (Kiwi), Fulton Hogan, and Oyster Capital. The modelling has identified Points of Assessment at which development yield has been assessed in relation to specified infrastructure upgrades.

Traffic modelling has previously been prepared to support the plan changes, however changes to the modelling methodology and government infrastructure announcements regarding Mill Road and SH1 funding necessitates this update.

The traffic modelling has been undertaken using a three-tiered approach, consisting of a macro strategic model (MSM), a mesoscopic project model (SATURN), and a localised intersection operational model (Sidra Intersection). The assessment period spans three decades, between the anticipated start of the developments in 2023 through to 2048.

This revised traffic modelling assessment has been undertaken utilising Supporting Growth Alliance (SGA)'s SATURN model which was prepared to support the Drury Infrastructure Funding and Finance Study. Stantec adopted SGA's trip generation rates, mode share splits, internalisation assumptions and refined zone system, so the same testing platform would be used to assess the development's impact. Some of the assumptions made by SGA are considered conservative, however the Stantec modelling has adopted these assumptions to remain consistent with the overall modelling philosophy.

The key difference in modelling objectives between the Stantec modelling assessment and SGA's assessment is the focus on a more detailed analysis of network operation, including the assessment of varying infrastructure supply scenarios at the Points of Assessment. This is in comparison to SGA's modelling which focused on a more strategic assessment of the transport infrastructure needs using infrastructure staging principles and link flow values.

Infrastructure staging was tested using two core scenarios; planned infrastructure supply; and additional infrastructure supply. The planned infrastructure supply includes planned infrastructure as part of SGA's Preferred Network and infrastructure that developers are able to provide. The additional infrastructure supply was tested as a sensitivity test, including Brookfield Road/Quarry Road link and a Firth Street overbridge. These were tested to assess if such measures could be used to expedite the development.

Modelling was undertaken to test several short-, medium- and long-term infrastructure scenarios at the Points of Assessment, which will be used to inform the Plan Changes Precinct Provisions.

Intersection operational criteria was developed that defined poor intersection performance and an assessment point of network operation focused on the queue lengths, including the remaining queue storage capacity to the adjacent intersection and, where applicable, interpeak delays. Consideration was also given to the northbound queuing on SH1 and average daily link flows for roads connecting to the GSR/Waihoehoe Road intersection.

Where the implementation dates of infrastructure upgrades were unknown, Indicative years of when potential infrastructure could be built were estimated based on SGA's assumptions to enable background traffic (growth outside of the Drury East area) to be taken into consideration. The land uses in both the SGA and Stantec models are based on the original Council i11.5 land use assumptions, with updates reflecting the latest Drury East and Drury West development schedules. Utilising the Council i11.5 households and employment estimates for the background traffic is considered a conservative approach given the considerable development predicted for areas outside of Drury East and Drury West that face unresolved environment issues which may restrict development. Additionally, the development programme for other zones outside of Drury East relied on an earlier introduction of major infrastructure such as Mill Road or Pukekohe Expressway.

The modelling approach was developed in coordination with authorities (Waka Kotahi, Auckland Transport, Auckland Council and SGA) through a series of meetings. Broad consensus on the overall approach was reached, albeit with some outstanding questions regarding some aspects of the analysis. It is expected that most of these outstanding questions will be resolved within this report, and any remaining issues can be discussed in traffic caucusing.

The modelling demonstrated that the rezoning sought by the plan changes can be accommodated by the surrounding transport network, with several targeted local upgrades recommended within the first two decades.

These are primarily an immediate minor upgrade to the intersection of Great South Road and Waihoehoe Road with a signalised upgrade proposed as part of the Auckland Transport Alignment Project (ATAP) works. Provision of a direct

access to the Metropolitan Centre from SH1 would benefit the centre and help reduce traffic flows elsewhere in the immediate vicinity of the Metropolitan Centre. Urbanisation of Fitzgerald Road, Brookfield Road and other roads fronting Kiwi's, Oyster's and Fulton Hogan's developments is also proposed.

Based on the modelling, it is considered that the Drury East plan changes can be supported from a traffic perspective and are unlikely to have a significant adverse effect on the traffic network, assuming that infrastructure to support the developments is implemented.

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1 Introduction

Stantec has been engaged to undertake traffic modelling to assess the traffic effect of proposed developments within Drury East as part of Plan Change 48 (Kiwi Property (Kiwi)), Plan Change 49 (Fulton Hogan) and Plan Change 50 (Oyster Capital).

The traffic modelling assessment period spans three decades, between the start of the development in 2023 through to 2048. The purpose of the modelling is to forecast future traffic movements in the area based on a series of infrastructure and land use assumptions. It should be noted from the outset that the modelling is conservative and is inherently less accurate as time progresses. In this regard, the modelling has identified a number of Points of Assessment in the development schedule at which infrastructure is assumed to have been developed, failing which a further Transport Assessment would be required, taking account of the actual traffic conditions at that time.

There are other important transport planning aspects, in addition to the traffic modelling, that are important to consider for the Plan Changes. These will be more widely discussed in the Integrated Transport Assessment reports prepared for Plan Change 48, Plan Change 49 and Plan Change 50.

1.1 Background

To accommodate further growth and to facilitate urbanisation in Drury, Council has undertaken Structure plans for Drury-Opaheke and Pukekohe-Paerata. The Drury-Opaheke area is divided into Drury East / Central / South (Drury East) and Drury West, as shown in Figure 1-1 below. State Highway 1(SH1) separates Drury East and Drury West and provides a direct connection northbound and southbound.

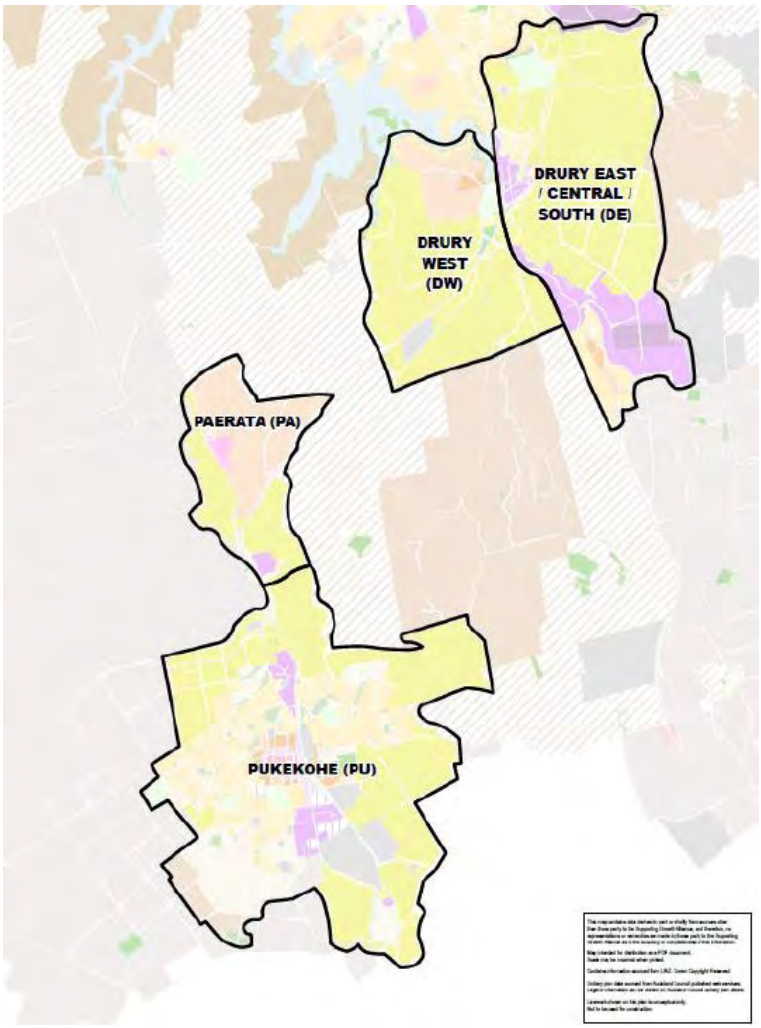


Figure 1-1: Geographic subdivisions of Structure Plan Area

On 2 April 2019, a Draft Integrated Transport Assessment by Supporting Growth Alliance (SGA ITA) was released. This outlined the transportation effects of the proposed Structure Plan areas for Drury-Opaheke and Pukekohe-Paerata, as part of the Council's Future Urban Land Supply Strategy (FULSS). The Drury-Opaheke Structure Plan Area is shown in Figure 1-2.

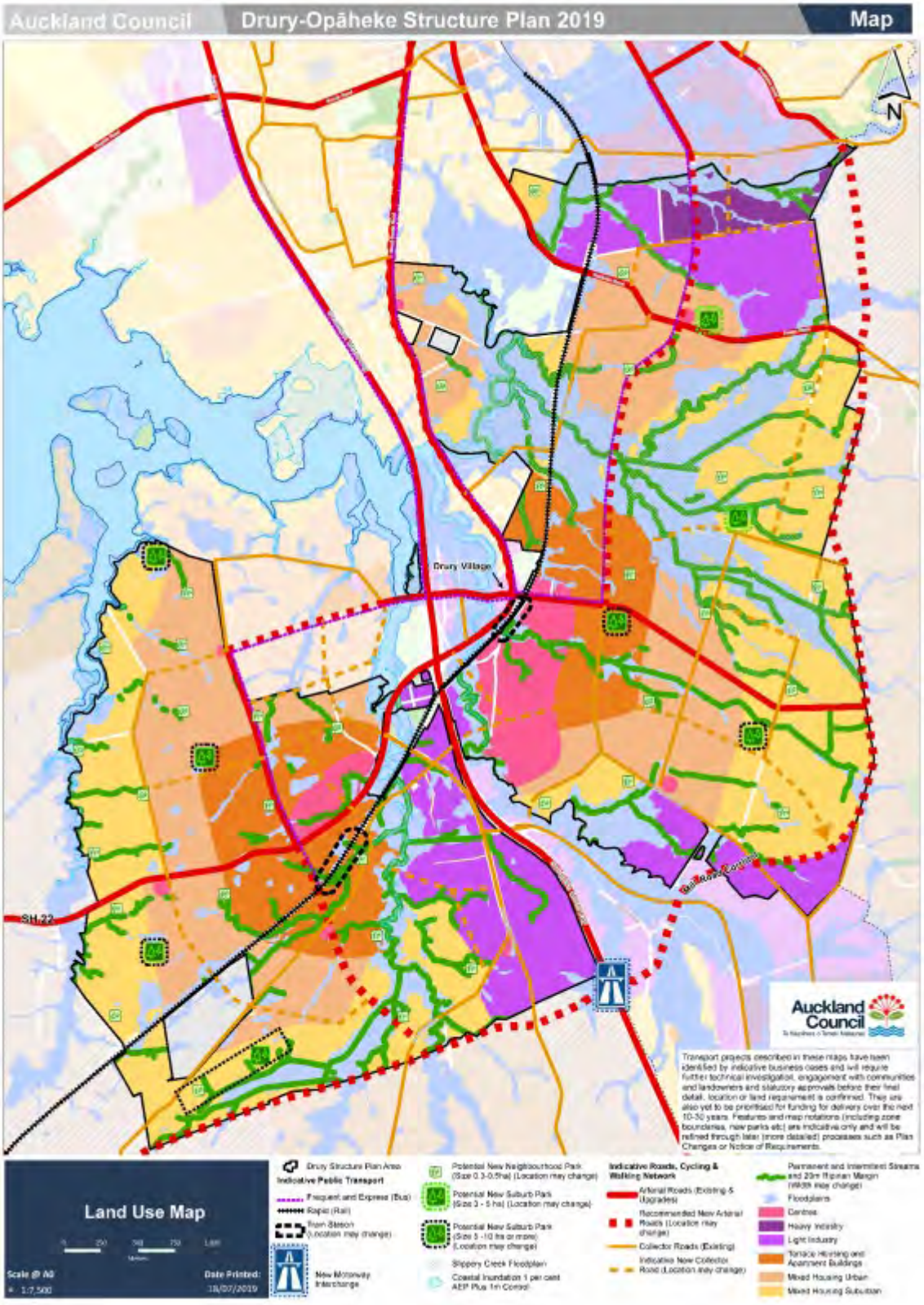


Figure 1-2: Drury-Opaheke Structure Plan 2019 (from SGA ITA)

Kiwi Property, Fulton Hogan and Oyster Capital have substantial landholdings within Drury East and are seeking to progress development ahead of the Council's current staging. Kiwi Property is proposing to develop a Metropolitan Centre (i.e. mixed use) whilst Fulton Hogan and Oyster Capital are both proposing primarily residential development. The broad proposed plan change areas for each property owner are outlined in Figure 1-3 below.

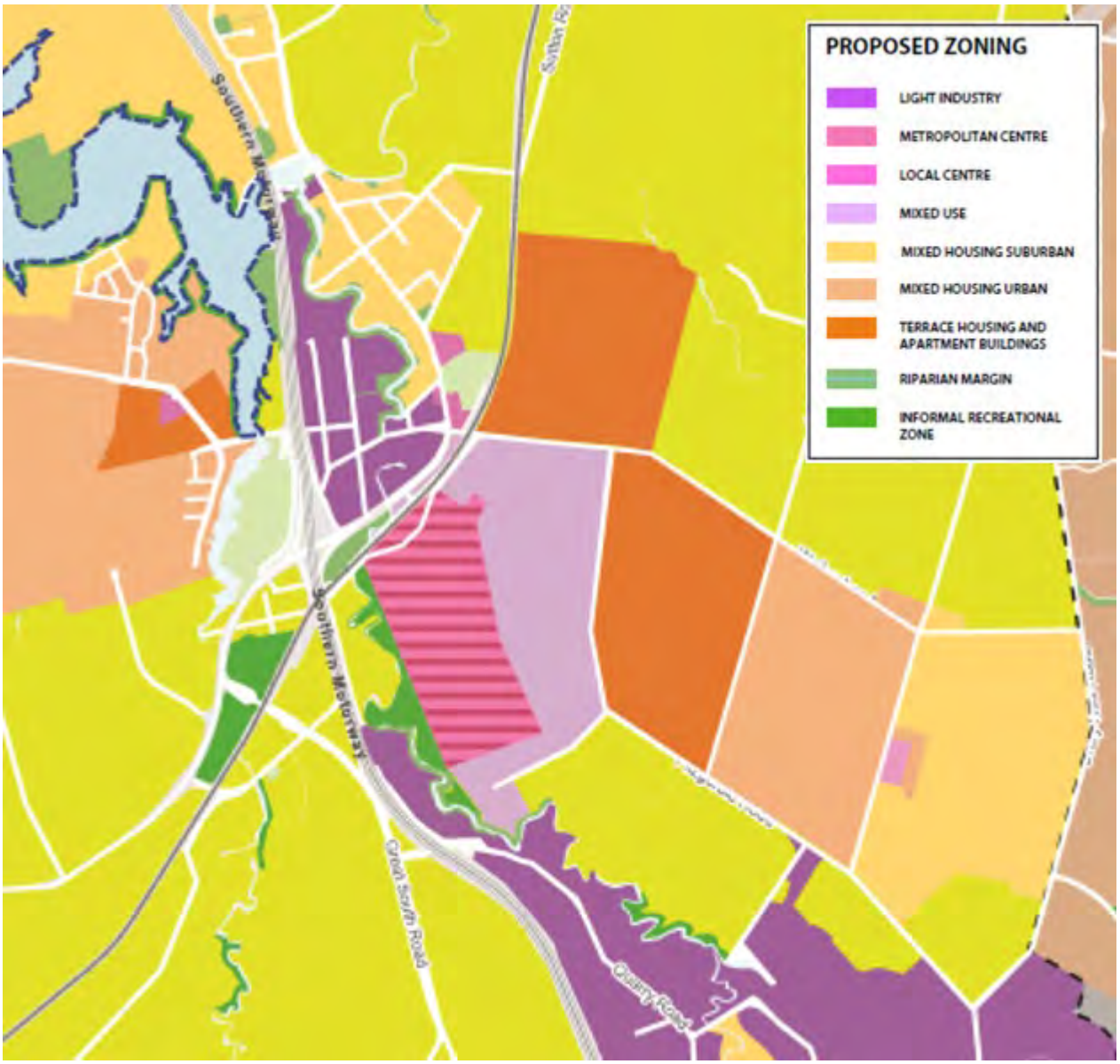


Figure 1-3: Kiwi, Fulton Hogan and Oyster Capital broad proposed plan change areas in the context of the Draft Structure Plan boundary

The traffic effects due to the proposed developments are required to be assessed on the surrounding network, and the access routes to each site also need to be considered. This will indicate any additional infrastructure that could be implemented to enable development as desired by Kiwi, Fulton Hogan, and Oyster Capital, prior to or beyond any committed future network upgrades.

1.2 Previous Assessments

In November 2019, Stantec undertook traffic modelling and prepared a modelling report to assess the traffic effects of the proposed developments within Drury East. Stantec undertook the traffic modelling using a three-tiered approach, consisting of a macro strategic model (MSM), a mesoscopic project model (SATURN), and a localised intersection operational model (Sidra Intersection).

The modelling considered the SGA future transport network, as reported in the SGA ITA for the Drury-Opaheke and Pukekohe-Paerata areas, with land use assumptions adjusted to align with Kiwi, Fulton Hogan and Oyster Capital's desired build rates. This modelling assumed mode share assumptions consistent with the MSM model, which was conservative noting a lower mode share for Drury East than Drury West.

The modelling demonstrated that the rezoning could be accommodated by the surrounding transport network, on the assumption of several targeted local upgrades within the first two decades including;

- The signalisation of the Great South Road / Waihoehoe Road roundabout prior to 2028;
- The widening of Waihoehoe Road and Great South Road prior to 2038; and
- A network capacity upgrade prior to 2038 which could be achieved through doubling the northbound ramps at the Drury Interchange or an earlier provision of the Southern Mill Road (proposed in 2038) connection to Fitzgerald Road.

Subsequent to the above modelling, in January 2020 the Government announced funding and delivery timeframes of the New Zealand Upgrade Programme (NZUP) including several key projects that are influential to the outcomes of the Plan Change traffic modelling. Notably this included the construction of Drury South Interchange by 2025 and the full length of Mill Road by 2028. Moreover, Auckland Council shared a number of relevant projects within indicative timeframes.

Stantec undertook revised modelling to include the infrastructure upgrade announcements and assumptions, to reassess the traffic effect of the proposed developments on the future network. This modelling was presented in the Integrated Transport Assessments (ITA) for Kiwi Property and Oyster Capital, dated March 2020. It is noted that the Fulton Hogan land parcel was included in the traffic modelling however the ITA was prepared by Mott McDonald and utilised the Stantec traffic model.

This revised modelling showed that given much earlier delivery of critical upgrades, in particular the Papakura and southern section of Mill Road, that only a limited number of local roading upgrades were required to enable the development, such as:

- Interim safety upgrade to the Waihoehoe Road / Great South Road roundabout to provide safe crossing facilities for pedestrians and cycles on all approaches; and
- Upgrade and signalisation to the Great South Road / Waihoehoe Road intersection to signals prior to 2038 (by 2033 when a new access to the Metropolitan Centre is not provided, and by 2038 when a new access is provided).

1.3 Revised Modelling Assessment

In March 2021, Stantec received the Drury Infrastructure Funding and Financing Study (DIFF) SATURN model prepared by SGA. Upon review of the model, the decision was made to utilise this model for the Plan Change traffic modelling. By doing so, any ambiguity surrounding trip generation rates, mode share splits, internalisation assumptions and the refined zone system were resolved. Further discussion regarding the SGA model and adjustments made to the model is provided in Section 2.1.

In June 2021 Stantec produced a Modelling Report based on the SGA model, and this was provided to the parties involved in the Drury East plan changes traffic caucusing. Shortly thereafter, a further announcement was made by the government regarding the NZUP projects. Of particular relevance was the removal of the Takanini, Papakura and Drury sections of the Mill Road project, and the Papakura to Drury South Stage Two project, including the Drury South interchange, from NZUP.

Stantec therefore revised its modelling to change the assumptions regarding when these projects would be implemented and assessed the development thresholds relevant to these projects.

This traffic modelling report describes the revised modelling methodology used and the land use assumptions for Drury East, outlines the various scenarios investigated, and discusses the effects on the relevant surrounding road network. The modelling has considered specified magnitudes of land use in relation to assumed infrastructure upgrades in terms of dwellings, commercial and retail Gross Floor Area (GFA). These Points of Assessment will inform the planning policy proposed within the Precinct Provisions as part of the Drury East Plan Changes.

2 Modelling Philosophy

2.1 Background

This modelling iteration to assess Drury East Plan Change developments utilised the updated South Auckland Mesoscopic SATURN models developed by SGA (S3M) for Drury Infrastructure Funding and Financing Study (DIFF). The models were received on 15 June 2021 and comprised three modelling years: 2028, 2038 and 2048+.

Similar to previous iterations of S3M models, the latest models are based on regional Macro Strategic Model (MSM) which estimates travel patterns based on inputs of land use and transport infrastructure assumptions. The key land use inputs to the MSM models, as discussed in the SGA's DIFF report, are:

- Land use forecasts developed by Auckland Council and the Auckland Forecasting Centre (AFC) referred Scenario I11.5; and
- Yield estimates in the FUZ areas estimated by Auckland Council for a full build model scenario referred to as 2048+.

SGA also updated the trip generation for Drury East and West zones to reflect the developers' land use plans by applying a first-principles traffic generation approach and factoring the S3M demand for these zones to better reflect planned deviations from I11.5 land use.

In addition to the above, the latest SGA models have a more desegregated zoning structure in the Drury East area compared to the models previously used in the Plan Change assessment and include the most up to date land use and infrastructure assumptions. As such Stantec chose to utilise the SGA models so that the same testing platform is used to assess the development's impact. The key difference in modelling objectives between this modelling assessment and SGA's assessment is that Stantec has focused on a more detailed analysis of network operation, including the assessment of varying development and infrastructure supply scenarios (i.e.: the Points of Assessment) to consider network performance, whereas SGA has focused on a more strategic assessment of the transport infrastructure needs using infrastructure staging principles and link flow values.

Stantec has made some refinements to the S3M model mostly relating to heavy vehicle proportions, link capacities, and intersection layouts, and these are documented in Section 2.5.5.

2.2 Modelling Methodology

2.2.1 Modelling Approach

Transport modelling for Drury has been undertaken primarily using a three-tiered approach, consisting of a macro strategic model, a mesoscopic project model, and a localised intersection operational model. The strategic model is the AFCs MSM. The MSM is an EMME based conventional four stage model[1] covering the wider Auckland area.

The mesoscopic model is a SATURN based multi-user class (light vehicle and heavy vehicle) user equilibrium assignment model detailing the road network and intersections in the area. The mesoscopic model takes the private vehicle and heavy vehicle demands from MSM and further disaggregates the zoning to give a greater level of detail.

SIDRA Intersection was used to test the operational performance of the key intersections in the network (with the primary focus on the Great South Road / Waihoehoe Road intersection) and aid in identifying potential intervention measures to ensure an acceptable level of service is maintained.

[1] The four stages consist of trip generation, distribution, mode split, and assignment.

2.2.2 Model Extent

The zoning areas for the MSM model is shown in Figure 2-1below.

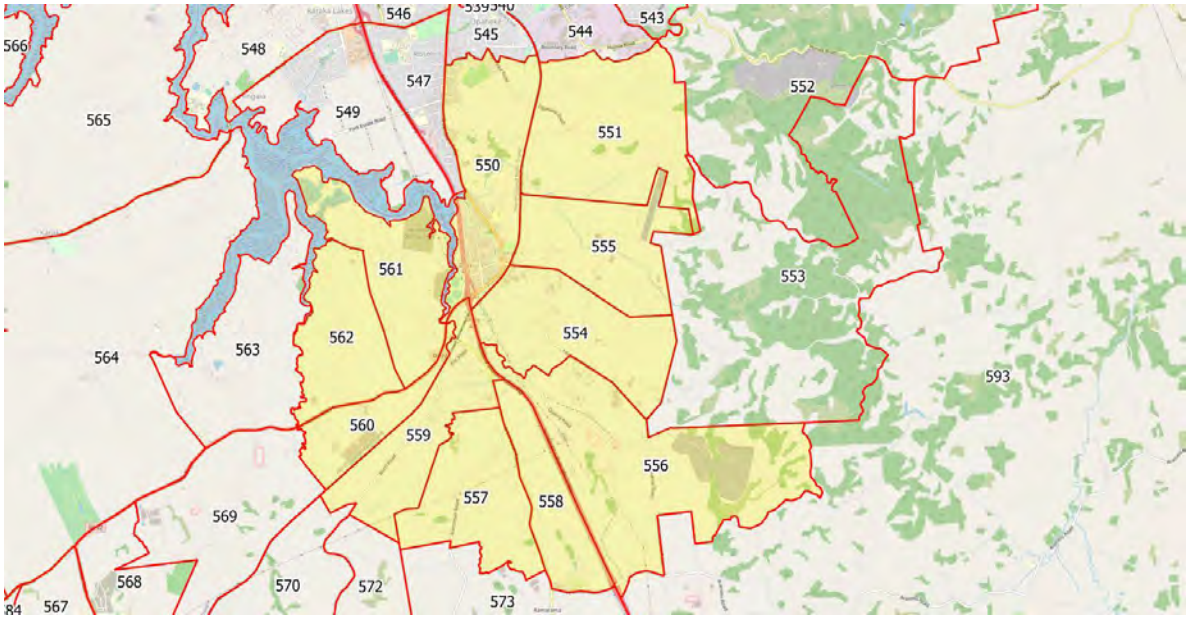


Figure 2-1 Latest MSM Model Zoning Map

The MSM model was used as a base in the SATURN modelling, to allow more representative and accurate results to be determined. The extent of the SATURN model is shown in Figure 2-2 below.

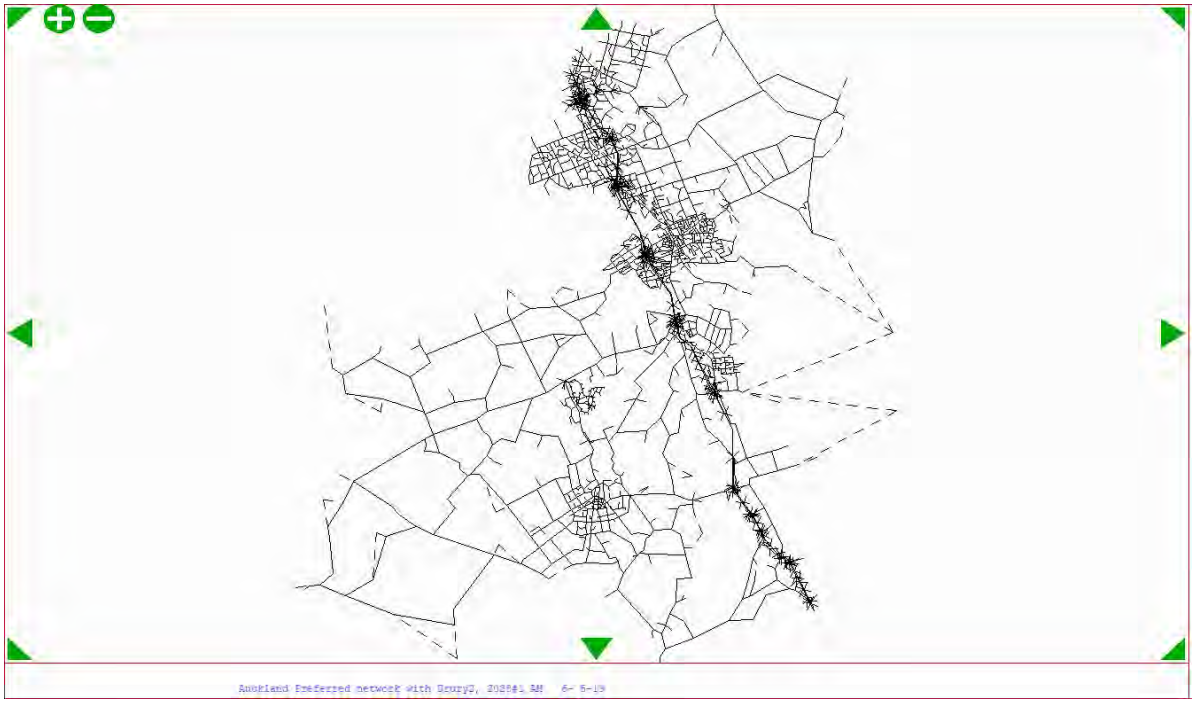


Figure 2-2 SATURN Model Extent

The original SGA models that were used as starting points to test the Drury East development are:

- **2028 model scenario - Scenario C** with the removal of all of Mill Road south of Papakura but includes Maketu-Waihoehoe Road internal collector roads.
- **2038 model scenario - Scenario A** - Reference Case Mill Road Models updated for DIFF 3.0 Study (with 2038 Drury East and Drury West land uses). These include full Mill Road and Papakura to Drury South projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR).
- **2048 model scenario - Scenario A** - Reference Case Mill Road Models updated for DIFF 3.0 Study (with 2048 Drury East and Drury West land uses). These include full Mill Road and P2DS projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR).

These SGA models were then adapted by Stantec for the Drury East plan change testing. Some changes to these models were made such as:

- Additional infrastructure was coded;
- Traffic demands were estimated to develop new future year scenarios; and
- Amendments described in Section 2.5.5 were included.

These changes were necessary to develop a set of tests/models for assessment point definition as described in the section below.

2.2.3 Modelling Scenarios

The land use scenarios considered in the modelling are grouped in decades and interpolated to develop interim scenarios to define Points of Assessment. For the interim scenario, modelling the land use and traffic demand were interpolated in a linear manner.

The infrastructure staging was tested using two core scenarios:

- **Planned infrastructure supply** which includes only currently planned infrastructure included within SGA's Southern Preferred Network (some of which has funding already identified, and some of which that hasn't), plus infrastructure that the developers are able to provide, such as a direct southbound connection from SH1 to the Town Centre. This scenario excludes options that require third party land acquisition.
- **Additional infrastructure supply** (treated as a sensitivity test) and covering additional infrastructure to the Planned infrastructure scenario, namely Brookfield Road – Quarry Road Link (which relies on private land acquisition) and Firth Street overbridge connection which relies on complex engineering and consenting challenges. In this scenario it is investigated if such measures can be introduced by the developers (from a modelling perspective) to increase network resilience and therefore increase the potential yield of the developments, to supplement the planed infrastructure supply.

All infrastructure from both scenarios is depicted in Figure 2-3.

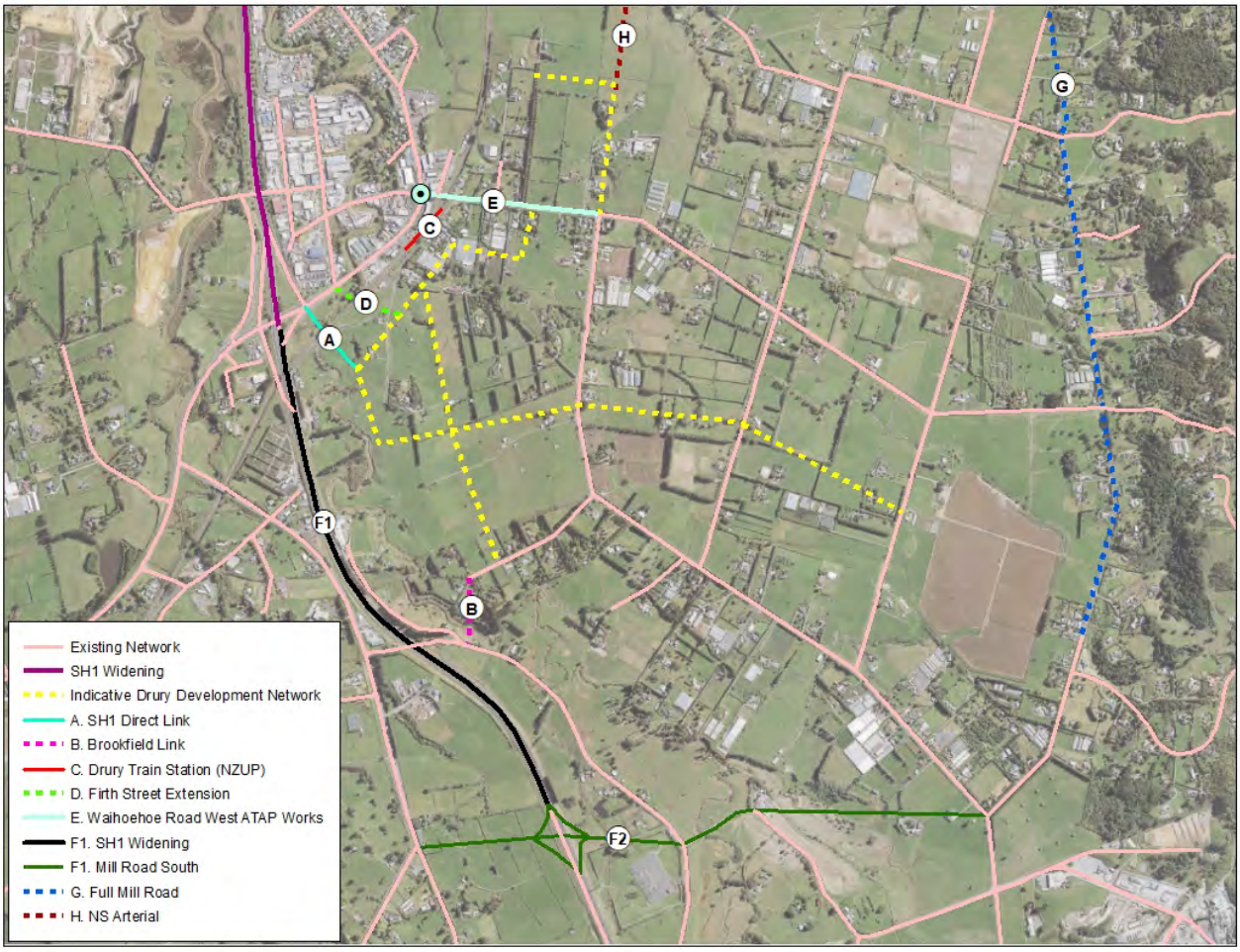


Figure 2-3: Infrastructure to be tested

The Planned Infrastructure Scenario test was completed for the full 30+ year programme. The Additional Scenario tests were completed to provide an indication of additional capacity that Brookfield Road- Quarry Road link and Firth Street link can unlock. See Table 2-1 for the list of tested scenarios.

The core eight tests that were completed for three peak hours (AM, PM and Interpeak (IP) hours) are listed below:

- **Short-term (1-5 year) infrastructure tests** – covers the period of development prior to Waihoehoe Road West Auckland Transport Alignment Project (ATAP) scheme implementation. These scenarios include modelling of the following scenario:
  - **Test 1** – models the first development years with minor improvements to the GSR/Waihoehoe Road roundabout (within the existing road boundary) only. This incorporates a lower Public Transport (PT) mode share uptake percentage assumption, as it would occur prior to Drury Central rail station construction.
  - **Test 2** – assesses the impact of the SH1 widening and Drury Interchange improvements. As with Test 1, this model includes lower PT mode share uptake percentage without the train station.
  - **Test 3** – assesses the impact of Drury Central station and models the impact of the immediate larger PT % mode share uptake that it enables. It also includes the impact of the direct SH1 connection from SH1 (in the vicinity of the Drury interchange) to the development

Note that each test builds upon the previous to produce cumulative infrastructure improvement scenarios.

- **Medium-term (6-15 year) infrastructure tests** – these tests estimate the additional capacity provided by Waihoehoe Road West ATAP scheme and new southern connection from Fitzgerald Road to SH1 (similar or alternative to Mill Road South Interchange previously proposed as part of NZUP programme). The model tests include:
  - **Test 4** – which builds on improvements included in abovementioned three tests and adds signalisation and widening of the Waihoehoe Road/GSR intersection and widening of Waihoehoe Road between Fitzgerald Road and GSR to provide bus lanes as per the ATAP scheme.
  - **Test 5** – this modelled scenario assesses the capacity that construction of the southern connection from Fitzgerald Road to SH1 (Mill Road South or similar) would provide in addition to improvements included in Test 4. This includes SH1 3-laning between Drury Interchange and Drury South interchange.
- **Long-term (16 – 25 year) infrastructure tests** – includes three tests that cover the additional network capacity provided by the completion of northern connections; the provision of the first new connection to the Ponga Road similar to the full Mill Road initially proposed as part of the NZUP, the second new North-South connection such as Opaheke Road extension or similar link and Pukekohe expressway which was designed to enable full growth in Pukekohe, Paerata and Drury West areas. As such the following tests were completed:
  - **Test 6** – builds on improvements included in medium-term testing and adds the first Mill Road connection from Ponga Road to east of Fitzgerald Road. This test is aimed at identifying how much capacity can be unlocked with the new link to the north before further improvements are needed.
  - **Test 7** – assesses the impact of the second north-south connection as part of Opaheke Road extension.
  - **Test 8** – assess the impact that Pukekohe expressway has on unlocking further capacity and enabling growth in South Auckland

The sequence of the infrastructure was based on the SGA previously adopted schedule with the large infrastructure elements included in mid to long-term periods.

The modelling identifies the effects on operational efficiency and any constraints on access at intersections that arise for each scenario. This is defined as a Point of Assessment. The criteria for what is considered acceptable is discussed in Section 3. That information will be taken into account when determining the PC48, PC49 and PC50 precinct provisions regarding traffic and transport matters.

A number of alternative infrastructure tests were also completed as Additional Infrastructure Scenarios. These tests included the modelling of the potential overbridge connection from Drury East to Firth Street (Firth Street Link) and a potential Brookfield Road – Quarry Road connection (Brookfield Link). The Additional Infrastructure Scenario was only undertaken as sensitivity testing due to Brookfield Link requiring third party land and due to uncertainties around Firth Street Link being a complex engineering and planning piece of infrastructure.

Indicative years of when potential infrastructure could be built had to be estimated to enable background traffic (growth outside of the Drury East area) to be taken into consideration.

A summary of each of the scenarios tested are provided in Table 2-1 below:

Table 2-1: Summary of Infrastructure Scenario Tests

Test No, setting out **background traffic assumption**. Point of Assessment to be determined based on performance metrics	Planned Infrastructure Supply Scenario								Additional Infrastructure Supply Scenario		
	Short-term infrastructure			Medium-term infrastructure		Long-term infrastructure			Additional infrastructure tests		
	GSR / Waihoehoe Roundabout (RAB) upgrade	SH 1 Widening from Papakura to Drury completion	Drury Central Station and SH1-Town Centre Connection (Coincides with Drury Interchange Upgrade	Waihoehoe Road West ATAP upgrade as per NOR including signalisation and widening of GSR/Waihoehoe intersection	Southern Connection - linking Fitzgerald Road to SH1and GSR (alternative or similar to Mill Road South)	First North-South connection from Waihoehoe Road to Ponga Road (e.g. full Mill Road connection)	Second North-South connection (e.g. Opaheke Road extension)	Pukekohe Expressway	Firth Street Outbound connection	Brookfield Road- Quarry Road link	
Prior to 2025 (Test 1)	✓										
2025-2026 (Test 2)	✓	✓									
2026-2028 (Test 3)	✓	✓	✓							✓	Test 3A
2028-2033 (Test 4)	✓	✓	✓	✓					✓		Test 3B
2033-2038 (Test 5)	✓	✓	✓	✓	✓						
2038-2048 (Test 6)	✓	✓	✓	✓	✓	✓					
2038-2048 (Test 7)	✓	✓	✓	✓	✓	✓	✓				
2038-2048 (Test 8)	✓	✓	✓	✓	✓	✓	✓	✓			

2.3 Network Capacity Criteria

Intersection operational criteria defining the threshold of poor intersection operation focused on the queue lengths, including the remaining queue storage capacity to the adjacent intersection and, where applicable, interpeak delays. It was considered that network operation is acceptable if:

- The average queue during the peak hours is sustained within the available storage length and on average does not overspill into an adjacent intersection; and
- if the above condition was met then peak hour delays are considered acceptable as long as interpeak intersection operation was better than Level of Service F.

The table below shows the storage length for the approaches at GSR / Waihoehoe intersection.

Table 2-2: Approach Storage Length for GSR / Waihoehoe Intersection

Great South Road / Waihoehoe Road Intersection Approach	To Downstream Intersection	
	Road Name	Distance (m)
North	Sutton Road	770
West	Firth Street	340
South	Firth Street	450
East	Kath Henry Lane	250

These network capacity definitions were broadly discussed with other modelling specialists and are specifically put forward to move away from the peak hour delay threshold as this could result in the oversupply of transport infrastructure that enables or even encourages private vehicle usage and impacts the competitiveness/attractiveness of public transport and active modes.

Three additional parameters that were monitored are:

- The northbound queue on SH1 and whether this queue extends to Drury Interchange. These queues were monitored to understand potential queue over spill into a local network, e.g. as a result of on-ramp signal operation.
- Average daily link flows at links connecting to the GSR/Waihoehoe Road intersection.
- Public transport delays at key locations of the network. Whilst enabling intersection queuing, consideration was given to delays along specific public transport routes, especially where no bus lanes are provided;

As per SGA's request, daily link flows on were monitored in the local network with the key focus on the links at the GSR/Waihoehoe intersection. For the context of how Waihoehoe Road (a future arterial road with one traffic and one bus lane in each direction) daily traffic volumes compare to traffic volumes of the operational arterial roads refer to Table 2-4 and Appendix A. As shown in Table 2-4 the daily traffic volumes of the arterial roads range from around 20,000 to 30,000 vehicles per day and peak hour volumes are around 2,200 vehicles per hour.

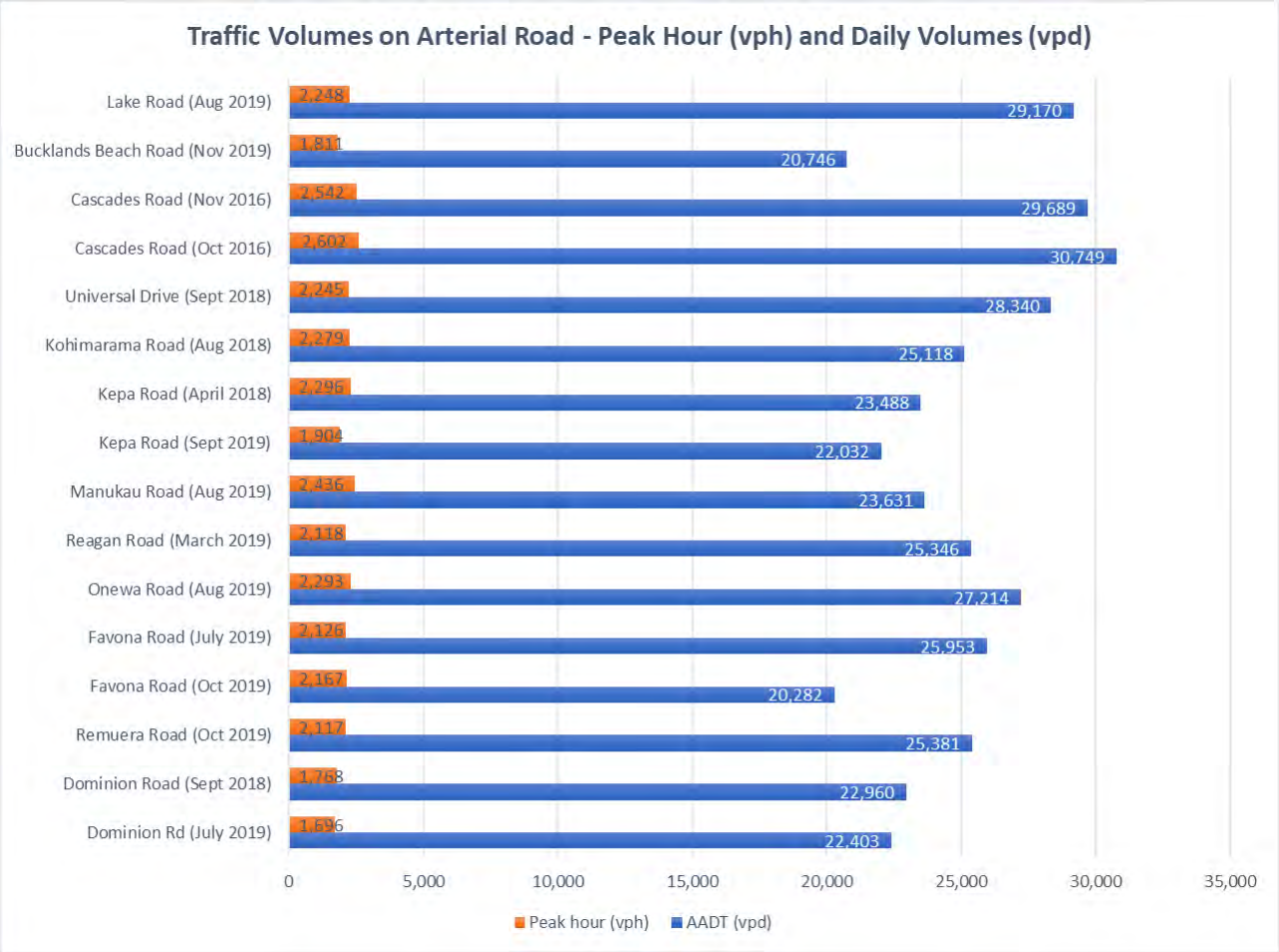


Figure 2-4: Daily and Peak hour traffic volumes on key arterial roads in Auckland

It should be noted that as years progress, the modelling results have greater uncertainty and therefore, whilst the above criteria have been used to establish Points of Assessment, at the time of development a revised Transportation Assessment could be undertaken that reflects the actual traffic operations at the time. The proposed Plan Changes Precinct Provisions will describe how this will be undertaken in practice.

2.4 Land Use Assumptions

The Auckland Forecasting entre (AFC) MSM model, with the original Council's I11.5 land use assumptions, was used as a base model for both the Stantec modelling and the SGA model, in order to create a standard baseline.

B&A then reconfigured the land use assumptions to align with the proposed developers' staging plans for the Plan Change 48-50 areas and refined the yield predictions for Drury South based on the consented development underway there. These development yields were adopted by SGA and included in its updated S3M models.

The employment assumptions for Drury East have been adjusted using an estimated target build-out of 60,000m2 of commercial (office),107,650 m2 of retail, and the expected level of employment of approximately 5,500 jobs.[2] For commercial employment, a rate of 17.6m2/person has been adopted. This is based on the New Zealand national office density reported in the Colliers Workplace Report (2016). The remaining employment are therefore retail park-related jobs.

[2] According to the 2048 Masterplan Vision Hybrid Concept Urban Design Framework (February 2019) by Civitas.

Some differences can be observed between the developers' land use assumptions and the I11.5 households and employment estimates. The developers' land use assumptions were adopted by SGA including approximately 18% higher residential development yield. There were also large differences in It is noted that many of the assumptions used in the model are considered conservative, as considerable development has been predicted for areas outside PCs 48, 49 and 50 that have several challenges in realising significant development, including fragmented land ownership and reduced yield as a result of tightening freshwater treatment legislation. Additionally, the development program for other zones outside of this development relied on an earlier introduction of major infrastructure such as Mill Road or Pukekohe Expressway. With the immediate funding for these projects removed from NZUP, the development potential of those other zones is likely to be restricted, but that has not been reflected in our modelling which assumes continued future growth.

A detailed land use breakdown for the key zones in the south Auckland model is shown in Table 2-3. For the full list of zone-by-zone land use assumptions breakdown, refer to Appendix B.

It is noted that Drury West includes the MSM zones 557, 558, 559, 560, 561, and 562; while Drury East includes the MSM zones 550, 551, 554 and 555, Drury South - zone 556 and Paerata – zones 567 and 568. The Kiwi, Fulton Hogan, and Oyster Capital development are contained within the zones 554 and 555. As shown, most of the housing in these zones is provided in Drury East, West and Paerata areas whereas the key employment areas are Drury East and South

Table 2-3: Land Use Assumptions for Drury- Opaheke Area

HOUSEHOLD FORECASTS (number of dwellings)							
MSM Zone	**Zone Name**	**2016**	**2028**	**2038**	**2048**	**SGA48+**	**Diff 2048+ vs 2016**
554	Drury East (south of Waihoehoe Road)	148	1,919	4,207	4,804	5,400	5,252
555	Drury East (north of Waihoehoe Road)	128	1,024	1,453	2,295	2,905	2,777
556	Drury South	109	866	912	954	1,000	891
557 - 562	All Drury West Zones	356	2,198	6,605	10,805	13,181	12,825
Total for Drury East, West and South						**22,486**	
567	Paerata (west of SH 22)	58	454	758	849	1,583	1,525
568	Paerata (east of SH 22)	48	1,704	2,959	3,426	3,617	3,569
Total for Drury East, West and South + Paerata						**27,686**	
EMPLOYMENT FORECASTS (number of jobs)							
MSM Zone		**2016**	**2028**	**2038**	**2048**	**SGA48+**	**Diff 2048+ vs 2016**
554	Drury East (south of Waihoehoe Road)	69	1,429	3,108	5,508	5,508	5,439
555	Drury East (north of Waihoehoe Road)	117	175	175	175	175	58
556	Drury South	156	2,125	4,776	5,580	6,296	6,140
557 - 562	All Drury West Zones	565	1,019	2,346	3,643	4,323	3,757
Total for Drury East, West and South						**16,302**	
567	Paerata (west of SH 22)	21	112	173	186	358	337
568	Paerata (east of SH 22)	74	451	704	775	857	784
Total for Drury East, West and South + Paerata						**17,517**	

The planned growth of South Auckland within the MSM zones noted above is shown visually in Figure 2-5 (for the increase in households) and Figure 2-6 (for employment increase). The zones with the largest increase in households in 2048+ scenario compared to the base year can be seen in Drury East, West, Paerata, Kingseat and Pukekohe, whereas, the largest increase in jobs is expected in Opaheke, Drury East, Drury South and Pukekohe.

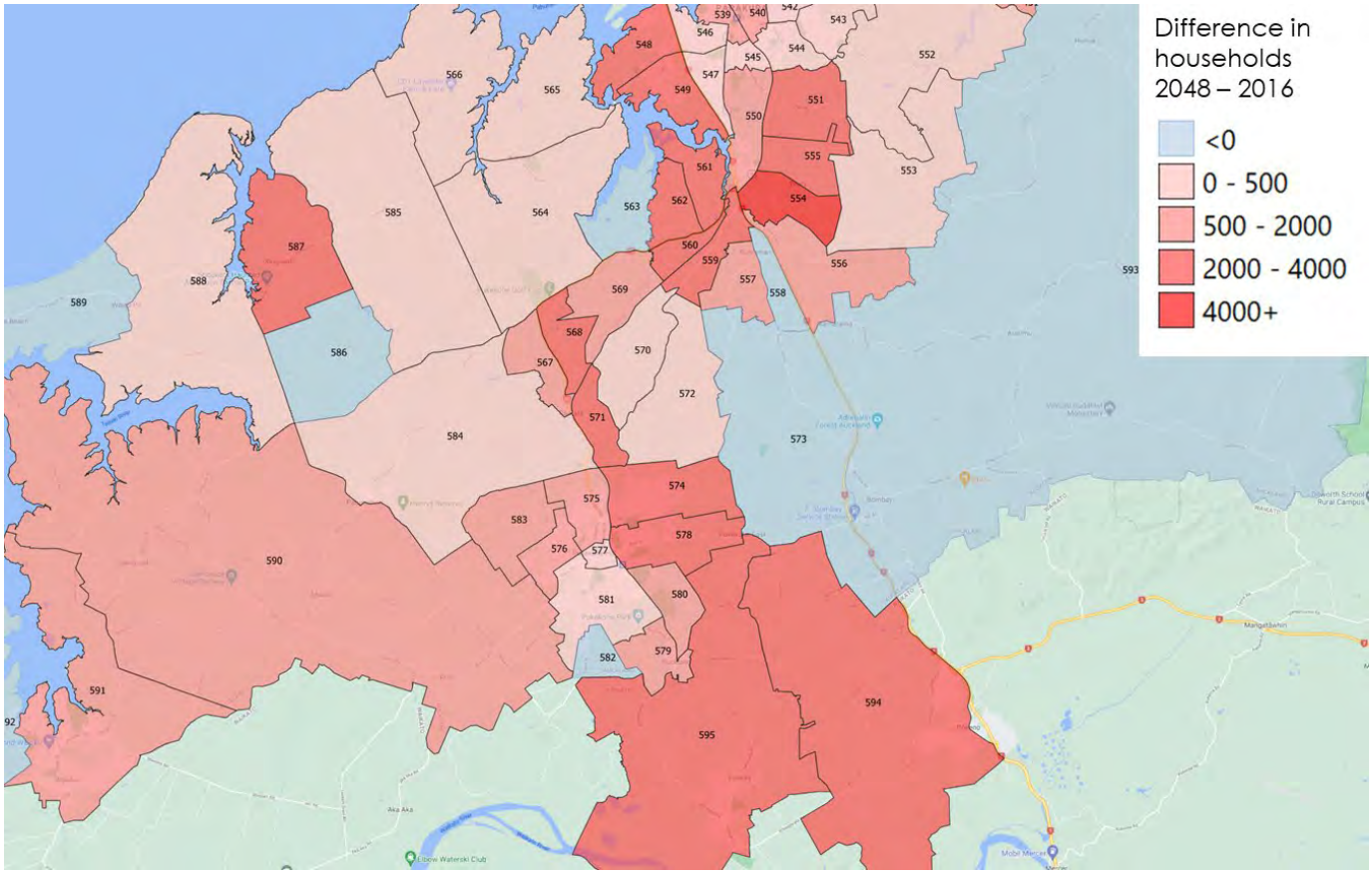


Figure 2-5: 2048+ Household growth per MSM zones

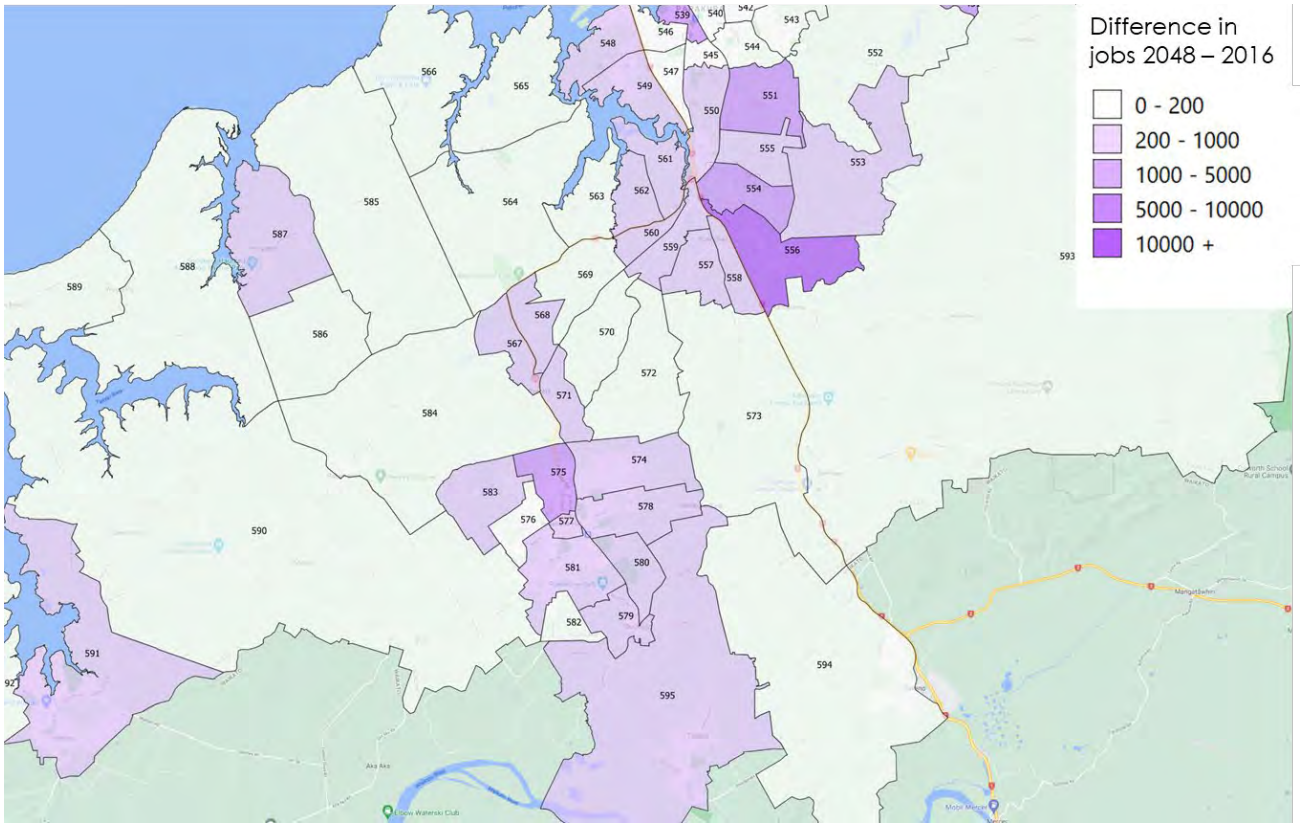


Figure 2-6: 2048+ Employment growth per MSM zones

2.5 SGA Trip Generation and Distribution

Trip generation and distribution estimates were adopted as per SGA's methodology and are discussed in detail in Appendix C. All trip rates, mode share percentages, vehicle occupancy, pass-by and internalisation rates are consistent with those adopted by SGA.

Overall, the trip generation was estimated using the number of trips generated by different household types and retail/commercial trips were calculated using the estimated floor area. These trip rates were then refined by applying internalisation, pass-by and PT/Active mode share assumptions. The key elements of trip generation estimation are summarised in the following sub-sections as outlined in the SGA's "Trip Generation Review" report.

2.5.1 Trip Generation – Residential, Retail and Other Land Uses

The trip generation for Drury East area (MSM Zones 554 and 555) covered residential, retail, commercial and community service trips. A step-by-step trip generation process for Drury East adopted by SGA is summarised below:

- **Residential Trips** - estimate residential trip generation totals. This step included the following calculation/assumptions:
  - Estimate average people per household for Low-, Medium- and High-density dwellings.
  - Apply a typical trip rate of 4.0 trips per person per day to get person-trip generation estimates.
  - Estimate PT/Active mode shares based on density and proximity to rail station.
  - Subtract PT/Active trips to obtain estimated trip rates by vehicle.
  - Apply average vehicle occupancy of 1.2 persons per vehicle to obtain daily vehicle trip rates.
  - Apply percentages of the daily values to get AM (9%), interpeak (5.5%) and PM peak (9%) generation estimates.
  - The total person trip rates and vehicle occupancies were kept constant over time, however other assumptions were varied through the modelled years as follows:
    - The average people per household was reduced over time to reflect demographic trends (10% reduction over 40 years was assumed).
    - The PT/Active mode shares were increased over time to reflect expected increasing relative attractiveness of these modes relative to vehicle travel and completeness of the wide network.
- **Other Trip Types** - estimate commercial/community and retail generation totals using the following calculations/assumptions:
  - Estimate peak-hour vehicle trip rates per 100m2 GFA from typical sources for each of the retail, commercial and community service activities.
  - Estimate the potential mode shift to active/PT modes for this location to derive reduced vehicle trip rates.
  - Apply the peak-hour trip rates to the relevant period (PM peak for retail, AM peak for Commercial and interpeak for community activities).
  - Estimate trip rates for the other periods, as a percentage of the peak rates.
  - Apply pass-by discounts for the trips external to the site.

For the retail trip rates, data from the ITE manual and survey data from the Sylvia Park shopping Centre in Auckland was considered and for the purposes of this analysis rates half-way between the two data sets were adopted. The trip generation rate for retail depends on the size of the retail development. Trip rates for smaller retail sites are higher per square metre than for larger sites as larger sites can offer multi-purpose activities thus reducing the need to travel to several separate destinations. Stantec adopted this non-linear trip generation profile when modelling the development during the early years.

Peak hour vehicle trip rates for the commercial areas were assumed to be 1.8/100m2 GFA, while those for community services were assumed to be 1.0.

Once this was completed, the peak generation was assigned to the respective model peaks and assumed proportion applied for the other periods as indicated in the screenshot (Table 2-4) from SGA's report below.

Table 2-4:: Proportion of Peak Generation (reproduced from SGA DIFF Transport Assessment Appendix C)

Activity Type	AM	Interpeak	PM
Retail	25%	80%	100%
Commercial	100%	30%	90%
Community	30%	100%	70%

Further trip generation details are provided in Appendix C.

2.5.2 Pass-by Trips

Pass-by trip proportions as per SGA's methodology were then applied to retail, commercial and community trips of 30%, 5% and 40% respectively. No pass-by trips were applied for the residential trip generation. These pass-by values were retained for Drury East development testing.

2.5.3 Internalisation

The internalisation percentage derived from SGA's MSM zone indicated that the internalisation between two zones is modelled to be around 6%. SGA in their *"Trip Generation Review"* report indicated that this could be plausible for the early stages of development but potentially considered low for full build out due to MSM including lower number of jobs than proposed in the plan change. As such SGA have adopted a 2% increase for each subsequent modelling scenario with the final internalisation factor of 12% for the 2048+ models.

SGA also stated that:

"Although the proportion of total person trips remaining internal is expected to be relatively significant, a high proportion of those short internal trips are expected to be undertaken by active modes. Hence the proportion of vehicle trips remaining within the zone is not expected to be particularly high."

Stantec agrees that a large proportion of internal trips will be taken by active modes as the active mode network will be complete and protected, however, it is considered that assuming such a low internal vehicle trip assumption represents a very conservative approach. The main reason for this is that the retail area is proposed to include a supermarket and large format retail areas and for such large format shopping trips a fair proportion of those vehicle trips to these areas are expected to be completed by car, especially from residential areas like the Oyster and Fulton Hogan sites which are located more than a kilometre away from the town centre. As a result, this internalisation would reduce the proportion of external trips through such critical intersections like the GSR/Waihoehoe Road.

Despite this, to remain consistent with the overall modelling philosophy, Stantec adopted SGA's internalisation factors for the modelled scenarios for the Planned Infrastructure Supply scenario.

2.5.4 Public Transport/Active Travel Mode Share

SGA estimated potential PT/active travel mode shares based on density and proximity to key facilities and, as such, higher percentage of PT/active travel were adopted for higher density residential areas closer to the Drury Central station. In the modelled 2028-year, approximately 13% of trips from lower density

residential areas located approximately 2km away from the station were estimated to use PT or active modes compared to 28.8% from higher density residential areas located just around 500 metres away from the station. In the final 2048+ models these combined PT and active modes travel proportions increased to 20% and 46% respectively. We have used those figures in our modelling.

From the SGA's "Traffic Generation Review" report it is understood that for the retail, commercial and community areas 0% and 25% PT/active mode shares were adopted for 2028 and 2048+ years respectively. These figures were adopted in this modelling.

Walking and cycling infrastructure will be in place to support and enable a high proportion of active mode travel from the early stages of the development, therefore, the SGA's PT/Active mode shares described for the residential land uses are considered appropriate once the Drury Central Station is operational.

The PT/active mode share of 0% for the other land uses such as retail, commercial and community areas in 2028 is considered very conservative. Take for instance the 2028 PM peak model in which almost 50% of trips relate to retail, commercial and community land uses. With a PT/active mode share of 21% for the resultant 50% of trips (assuming an average of low and high density residential) and taking into account 0% PT/active mode share for the retail, commercial and community land uses, then the total PT/active mode share for the Drury East development in the PM peak is 10.5%. By comparison, New Lynn in Auckland and Waterloo in Wellington have PT/active modes shares of 50% and 30% respectively[3] as shown in Figure 2-7and Figure 2-8.

In this regard, Stantec consider the SGA assumptions regarding PT/Active mode rates, especially for the early modelling years, to be conservative. Despite that, to provide the modelling comparison to SGA results, PT/active mode assumptions were retained for the models that include Drury Central station. For the earlier year tests vehicle trip generation was increased by 10.5% to reflect lower level of PT accessibility.

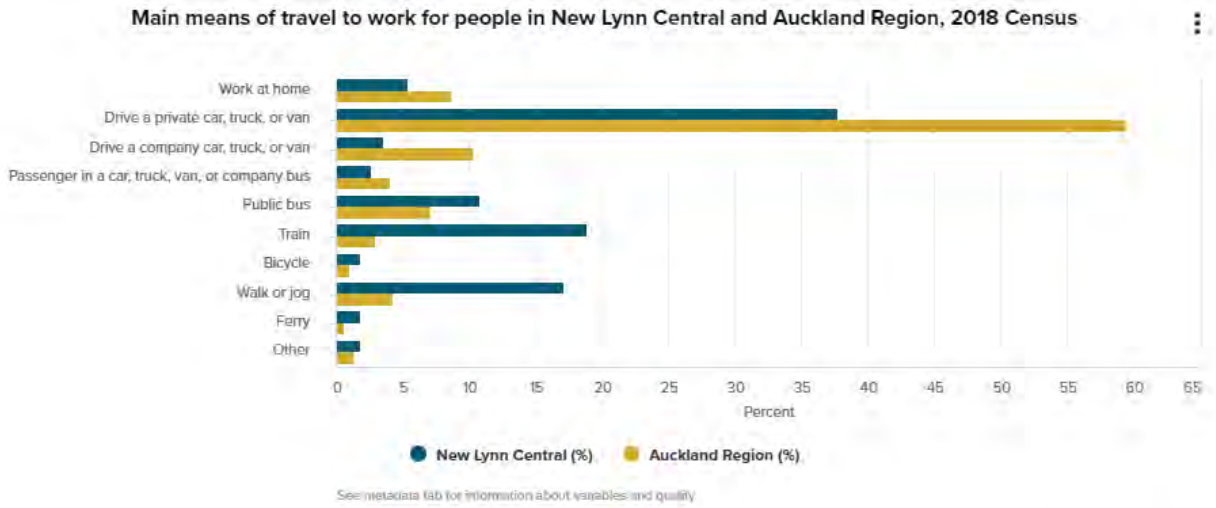


Figure 2-7: New Lynn Mode Share based on Census 2018

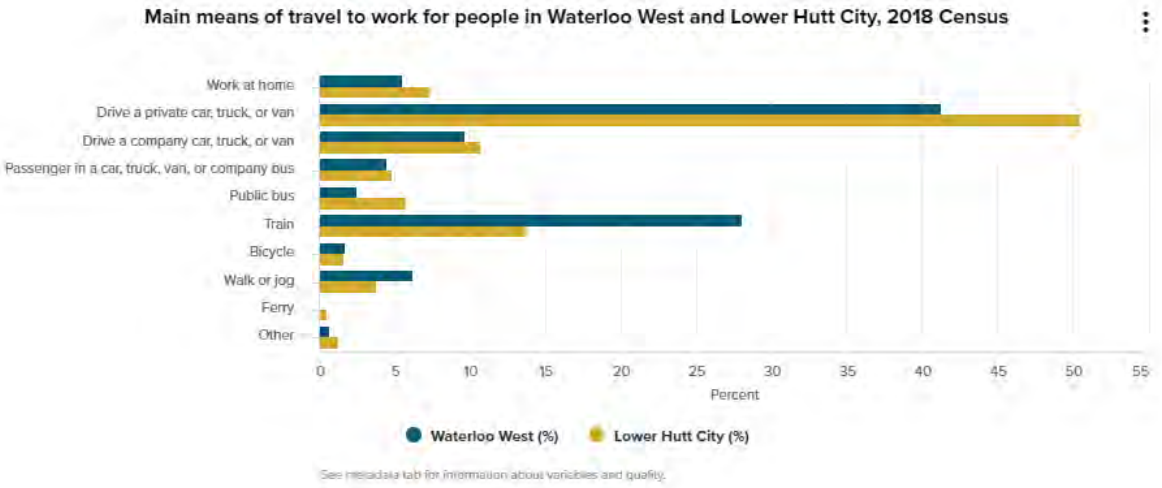


Figure 2-8: Waterloo West Mode Share based on Census 2018

[3] As per 2018 census data

MSM model outputs were also reviewed to understand non-combined mode shares for active travel and public transport and are provided in Appendix D split by peak hour and the future year scenario. MSM only provides the daily active mode splits. The active mode trips for each peak period has been estimated using the peak period to daily ratio for motorised vehicles (car and public transport trips). A comparison has also been undertaken by splitting the daily active mode trips using the AT Regional Cycle Monitoring report from 2015. These two methodologies provide a range of potential active mode shares for the peak periods from the MSM data.

Figure 2-9 shows the average mode share for active travel and public transport for Drury East as per MSM. It is noted that the current data is based on 2018 census data and excludes school bus trips which for the base year comprise 6% more than that shown in Figure 2-9.

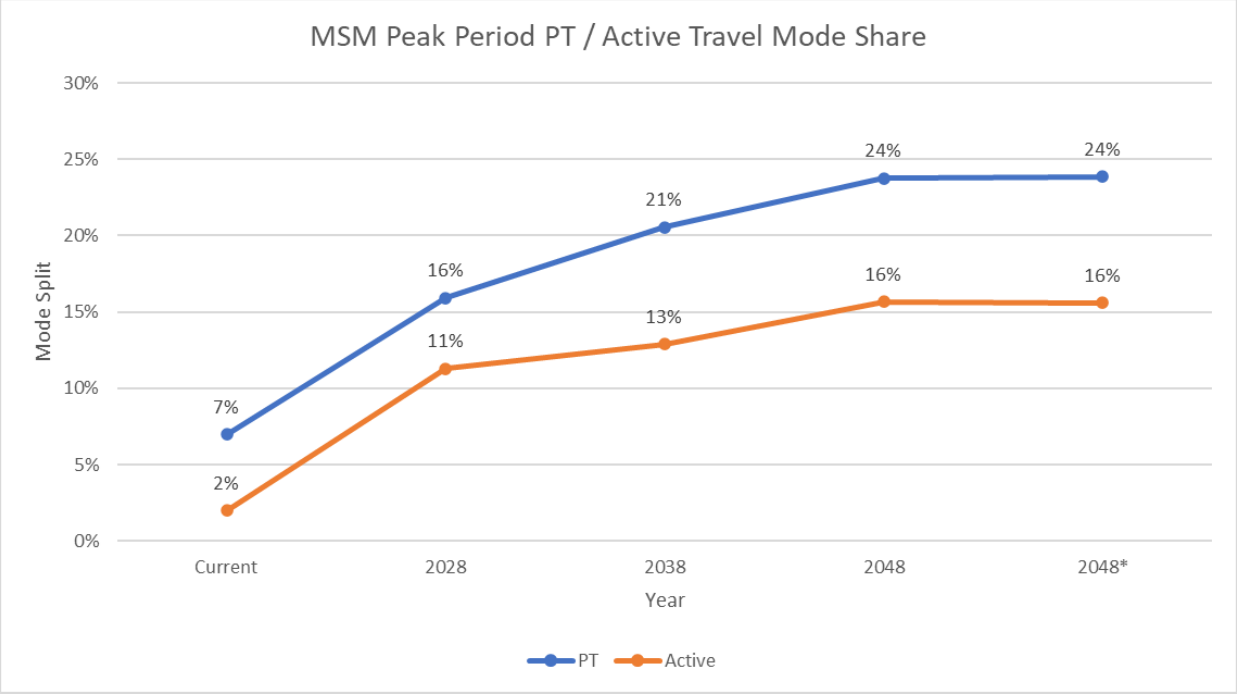


Figure 2-9: PT and Active Travel Mode Shares in Drury East Area Based on MSM models

As shown in Figure 2-9, MSM data shows that the expected PT and active mode shares are between 27% in 2028 and 40% in 2048+. When comparing the MSM data to SGA's mode share assumptions, the MSM 2048+ PT/Active travel mode share of 40% is higher than both the SGA's assumptions for residential land uses (which are 20%-46% for low density and high-density development respectively) and retail, commercial and community areas (which are 25%). SGA's DIFF report stated that the SGA PT/active mode share assumptions were optimistic however the comparison with the MSM data would suggest that these are less than the MSM assumptions.

Notwithstanding the above, Stantec has retained the SGA assumptions but again note that these should be considered conservative and easily achievable.

2.5.5 Changes to SGA Models

Some changes were introduced to the SGA models, and these are summarised below:

- Change to heavy vehicle/light vehicle proportion was amended from approximately 10%-20% heavy vehicle proportion related to Drury East zones to 5% across all zones as this is considered more representative of traffic composition travelling to/from residential, retail and commercial zones.
- Coding of the GSR/Waihoehoe Road and the Fitzgerald Road/ Waihoehoe Road intersections were amended to reflect more efficient intersection layouts.
- Short lane coding removed as this was found to sometimes cause excessive delays, which were not replicated in the more detailed SIDRA analysis.
- Coding of link capacities at Drury interchange were amended to reflect capacity more accurately.

- Distances between intersections on the Waihoehoe Road were amended to reflect more accurately the position of existing and future intersections.
- Addition of one-way direct link from SH1to the Metropolitan Centre in 2025.
- Slight amendment of retail/commercial zone location in SATURN was done moving it closer to the location better matching the master plan.

2.5.6 Trip Distribution

The latest (2018) commuter census data[4] for Drury shows that most current commuters in the area originate or end their trips outside of Drury, and that currently there is only a small proportion of internal trips. It is noted that 10% of employment/education trips within the Drury area originate from within the Drury area unit itself. However, there is still higher level of external commutes compared to that of internal commutes given the current land use and employment opportunities in Drury. The key outbound destinations relate to the key employment centres in Auckland Airport, Penrose, Wiri, East Tamaki and City Centre areas as shown in Figure 2-10.

It is expected that in the future, as the Metropolitan Centre is developed and more jobs are created, the commuting pattern will change with more significant commuting trips originating to and from within the Drury area (East, West and South). As discussed in the next sections, given the future infrastructure upgrades and PT services, a greater proportion of these commuting trips are likely to be undertaken via alternative modes other than private cars.

[4] https://commuter.waka.app/

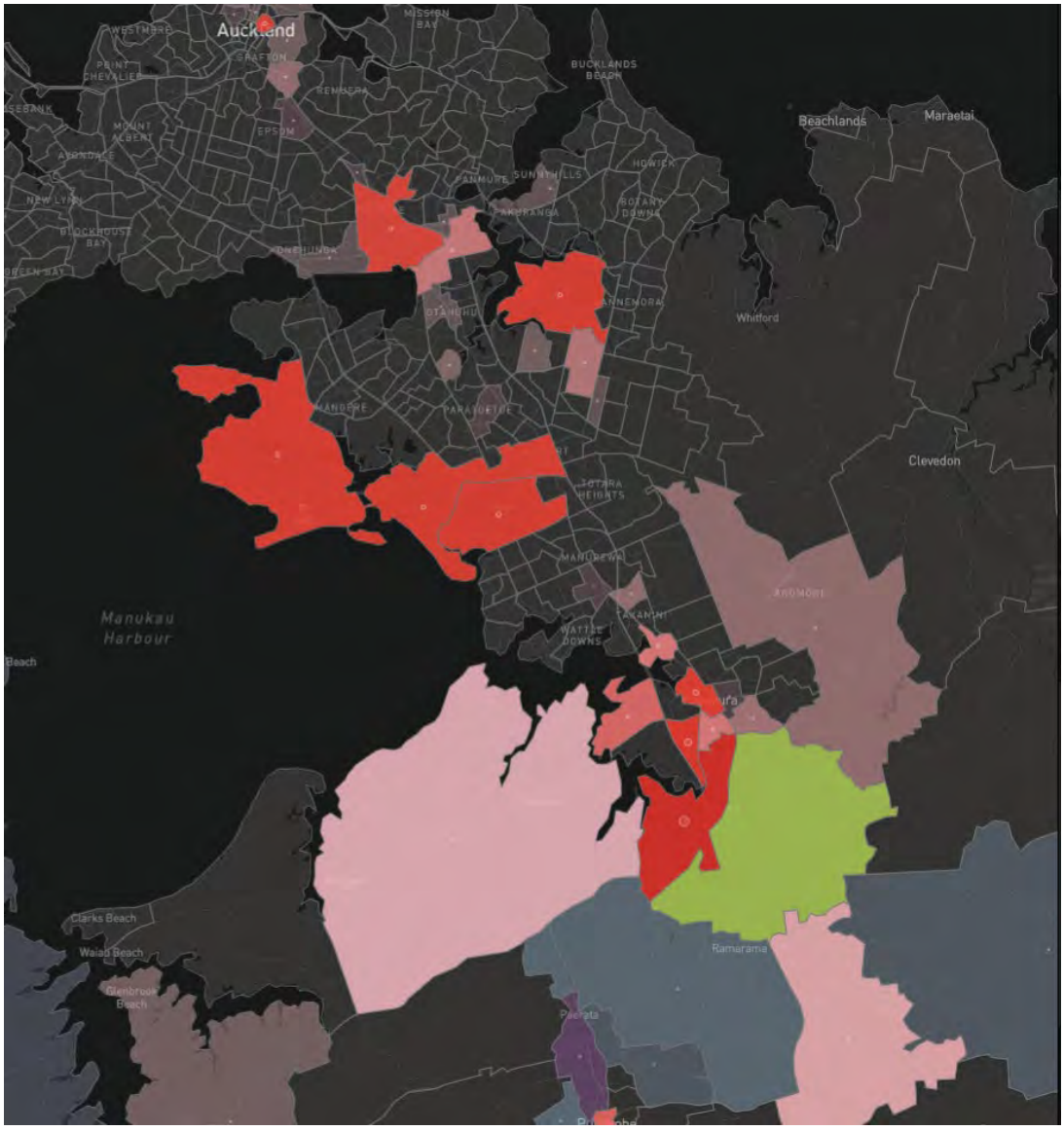


Figure 2-10: Existing Commuter Census Data for Drury Rural showing Departures for Work or School

The modelled Select Link Analysis (SLA) was undertaken for the inbound and outbound trips in peak periods to understand the trip pattern in the network in 2028 models (prior to Waihoehoe Road West widening). The origin for residential (Zone 5547) and destination for retail/commercial areas was analysed in the morning peak and the opposite in the afternoon peak as these are the dominant movements.

In the AM peak, the analysis shows the inbound trips to the Drury Metropolitan Centre travel southbound on SH1 and Great South Road via the Drury Interchange direct access. Outbound trips from Drury East residential zone, such as trips from the Kiwi Property plan change area, travel citybound via the Great South Road / Waihoehoe Road intersection or southbound towards Drury South employment area. Refer to Figure 2-11 for the SLA plots of outbound trips.

In the PM peak, the analysis shows that the outbound trips from the Drury Metropolitan Centre travel either via the Great South Road / Waihoehoe Road intersection or via Fitzgerald Road and Quarry Road northbound up GSR. Other inbound trips access Drury East via the Great South Road / Waihoehoe Road intersection. Refer to Figure 2-12 for the SLA plots of inbound trips.

Routing of these trips changes depending the modelled scenarios but the distribution of trips largely remains similar. No changes were made to SGA trip distributions as these disruptions compared well to previous modelling completed by Stantec in 2019.

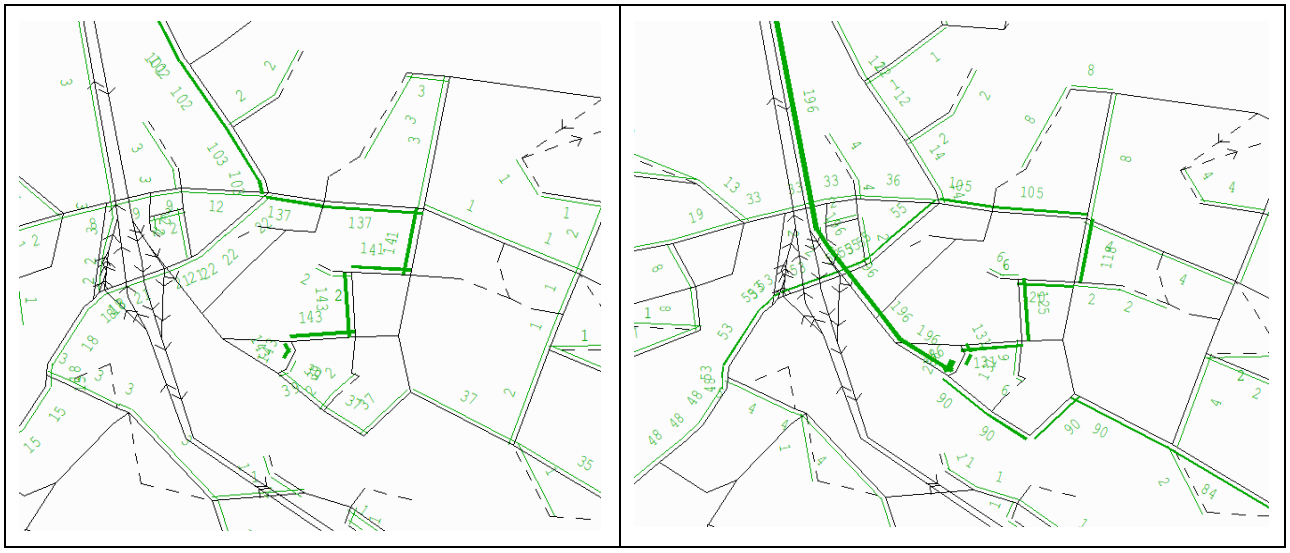


Figure 2-11: AM Peak - outbound trips to the retail/commercial zone (left) and inbound trips from the residential zone (right).



Figure 2-12: PM Peak – outbound trips from the retail/commercial zone (left) and inbound trips to the residential zone.

2.6 Infrastructure Upgrade Assumptions

There are a number of uncertainties related to infrastructure upgrade timing, especially for the infrastructure that does not have allocated funding. Modelling of this infrastructure timing was indicative and instead of focusing on when each infrastructure can be introduced, an estimate of the capacity that each element of infrastructure relevant to the Drury East development can provide was assessed. A list of assumed infrastructure with indicative timeframes when an infrastructure piece can be built is listed in Table 2-5 below. The timeframes are identified simply to inform the assumptions regarding background development and traffic conditions outside the PC 48, 49 and 50 area. These timings are based upon those provided in SGA's 2019 ITA to support Council's Drury-Opaheke Structure Plan.

Table 2-5: Infrastructure Upgrade Assumptions

Decade	SGA / Stantec Assumed Infrastructure	Funding Source
2025-2028	SH1 3-laning Papakura to Drury, including upgraded Drury Interchange	NZUP
	SH22 intersection upgrades at Great South Road and Jesmond Road	NZUP
	Rail Electrification Papakura to Pukekohe	NZUP
	New Drury Central, West and Paerata Stations	NZUP
	Minor Improvements to the GSR/Waihoehoe Road roundabout	Drury East Developers
2028-2038	Waihoehoe Road West ATAP improvements, including the signalisation of the GSR/Waihoehoe Road intersection	ATAP
	Construction of southern connection from Fitzgerald Road to SH1 (similar or alternative to previously planned Mill Road South) including Drury South Interchange	Planned (SGA)
	SH1 3-laning from Drury Interchange to Drury South Interchange	Planned (SGA)
	Connection from Drury South Interchange to GSR	Planned (SGA)
2038-2048	SH1 3-laning from Drury South Interchange to Bombay	Planned (SGA)
	First northern connection to Papakura (similar or alternative to Mill Road North link between Waihoehoe Road and Ponga Road)	Planned (SGA)
	Second northern connection (similar or alternative to north-south arterial – Opaheke Road extension to Ponga Road)	Planned (SGA)
2048+	Third Main Rail Line Pukekohe to Papakura	Planned (SGA)
	Pukekohe Expressway full Route (SH1 to Pukekohe)	Planned (SGA)

SH1 Papakura to Bombay is a project undertaken by Waka Kotahi (New Zealand Transport Agency). These upgrades include additional vehicle lanes, wider shoulders to future-proof for bus services along the SH1 corridor, improvements to interchanges, new bridges over the Main Trunk Rail Line rail line to enable electrification and additional tracks, and a shared walking and cycling path to support future growth in housing and employment.

The SH1 Upgrade is divided into two main stages[5]. The first stage of the SH1 Papakura to Bombay project will deliver improvements between Papakura to Drury Interchange. The breakdown of the stages is as follows:

- Stage 1A is the widening of SH1 to three lanes in each direction from Papakura interchange to Slippery Creek Bridge. Construction of this Stage of works commenced in April 2021.
- Stage 1B1 includes the provision of a Shared Use Path between Papakura interchange and Slippery Creek bridge, and the widening of SH1 between the Bremner Road bridge to Drury Interchange. This stage also includes the reconstruction of the Drury Interchange to provide new bridges over the Main Trunk Rail Line to enable electrification and widening of the rail corridor. This Stage is currently being consented as part of the Covid-19 Fast Track Process.
- Stage 1B2 is the widening of SH1 to three lanes between Slippery Creek Bridge and Bremner Road bridge.
- Stage 2 is the widening of SH1 from the south of the Drury Interchange to Drury South, including the provision of a new interchange at Drury South. It was announced in June 2021 that the funding for this stage will be deferred as is no longer part of NZUP.



Figure 2-13:SH1 Papakura to Bombay Upgrade Stages (sourced from NZTA website)

For modelling purposes, the above upgrades have been assumed to be in place in accordance with the SGA assumed timeframes, as outlined in Figure 2-13.

2.7 Local Upgrade Assumptions

The developer-led staging will generate additional traffic volumes in the Drury East area prior to the completion of key infrastructure upgrades assumed by SGA / Council to enable the planned growth in South Auckland. In order to access and accommodate the proposed development, it is initially assumed that some local Drury East infrastructure is required to be upgraded within the immediate vicinity of the site, within the first development period (2025-2028). This is to ensure sufficient access capacity to and from the site for vehicles and public transport options.

The Metropolitan Centre can have multiple connections to the external network, which could be implemented in stages depending on the actual rate of development, while Fulton Hogan and Oyster Capital properties can be primarily accessed via Waihoehoe Road and Fitzgerald Road.

For the modelling purposes the one-way southbound only direct access to the Metropolitan Centre via Drury Interchange has been assumed to be constructed at the same time as Drury Central rail station. However, it is noted that the other

[5] https://www.nzta.govt.nz/projects/sh1-papakura-to-bombay/

options (i.e. access via Firth Street or Quarry Road) will all work from a capacity perspective and therefore offer some flexibility in the future selection process. However, these were modelled only as a sensitivity test and the capacity improvements these infrastructure elements enable are discussed in Section 3 – Modelling Results.

Overall, the potential local infrastructure upgrades that are considered relevant to the accessibility of Drury East developments are:

- Waihoehoe Road Upgrade including bus lanes, a new bridge over the rail line and signalising the Great South Road / Waihoehoe Road Intersection;
- The direct access to the Metropolitan Centre from the Drury Interchange;
- Urbanisation of Fitzgerald Road and Brookfield Road; and
- Urbanisation of other roads fronting Oyster's and Fulton Hogan's developments as the area grows.

Explanations of what each upgrade entails are provided in the following sections. Traffic modelling was undertaken to confirm the impact of the above local upgrades. These results are discussed in further detail within **Section 3** of this report.

2.7.1 Great South Road / Waihoehoe Road Intersection Upgrades

The Great South Road / Waihoehoe Road roundabout currently serves as the main access between Drury East and the wider street network, including Great South Road and SH1. The existing roundabout has limited capacity, particularly during the AM peak period when northbound traffic demand is high due to northbound SH1 trips using Great South Road to avoid queuing. The single lane approaches to the roundabout on the west and south legs are the key limiting factor on its current performance. It is noted that once the widening of SH1from Drury to Papakura as part of the NZUP project (SH1Papakura to Bombay improvements – Stage 1[6]) is completed, there is likely to be a reduction of traffic leaving the motorway to avoid queuing, thereby easing congestion at the roundabout.

To cater for the future land use and travel demand in Drury East, an upgrade to the current intersection is needed. It is envisioned that the roundabout will be upgraded in two stages:

- Firstly, an interim upgrade will be provided with minor improvements to the roundabout by introducing an additional left turn lane from Waihoehoe Road and the provision of raised zebra crossings across all approaches to enhance active mode safety and amenity. A concept sketch of the changes to the roundabout is shown in Figure 2-14 below.

[6] https://www.nzta.govt.nz/projects/sh1-papakura-to-bombay/

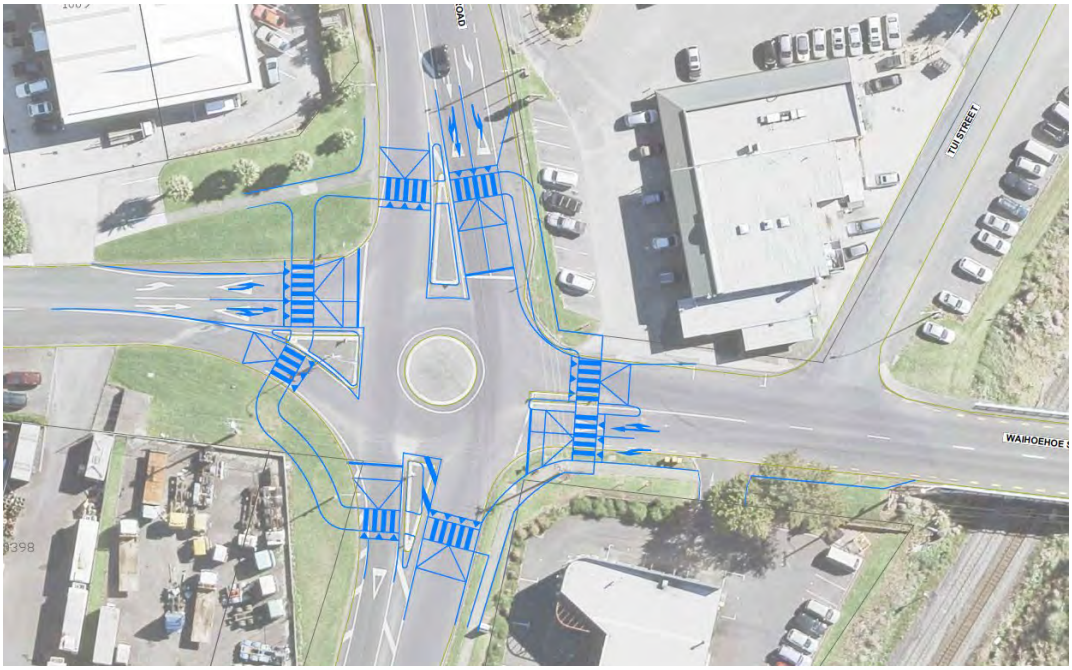


Figure 2-14: Interim upgrade to Great South Road / Waihoehoe Road roundabout

- Secondly, conversion of the roundabout to a high-capacity signalised intersection with pedestrian facilities as part of the Waihoehoe Road West ATAP scheme and Waihoehoe Road widening. It is likely that this intersection and Waihoehoe Road widening will have to occur alongside the construction of the Drury Central station and Park and Ride access. The intersection layout is shown in Figure 2-15.

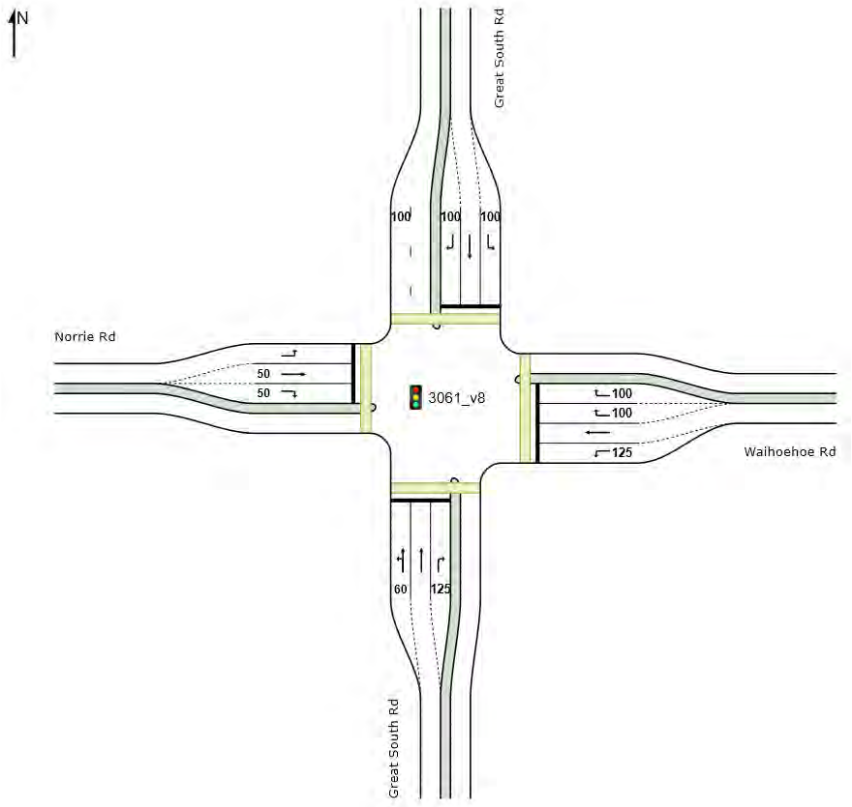


Figure 2-15: Proposed Signalised Intersection Upgrade at Great South Road / Waihoehoe Road

This is broadly consistent with the Drury Arterials Network: Jesmond to Waihoehoe West FTN Upgrade plans which have been lodged as a NOR. The plans for the intersection are shown in Figure 2-16 below.

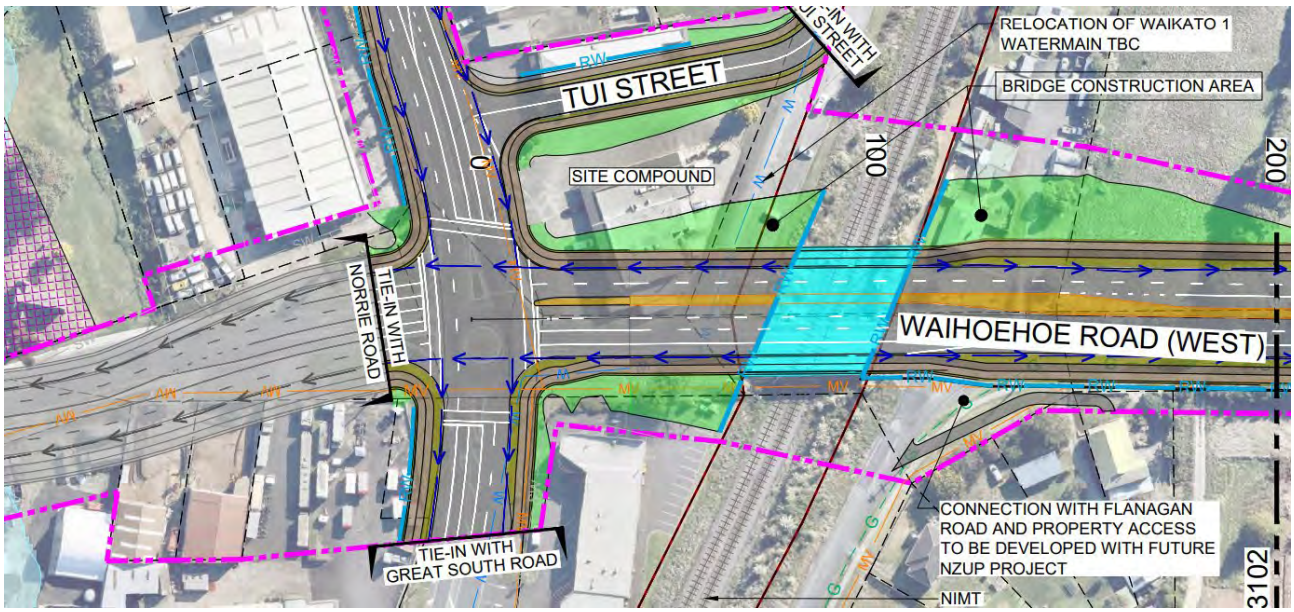


Figure 2-16: Great South Road / Waihoehoe Road upgrade as part of Jesmond Road and Waihoehoe Road West Upgrade

2.7.2 Direct access to the Metropolitan Centre from the Drury Interchange

Direct and legible access is desirable for the metropolitan centre and the surrounding residential areas. One potential access location that will fulfil the criterion is a direct access from the Drury Interchange. An access at this location would provide a primary route from SH1, over the rail line, directly into Drury East Metropolitan centre.

There is the potential to align the direct access construction with the committed SH1 Drury Interchange upgrades that are planned to occur during Stage 1B1 of the SH1 Papakura to Drury project. It is understood that discussions between Waka Kotahi and the Drury East developers are currently being undertaken to understand the viability of providing this connection.

3 Modelling Results

Stantec has undertaken extensive traffic modelling of the future network to investigate and understand the effects of various infrastructure scenarios on the surrounding network.

It is noted that while the modelling has considered the traffic effects on the wider network and assessed key local intersections, the focus of the assessment and reporting is on the Great South Road / Waihoehoe Road intersection, due to its relevance to the developments.

The results are presented in two formats. Firstly, a graph depicting the development growth profile and development yields per infrastructure supply scenario based on eight modelled tests is shown in Figure 3-2 below. A summary of modelling results for each test scenario are then provided within the subsequent sections (3.1 onwards), with the detailed modelling results contained within Appendix E.

The results describe the point at which the development yields / traffic generated cause the thresholds described in Section 2.3 to be exceeded, then provide the development yields / traffic generated that perform within the capacity thresholds as the Points of Assessment. In other words, the intersection is iteratively tested to failure, then the previous successful test represents the Point of Assessment.

The legend explaining the concept of Figure 3-2 is shown below in Figure 3-1.

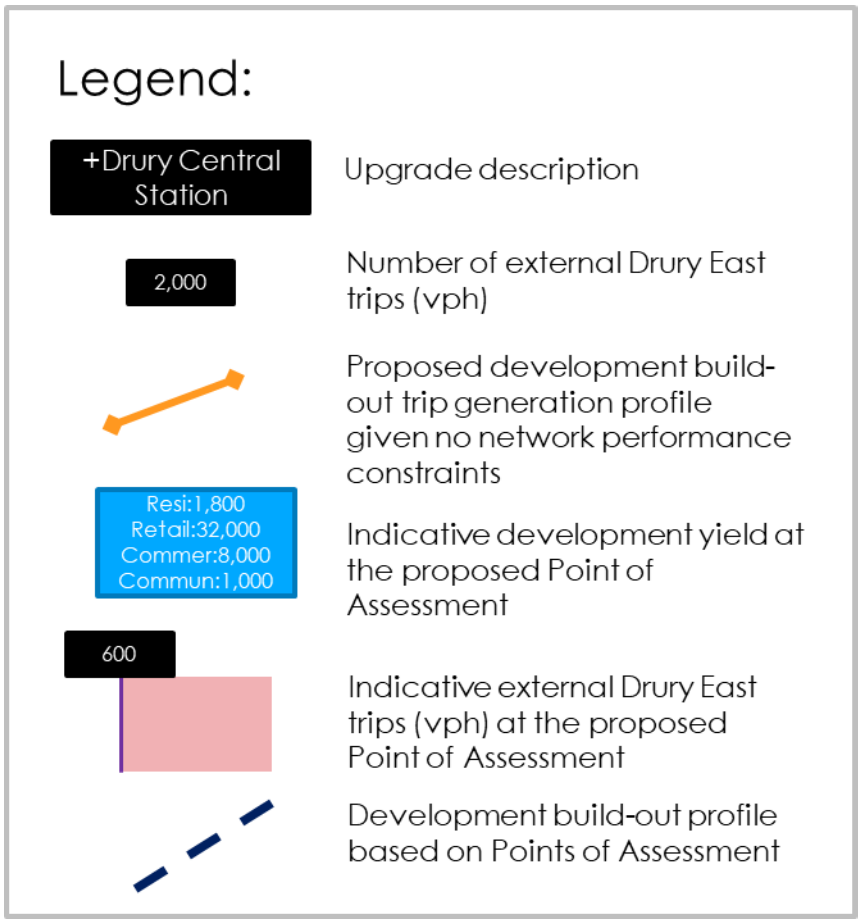


Figure 3-1: Legend for Modelling Testing Figure

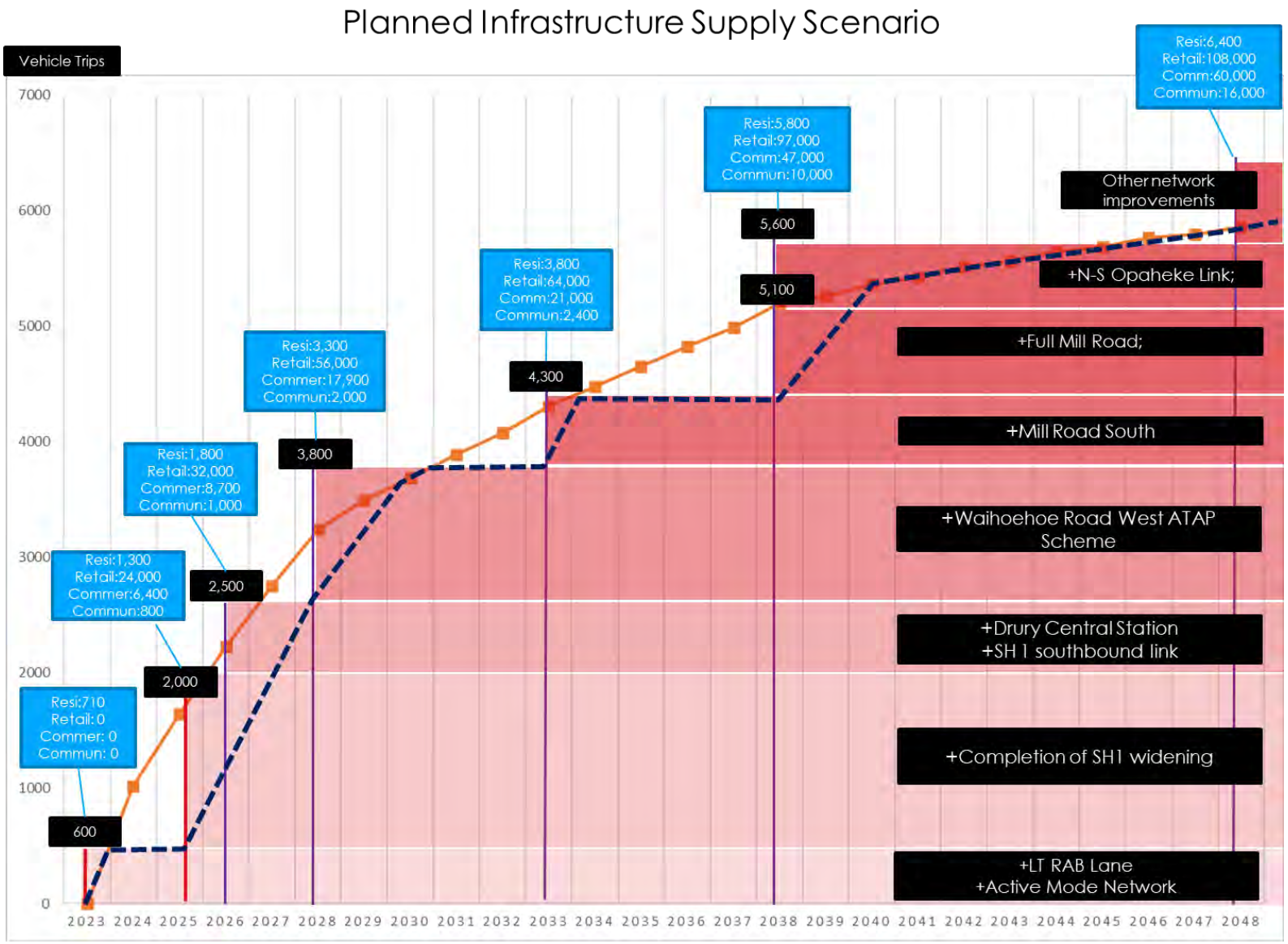


Figure 3-2: Development growth profile (residential dwellings, retail/commercial and community land uses in square metre)

3.1 Test 1 - Prior to Drury Interchange and SH1 Widening

This test assessed the modelling of the early development years, prior to the construction of SH1 widening. No SATURN modelling was completed for this scenario (as the base year was not available) therefore the base year SIDRA model for the GSR/Waihoehoe Road intersection was used.

Background traffic was added to develop the future year models, including growth from Drury West and Drury South areas. The annual background traffic growth of up to 4% per annum was used and Drury East trip rates were increased by 10% to replicate the absence of the Drury Central station and resulting lower PT uptake.

Only minor improvements to the GSR/Waihoehoe Road roundabout are included, such as the additional left turning lane and active mode crossings. A capacity penalty to replicate the vehicle interruptions at the zebra crossings was applied.

The modelling results for Test 1 are shown in the Table 3-1 below.

Table 3-1: Test 1 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	172s	56s	No interpeak model available but given good PM performance, it is expected to operate without issues.
	Intersection Delay	F	E	
	Worst Queue	South (643m queue with storage capacity of 450m)	East (167m queue with storage capacity of 250m)	
	Outcome	Queue length capacity exceeded	All queues within capacity limits	
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	97s	26s	
	Intersection Delay	F	C	
	Worst Queue	South (387m queue with storage capacity of 450m)	East (63m queue with storage capacity of 250m)	
	Outcome	All queues within capacity limits	All queues within capacity limits	
Point of Assessment	**Trip Generation – Point of Assessment**	400 trips based on AM peak hour model; 600 trips based on PM peak model.		
	Development Yield – Point of Assessment	710 dwellings		

The results establish that beyond the assessment point of 400 external trips / 710 dwellings, the capacity of the intersection would be exceeded during the AM peak hour.

3.2 Test 2 – Prior to Drury Central Rail Station

Test 2 assessed the development impact on transport infrastructure once SH1Papakura to Drury upgrades are completed.

This model was developed using the 2028 SATURN model and scaling down the demand trips to replicate 2025 future year. The lower PT mode share percentage from Test 1 was retained as the test replicates the infrastructure prior to Drury Central Station.

The modelling results for Test 2 are shown in the Table 3-2 below.

Table 3-2: Test 2 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	F	F	. No interpeak model available but given good IP performance of Test 3 it is not considered an issue.
	Intersection Delay	215s	130s	
	Worst Queue	South (644m queue with storage capacity of 450m)	East (374m queue with storage capacity of 250m)	
	Outcome	Queue length capacity exceeded	Queue length capacity exceeded	
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	F	F	
	Intersection Delay	123s	89	
	Worst Queue	South (434m queue with storage capacity of 450m)	South (239m queue with storage capacity of 250m)	
	Outcome	Queue length within capacity	Queue length within capacity	
Point of Assessment	**Trip Generation – Point of Assessment**	2,000 trips based on PM peak hour model.		
	Development Yield – Point of Assessment	Residential: 1,300 dwellings Retail: 24,000sqm Commercial: 6,400sqm Community: 800 sqm		

The modelling results show that the assessment point could be reached once approximately a total of 2,000 vehicle trips are generated from the Drury East area (areas covering MSM zones 554 and 555), beyond which, capacity would be exceeded.

3.3 Test 3 - Drury Central Rail Station

This test assessed the development and its impact on transport infrastructure modelling the scenario which includes the Drury Central rail station and the direct southbound town centre link from SH1 at the Drury Interchange to the development.

The modelling results for Test 3 are shown in the Table 3-3 below.

Table 3-3: Test 3 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	F	E	A
	Intersection Delay	173s	64s	10s
	Worst Queue	South (556m queue with storage capacity of 450m)	East (260m queue with storage capacity of 250m)	East (21m queue with storage capacity of 250m)
	Outcome	Queue length capacity exceeded	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	F	D	A
	Intersection Delay	105s	36s	9s
	Worst Queue	South (383m queue with storage capacity of 450m)	East (124m queue with storage capacity of 250m)	East (17m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 28,000 vpd.		
	SH1 Congestion	SH1 northbound congestion does not extend to Drury Interchange		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	2,500 trips based on PM peak hour model.		
	Development Yield – Point of Assessment	Residential: 1,800 dwellings Retail: 32,000sqm Commercial: 8,700sqm Community: 1,000sqm *Results are based on 2028 background traffic flows.*		

The modelling results show that the assessment point would be reached once approximately 2,500 vehicle trips are generated from the Drury East area, beyond which, capacity would be exceeded. A check was undertaken of the delays on Waihoehoe Road to ensure that buses would not be unduly delayed during peak hours. In the AM and PM peak hours, the delays on the eastern approach to the GSR/Waihoehoe intersection would be 17s and 81s respectively. These minimal delays would have no effect on the viability and attractiveness of bus services servicing Drury East. On

the southern approach, delays are 362s and 383s respectively, however, there are currently no public transport services travelling along GSR south of the intersection, and the new Drury West route joins to GSR via Norrie Road. Should any new bus services be introduced along GSR to the south of the intersection, then this delay can easily be timetabled into the schedule for the short interim period until additional bus priority can be introduced.

Sensitivity tests were completed to assess this scenario with and without the SH1 direct one-way connection to the Drury East town centre. The test showed that for a scenario like Test 3, where the AM peak operates at high congestion levels, the direct link (which mostly provides congestion reduction in the PM), did not add significant amount of capacity/transportation benefits during the critical AM peak. However, in the medium- and long-term scenarios, where the PM peak becomes most critical, the direct link provided additional capacity of around 200-400 vehicles per hour.

In addition, it was noted that a proportion of traffic departing from Drury East area to travel northbound bypasses the GSR/Waihoehoe Road intersection and travels via Fitzgerald Road then Quarry Road and GSR as shown in Figure 3-3 below (traffic departing town centre zone). The intersections along this route were assessed and showed acceptable levels of operation (details are provided in Appendix F). Approximately 400 trips during the peak hour use Quarry Road to leave Drury East zones. This number decreases significantly to 160 trips during the PM peak hour once the widening of Waihoehoe Road is completed (Test 4 – see Section 3.6).

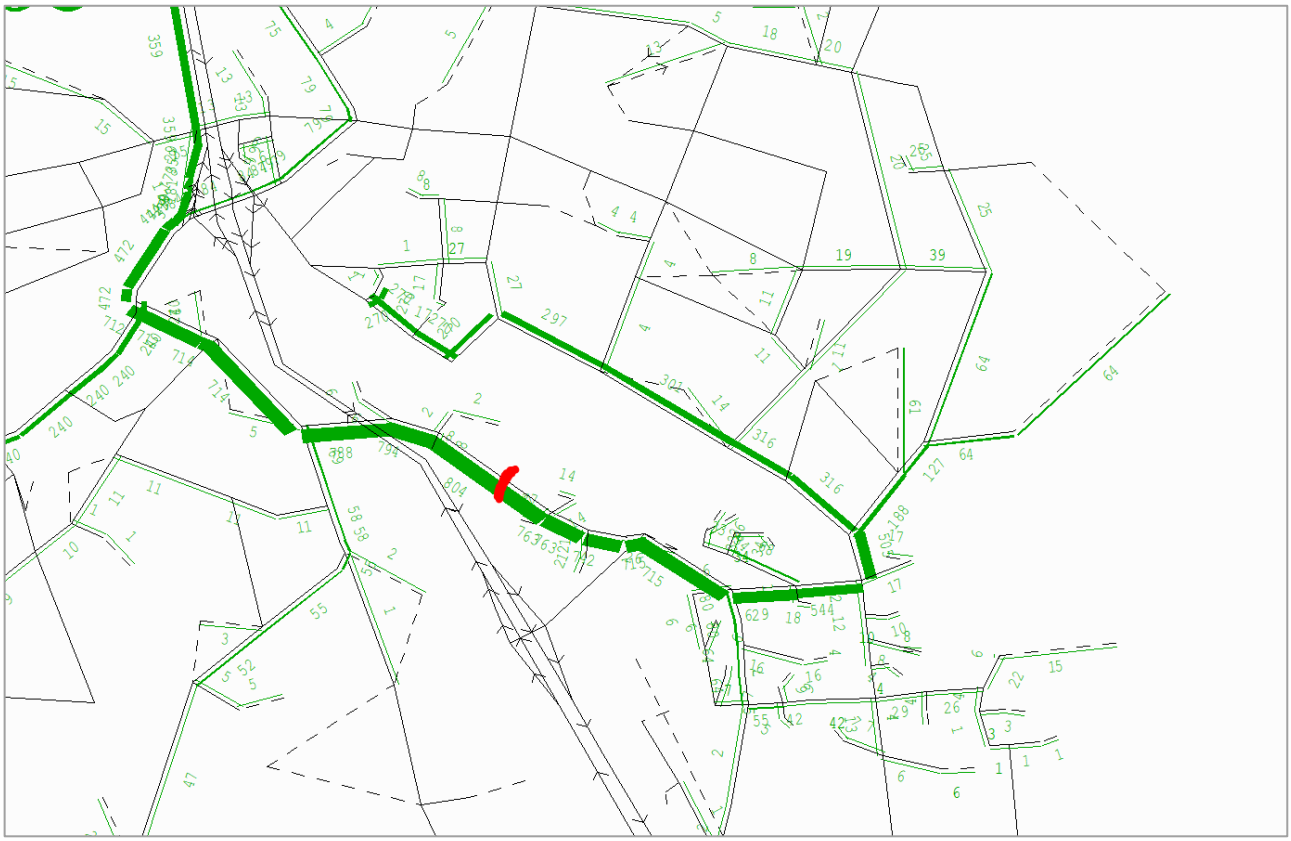


Figure 3-3: SATURN SLA of the northbound Quarry Road direction in the PM peak (cross section shown in red)

3.4 Test 3A – Brookfield Road to Quarry Road Link (Sensitivity Test)

Test 3A assessed the introduction of the Brookfield link, indicated as network infrastructure B in Figure 3-2 linking existing Brookfield Road with Quarry Road at Tegal Road. This test was created as a sensitivity based on Test 3, as it relies on third party land acquisition or complex engineering/consenting challenges.

The modelling results for Test 3A are shown in the Table 3-6 below.

Table 3-4: Test 3A Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	C	F	A
	Intersection Delay	25s	82s	9
	Worst Queue	South (69m queue with storage capacity of 450m)	East (374m queue with storage capacity of 250m)	East (22m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	B	E	A
	Intersection Delay	15s	52s	8s
	Worst Queue	South (35m queue with storage capacity of 450m)	East (240m queue with storage capacity of 250m)	East (18m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 26,000 vpd.		
	SH1 Congestion	SH1 northbound congestion does not extend to Drury Interchange		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	2,500 trips based on PM peak hour model		
	Development Yield – Point of Assessment	Residential: 1,800 dwellings Retail: 32,000sqm Commercial: 8,700sqm Community: 1,000sqm *Results are based on 2028 background traffic flows.*		

The results show that Brookfield link to Quarry Road does not provide much additional capacity to the local network. The overall trip generation this network can support is similar to test 3. However, the link does divert the traffic on Waihoehoe Road with the resulting AADT expected to be 10% less than test 3 for the eastern approach, and 30% less for the southern approach.

3.5 Test 3B – Firth Street Overbridge

Test 3B assesses the introduction of the outbound only Firth Street overbridge, indicated as network infrastructure D in Figure 2-3 extending existing Firth Street to development network. Similarly to Test 3A, this test was created as a sensitivity based on test 3.

The modelling results for Test 3B are shown in the Table 3-6 below.

Table 3-5: Test 3B Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	C	F	A
	Intersection Delay	29s	72s	9s
	Worst Queue	South (87m queue with storage capacity of 450m)	East (341m queue with storage capacity of 250m)	East (20m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	B	D	A
	Intersection Delay	16s	49s	8s
	Worst Queue	South (38m queue with storage capacity of 450m)	East (235m queue with storage capacity of 250m)	East (16m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 28,000 vpd.		
	SH1 Congestion	SH1 northbound congestion does not extend to Drury Interchange		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	2,800 trips based on PM peak hour model		
	Development Yield – Point of Assessment	Residential: 2,000 dwellings Retail: 36,000sqm Commercial: 9,700sqm Community: 1,300sqm *Results are based on 2028 background traffic flows.*		

The results show that Firth Street overbridge does provide some additional capacity to the local network, where the intersection can support 10% more development traffic in this scenario compared to Test 3.

Similar to Test 3A, the link is expected to reduce traffic on the eastern and southern approaches at the Waihoehoe / GSR roundabout, with the resulting AADT expected to be 10% less than Test 3 for the eastern approach, and 40% less for the southern approach.

3.6 Test 4 - Waihoehoe Road ATAP Scheme

Test 4 assessed the introduction of the wider Waihoehoe Road West ATAP scheme, incorporating the signalisation of the GSR/Waihoehoe Road intersection, widening of the Waihoehoe Rail Bridge, and widening of Waihoehoe Road to include bus lanes. Lane coding followed the concept designs provided within the Waihoehoe NOR package.

The modelling results for Test 4 are shown in the Table 3-6 below.

Table 3-6: Test 4 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	E	F	C
	Intersection Delay	65s	81s	35s
	Worst Queue	East (210m queue with storage capacity of 250m))	East (261m queue with storage capacity of 250m)	East (83m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	E	E	C
	Intersection Delay	62s	79s	35s
	Worst Queue	East (189m queue with storage capacity of 250m)	East (244m queue with storage capacity of 250m)	East (80m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 30,000 vpd.		
	SH1 Congestion	SH1 northbound congestion does not extend to Drury Interchange		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	3,800 trips based on PM peak hour model		
	Development Yield – Point of Assessment	Residential: 3,300 dwellings Retail: 56,000sqm Commercial: 17,900sqm Community: 2,000sqm *Results are based on 2028 background traffic flows.*		

The results show that Waihoehoe Road widening and signalisation of the GSR/Waihoehoe Road add substantial amount of capacity to the local network. The key links in the area are likely to carry a large volume of traffic through the day, however interpeak operation of the GSR/Waihoehoe intersection and other local intersections in the model operate satisfactorily at LOS D.

Also of note is that around 2033, the model forecasts that northbound SH1 queuing begins to reach the Drury Interchange, therefore there may be congestion at the interchange that is not a direct result of Drury East or West

intersection performances. This is not considered to be a critical consideration as State Highway congestion is evident at every Auckland urban intersection during peak hours and is therefore considered normal.

3.7 Test 5 - Mill Road South

Test 5 assessed the introduction of a connection to the south of the plan change areas, linking Fitzgerald Road to SH1, including the provision of an interchange at SH1 (Drury South interchange) and a connection to Great South Road on the western side of SH1. This is similar to that which was previously proposed as part of the Mill Road scheme and has therefore been named Mill Road South for simplicity. It was assumed that the SH1 widening between Drury interchange and Drury South interchange would be implemented at this point.

The modelling results for Test 5 are shown in the Table 3-7 below.

Table 3-7: Test 5 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	E	F	D
	Intersection Delay	56s	100s	36s
	Worst Queue	East (151m queue with storage capacity of 250m))	East (278m queue with storage capacity of 250m)	East (91m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	D	F	C
	Intersection Delay	51s	91s	34s
	Worst Queue	East (126m queue with storage capacity of 250m)	East (238m queue with storage capacity of 250m)	East (73m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 29,000 vpd.		
	SH1 Congestion	SH1 northbound congestion during the AM peak hour extends to Drury Interchange in 2033.		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	4,300 trips based on PM peak hour model		
	Development Yield – Point of Assessment	Residential: 3,800 dwellings Retail: 64,000sqm Commercial: 21,000sqm Community: 2,400sqm *Results are based on 2028 transport models using linear increase. Testing the development from 2038 demands resulted in slightly higher capacity therefore the worst case has been chosen.*		

The modelling results indicate that the provision of a connection between Fitzgerald Road and SH1 around 2033 will not add substantial capacity to the network as the other key links in the vicinity of the development are already congested. As such, with the infrastructure included in this scenario the assessment point could be reached at 4,300 vehicle trips generated by Drury East area.

3.8 Mill Road (Test 6 and 7)

These tests model the planned infrastructure in the long-term such as a provision of the northern connection(s) from Waihoehoe Road to Ponga Road.

The modelling results for Tests 6 and 7 are shown in the Table 3-8 below.

Table 3-8: Tests 6 & 7 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	D	D	C
	Intersection Delay	38s	53s	28s
	Worst Queue	West (99m queue with storage capacity of 340m)	East (261m queue with storage capacity of 250m)	East (57m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	D	D	C
	Intersection Delay	38s	44s	28s
	Worst Queue	West (98m queue with storage capacity of 340m)	East (184m queue with storage capacity of 250m)	East (50m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 22,000 vpd.		
	SH1 Congestion	Satisfactory due to alternative north – south route		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	5,100 vehicles per peak hour with one northern connection (similar to previously proposed full Mill Road) 5,600 vehicles per hour with both northern connections.		
	Development Yield – Point of Assessment	Residential: 5,800 dwellings Retail: 97,000sqm Commercial: 47,000sqm Community: 10,000sqm *Results are based on 2038 transport models using linear increase. Testing the development from 2048 demands resulted in slightly higher capacity therefore the worst case has been chosen.*		

The results show that one or both northern connections from Waihoehoe Road to Ponga Road will substantially increase road network capacity.

3.9 2048 Year (Test 8)

This test assessed the final year with full Drury East yield and other developments in south Auckland as per I11.5 land use data.

The modelling results for Test 8 are shown in the Table 3-9 below.

Table 3-9: Tests 8 Modelling Results

	Criteria	AM Peak	PM Peak	Interpeak
Great South Road / Waihoehoe Road Results (FAIL test)	**Intersection LOS**	E	E	C
	Intersection Delay	73s	66s	30s
	Worst Queue	West (295m queue with storage capacity of 340m)	East (287m queue with storage capacity of 250m)	East (63m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queue length capacity exceeded	Queues within storage capacity
Great South Road / Waihoehoe Road Results (PASS test)	**Intersection LOS**	E	E	C
	Intersection Delay	64s	56s	29s
	Worst Queue	West (235m queue with storage capacity of 340m)	East (221m queue with storage capacity of 250m)	East (45m queue with storage capacity of 250m)
	Outcome	Queues within storage capacity	Queues within storage capacity	Queues within storage capacity
Wider Network Results	**Daily Link Flows**	Average daily link flows on Waihoehoe Road West, GSR North, GSR South and Norrie Road approaches are below 25,000 vpd.		
	SH1 Congestion	Satisfactory due to alternative north – south route		
	Other Intersections	Performance of other intersections is acceptable – see Appendix F		
Point of Assessment	**Trip Generation – Point of Assessment**	6,000 vehicles per peak hour based on PM peak model		
	Development Yield – Point of Assessment	Residential: 6,400 dwellings Retail: 108,000sqm Commercial: 60,000sqm Community: 16,000sqm *Results are based on 2048 transport models.*		

This modelling scenario has been run with and without Pukekohe Expressway and the results above are shown for the model that does not include this arterial road. Overall, the modelling results show that with full operational development the network during the peak hours will be busy but local network intersections during the other times of the day is estimated to be within LOS D.

SATURN volume and delay plots for the above discussed scenarios are shown in Appendix G

3.10 Modelling Summary

To summarise the outcomes of the modelling that has been undertaken, a tabulated summary of the diagram is provided in Figure 3.2. This identifies the level of development at which the network criteria set out in Section 2.3 are exceeded. For example, development of up to 710 dwellings could occur with the interim upgrade of Great South Road/Waihoehoe Road roundabout in place, without exceeding the criteria. Between 710 dwellings and up to 1,300 dwellings, up to 24,000m^2 retail, up to 6,000m^2 commercial and up to 800m^2 community, it is assumed that the SH1 widening – Stage 1B will be in place.

The table is the output of the transport modelling undertaken. Because the transport modelling is conservative and is based on assumptions about what will occur in the future, any development that occurs ahead of the transport infrastructure listed in the table will require an assessment.

Table 3-10: Points of Assessment for Infrastructure Upgrades

Transport Infrastructure	Level of Development enabled by Transport Infrastructure				
	Residential (Dwellings)	Retail (GFA)	Commercial (GFA)	Community (GFA)	Drury East Trip Generation
Interim upgrade to Great South Road/Waihoehoe Road roundabout	Up to 710 units	-	-	-	Up to 400 trips (AM peak)
SH1 Widening – Stage 1B	Up to 1,300 units	Up to 24,000m^2	Up to 6,400m^2	Up to 800m^2	400 to 2,000 trips (PM peak)
Drury Central Station Direct connection from SH1 to Town Centre	1,300 to 1,800 units	24,000 to 32,000m^2	6,400 to 8,700m^2	800 to 1,000m^2	2,000 to 2,500 trips (PM peak)
Waihoehoe Road ATAP upgrade including signalisation of GSR/Waihoehoe intersection	1,800 to 3,300 units	32,000 to 56,000m^2	8,700 to 17,900m^2	1,000 to 2,000m^2	2,500 to 3,800 trips (PM peak)
Southern connection between Fitzgerald Rd and SH1 (incl. Drury South Interchange)	3,300 to 3,800 units	56,000 to 64,000m^2	17,900 to 21,000m^2	2,000 to 2,400m^2	3,800 to 4,300 trips (PM peak)
Mill Road northern connection and Opaheke northern link	3,800 to 5,800 units	64,000 to 97,000m^2	21,000 to 47,000m^2	2,400 to 10,000m^2	4,300 to 5,600 trips (PM peak)
Assessment of PT uptake required	5,800 to 6,400 units	97,000 to 108,000m^2	47,000 to 60,000m^2	10,000 to 16,000m^2	5,600 to 6,000 trips (PM peak)

4 Conclusions

Modelling has been undertaken to assess the effect of the proposed development by Kiwi Property, Fulton Hogan and Oyster Capital enabled by Plan Changes 48, 49 and 50 in Drury East. The modelling has been undertaken utilising SGA's model prepared to support the Drury Infrastructure Funding and Finance Study and takes into account recent government NZUP announcements regarding the removal of funding for Mill Road and the southern section of the Papakura to Drury South three-laning.

By utilising SGA's assumptions as well as Council's i11.5 land use assumptions, the modelling undertaken presents a conservative assessment of the impact of the Drury East development on the surrounding road network. The modelling approach was broadly agreed with Authorities, albeit with some outstanding issues that are likely to be discussed in caucusing or hearing evidence.

The modelling demonstrates that although congestion will be evident during the peak hours, interpeak times will operate satisfactorily, and two-way daily flows remain within normal operating levels for urban arterials. From 2033, northbound queues on SH1 during the morning peak period are forecast to begin to block back into the Drury Interchange which may affect local intersection performance. Again, this is considered acceptable and normal for busy urban motorway interchanges and returns to free-flowing operation outside of that peak period.

The direct southbound SH1 link into the town centre was found to have limited effectiveness from a traffic capacity perspective in earlier years when the AM peak period is critical. However, in medium to longer term tests, as the PM peak period becomes most critical, the link provides a more significant capacity benefit. Regardless of traffic capacity, this link will significantly enhance legibility of access from the north.

The Brookfield Link and Firth St Link sensitivity tests established that the Brookfield link has limited effectiveness, but the Firth Street link would add further resilience to the network. It is therefore considered that the Firth Street link could potentially be utilised to provide additional yield to development within Drury East should that be required, assuming that geometrical design constraints can be overcome.

Overall, the assessment shows that the planned transport infrastructure is sufficient to provide required transport capacity to enable the Drury East Plan Changes, albeit with several Points of Assessment at various stages, as outlined in Table 3-9. These Points of Assessment will inform the Plan Change Precinct Provisions that will provide surety on the coordination of land use and infrastructure.

Appendices

We design with community in mind

Appendix A Surveyed ADT Volumes on Arterial Routes

Road	Between	Road Classification	AADT (vpd)	Peak hour(s) (vph)	Configuration
Dominion Rd (July 2019)	Wembley Rd & Lambeth Rd	Arterial	21,755 (5-day)	1,675 (PM)	One lane + bus lane in each direction, separated by flush median
Dominion Rd (July 2019)	Marsden Ave & Halesowen Ave	Arterial	21,682 (5-day)	1,668 (PM)	One lane + bus lane in each direction, separated by flush median
Dominion Rd (July 2019)	Donald Cres & Louvain Ave	Arterial	22,403 (5-day)	1,696 (PM)	One lane + bus lane in each direction, separated by flush median
Dominion Road (Sept 2018)	St Albans Ave & Mont Le Grand Rd	Arterial	22,960 (5-day)	1,768 (PM)	One lane + bus lane in each direction, separated by flush median
Dominion Road (Sept 2018)	Lambeth Rd & Landscape Rd	Arterial	22,329 (5-day)	1,729 (PM)	One lane + bus lane in each direction, separated by flush median
Remuera Road (Oct 2019)	Upland Rd & Lucerne Rd	Arterial	24,225 (5-day)	1,893 (PM)	One lane + T3 lane (in one direction) and on-street parking (in other direction) separated by flush median
Remuera Road (Oct 2019)	Stonyroyd Gardens & Waiatarua Rd	Arterial	25,381 (5-day)	2,117 (PM)	One lane + T3/bus lane in both directions separated by flush median
Favona Road (Oct 2019)	Harania Ave & Forbes Rd	Arterial	20,282 (5-day)	2,167 (PM)	One lane in each direction separated by flush median

Favona Road (July 2019)	Norana Ave & Saville Dr	Arterial	25,953 (5-day)	2,126 (PM)	One lane in each direction separated by flush median
Onewa Road (Aug 2019)	Woodside Ave & Seaview Ave	Arterial	25,127 (5-day)	2,210 (mid-hr), then 2,053 (PM)	One lane + T3 lane in each direction separated by a solid white line
Onewa Road (Aug 2019)	Wernham Pl & Park Ave	Arterial	25,030 (5-day)	2,187 (mid-hr), then 2,063 (PM)	One lane + T3 lane in each direction separated by a solid white line
Onewa Road (Aug 2019)	Lake Rd & Church St	Arterial	27,214 (5-day)	2,293 (mid-hr), then 2,132 (PM)	One lane + T3 lane in each direction separated by a solid white line
Reagan Road (March 2019)	Meadowcourt Dr & motorway overbridge	Arterial	25,346 (5-day)	2,118 (PM)	One lane in each direction separated by a solid yellow line
Manukau Road (Aug 2019)	King George Ave & King Edward Ave	Arterial	23,631 (5-day)	2,436 (AM)	One lane + T3 lane in each direction separated by a flush median
Kepa Road (Sept 2019)	Width change & Dudley Rd	Arterial	22,032 (5-day)	1,904 (PM)	One lane in each direction separated by solid yellow line
Kepa Road (April 2018)	Orakei Rd RABT & Nehu St	Arterial	23,488 (5-day)	2,296 (mid-hr), then 1,943 (PM)	One lane in each direction separated by solid yellow line
Whangaparoa Road (not in AT spreadsheet)					
Kohimarama Road (Aug 2018)	St Heliers Bay Rd & Whytehead Cres	Arterial	25,118 (5-day)	2,279 (PM)	Two-lanes merging into one lane from south in both directions,

					separated by solid yellow line
Universal Drive (Sept 2018)	Zodiac St & Bittern Pl	Arterial	23,373 (5-day)	1,818 (PM)	One lane & on-street parking allowed in each direction separated by wide solid median
Universal Drive (Sept 2018)	Rathgar Rd & Penfold Pl	Arterial	28,340 (5-day)	2,245 (mid-hr), then 2,174 (PM)	One lane in each direction separated by flush median
Cascades Road (Oct 2016)	Bernie Edwards Pl & Solana Ct	Arterial	30,749 (5-day)	2,602 (PM)	One lane in each direction, however EBD lane splits into two lanes towards Solana Ct direction
Cascades Road (Nov 2016)	Aviemore Dr RABT & Bernie Edwards Pl	Arterial	29,689 (5-day)	2,542 (PM)	One lane in each direction, however WBD lane splits into two closer to the RABT
Bucklands Beach Road (Nov 2019)	Tangelo Pl & Damson Pl	Arterial	20,746 (5-day)	1,811 (PM)	One lane and on-street parking in each direction, separated by dashed / solid white line
Lake Road (Aug 2019)	Onepoto Rd & Bayview Rd	Arterial	29,170 (5-day)	2,248 (PM)	One lane and cycle lane in each direction

Appendix B I11.5 Land Use Data

		HOUSEHOLD FORECASTS						EMPLOYMENT FORECASTS				
MSM												
Zone		2016	2028	2038	2048	SGA48+		2016	2028	2038	2048	SGA48+
540		1,644	1,916	2,044	2,154	2,154		612	694	729	761	790
541		1,210	1,261	1,273	1,301	1,301		465	471	473	476	495
542		1,293	1,319	1,321	1,336	1,336		218	226	231	237	246
543		1,446	1,502	1,569	1,620	1,620		327	331	333	335	348
544		408	459	483	503	503		1,834	1,899	1,860	1,844	1,914
545		847	1,022	1,107	1,180	1,204		392	397	399	402	424
546		1,404	1,537	1,576	1,608	1,608		544	594	606	620	644
547		1,197	1,210	1,206	1,253	1,253		640	649	651	656	681
548		511	2,433	2,892	2,876	2,876		413	672	658	652	677
549		320	2,724	3,299	3,282	3,282		119	790	756	749	778
550		438	783	1,263	1,443	1,847		1,169	1,230	1,232	1,241	1,382
551		99	270	1,069	1,711	2,415		32	70	795	1,606	1,727
552		384	464	513	547	547		252	331	387	428	445
553		248	273	285	294	294		125	260	369	448	465
554		148	1,919	4,207	4,804	5,400		69	416	1,599	1,585	3,139
555		128	1,024	1,453	2,295	2,905		117	175	389	545	701
556		109	866	912	954	1,000		156	2,125	4,776	5,580	6,296
557		79	80	400	755	803		65	171	257	343	441
558		76	76	74	73	75		51	52	369	724	767
559		59	60	916	1,864	2,298		134	138	368	687	736
560		13	13	852	1,780	2,195		70	70	251	438	550
561		70	1,606	2,427	3,097	3,819		100	429	578	690	873
562		60	363	1,936	3,235	3,991		144	158	523	762	955
563		79	79	78	77	77		46	50	52	54	56

564		200	222	270	315	315		122	141	171	200	208
565		76	145	153	160	160		170	182	190	198	206
566		53	83	148	209	209		67	83	109	135	140
567		58	454	758	849	1,583		21	112	173	186	358
568		48	1,704	2,959	3,426	3,617		74	451	704	775	857
569		75	493	810	928	974		97	145	254	272	296
570		58	71	81	90	90		24	40	72	103	107
571		45	827	1,659	1,663	3,162		88	274	458	439	807
572		93	148	257	359	359		41	69	125	178	185
573		423	423	417	411	411		606	618	624	631	655
574		972	1,656	2,513	3,097	3,346		296	433	594	683	776
575		1,354	1,562	1,669	1,695	1,940		976	1,422	1,939	2,174	2,258
576		1,298	1,675	1,881	1,938	2,240		298	361	384	379	463
577		332	547	705	818	818		2,331	2,680	2,861	3,004	3,120
578		974	1,953	2,289	2,352	3,099		517	594	595	594	945
579		221	397	502	534	873		171	317	615	774	834
580		63	747	1,047	1,120	1,862		73	263	548	685	727
581		2,640	2,720	2,742	2,737	2,737		3,750	4,006	4,187	4,291	4,456
582		48	48	47	46	46		56	60	63	65	68
583		56	386	575	631	848		155	252	448	552	594
584		588	624	801	969	969		478	501	505	514	534
585		275	322	405	483	483		149	185	248	309	321
586		108	107	106	104	104		173	175	176	177	184
587		169	632	1,560	2,430	2,430		152	288	564	824	856
588		317	398	450	488	488		201	252	285	311	323
589		751	750	740	729	729		375	381	382	385	400
590		1,319	2,099	2,600	2,960	2,960		1,412	1,462	1,432	1,419	1,474
591		3,551	3,920	4,127	4,270	4,270		3,085	3,251	3,235	3,242	3,366
592		1,104	1,102	1,087	1,070	1,070		663	672	675	680	706

593		1,735	1,733	1,710	1,683	1,683		1,413	1,463	1,433	1,420	1,474
594		602	2,334	2,916	3,221	3,221		530	620	613	609	633
595		2,020	3,256	4,043	4,480	4,480		1,462	1,677	1,681	1,686	1,751
596		4,580	4,989	5,207	5,374	5,374		4,127	4,272	4,185	4,147	4,307

Appendix C SGA's DIFF Report

TE TUPU NGĀTAHI
SUPPORTING GROWTH

Drury Infrastructure Funding and Financing Study (DIFF) Transport Assessment

August 2021

Version 0.3

WAKA KOTAHI NZ TRANSPORT AGENCY

New Zealand Government

Document Status

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0.1		Early Draft for internal review
0.2		Draft Final Report
0.3		Final Report

Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

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Appendix A – Yield and Trip Generation Review

Executive Summary

Purpose and Scope

This report presents the transport assessment element of the Drury Infrastructure Funding and Finance study (DIFF), being undertaken by Auckland Council. The transport assessment seeks to identify a potential Staging Schedule of transport infrastructure upgrades to support the growth proposed in the Drury area.

The purpose and context of the resulting Staging Schedule is important to note, including that:

- It is for the purpose of Council considering funding and financing options, and as such has not explicitly considered funding constraints or delivery mechanisms
- It is based on transport facilities to serve the full release of the proposed plan changes in Drury, using assumed yield and build-out rates derived from the Plan Change documents. It therefore has not considered land use approval, funding, network, economic or other constraints on growth
- It is based on application of SGA transport planning principles and processes in this context and hence does not reflect a committed infrastructure staging plan by Auckland Transport, Auckland Council or Waka Kotahi
- While the ultimate corridor forms are based on the SGA work, opportunities for potential interim stages remain conceptual options only, with the design, form and timing of any works remaining for agreement between developers and the relevant road controlling authority
- The Staging Schedule therefore does not have the status of committed projects endorsed by Auckland Transport or Waka Kotahi and is subject to change in response to funding methods, delivery mechanisms, land use decisions and regional investment priorities. Nor does the Staging Schedule reflect specific projects that Auckland Transport or Waka Kotahi would deliver.

By design, this assessment has not considered design, planning or submission detail related to the Private Plan changes in Drury. While it has utilised, information provided with the Plan Change applications in its assessment, it has focussed on a more strategic assessment of the bulk transport infrastructure needs. The work was progressed with liaison with the proponents and advisers for the plan changes, including sharing of staging principles, modelling, access strategies and the draft Staging Schedule.

The scope of projects considered in this assessment are new or upgraded transport infrastructure within the Drury area needed to support the plan changes. Key projects included in Drury West will also support later growth in Drury West Stage 2 (south of SH22), however the specific additional elements needed within that later growth area are not included. Some of the projects included also have wider growth or strategic transport functions, making ring-fencing of the Drury-specific projects very complex. The local street network design also has a key role in supporting the urban form and mode shift objectives sought for this area, however those elements were not included in this assessment as they are assumed to be the responsibility of developers for delivery. This work has not included construction traffic effects, maintenance, rehabilitation, renewals or services and omits transport projects needed for growth wider than the Plan Change areas of east and west Drury, some of which are located in Drury.

Approach

The Staging Schedule was developed based on the application of Staging Principles which sought the following outcomes:

- Transport systems that support quality, compact urban form, including through higher density around major public transport corridors
- Mutually supportive transport and land use systems that:
    - provide safe travel across all modes
    - provide a transformation in mode share to more sustainable modes, such as public transport, walking and cycling to support decarbonisation goals
    - provide improved choices of travel
    - provide efficient freight movement
    - provide high levels of accessibility to social and economic opportunities
- a resilient transport system

A key component of this approach is transport infrastructure that supports high mode shift to more sustainable modes, as well as supporting the land use activities and place function. A heavy emphasis was therefore placed on the provision of quality walking, cycling and PT infrastructure from the outset of development. Traffic data and modelling was then used to inform the assessment of key access points to the Drury West and East areas, including linkages between the two. The traffic modelling applied first-principle estimates of trip generation for the plan change areas, including mode share assumptions of up to 46% by walk/cycle or PT. These mode shares are significantly higher than traditional rates for such areas, and are considered feasible only with supporting infrastructure, land use planning, local street design, public transport services and land use planning provisions.

Although the focus has been on the plan change areas in Drury, the assessment has considered the cumulative effect of both this growth and ongoing growth in adjacent and wider areas.

During development of this assessment there was uncertainty regarding the outcomes of the re-baselining of the NZ Upgrade (NZUP) programme. As such, this assessment considered scenarios with and without key elements such as the Drury South Interchange, Mill Road and Drury West Station. The NZ Government announced in June 2021 the outcomes of that re-baselining, namely:

- Delivery of all three rail stations (Paerata, Drury West and Drury Central)
- Delivery of only a scaled-down version of Mill Road in Manukau (i.e. no delivery of Mill Road in this Drury area)
- Delivery of the Papakura-Drury upgrade of SH1, but not the subsequent stage from Drury to Drury South
- Funding of a (non-specified) local package of upgrades to support growth in Drury

Because of the early consideration of scenarios with and without key elements (such as Mill Road and the Drury South interchange), it was not considered necessary for the purposes of this assessment to revisit the basis of this work, beyond altering the indicated timing and staging opportunities of key projects in response to these decisions. The timing, alignment and form of the Mill Road corridor where it passes through these plan change areas also remains unconfirmed, with any potential timing and alignments shown here being indicative only.

Growth Inputs and Assumptions

Assumptions on the total yield and build-out rate for the plan change areas was derived from the Plan Change documents where possible. This assessment was based on the regional transport model (MSM) zones in which the plan changes fell, meaning they did include some adjacent areas of Future Urban Zoned (FUZ) land. For this assessment 'Drury West' includes the FUZ-zoned land north of SH22 but not the FUZ to the south of SH22, while 'Drury East' includes some adjacent FUZ in Drury East, but not Opaheke.

For these definitions, Drury East is indicated to provide some 8,500[1] dwellings and 186,000m2 GFA of business/community floor area, while Drury West provides some 8,500 dwellings and 12,000m2 GFA of business area. Even with the aggressive mode shift assumptions, total vehicle movements are expected to be some 65,000 trips per day associated with Drury East and 46,000 vehicles per day for Drury West. For context, SH1 north of Drury recently recorded some 62,000 vehicles per day while SH22 carries approximately 22,000 vehicles per day.

Drury East Movement and Access

Current access to Drury East is highly constrained, being only via the existing rural roads of Waihoehoe Road (into Drury Village) and Ramarama Road (south to Drury South industrial area). Those roads are typically rural roads, without suitable walking, cycling PT or other urban street functionality. The wider receiving network is also constrained for the scale of growth proposed, being only via the SH1, Gt South Road and Rail corridors.

The Drury Central rail station is considered the critical element in providing PT access to/from this development area, supported by feeder bus routes and quality walk/cycle access. A supporting network of internal arterial, collector and local streets is also required. The analysis confirmed that the two existing access corridors (Waihoehoe Road and Ramarama Road), are not sufficient to support development of this full Drury East area. A number of new access roads were indicated in the Plan Change Movement Plans, however not all were indicated as being delivered by the developers. This assessment has confirmed that a number of those access links are necessary to support full development of this site, namely that:

- A new access to the west (such as the Brookfield-Quarry Link) is required to provide alternative access to Waihoehoe Road and provide connections between East and West Drury
- Enhanced access from the north is needed to provide relief to Waihoehoe Road, such as via the proposed direct entry from the Drury southbound motorway off-ramp
- Additional access capacity to SH1 is required for travel south and north on SH1, such as via the Drury South Interchange and access roads
- An additional connection is needed north to Papakura to provide improved connectivity and to reduce traffic on SH1 and Gt South Road by allowing direct access to Papakura and communities east of SH1

[1] This includes the Plan Change areas as well as the remaining FUZ area within MSM Zone 555

The Brookfield-Quarry Road link and direct Drury access ramp were found to be needed both short and long-term, even with Mill Road in place. However, the estimated level of traffic on these links will require careful design to integrate with the internal street networks.

The high mode share aspirations for walking and cycling in these areas will also require careful design of local street networks to help increase their safety and attractiveness. It is therefore recommended that the local street network is developed with appropriate access controls and speed environments to both minimise through traffic and maximise the safety and attractiveness of walking and cycling within those internal street systems.

Drury West Movement and Access

The current primary access to Drury West is via SH22, which is a high-speed rural road providing strategic movement function connecting Drury to Pukekohe and surrounding areas. Its current form is unsuitable for adjacent urban development. Secondary access is via the Bremner Road crossing over SH1 into the Drury Village. That route into Drury Village is also constrained via poor walk/cycle connections and the low lying, single-lane bridge on Norrie Road that is susceptible to flooding.

The Drury West rail station will directly support the southern and central parts of Drury West, with the northern parts of the Auranga development having the choice of both the Drury West and Drury Central stations. The arterial networks have been developed with quality walk/cycle and frequent transit (bus) corridors to both access those stations and connect the east and west communities through the supporting network. SH22 is currently a critical movement corridor which is operating effectively at the capacity of a rural road, which will need to change to a low-speed urban environment as the areas to both the north and south develop. Upgrading that corridor to a 4-lane urban arterial form with segregated walk and cycle facilities is identified as being needed to support release and integration of further urban growth in Drury West.

The long-term recommended network for the Southern Auckland growth area also includes the Pukekohe expressway to aid the transition of SH22 from its current strategic movement function to a localised urban function. This includes a southern extension of Jesmond Road from SH22 to connect with the strategic expressway. Those elements south of SH22 (including the collector road network), are needed to support Drury West Stage 2 and wider regional growth. An initial stage of the Jesmond Road southern extension is included as part of access to the Drury West Station, but those strategic elements were not included in this assessment.

As with the Drury East network, it is recommended that the local street design within Drury West is developed with appropriate access controls and speed environments to both minimise through traffic and maximise the safety and attractiveness of walking and cycling within those internal street systems.

East West Connections

In addition to internal or access corridors for Drury west and east, a number of more strategic upgrades have been identified that are needed to improve connections between the two communities, including:

- Upgrades to Norrie Road (Bremner road east FTN)
- Regional active mode corridor between Drury and Pukekohe, of which the section between Drury Central and Drury West has been considered for this assessment; and

- Gt South Road between Karaka Road and Quarry Road

Network upgrades in Drury West south of SH22 have not been explicitly included in the scope of this assessment as there are no current plan changes. However, it is noted that the confirmation that NZUP will deliver this station early indicate that additional growth (and hence infrastructure needs) could occur in Drury West, outside the scope of projects included here.

Staging Schedule

A Staging Schedule has been developed with indicative time horizons and identifying the growth areas they support. As noted above, there are significant uncertainties as to the roll out of the development and the timing of key transport infrastructure. As such, this Staging Schedule provides one potential scenario for such development, to assist Council develop infrastructure funding methods. While this Staging Schedule is subject to change based on other decisions and economic or other drivers, the key principles applied, and outcomes sought are considered to remain valid underthe various possible scenarios of how this area will develop into a new urban community.

The detailed Schedule is provided later in this report, based on the network elements in the following Figure.



Conclusions

Key conclusions of this work include:

- Both the Drury East and Drury West areas constitute a significant scale of urban growth

- That Drury growth is itself only a sub-set of the total growth planned and expected in the southern parts of Auckland
- This scale of growth requires an extensive network of new or upgraded transport corridors, both within the immediate growth area and on the surrounding receiving environment. This network will need to comprise both strategic network and local network elements in order to deliver on the mode change aspirations
- The long-term arterial and strategic network to support this growth has been identified through the SGA IBC and is being further developed through SGA detailed business cases. The local network has been assumed to be represented by the master plan networks put forward for the Plan Change areas. Some opportunities for the staged implementation of the new or upgraded corridors has been identified in this assessment, however the feasibility, design, and timing of any such interim upgrades will remain to be agreed directly with the appropriate road controlling authority
- Drury is located where all movements between Auckland and the south must pass, meaning that the transport networks have been scaled for local, regional and inter-regional growth. This means it is not feasible to fully isolate the projects needed to support just the Drury plan change areas from growth in the wider network. While this assessment has focussed on the projects needed for Drury, it includes some elements in Drury to accommodate wider growth but excludes wider-network projects which will benefit the Drury area.

1 Purpose, Context and Scope

1.1 Purpose and Background

This report documents an assessment of the transport infrastructure needed to support the planned growth in Drury, with the desired land use and transport outcomes.

Auckland Council are undertaking the Drury Infrastructure Funding and Financing Study (DIFF), which seeks to:

- "*Provide for integrated and timely infrastructure delivery that enables and supports growth in the Drury area in a way that uses current and alternative funding, financing and delivery opportunities*"

Council commissioned the Te Tupu Ngatahi Supporting Growth Alliance (SGA), to undertake the transport infrastructure component of that study. Specifically, it requested SGA to identify sequencing/staging of transport infrastructure to support progressive urban development of Drury.

This work was similar to the previous DTIP study undertaken by Council, but with the following refinements to address feedback on the previous work:

- Use of new information, including ATAP, Private Plan Change Applications, NZUP, SGA Detailed Business cases etc
- More granular staging of infrastructure (physical and temporal), not just corridor sequencing
- More extensive liaison with key parties (including developers), on inputs, assumptions and methodologies

1.2 Relationship to Private Plan Change Regulatory Processes

This work is primarily targeted at Council's consideration of funding options and is not intended to duplicate or replace Council's, Auckland Transport's, or Waka Kotahi's detailed assessment of eachPrivate Plan Change. In regard to the Plan Change processes, this work:

- Has a broader-network focus than just the individual plan changes, looking at the cumulative growth across both the various plan changes and the wider growth pressures
- Has a focus on the 'strategic' rather than local elements of the network, and especially does not cover local street design or delivery
- Is not considering detailed plan change provisions or submission points
- Is focussed on 'bulk' transport infrastructure, not detailed provisions (e.g. parking policy, local street design, staging triggers etc)
- Is using different transport advisers (i.e. SGA) to those from Council[2], Auckland Transport or Waka Kotahi involved directly in the Plan Change process

2 Regulatory

1.3 Scope of Transport Elements Considered

The approved SGA Indicative Business Case (IBC) for the Southern Growth area of Auckland provides a range of projects and interventions between Manukau and Pukekohe to accommodate the long-term planned growth in this area, including inter-regional growth. The scope of projects included in this assessment are a sub-set of those projects involving new or upgraded transport infrastructure to support the Plan Changes. It is however noted that growth in adjacent and wider areas is still considered when estimating the required timing and scale of projects.

In addition to the SGA arterial and strategic projects, this study also includes key collector roads in Drury East and West, but not local streets.

Key projects included in Drury West will support later growth in Drury West (Stage 2, south of SH22), however the specific additional elements needed within that later growth area are not included (as there are no active plan changes and it was indicated for later development under FULSS). Some of the projects included also have wider growth or strategic transport functions, making ring-fencing of the Drury-specific projects very complex. The local street network design also has a key role in supporting the urban form and mode shift objectives sought for this area, however those elements were not included in this assessment as they are assumed to be the responsibility of developers for delivery.

It focusses on new or upgraded transport infrastructure needed to improve access, safety or capacity (by any mode), but has not considered any consideration of construction related traffic effects nor has it included any assessment on the existing carriageway quality to support the anticipated traffic flows.

Although focussed on the Drury area, other key strategic IBC projects identified to support the whole southern growth area that are omitted from this assessment include:

- Pukekohe Expressway and arterial connections
- Paerata rail station
- Pukekohe arterials
- Rail 4-tracking
- Takaanini rail crossings
- Opaheke and Gt South Road Frequent Transit Routes (FTNs) between Drury and Papakura
- Mill Road, north of Papakura, including associated connections
- SH1 FTN and other long-term upgrades north of Papakura
- Regional Active Mode Corridor (south of Drury)

This assessment therefore, represents a technical assessment by SGA (who are not parties to the Plan Change hearings), for a specific purpose and based on key assumptions. It therefore, does not represent a formal endorsement by Council, Auckland Transport or Waka Kotahi for any specific staging or sequencing of transport infrastructure.

1.4 Assumptions on NZ Upgrade Projects

A number of projects proposed for this area were incorporated in the NZ Upgrade Programme (NZUP) announced in early 2020, including (see):

- Mill Road

- Papakura to Drury South
- Drury Rail Stations
- Papakura to Pukekohe rail electrification

Figure 1-1 NZ Upgrade Projects in Southern Auckland



During the preparation of this assessment, NZUP was going through a re-baselining exercise for the whole programme. Due to this uncertainty on the exact scope and timing of elements of the NZUP programme that could emerge from the process, it was considered necessary to consider scenarios with and without key elements. Solely for the purposes of progressing an initial assessment ahead of decisions on the re-baselining, the following was assumed:

- Assume the rail electrification proceeds, due to progression of design and construction planning
- Consider scenarios with and without Mill Road (at least the parts south of Papakura of most relevance to this work)
- Assume Stage 1 of the Papakura-Drury South project (between Papakura and Drury only), due to progression of design and construction
- Stage 2 of the Papakura to Drury South project (the section between Drury to Drury South) is considered inter-related to assumptions on Mill Road
- Consider with and without the immediate delivery of Drury West Station

A decision was subsequently announced on the NZUP projects in June 2021 (just before completion of this study), and included:

- Delivery of all three rail stations (Paerata, Drury West and Drury Central)
- Delivery of only a scaled-down version of Mill Road in Manukau (i.e. no delivery of Mill Road in this Drury area)

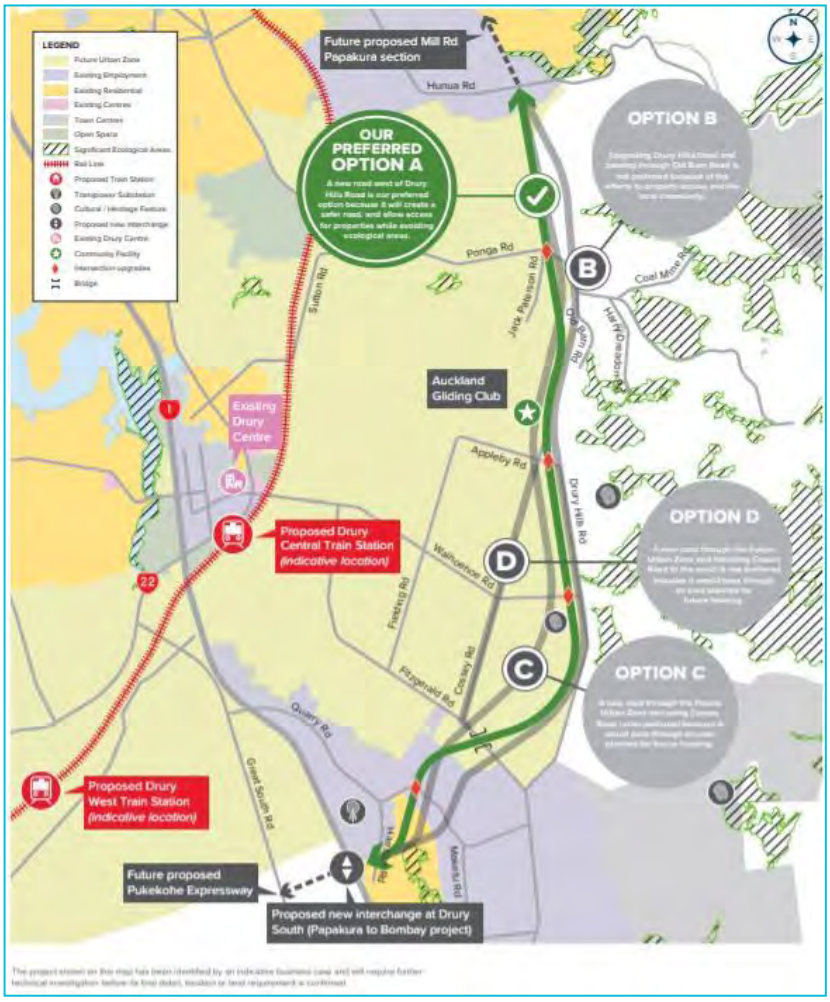
- Delivery of the Papakura-Drury upgrade of SH1, but not the subsequent stage from Drury to Drury South
- Potential funding of a (non-specified) local package of upgrades to support growth in Drury

Although removed from the NZUP delivery programme, it is not confirmed that projects such as the Drury South Interchange and Mill Road should be removed from all future network planning. The key changes made to the initial Staging Schedule following the NZUP decisions were:

- An accelerated need for the full upgrade on Waihoehoe Road west, given this would remain the primary access into Drury East with the removal of the Drury South interchange and Mill Roads from NZUP delivery
- An acceleration of the need for the full upgrade to SH22 (east of Jesmond Road) to assist transition to an urban environment following the confirmation of the early delivery of the Drury West station south of SH22

It is noted that longer-term decisions on the alignment, form and timing of projects such as the Drury South interchange and Mill Road will remain influenced by regional or national priorities, rather than solely on the needs of local development in Drury. This means that any indication provided in this report regarding the timing of those elements remains highly uncertain. For reference, the technically preferred alignment option for Mill Road identified for public engagement in May 2020 is shown in **Figure 1-2** below.

Figure 1-2 Options Considered for Mill Road Corridor Alignment



1.5 Stakeholder Liaison

As noted above, the scope for this SGA assessment does not include detailed consideration of the Plan Change proposals or submissions but does include liaison with key parties. Liaison with external parties was managed by Council, and included:

- Attendance at steering group and technical (transport) meetings with:
  - Drury East developer group (Fulton Hogan, Kiwi Property and Oyster Capital)
  - Auranga development in Drury West
  - Waipupuke development in Drury West
- Representatives of Auckland Transport and Waka Kotahi were included in these meetings

Information shared with parties during this process included:

- Staging Principles (as described later in this report)
- Site trip generation estimates
- Emerging access strategies
- Traffic model scenarios
- Draft Staging Schedule

1.6 Report Structure

The remainder of his report is structured as follows:

Chapter 2: Describes the approach to this assessment

Chapter 3: Outlines the growth in this area

Chapter 4: Considers the potential yield, travel movements and access requirements for the plan change areas

Chapter 5: Discusses the purpose, form and opportunities for staging each key element of the network and presents the resulting Staging Schedule

Chapter 6: Provides key conclusions

2 Assessment Approach

This Chapter describes the overall approach to this assessment, including the ongoing land use and transport system planning context. Detail on growth inputs are included in the subsequent chapter.

2.1 Full System Solution and Role of SGA

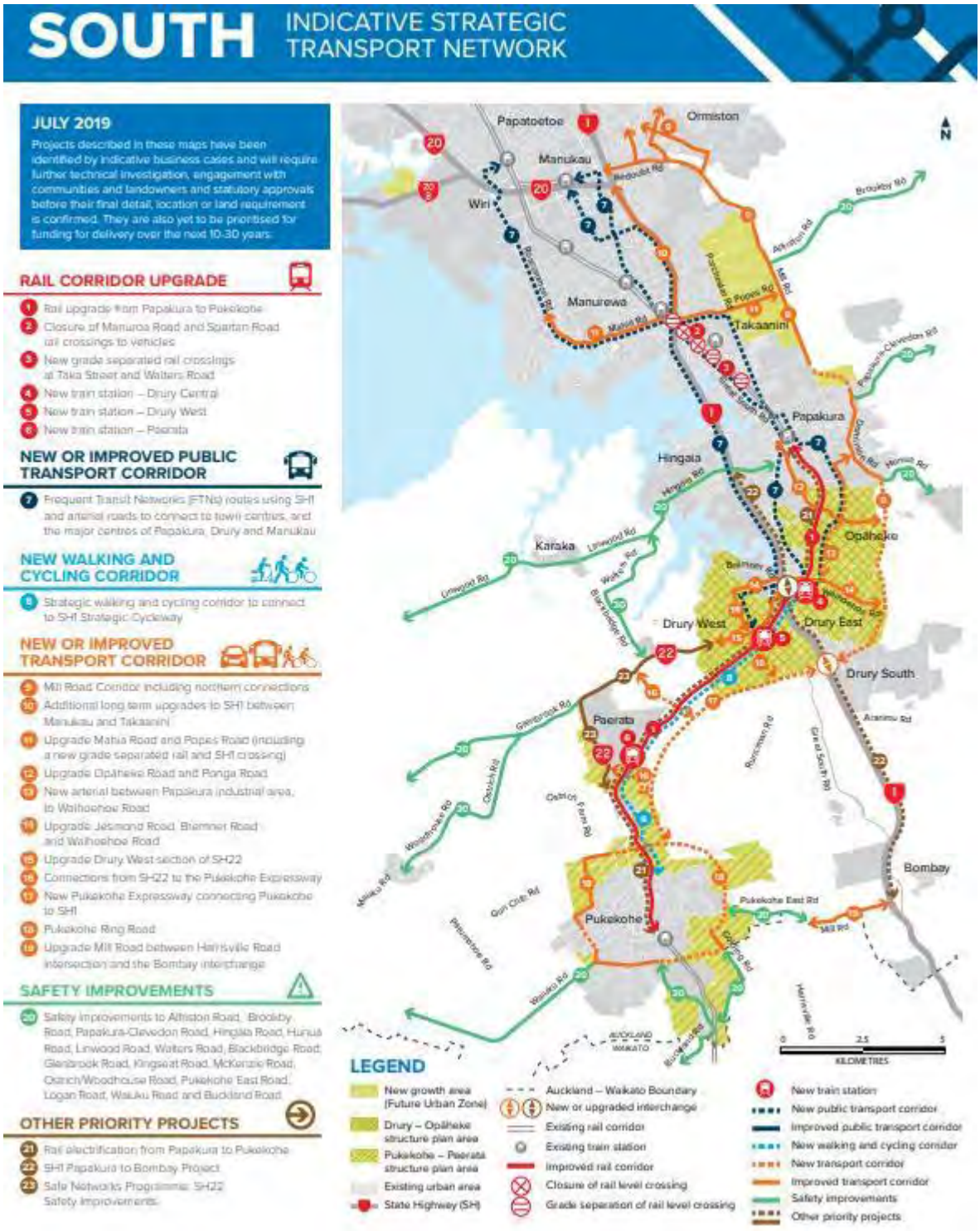
As noted above, the SGA IBC identified a full system solution to support the planned growth in southern Auckland, as indicated in **Figure 2-1**. In addition to the infrastructure projects shown in the Map, the business case identified the need for supporting initiatives related to demand management and land use-transport integration. The land-use-transport integration work has included continuous liaison between SGA and Council on planning for both the transport projects and the land use planning. This included the Drury Opaheke Structure Plan for which SGA prepared the Integrated Transport Assessment for Council.

The role of SGA is to achieve long-term route protection of the recommended networks, with subsequent project implementation decisions and processes remaining with Auckland Transport and Waka Kotahi. This means that the SGA work is focused on identifying required corridor footprints and does not imply any specific implementation status. SGA are progressing detailed business cases (DBCs) for elements of the network and have recently lodged a Notice of Requirement for the Drury Arterials package.

The SGA IBC/DBC work and the Council planning documents[3] therefore form the key basis for the planned growth, desired outcomes and strategic projects used in this work.

3 Including the Unitary Plan, Drury Opaheke Structure Plan and Future Urban Supply Strategy

Figure 2-1 SGA IBC Network



2.2 Approach to Plan Changes

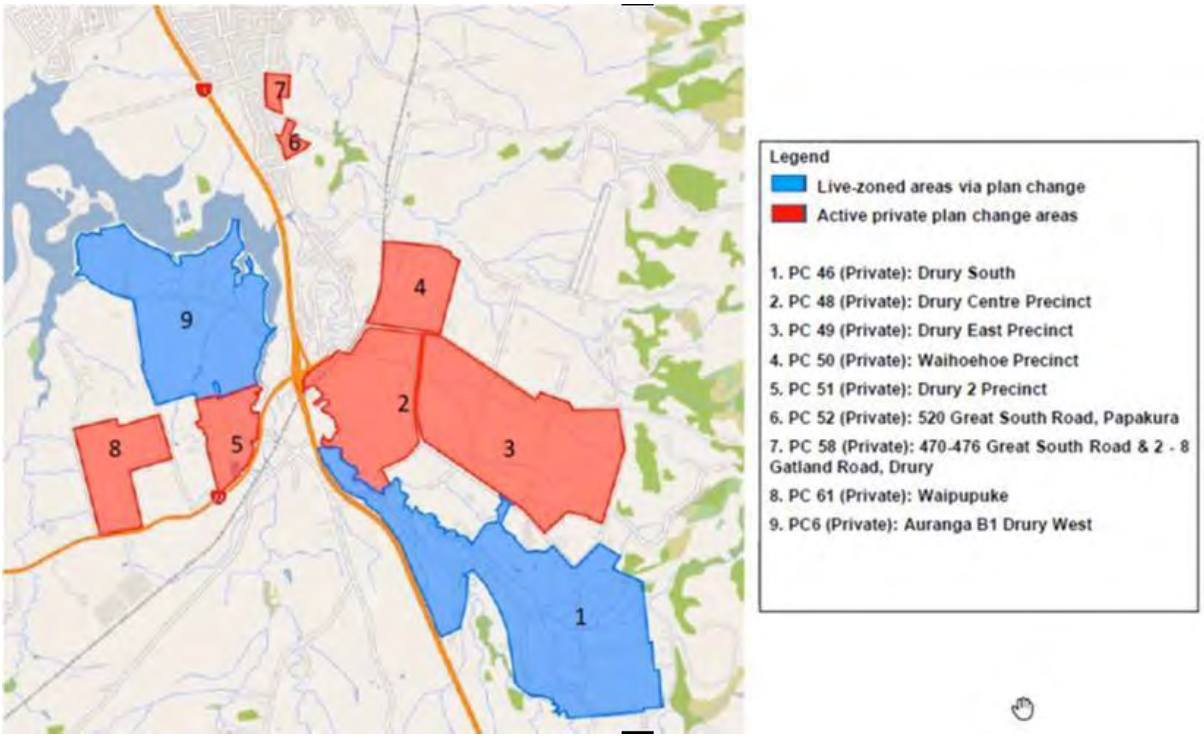
As noted above, this assessment has treated the lodged Plan Change documents at face value, and used their key elements for this assessment, including:

- proposed type, location and yield of indicated land use activities
- proposed transport connections
- Indications of potential land use sequencing

This work has not considered the detailed planning provisions proposed in the documents to manage transportation effects or specific transport policies, nor provided a view on the appropriateness of the proposals. The plan changes are indicated in **Figure 2-2** below. To avoid potential confusion from the multiple numbers, the Plan Changes are also referred to here by their proponent developer, namely:

- Kiwi Properties for PC48 (Drury Centre)
- Oyster Capital for PC50 (Waihoehoe)
- Fulton Hogan for PC49 (Drury East)

Figure 2-2 Recent and Current Plan Changes



Although the Drury 1 and Drury South Industrial precincts are live-zoned, they are only partially developed and include planning provisions (via AUP Precinct Plans) regarding the provision of key transportation elements to allow full development that are relevant to this work. Additionally, the Drury South Industrial area has a new Private Plan Change to revise some aspects of the existing Precinct Plan.

2.3 Transport Outcomes Sought

The transport and land use planning for this southern area has identified the need for a move away from low density, car-dependent developments in order to minimise adverse outcomes in terms of:

- Inefficient use of scarce land
- Poor environmental outcomes, including carbon emissions from car-dominated travel
- Poor urban form outcomes from dispersed development with car and movement-dominated transport systems
- Poor safety outcomes from conflicts with and between walking/cycling and high traffic flows in urban areas
- Poor economic outcomes from inefficient freight movement and poor business accessibility
- Poor social and economic outcomes from poor accessibility to social and economic opportunities and limited travel options
- Poor economic outcomes through a lack of resilience in the transport system

The key outcomes sought through the SGA business cases to address these issues include:

- Transport systems that support quality, compact urban form, including through higher density around major public transport corridors
- Mutually supportive transport and land use systems that:
    - provide safe travel across all modes
    - provide a transformation in mode share to more sustainable modes, such as public transport, walking and cycling to aide decarbonisation goals
    - provide improved choices of travel
    - provide efficient freight movement
    - provide high levels of accessibility to social and economic opportunities
- a resilient transport system

These outcomes are used in the SGA business cases and have also been used for this assessment.

2.4 Approach to Staging Assessment

This assessment is substantially based on design and timing principles that will help deliver the desired outcomes, particularly regarding mode shift and safety. It is acknowledged that there is significant uncertainty in growth planning in greenfield areas, including:

- The outcome of land use planning decisions, such as the various private Plan Changes
- The exact sequencing of how each site will develop, which is complicated by the large area and multiple land-owners
- The rate of development
- The timing of key infrastructure to support growth
- The growth demands that impact this area from other locations, such as Northern Waikato

Due to these uncertainties, it has not been possible to predict or model all possible interim scenarios. Instead, the assessment needed to consider general principles that would apply to growth in a specific area, a range of scenarios for provision of new connections or major infrastructure and the potential cumulative effects of growth across many areas.

The broad approach to this work is therefore as follows:

- Apply design and timing principles to identify key transport elements needed to support each area, especially as regards PT, walk and cycle facilities
- Consider key constraints to access to Drury West and Drury East
- Use traffic data and models where needed to identify access strategies/needs under different scenarios for key infrastructure
- Consider the cumulative effect of growth in both Drury east and west, including on the key east-west linkages
- Identify opportunities for interim stages of needed upgrades
- Develop indicative project sequencing strategy

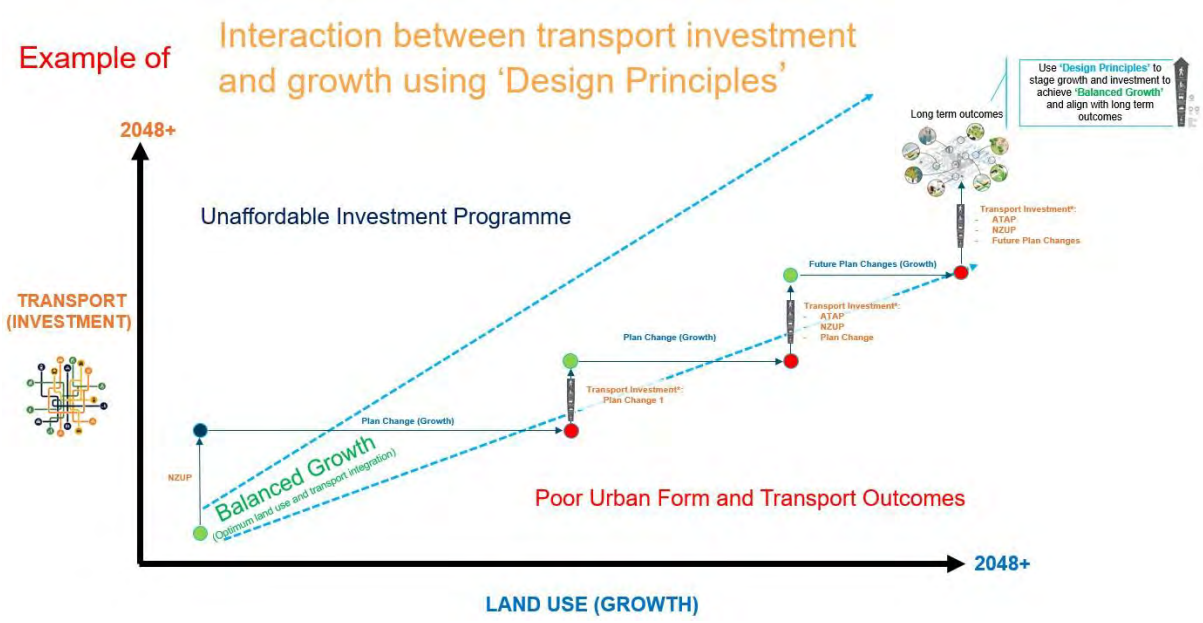
The assessment is based on provisions of high-quality walking/cycling and PT facilities from the outset of development, to support compact urban form, high mode shift and associated demand management and climate objectives. Transport modelling has been used to inform, rather than dictate this approach.

2.5 Staging Principles Overview

Due to the uncertainty regarding the timing and form of specific land-use activities staged over three decades surrounding Drury, a principle/design-based approach is regarded as the best way to manage and deliver the desired transport and land use outcomes consistently.

The 'Timing and Design Principles' are intended to provide guidance to stage transport infrastructure to achieve balanced growth, that aligns with the long-term outcomes and achieve optimum land use and transport integration over time. **Figure 2-3** provides an example of how the interaction between transport investment and growth using 'Timing and Design Principles' to help develop staging plan(s).

Figure 2-3 Example of desired outcomes over time



2.5.1 Timing and Design Principles

A set of timing and design principles were developed to guide the strategy development. These principles are based on the desired transport outcomes and reflect the need to stage the upgrades in an integrated way with land use development. The principles related to early provision of mode-shift and demand management initiatives are a key element of strategies to decarbonise the transport system.

Timing Principles:

1. On sites where urban development is occurring:
    a) Urbanise existing corridors within and adjacent to development concurrently with that development
    b) Provide for, or do not preclude, planned transport corridors within/adjacent to development, including through providing interim facilities as part of development
    c) Where transport improvements are provided in an interim form, ensure alignment with the full build-out network
2. Beyond sites where development is occurring, stage the form and capacity of the transport network progressively to match both development stages and system needs, including cumulative effects of urban development on transport demands on the network.
3. Provide safe and efficient public transport and active mode facilities from the outset of urban development to support a shift to more sustainable travel.
4. Sequence the provision of rail stations and facilities for gaining access to rail stations to coincide with and support:
    a) A commitment to adjacent land use of significant scale within walking distance
    b) The need to serve as a strategic PT hub to service a wider catchment with poor PT options
    c) Support significant mode shift to PT from early in the development cycle
    d) Noting a need to find a balance between criteria (4a and 4c)

Design Principles:

1. Include elements to support place function, not solely movement function (i.e. design standards change based on place value)
2. Provide safe travel by all modes
3. Provide walk and cycle connections from the start of residential development to the following key destinations/attractors within walk/cycle catchments:
    a) Closest train station
    b) Nearby education facilities
    c) Closest Major Centre
    d) Existing Centre
    e) Major employment area
4. Provide walk and cycle connections from the start of non-residential development to the following key locations within walk/cycle catchments:
    a) Closest train station
    b) Existing Centre
    c) Adjacent residential areas
5. FTN services & infrastructure provisions when needed to provide reliable, efficient & attractive frequent public transport
6. Provide local bus services and associated facilities to respond to timing, scale and location of urban development
7. General traffic improvement when needed for:
    a) Safety
    b) Wider network resilience
    c) Accessibility to key destination
    d) Inter-peak reliability & LoS for all modes
    e) Alleviation of severe peak-period congestion

   f) Alleviation of impact on public transport services
8. Coordination of adjacent projects for the purpose of practical construction staging

This process seeks opportunities to stage upgrades to match specific growth or system needs, however it is noted that such opportunities for interim stages may add to costs or difficulty in subsequent future upgrades. It is beyond the scope of this assessment to quantify and determine the economically optimal strategy for every part of the network, particularly given the uncertainty in how the various growth areas will indeed develop.

2.6 Transport Modelling

Transport modelling has been used to inform this work, however due to inherent uncertainties noted above, traffic modelling has not been the primary method to determine the recommended strategy.

Key points to note with the modelling include:

- Recommendations on walk/cycle and PT facilities have been driven by the Staging Principles, alignment with desired outcomes and considerations for long-term integration of land use and transport, and not directly by modelling
- The traffic models have been used to identify/assess the impact of potential new access links, rather than as specific forecasts of the future
- Transport modelling, especially in greenfield growth areas, has quite high levels of uncertainty, including the type and rate of growth, timing of infrastructure, the influence of policy decisions and the design and performance of key parts of the system. In such circumstances the models are considered least accurate at a disaggregate level (e.g. hourly turning flows and delays at key locations), and more likely to be accurate at aggregate levels (e.g. daily 2-way traffic flows)
- In some locations the lodged Plan Change documents indicate different type and scale of development than is indicated in the regional land use forecasts (which were informed in part by the Structure Plan for Drury). Subsequently, first-principle estimates of traffic generation were made for Drury East and West (north of SH22), based on the Plan Change documents. The 'standard'[4] traffic models were then adjusted to match these estimates
- Data was used from both the regional demand (MSM) and the local traffic (S3M) models

The specific assumptions on yield and trip generation in each area are discussed in the following Chapter.

A number of scenarios were used to test the effects of various network changes. Due to the significant number of potential combinations of network and land use inputs that could be considered, these tests were kept at a simple level to understand key effects. This included using fixed demand patterns for some tests with/without key links, rather than fully re-running both the regional demand and local traffic models in all cases. The limitations of this approach were acknowledged, and various other methods used to inform the analysis, including use of existing traffic count data, outcomes of similar corridors elsewhere and high-level assessments of the daily flows likely to want to head in each direction.

4 These are models using the regional growth forecasts

The various scenarios modelled are described in **Table 2-1** with resulting daily and maximum hourly flows at key locations shown in Figure 2-4. The locations of the key flow estimates are indicated in **Table 2-2.**

Table 2-1 Model Scenarios

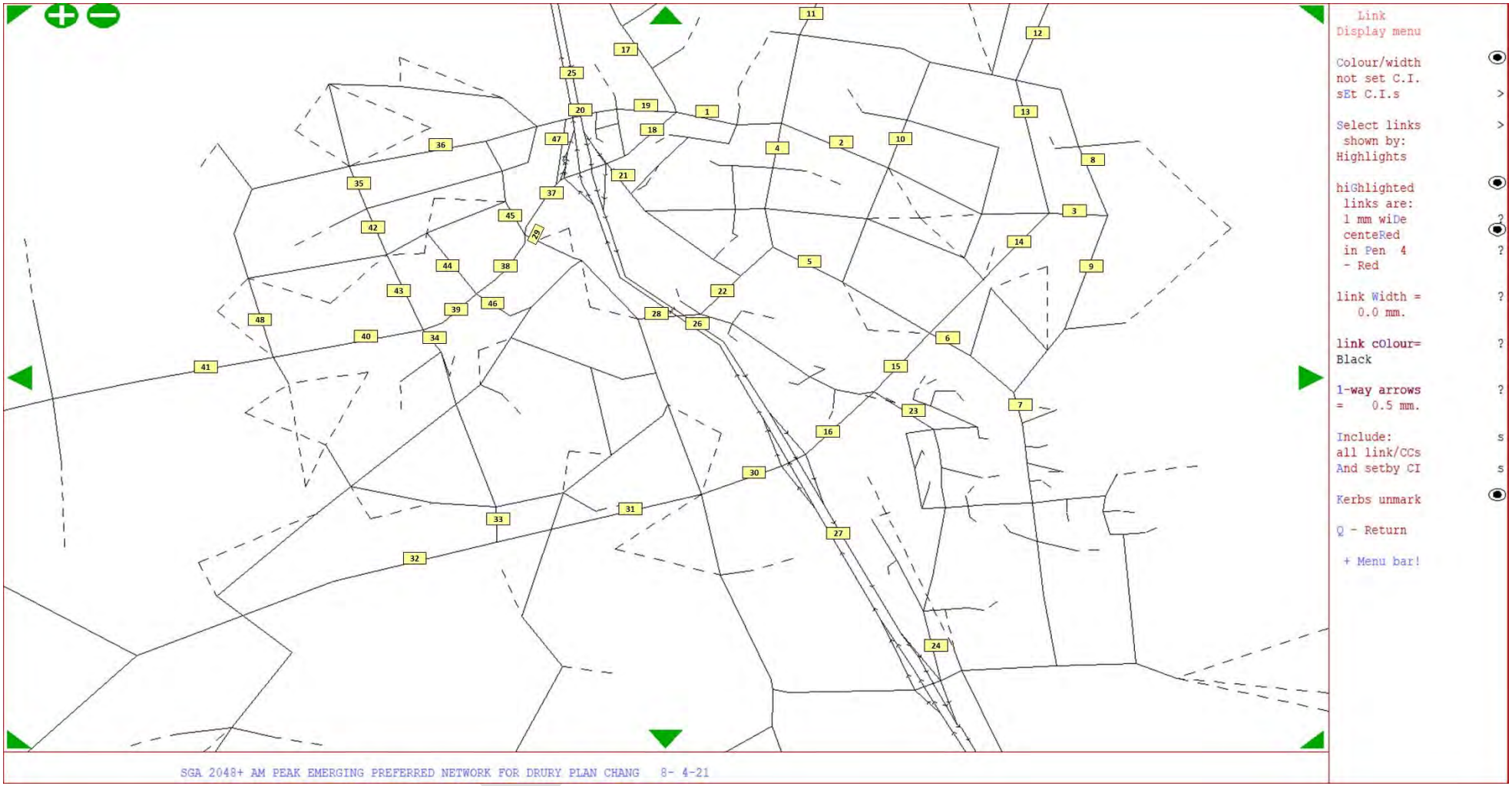
Scenario	Description	Purpose
2028 Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	A reference scenario similar to that used in the plan change assessments
B	Remove (Ban) Mill Road between Drury and Papakura, but still includes Drury South Interchange	To test the effect of only having the Drury South Interchange element of Mill Road
C	Remove all of Mill Road south of Papakura, but include Maketu-Waihoehoe Road internal collector roads	To test the effect of having no Mill Road
D	Scenario C + BQL + DKR	To test the effect of adding the additional Access Links
2038 Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	A reference scenario similar to that used in the plan change assessments
B	Scenario A+ BQL + DKR + change signals to roundabouts on North-South arterial	To test the effect of adding the additional Access Links
2048+ Models		
A	Reference Case Mill Road Models updated for DIFF 3.0 Study (Drury East and West land uses). These include full Mill Road and P2DS projects and Opaheke North-South Arterial (with signals) but do not include Brookfield-	A reference scenario with the full SGA network and full growth development

Scenario	Description	Purpose
	Quarry Link (BQL) or direct Drury-Kiwi ramp access (DKR)	
B	Scenario A+ BQL + DKR	To test the effect of adding the additional Access Links
C	Scenario A With the change to Roundabouts on North South Arterial	To test the effect of different intersection forms
D	Scenario B With the change to Roundabouts on North South Arterial	To test the effect of different intersection forms

Table 2-2 Modelled Traffic Flow Estimates

	Demand Flows (Vehicles)		2028								2038				2048+							
			Scenario A		Scenario B		Scenario C		Scenario D		Scenario A		Scenario B		Scenario A		Scenario B		Scenario C		Scenario D	
S.No	Road Name	Road Section	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT	Max Peak Flow	ADT
1	Waihoehoe Road	GSR-Kath Henry Lane	1,173	20,162	1,273	24,210	1,356	27,706	1,208	19,644	1,331	22,802	1,162	17,101	1,276	23,968	1,226	17,284	1,401	25,970	1,188	17,891
2	Waihoehoe Road	FitzgeraldRd-ApplebyRd	397	5,739	238	4,507	352	6,575	507	6,323	134	2,168	127	2,558	244	4,360	217	3,874	207	4,692	287	4,816
3	Waihoehoe Road	MillRd-DruryHillsRd	127	2,190	162	2,701	225	3,776	239	3,857	194	3,470	205	3,679	546	7,993	538	8,124	547	8,001	547	8,188
4	Fitzgerald Road	NewParallelRd-WaihohoeRd	214	3,736	281	4,857	361	6,710	259	4,501	429	7,421	524	8,632	415	7,118	478	7,141	607	10,556	771	10,203
5	Fitzgerald Road	BrookfieldRd-FieldingRd	349	6,025	499	6,623	581	8,213	481	8,681	539	11,857	359	8,265	640	10,531	349	6,659	666	11,119	361	7,204
6	Fitzgerald Road	CoseyRd-DruryHillsRd	249	6,193	277	6,547	181	4,818	234	5,699	419	10,837	480	10,777	360	7,790	411	8,127	386	7,939	454	8,185
7	Fitzgerald Road	QyarryRd-DruryHillsRd	185	4,036	141	3,223	166	3,374	175	4,096	341	7,314	392	7,408	449	8,425	476	8,291	449	8,426	465	8,376
8	Drury Hills Road	WaihohoeRd-ApplebyRd	70	1,373	140	2,582	168	3,234	193	3,297	78	1,835	100	2,063	248	4,993	259	5,136	236	4,981	260	5,139
9	Drury Hills Road	WaihohoeRd-MacwhinneryDr	66	955	28	257	63	687	55	706	132	1,899	138	1,873	415	5,567	401	5,258	417	5,445	410	5,244
10	Appleby Road	WaihohoeRd-HarryDoddRd	365	6,262	84	1,595	84	1,610	85	1,628	273	4,033	132	1,820	386	4,945	321	5,227	212	3,760	274	4,259
11	NorthSouthArterial	HarryDoddRd(NSArterial)-PongaRd	0	0	0	0	0	0	0	0	726	7,840	783	11,846	1,290	12,572	1,297	14,610	1,297	14,982	1,283	17,156
12	Mill Road	ApplebyRd-PongaRd	1,672	21,819	0	0	0	0	0	0	1,693	28,462	1,657	25,113	2,110	36,123	2,106	34,638	2,110	34,611	2,139	33,249
13	Mill Road	WaihohoeRd-ApplebyRd	1,220	14,679	9	195	6	122	5	115	1,527	24,489	1,495	23,242	1,914	30,516	1,829	29,361	1,918	30,142	1,870	28,696
14	Mill Road	FitzgeraldRd-WaihohoeRd	1,151	14,231	70	1,232	36	627	32	576	1,383	23,624	1,345	22,181	1,597	28,418	1,518	27,345	1,591	28,158	1,543	26,641
15	Mill Road	MaketuRd-FitzgeraldRd	1,496	20,789	649	11,044	581	8,649	284	5,115	1,853	36,067	1,573	28,812	2,366	39,975	1,891	32,193	2,340	39,613	1,913	31,755
16	Mill Road	DSIC-MaketuRd	1,314	18,070	824	14,752	0	0	0	0	1,481	30,494	1,432	25,751	1,855	33,946	1,694	30,035	1,846	33,588	1,698	29,784
17	Great South Road	EastSt-SuttonRd	741	17,488	1,400	25,748	1,410	26,758	1,420	25,410	1,060	19,577	1,051	17,940	1,473	22,909	1,502	22,255	1,474	22,387	1,504	21,547
18	Great South Road	FirthSt-WaihohoeRd	845	12,162	1,035	16,976	1,013	18,201	894	12,585	1,007	14,170	741	8,083	1,051	17,426	800	10,439	1,160	18,565	881	10,886
19	Norrie Road	FirthSt-GSR	610	12,079	945	13,931	944	15,448	963	15,734	1,031	16,349	1,009	16,663	1,409	19,750	1,321	20,076	1,344	19,409	1,355	19,562
20	Bremner Road	VictoriaSt-CreekSt	709	10,436	695	10,501	644	10,635	698	11,001	1,000	14,958	1,056	15,358	1,253	17,639	1,215	18,176	1,229	17,469	1,228	17,904
21	Drury Interchange SH1 Off Ramp	SH1OffRamp-FlanaganRd	0	0	0	0	0	0	522	7,564	0	0	441	6,000	0	0	523	5,554	0	0	494	5,302
22	Brookfield Road	MaketuRd-Brookfield Rd	0	0	0	0	0	0	529	7,962	0	0	916	11,396	0	0	921	14,394	0	0	953	15,250
23	Maketu Road	MaketuRd-MillRd	568	10,261	400	9,830	489	8,919	381	7,730	1,040	19,191	1,036	18,999	1,178	20,809	1,083	20,882	1,124	20,782	1,087	20,629
24	Maketu Road	Ararimu Rd-MceldownieRd	366	4,568	318	4,691	604	11,741	446	8,880	960	9,605	902	9,106	1,199	11,332	996	10,330	1,130	11,179	995	10,081
25	SH1	Drury I/C-Papakura I/C	4,374	106,802	5,151	117,833	5,156	116,019	5,152	117,618	5,480	128,626	5,488	129,296	6,237	144,183	6,207	144,792	6,186	143,995	6,184	144,357
26	SH1	Drury South I/C-Drury I/C	3,084	79,080	3,982	91,028	3,787	83,875	3,824	83,075	4,477	107,652	4,455	107,438	5,221	124,051	5,219	124,390	5,222	123,677	5,223	124,082
27	SH1	RamaRama I/C-Drury South I/C	3,900	82,598	3,946	82,911	3,786	83,873	3,824	83,074	3,312	88,272	3,346	88,171	4,313	110,894	4,362	110,890	4,351	110,695	4,357	111,095
28	Quarry Road	GSR-QuarryRd	259	3,427	176	3,063	433	6,904	737	10,097	490	3,978	1,110	11,592	606	5,750	1,175	14,782	530	5,449	1,204	15,566
29	Great South Road	SH22-GSR	262	5,297	245	5,736	502	9,300	712	10,807	408	6,349	570	6,827	797	11,572	611	10,308	704	11,359	616	10,048
30	GSR - Drury South I/C	GSR-Drury South I/C	0	0	0	0	0	0	0	0	1,944	39,159	1,845	36,824	1,933	41,316	1,830	40,071	1,904	41,235	1,814	39,713
31	Pukekohe Expressway	RunchimanRd-GSR	0	0	0	0	0	0	0	0	2,138	40,751	2,043	40,527	2,148	46,128	2,069	46,014	2,152	46,014	2,073	45,797
32	Pukekohe Expressway	BurttRd-RunchimanRd	0	0	0	0	0	0	0	0	2,162	38,594	2,195	39,610	2,172	43,648	2,216	44,695	2,165	43,544	2,208	44,632
33	Extension of Jesmond Road	Pukekohe Expway-Runchiman/Burtt	0	0	0	0	0	0	0	0	280	6,730	440	6,956	588	11,401	585	11,752	576	11,141	573	11,558
34	Extension of Jesmond Road	JesmondRd Extn-SH22	360	5,515	360	5,747	346	5,690	337	5,530	246	4,421	217	3,986	497	7,307	543	7,022	493	7,397	536	6,851
35	Jesmond Road	NewParallelRd-South of Bremner Ro	299	4,235	291	4,194	291	4,310	274	4,183	459	7,566	450	7,373	481	9,517	518	9,417	527	9,555	493	9,302
36	New Bremner Road	Jesmond Rd-Auranga Dr	335	4,401	322	4,260	312	4,025	297	4,022	591	9,307	588	9,361	611	10,898	691	11,091	627	10,406	707	11,479
37	SH22	GSR-SH1 OffRamp	1,554	27,471	1,434	27,185	1,406	28,578	1,388	26,230	1,200	17,711	871	12,944	1,408	23,587	1,236	17,741	1,516	24,435	1,217	17,927
38	SH22	McPhersonRd-GSR	1,567	26,492	1,359	25,429	1,354	24,901	1,339	24,906	1,168	15,341	1,040	13,422	1,257	18,410	1,115	17,221	1,274	19,265	1,124	17,751
39	SH22	JesmondRd-McPhersonRd	1,567	26,494	1,360	25,431	1,354	24,901	1,340	24,907	1,092	14,158	984	12,676	1,102	16,588	1,048	15,744	1,117	17,257	1,052	15,789
40	SH22	OiraRd-JesmondRd	1,354	23,428	1,133	22,123	1,134	21,389	1,124	21,506	993	14,712	926	13,169	997	18,020	1,043	17,278	1,047	18,513	1,080	17,383
41	SH22	Whangapouri Rd-OiraRd	1,362	23,822	1,144	22,521	1,144	21,795	1,137	21,907	922	14,434	893	13,123	850	16,762	921	16,521	912	17,077	942	16,591
42	Jesmond Road	NewParallelRd-South of Bremner Ro	280	4,150	275	4,112	276	4,286	261	4,035	438	7,501	410	7,243	522	9,346	523	9,197	503	9,380	490	8,931
43	Jesmond Road	SH22-NewParallelRd	351	5,371	326	5,364	330	5,712	300	5,751	515	8,933	519	8,924	681	11,734	715	11,566	695	11,731	674	11,441
44	NewNSRoad	SH22-NewNSRoad b/w JesmondRd/B	0	0	0	0	0	0	0	0	75	1,184	56	748	157	1,970	143	1,703	158	2,119	139	2,032
45	NewNSRoad	SH22-NewNSRoad East of BurberryR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	NewNSRoad	BruttRd-SH22	0	2	0	2	0	1	0	1	0	1	0	2	53	148	87	226	39	110	22	70
47	Victoria Street	Bremner Rd-SH22	125	3,004	139	2,736	180	2,931	156	3,291	198	4,296	175	4,359	164	3,786	173	4,290	171	3,864	146	3,613
48	Oira Road	SH22-NewEWRoad b/w OiraRd/Jesm	46	849	47	861	47	865	47	880	79	1,555	78	1,591	154	2,873	151	2,859	157	2,923	154	2,942

Figure 2-4 Location of Key Traffic Flow Estimates



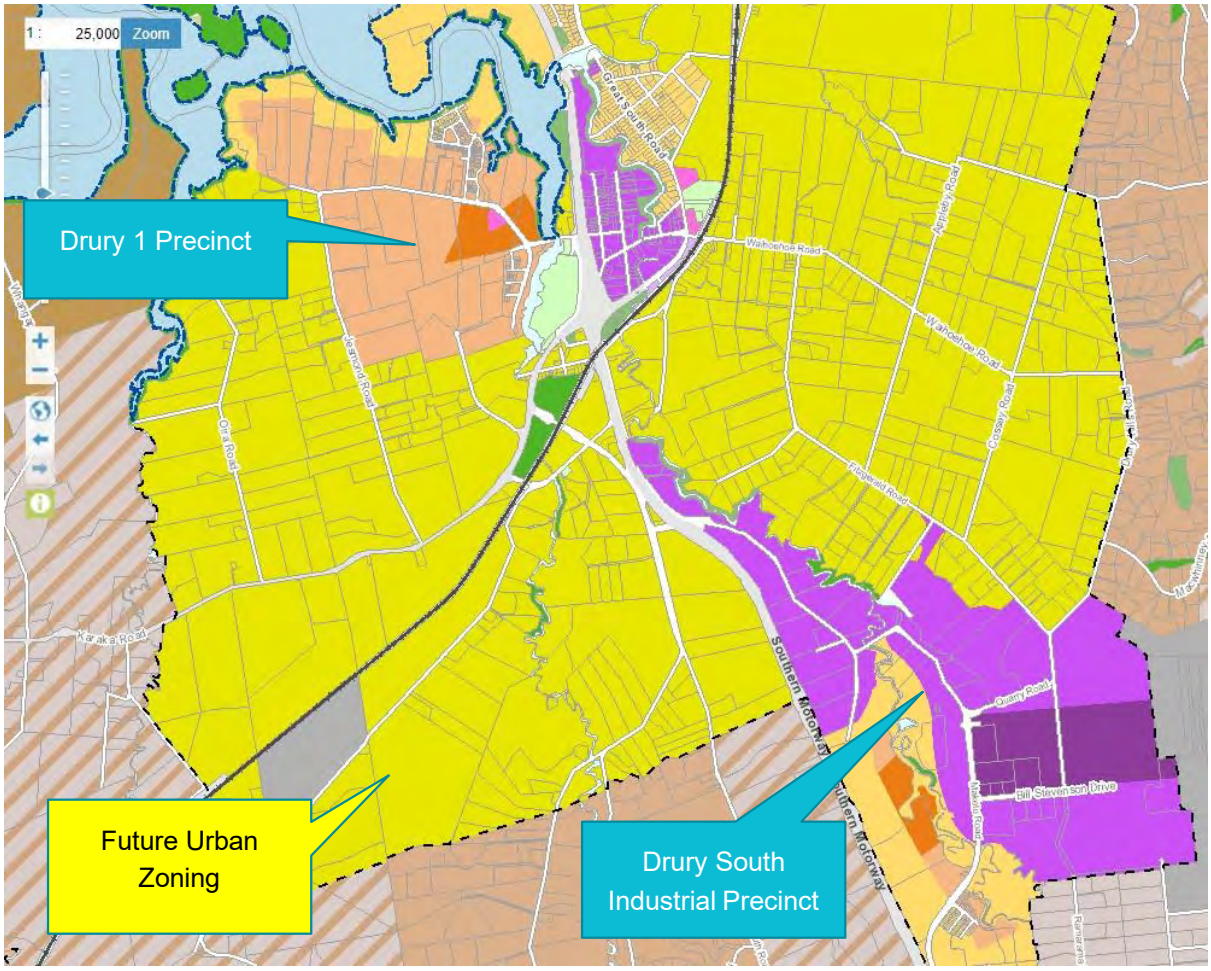
3 Growth Inputs

This chapter outlines the key growth inputs and assumptions used in this assessment.

3.1 Auckland Unitary Plan and Structure Plan

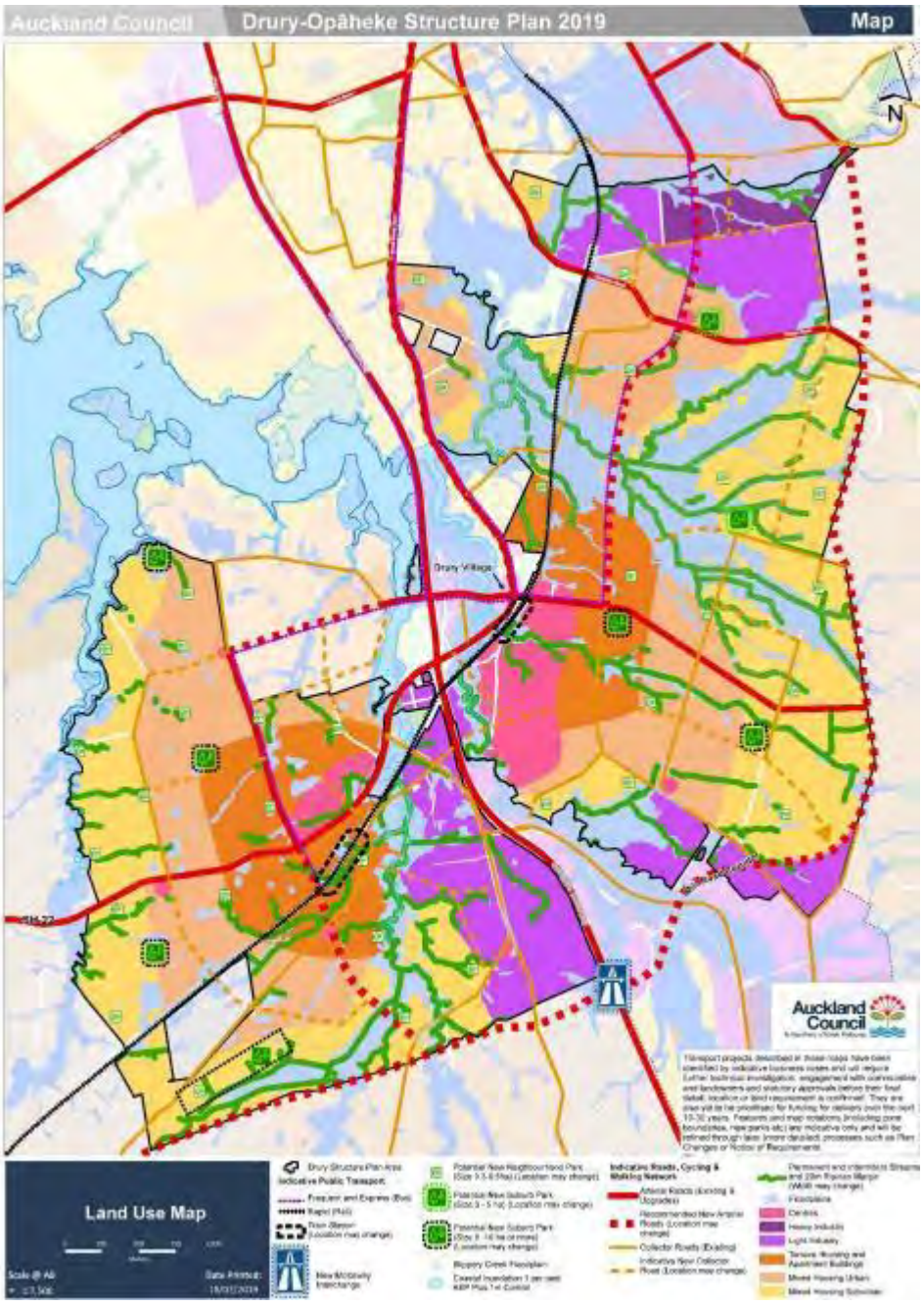
The AUP zoning for the Drury area is indicated in the following figure, highlighting the live-zoned areas and the extensive area of Future Urban Zone (FUZ, shown in yellow).

Figure 3-1 Auckland Unitary Plan Zoning and Precincts



Council progressed the next stage of land use planning by completing the Structure Plan for Drury and Opaheke in 2019. The resulting Structure Plan map (**Figure 3-2**), indicates the preferred type and location of land use activities, as well as the indicative transport network to support it. The indicative transport network indicated includes the SGA strategic network and indicative collector road network. Elements of the SGA network are currently being progressed through more detailed business case investigations.

Figure 3-2 Drury Opaheke Structure Plan



3.2 FULSS

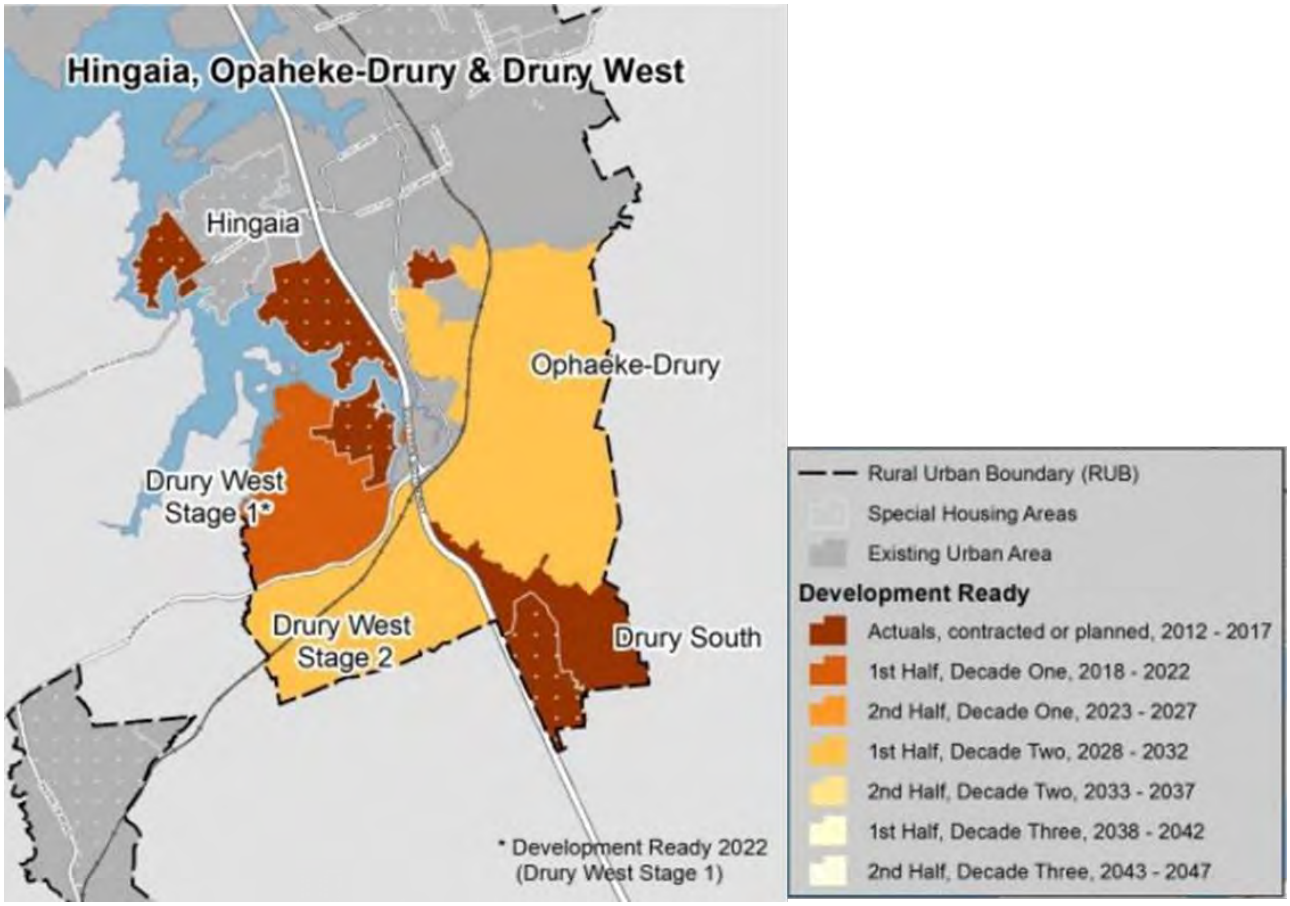
Another key land use planning document that informs both the SGA work and this assessment is Council's Future Urban Supply Strategy (FULSS, 2017). That strategy indicates the preferred sequencing of greenfield (FUZ) land. Relevant to this area is the staged sequencing of new urban areas indicated in **Figure 3-3**. Of relevant in this area is the following:

- Drury West Stage 1 (north of SH22) is indicated for the earliest development, by 2022
- Drury West Stage 2 (south of SH22) is indicated for being development ready by 2032
- Drury East and Opaheke are indicated for being development ready by 2032

It is noted that some of the private plan changes are aligned with this strategy, while those in Drury East involve acceleration ahead of the Strategy.

As noted earlier, this assessment has treated the seven plan changes at face value, assuming all could proceed immediately, regardless of the FULSS. However, the growth assumptions in the wider area remain generally aligned with FULSS (as reflected in the regional land use forecasts).

Figure 3-3 FULSS



3.3 Regional Growth Forecasts

Auckland Council, in liaison with Auckland Transport and Waka Kotahi[5], regularly update their regional land use forecasts. Those forecasts are estimates of long-term regional growth undertaken at a strategic level. They are not intended to provide precise predictions of future land use activities in all areas. Forecasting future land use activities has inherent uncertainty, particular in greenfield growth areas subject to such significant change.

The forecasts are developed from Statistics NZ population forecasts, and reflect various known developments, unitary plan zoning and strategies such as FULSS. The forecasts are used in the transport forecasting undertaken for the regional and sub-regional transport planning, including that undertaken by SGA. The current SGA assessments are based on forecast Scenario I11.5, albeit with

[5] This collaboration of agencies is reflected through the jointly owned Auckland Forecasting Centre

an additional horizon added with full build-out of the FUZ areas (and referred to as the 2048+ forecast). Scenario I11.6 was released in mid-2020 and is being progressively introduced into new SGA business cases. The updated regional scenarios typically reflect changes in the predicted rate of growth in various areas, with total yields in greenfield areas not typically changing unless subject to refined structure planning or plan changes[6]. The Scenario I11.6 forecasts were also created in 2020, with prevailing high levels of uncertainty regarding post-COVID economic and growth conditions.

This DIFF study has also used different assumptions for the Plan Change areas, relying on the regional forecasts only for wider-area growth. While the timing of development (both within and beyond the Plan Change areas), remains uncertain, the use of Scenario I11.5 rather scenario I11.6 is not considered likely to significantly impact the conclusions of this assessment.

3.4 Recent and Current Plan Changes

The following sections summarise the key yield and transport elements of the proposed plan changes, with more detailed estimates of growth rate and trip generation in the Subsequent Chapter 4.

3.4.1 Drury South

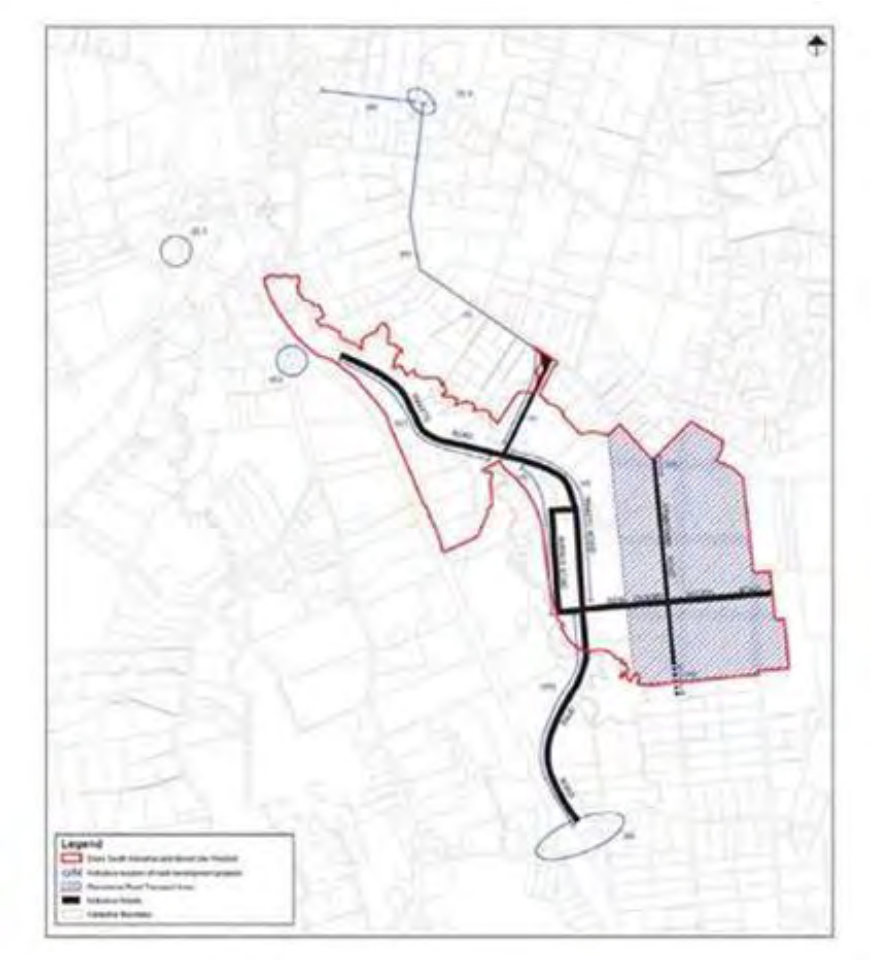
The Drury South Industrial Precinct includes around 185 hectares of Land Extensive Industrial Activities providing for heavy and light industrial activities. The adjacent Drury South Residential Precinct provides for residential development (approximately 750 dwellings). Plan Change 46 has recently been approved which has re-zoned the 'Commercial Services' area in the western part of the Industrial Precinct to Mixed Use.

This area was live-zoned prior to consideration of FUZ areas north and west of the Precinct, and that context is reflected in some of the precinct provisions. The Mill Road corridor with its connection through the Precinct to connect to SH1 was in its early stages of development and not reflected in the Precinct provisions. The transport network is indicated in **Figure 3-4** below. The key elements relevant to this assessment include:

- Use of Quarry Road / Gt South Road and Fitzgerald Rd as the access to the north, along with provisions requiring consideration of upgrades at the Quarry Road/Gt South Road and SH22/Gt South Road intersections. Interim safety upgrades have been implemented at both intersections
- Provisions requiring consideration of a minor upgrade at the Waihoehoe Road/Fitzgerald Road intersection (implemented) and a walk/cycle path on Fitzgerald Road (implemented)
- Creation of a new link road between Quarry Road and Fitzgerald Road to provide a new link to Fitzgerald Road. Note: As closure of Ramarama Road is no longer identified and the possibility of the NZ Upgrade Mill Road project using that same corridor, the provision of this new corridor is somewhat uncertain
- Provisions requiring consideration of upgrades to the Ramarama Interchange intersections, which provides the main access to the south. A full roundabout upgrade has been completed on the east side and an interim safety upgrade has already been provided on the west side.

[6] This comment relates to the regional forecasts and models. It is noted that the local traffic models used in this assessment did apply different assumptions on total yield and build-rate.

Figure 3-4 Drury South Industrial Precinct Transport Plan



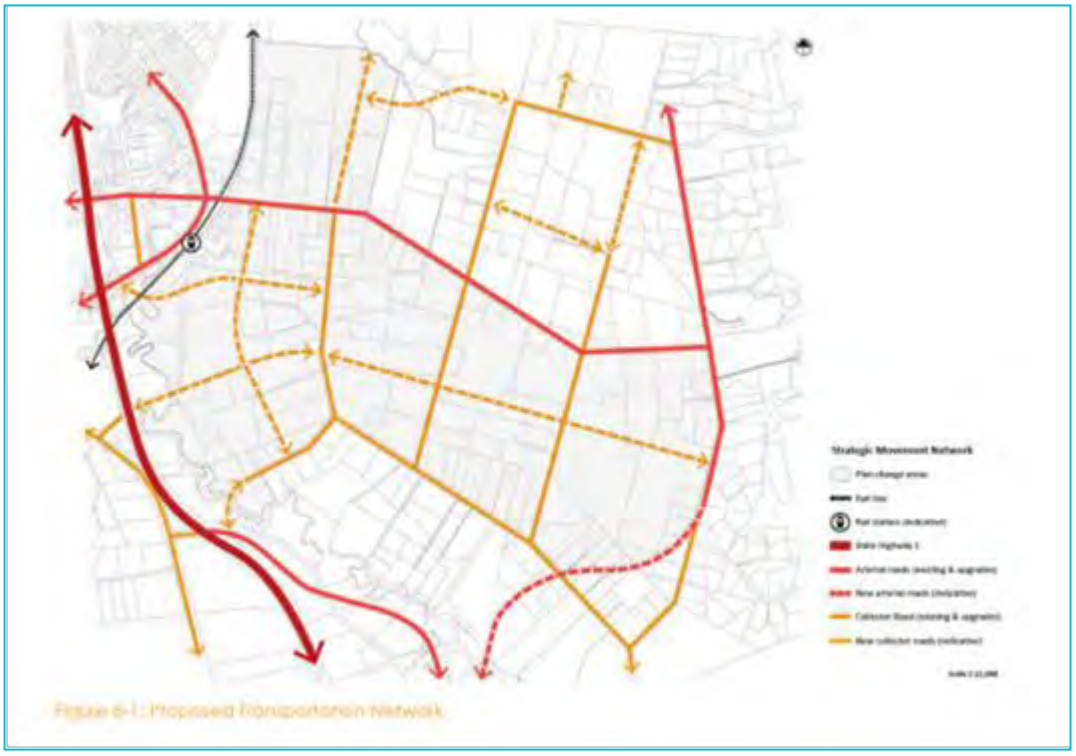
3.4.2 Drury East

Three private plan changes have been lodged covering the Drury East area. Those three Plan Changes have identified a common transport plan, indicated in **Figure 3-5** below.

Based on the plan change documents, the three plan changes suggest combined yield of:

- 7,000+ residential dwellings
- 100,000m^2 GFA of retail development
- 60,000m^2 GFA of commercial activity
- 16,000 m^2 GFA of community space

Figure 3-5 Drury East Proposed Transport Network[7]



3.4.3 Drury West

For this assessment, Drury West comprises the areas within the two MSM model zones north of SH22, including

- The live-zoned Aurunga A/B1 area (as included in the Drury 1 Precinct)
- The Aurunga B2 private Plan change 51
- The Waipupuke Private Plan Change 61
- Residual FUZ areas north of SH22

For this combined area, a yield of some 8,500 dwellings is indicated, along with a 12,000m2 GFA Centre. The network plans for the various plan change areas are indicated in the following figures (as sourced from the Plan Change documents or Unitary Plan).

[7] Background map sourced from Plan Change documents

Figure 3-6 Drury 1 Precinct Plan

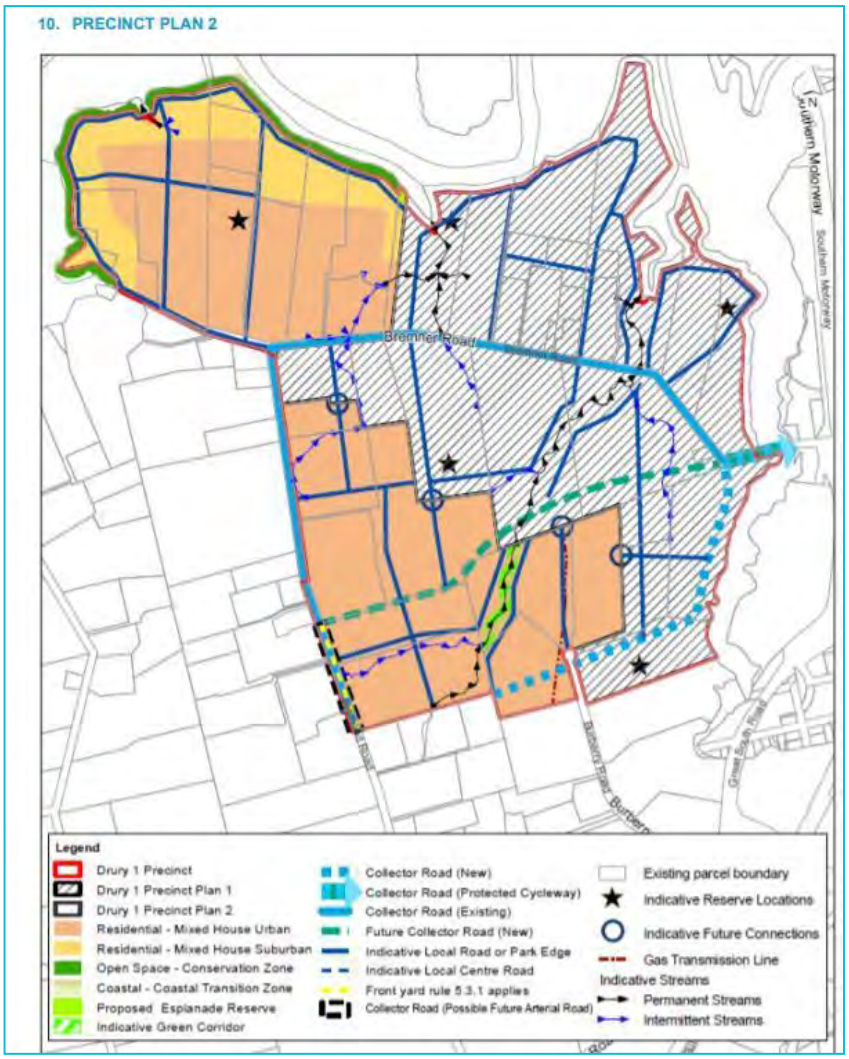


Figure 3-7 Plan Change 51 (Sourced from PC51 ITA Report)

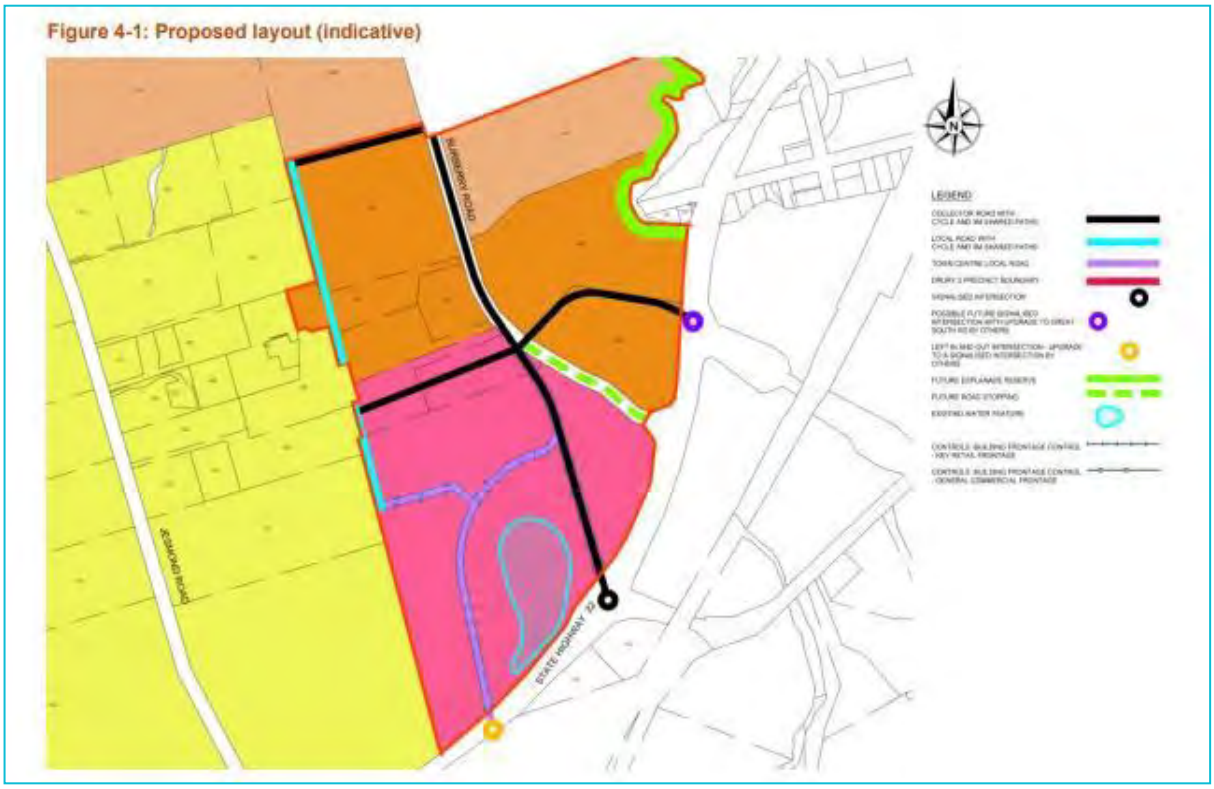


Figure 3-8 Plan Change 61 (Waipupuke) – Sourced from PC61 ITA Report



4 Movement and Access Assessments

This chapter considers likely traffic demands for Drury East and Drury West and key access requirements. The requirements and timing for PT, walking and cycling facilities were primarily derived from the Staging Principles. The traffic generation estimates used here are net, after assuming quite significant changes in traditional mode share.

4.1 Drury East

4.1.1 Trip Generation

For the purposes of this assessment, Drury East is defined as the area contained in MSM zones 554 and 555. These two zones cover the extent of the three plan changes for Drury East, but also includes a portion of future urban zone immediately north of Waihoehoe Road.

Detailed assumptions on development roll-out and the estimated vehicle trip generation for Drury East are contained in **Appendix A** and summarised in the following Figures. The figures also include estimates from the regional growth forecasts (Scenario I11.5). The Plan Change documents indicate total employment of some 6,000, which has been used here for comparison with the regional forecasts (with pro-rata from the floor area growth for interim years).

It can be seen that the total number of dwellings is some 18% higher than the regional forecasts, and with a faster/earlier growth rate. The total employment is however substantially higher than the regional forecasts[8].

The estimates of traffic generation, even after substantial assumptions of mode shift, indicate a very significant scale of demand, at nearly 65,000 vehicle movements per day. To put this in context, SH1 just north of Drury had 62,000 vpd in 2018. It is noted that these trip generation estimates are for future occupiers of the urban growth, and do not include construction-related traffic.

[8] It is possible that the Plan Change estimates use a different definition of jobs than the regional forecasts (e.g. employee counts versus full-time equivalents). The modelling check undertaken for this study used the estimated floor areas, rather than predicted employees.

Figure 4-1 Drury East Build Out Assumptions

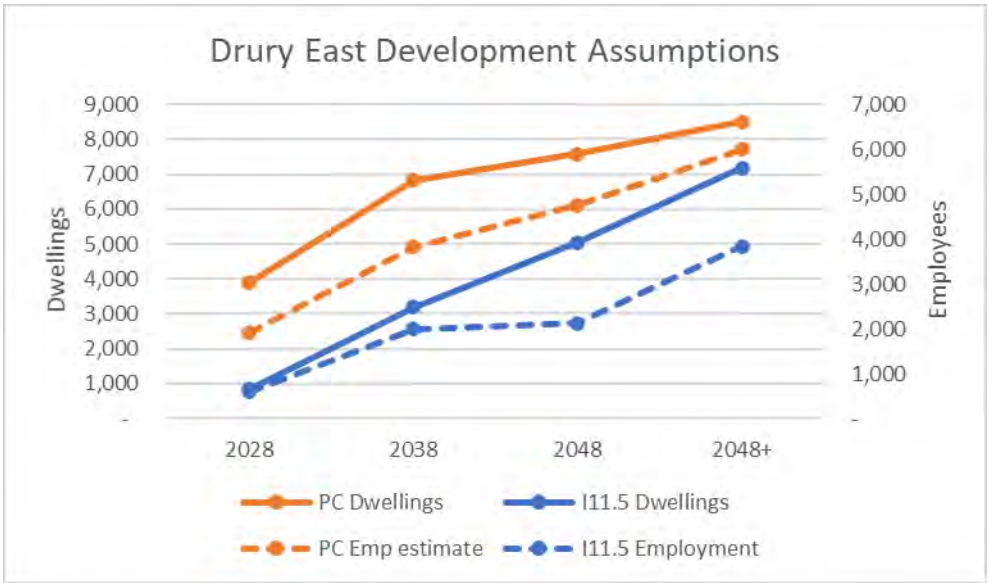
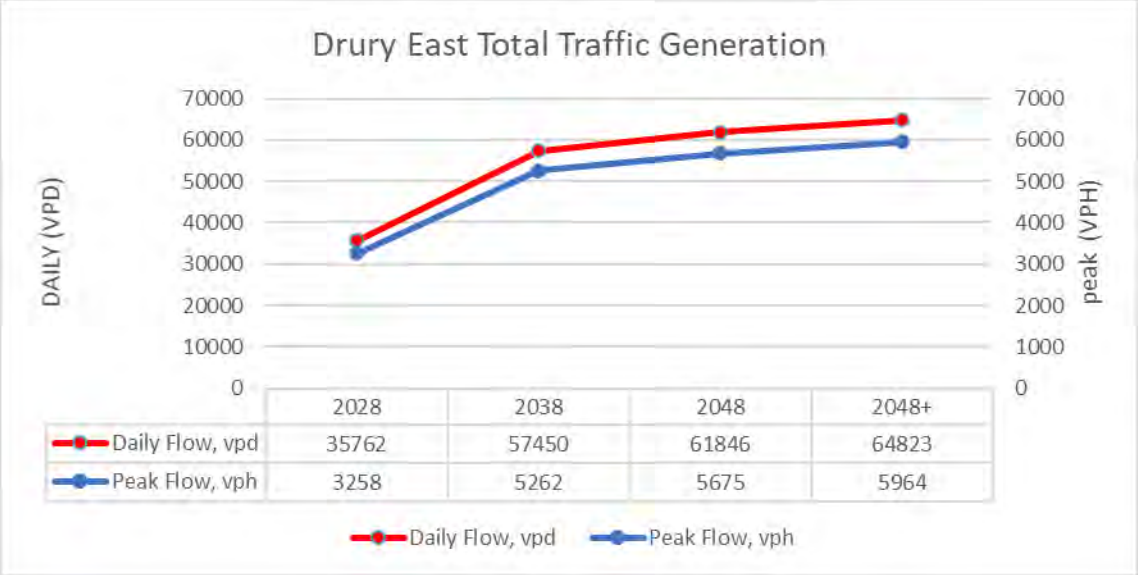


Figure 4-2 Drury East Vehicle Trip Generation Estimates



4.1.2 Drury East Access

Drury East access is constrained by the SH1 and rail corridors and the undeveloped rural Opaheke area to the north. It is currently accessed only by two roads, being Waihoehoe Road to the west (into Drury Village), and Ramarama Road to the south (which can then connect to Quarry Road or south on Maketu Road).

The Drury East Plan Change documents indicate a number of potential new access points (**Figure 4-3**), including:

1. An access to SH1 at the Drury South interchange (it is understood that current options considered for this link involve a direct ramp into the site from the existing southbound off-ramp)
2. A new link over SH1 to the west to connect to Pitt Road
3. A new link from Brookfield Road to Quarry Road

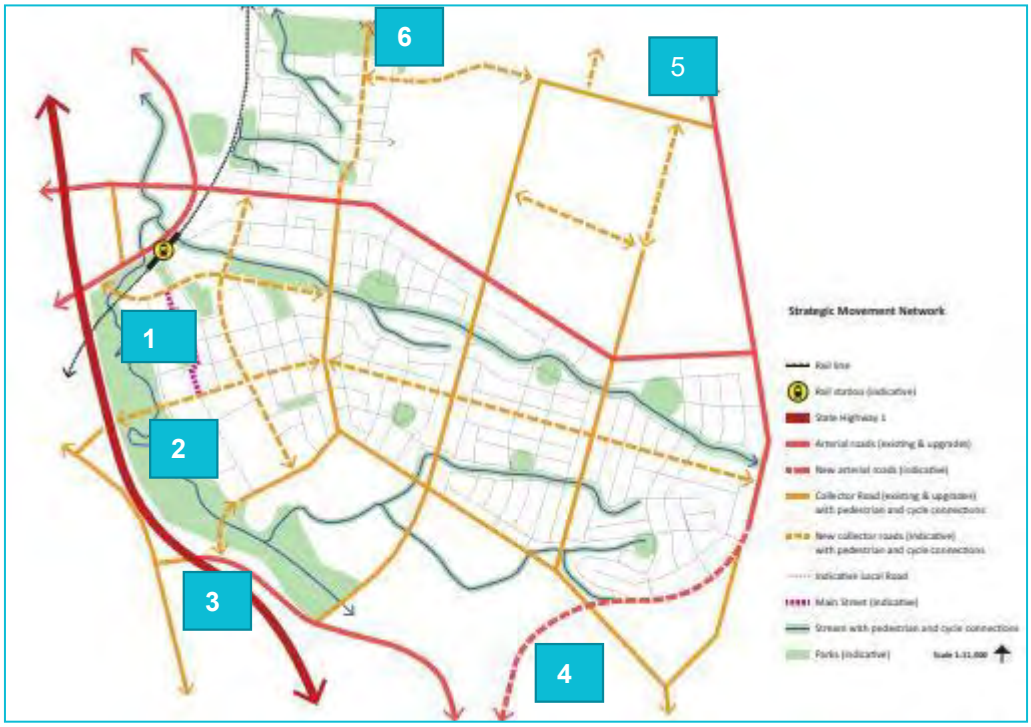
4. A new connection to SH1 via the proposed Mill Road corridor and the associated Drury South interchange
5. A new connection north to Papakura via the proposed Mill Road corridor
6. A new connection north to Opaheke via the proposed Opaheke North South arterial

Although shown in the Movement Map, the Plan Change assessments suggested that the Drury ramp, Pitt Road and Brookfield connections were not required for development. This assessment has however considered the case for additional connections, particularly due to uncertainty around strategic projects like Mill Road.

The Mill Road project would provide additional access north to Papakura and also south to SH1 (and then further south or north on SH1). The SGA work indicates that the Opaheke North-South arterial is likely to be a longer-term project dependent on full development of the Drury East and Opaheke areas. The Pitt Road connection appears useful in providing an access to/from the west, however, is considered less likely to be the preferred connection to the west given it would involve an extensive new structure spanning SH1.

The Brookfield-Quarry Link would provide a similar access to the west, (and the additional route to access SH1 at Drury via Quarry Road, Gt South Road and SH22), which would relieve traffic flows on Waihoehoe Road and allow easier east-west movement via routes that don't have motorway interchanges. The feasibility of that connection would however need to be confirmed, due to its crossing of the Hingaia stream.

Figure 4-3 Drury East Access Links (Background map sourced from plan change documents)

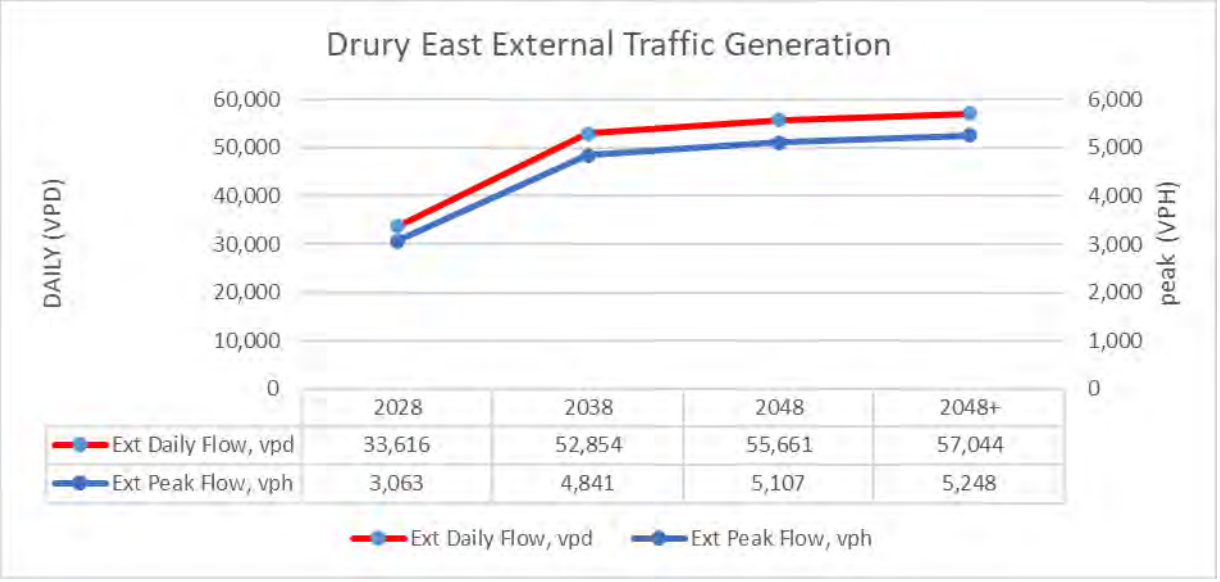


Given the uncertainty of the timing of strategic links such as Mill Road, model tests were undertaken with and without the southern elements of Mill Road. Given the additional uncertainty of the scale and timing of growth, these were simple model tests, assuming the same travel demand patterns. While removing a key strategic link such as Mill Road would be expected to alter the distribution of trips,

these tests have focussed on total trips entering/leaving the site. As such, the distribution of trips beyond the key access points is considered less critical.

The total daily and peak hourly traffic flow entering/leaving Drury East are indicated in **Figure 4-4** (note this differs from Figure 4-2 above as it excludes trips remaining within Drury East). This indicates some 33,600 movements per day accessing this area in 2028, rising to 57,000 movements per day at full build out. This 'external' trip generation only relates to generation from activities within Drury East, however the network to which it is applied will also include through traffic from other adjacent areas.

Figure 4-4 Drury East External Traffic



The need for new access points has been identified by using estimates of maximum 'desirable' daily flows on the access points. These daily flows are used in preference to hourly delays as they are considered less sensitive to specific intersection or network design assumptions, and also more representative of the business periods outside commuter peaks[9].

Waihoehoe Road west has a current daily traffic flow of some 4,500 vehicles per day, which is expected to increase with the live-zoned growth occurring from Drury South. This road is planned as a key FTN route and a critical walk-cycle access from Gt South Road into both the Drury East area and the rail station. As such, a desirable daily flow of less than 15,000-18,000 vpd is considered suitable. The SGA planning proposes Waihoehoe Road to ultimately be a 4-lane corridor, however the intention is to retain 2 lanes for traffic, with the additional lanes for bus priority on this important FTN corridor.

Ramarama Road is the southern access to this area, with existing flows estimated at closer to some 2,000 vpd. As a rural collector road, a desirable maximum daily flow would be less than some 8,000 vpd, rising higher to maybe 10,000 vpd as an urban road. However, only a relatively small proportion of the Drury East traffic is expected to head south via Ramarama Road. This proportion would vary depending on what links are in the wider network, however 20% is assumed for this assessment.

[9] As noted in the Staging Principles, congestion in commuter peaks is considered generally less important than during interpeak periods (and in fact, some levels of congestion are useful to drive consideration of other modes)

Hence, Waihoehoe Road is estimated to have ‘spare’ capacity for maybe 10,000 vpd from Drury East (depending on the background growth from Drury South), while Ramarama Road could maybe take some 5,000 vpd. Therefore, the existing access points are considered only able to absorb up to 15,000 vpd from Drury East development. It is clearly apparent that the 33,000 vpd movements accessing the site by 2028 cannot be accommodated on the existing two access points.

It should be noted that these roads would need to be upgraded to urban roads to support growth in this area, so this assessment applies to the upgraded roads, not the existing, rural roads.

Selected traffic model flows are extracted for a cordon around the site indicated in **Figure 4-5**, with daily flows shown in **Table 4-1**.

Figure 4-5 Traffic Flows and Cordon for Drury East

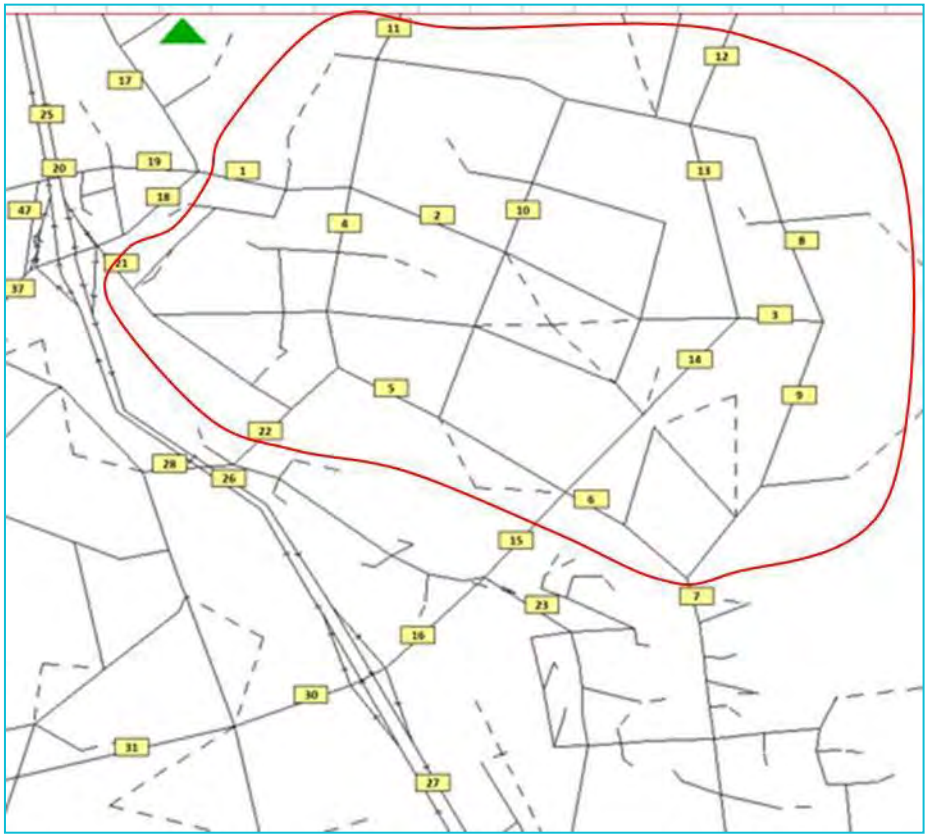


Table 4-1 Estimated Daily Traffic Flows

ID	Connection	2028				2038		2048+	
		Scenario A	Scenario B	Scenario C	Scenario D	Scenario A	Scenario B	Scenario A	Scenario D
		All Mill Rd	Only Drury South I/C	No Mill Rd	No Mill Rd + access links	All Mill Rd	All Mill rd + access links	All Mill Rd	All Mill rd + access links
1	Waihoehoe Road West	20,200	24,200	27,700	19,600	22,800	17,100	24,000	17,900
21	Drury I/C Access	-	-	-	7,600	-	6,000	-	5,300
22	Brookfield-Quarry Link	-	-	-	8,000	-	11,400	-	15,300
15	Mill rd Fitzgerald-Maketu	20,800	11,000	8,600	5,100	36,100	28,800	40,000	31,800
7	Ramarama Road	4,000	3,200	3,400	4,100	7,300	7,400	8,400	8,400
12	Mill Road North of Waihoehoe	21,800	-	-	-	28,500	25,100	36,100	33,200
11	Opaheke North-South Arterial	-	-	-	-	7,800	11,800	12,600	17,200
	Total Cordon	66,800	38,400	39,700	44,400	102,500	107,600	121,100	129,100
	Drury East External Traffic	33,600	33,600	33,600	33,600	52,900	52,900	57,000	57,000
	Other (through) traffic	33,200	4,800	6,100	10,800	49,600	54,700	64,100	72,100
17	Gt South Road	17,500	25,700	26,800	25,400	19,600	17,900	22,900	21,500
25	SH1	106,800	117,800	116,000	117,600	128,600	129,300	144,200	144,400

This analysis indicated:

2028 Models:

- Without Mill Road or the additional access links (Scenario C), resulted in flows on Waihoehoe Road west of 27,700 vpd which would significantly exceed the desired flow. The flow towards the south (Ramarama Road and the link road between Fitzgerald and Maketu Road) indicated a combined flow of 11,500 vpd, which also exceeds the desired flow on Ramarama Road
- Adding the two Additional Access links[10] (Scenario D) takes significant flow off Waihoehoe Road west, bringing it close to (but still exceeding) its desired level. Similarly, the flows likely on Ramarama Road (assuming Link 15 is not built), are 8,500, which near the desired maximum level
- With parts of Mill Road (scenarios A and B), but without the additional access links also shows flows on Waihoehoe Road significantly in excess of the desired level, but those on Ramarama Road (link 7 only) would be below the desired maximum
- The Brookfield-Quarry Link is estimated to have some 11,400 vpd, which is likley to exceed the desired maximum flow for a collector road
- This suggests that additional access links are required to relieve traffic on Waihoehoe Road, even with Mill Road in place
- It can also be seen that the flows on Gt South Road also increase without Mill Road, to levels that would be undesirable for its intended FTN function

2038 Models:

- These scenarios include both Mill Road and the Opaheke North South Arterial, which affects widernetwork flows, noting these are only modelling assumptions as neither project has committed funding.
- Even with Mill Road and the Opaheke North-south arterial, the flows on Waihoehoe Road west exceed the desired maximum if the additional Access Links are not provided
- The Brookfield-Quarry link serves some 8,500 vpd, and the Direct Drury Interchange access is estimated to serve some 7,800 vpd, reducing flows on Waihoehoe Road to desired levels
- This again suggests the Additional Access links are required to relieve traffic on Waihoehoe Road, even with Mill Road and the Opaheke North-South arterial in place
- Without the Opaheke arterial, the flows on Waihoehoe Road and Gt South Road would be expected to be higher than shown in these models

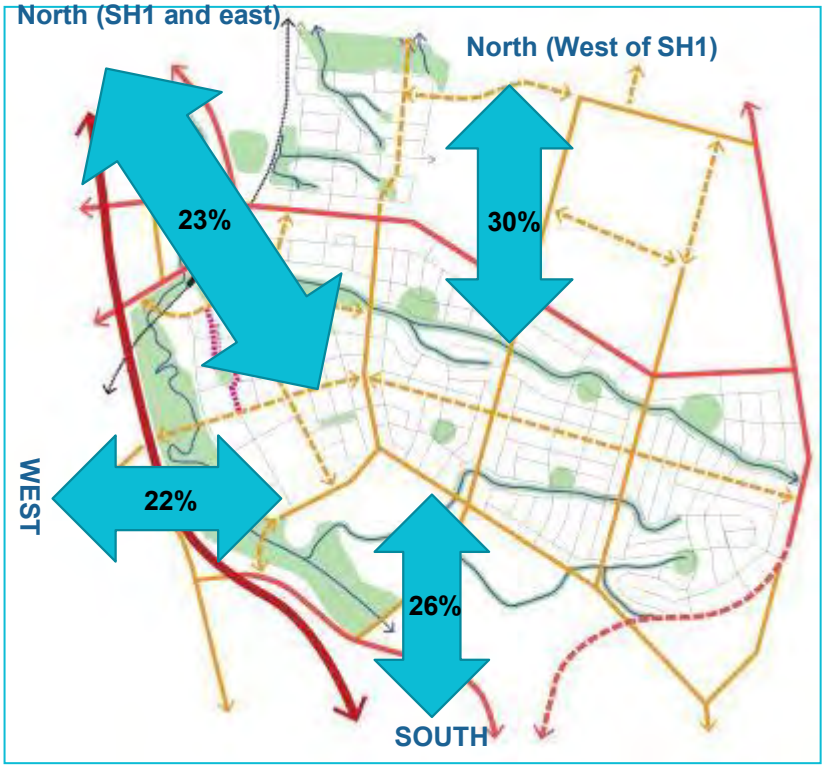
[10] This refers to both the Brookfield-Quarry Link and the Drury Interchange ramp

2048+ Models

- Again, the Additional Access links are required to bring Waihoehoe West to more desirable levels (this is consistent both short and long term)
- The Brookfield-Quarry Link is the most effective access, carrying nearly 3 times more traffic than the Drury Interchange access
- The Brookfield-Quarry Link is estimated to have some 15,400 vpd, which is likely to exceed the desired maximum flow for a collector road. This flow could be even higher if the direct Drury Interchange link was not in place

To further explore the need for access links, the potential distribution of site traffic was extracted from the models. This reduces the issues with the modelled flows on any link to a great extent depending on the assumed land use and network assumptions made for that scenario. This distribution of daily vehicle trips was estimated from the models and summarised in **Figure 4-6**. It is noted that these proportions are indicative only and would change somewhat with different network assumptions. However, the broad pattern is considered suitable for this analysis. These distributions were then applied to the total external trips estimated for Drury East, as indicated in **Table 4-2**.

Figure 4-6 Estimated General Distribution of Vehicle Trips[11]



[11] Background map sourced from Plan Change documents

Table 4-2 Estimated Distribution of Drury East Traffic Movements

Year	2028	2038	2048	2048+
Daily External Traffic Movement	33,600	52,900	55,700	57,000
North/East	9,900	15,600	16,400	16,800
North/West	7,700	12,200	12,800	13,100
South	8,600	13,600	14,300	14,600
West	7,300	11,500	12,100	12,400

As noted above, the 'spare' capacity on Waihoehoe Road access is estimated at some 10,000 vpd, with spare capacity on southern Ramarama Road access of some 5,000 vpd. This analysis does not directly consider through traffic on the key access roads, which will vary depending on what new access links are provided. However, this data indicates that for the full development of Drury East:

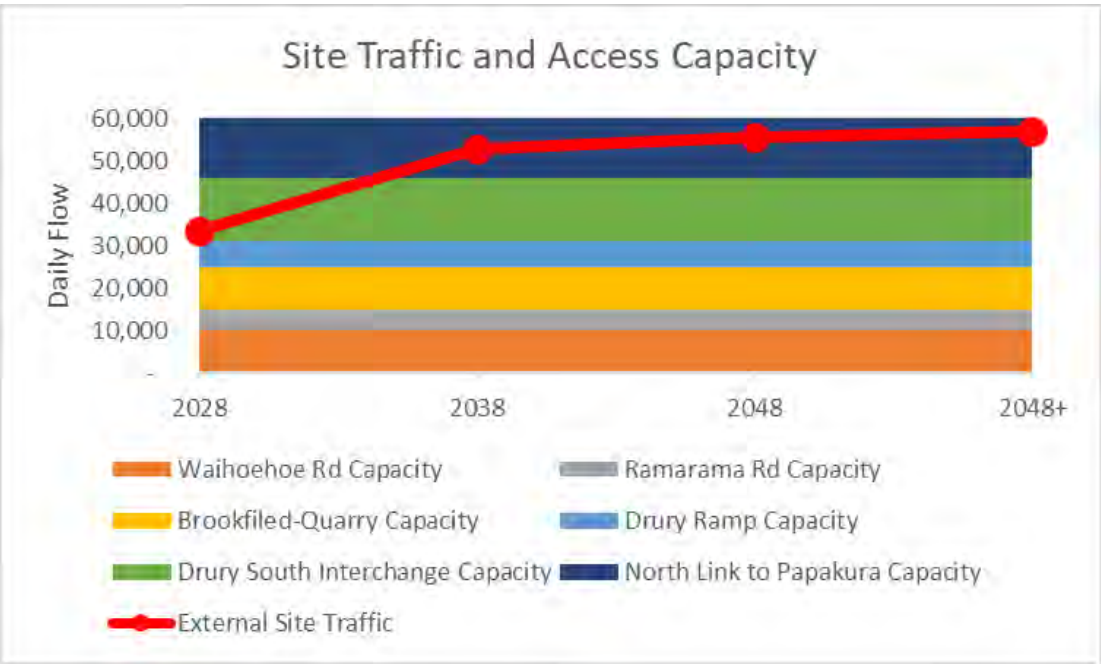
- A new access to the west is required, such as the Brookfield-Quarry Link
- An additional access to SH1 is required for travel south and north on SH1, such as the Drury South Interchange and access roads
- An additional connection is needed north to Papakura to reduce traffic on Waihoehoe Road, SH1 and Gt South Road

To demonstrate this outcome, the 'available' capacity on key link roads were estimated to identify the total access points required:

- Waihoehoe Road was estimated at some **10,000 vpd**, based on background/through traffic of some 8,000 vpd and a desirable maximum of 18,000 vpd
- Ramarama Road was estimated at **5,000 vpd**, based on background/through traffic of some 4,000 vpd and a desirable maximum of 10,000 vpd once urbanised
- The Brookfield-Quarry Link was estimated at up to **10,000 vpd**, for an urbanised route, andassuming upgrades to the receiving Gt South Road
- The direct Drury Interchange ramp was estimated to offer some **7,000 vpd**. This flow could vary depending on the design and how it connects into the local network within Drury East
- The SH1 Drury South access was estimated to offer some **15,000 vpd.** This value is indicative as it depends on whether the northern part of Mill Road is in place, and hence how much regional through traffic would be on the link. However, SH1 north would remain a key constraint on traffic that could be accommodated from Drury East via the Drury South interchange
- A northern link to Papakura was estimated to offer some **15,000 vpd.** This value is also indicative as it depends on which link is provided (Mill Road or the Opaheke North-South arterial), and hence how much regional through traffic would be on the link.

The cumulative access capacity and total (external) site generation is indicated in **Figure 4-7** below. It should be noted that this is indicative, as the traffic flows and 'available' capacity are dependent on which links are in place and wider-network assumptions. However, it confirms that multiple new connections are required to service the full development of Drury East, including new links to the west, south (SH1) and north.

Figure 4-7 Estimated Drury East External Traffic and Available Access Capacity



Overall, this analysis confirms that:

- Multiple additional Access points are needed to serve the full build-out of Drury East:
- The Brookfield-Quarry Road is needed to relieve traffic flows on Waihoehoe Road, even with Mill Road in place. This level of traffic may in fact be too high for a collector road and the models indicate potential through traffic on this route. This suggests that careful network design and traffic calming measures could be required to avoid this route having too much traffic
- An additional connection to SH1 (such as via the Drury South Interchange) is needed to reduce flows on Waihoehoe Road, as well as on the Brookfield-Quarry Link
- An additional connection north to Papakura is needed to allow full build out
- A number of these new access links would be needed by 2028 to accommodate the estimated level of initial development

4.2 Drury West

For the purposes of this assessment, Drury West is the area contained in MSM zones 561 and 562, north of SH22. These two zones cover the extent of the three plan changes for Drury west, as well as some future urban areas. Growth areas south of SH22 do not have specific plan changes for them, so relied on the regional growth forecasts.

4.2.1 Trip Generation

Detailed assumptions on development roll-out and the estimated vehicle trip generation for Drury West is contained in **Appendix A** and summarised in the following figures. The figures also include estimates from the regional growth forecasts (Scenario I11.5). The Plan Change documents provided indications of total business yield for the areas north of SH22, which allowed a comparison against regional land forecasts.

It can be seen that the total number of dwellings is some 9% higher than the regional forecasts, and an earlier/faster start to the growth. The estimated number of employees is also higher than regional forecasts, by about 26%[12]. It can be seen that the total estimated traffic generation reaches some 46,500 movements per day. For context, SH22 had some 20,000-24,000 vpd on this section of highway[13].

Figure 4-8 Drury West Land Use Assumptions (all FUZ areas north of SH22)

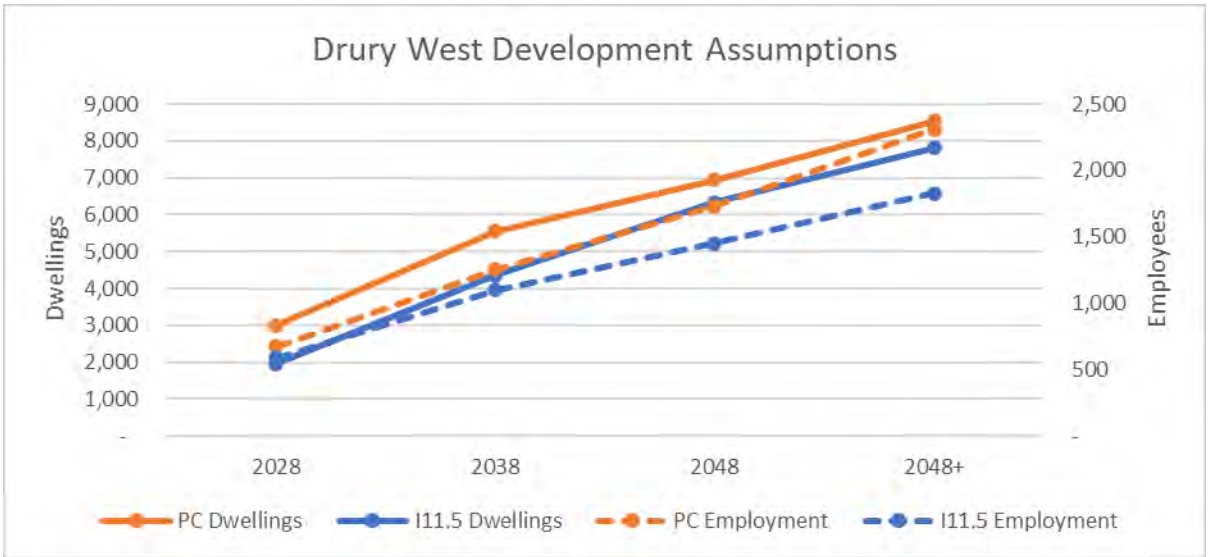
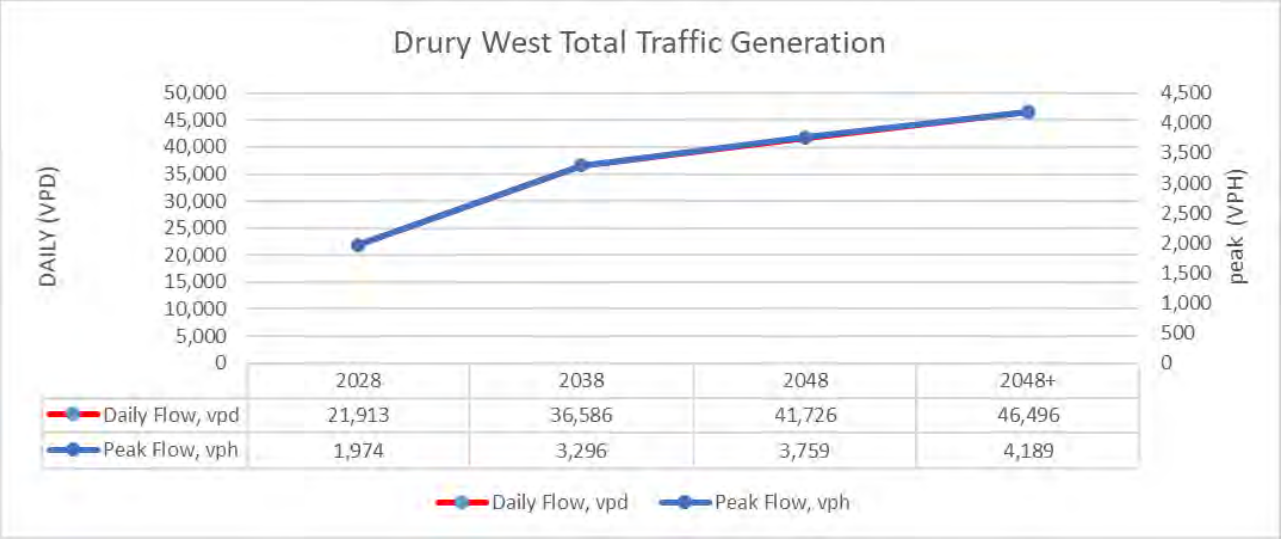


Figure 4-9 Drury West Total Vehicle Generation



4.3 Access

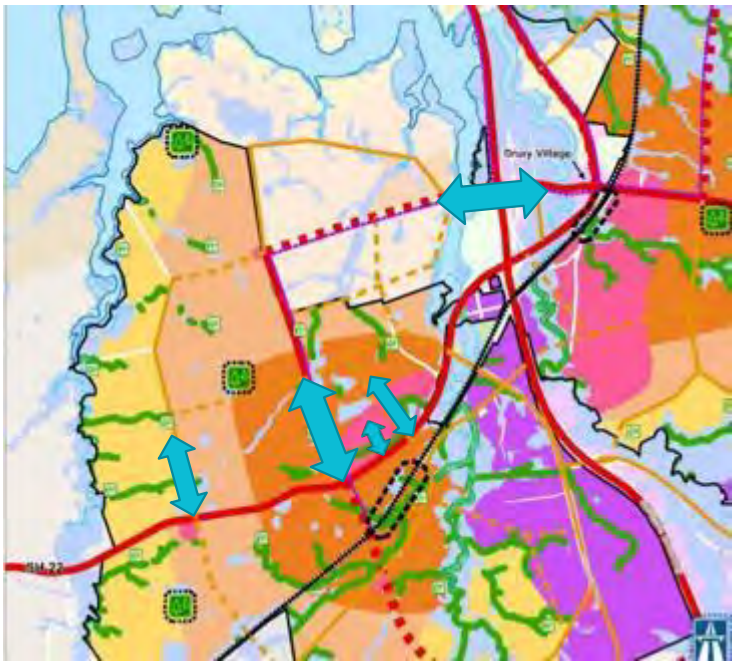
The access to Drury West is either south onto SH22, or east via Bremner Road, over SH1 to Gt South Road (see **Figure 4-10**).

[12] It is possible that the Plan Change estimates use a different definition of jobs than the regional forecasts (e.g. employee counts versus full-time equivalents). The modelling check undertaken for this study used the estimated floor areas, rather than predicted employees.
[13] Source: Waipupuke and Auranga transport Plan Change assessments

Bremner Road crosses over SH1 and connects to Gt South Road via either Firth Street or Norrie Road (which is constrained by a single-lane bridge). The SGA recommended network proposes Bremner Road to become an arterial road with a critical FTN function, which includes a new connection directly west to Jesmond Road and an upgraded route through the Drury industrial area to replace the Norrie Road bridge. The long-term proposal for this corridor involves 4 lanes, with 2 indicated for general traffic and two for bus or high-priority vehicles.

SH22 is a high-speed, rural road, with traffic flows of some 24,000 vpd. These flows are somewhat influenced by conditions on the nearby SH1, with some traffic from Paerata and west diverting north to the Hingaia Road access when congestion extents south of Papakura. This level of traffic flow is considered to be at or approaching the maximum flows than could be accommodated on this kind of road. The high volumes and speeds are such that the existing priority (Giveway) controlled roads connecting to SH22 are already considered potential crash risks. Any release of new growth areas north of SH22 are therefore considered essential to have controlled intersections (roundabouts, signals or restricted right turns), along with a lowered speed environment. The urbanisation adjacent to SH22 (initially to the north then also on the south), will require this section of SH22 to change in form to better suit this new environment. This is expected to include lower speed environment, segregated walk/cycle facilities, controlled pedestrian crossings and suitable kerb/channel and street facilities to improve the place function and environment for walk and cycle modes. This route will however also maintain its State Highway status and related movement and freight function, until the Pukekohe Expressway is available.

Figure 4-10 Key Access points to Drury West



Traffic count data from the Waipupuke Plan Change documents are shown in **Figure 4-11** below, which show directional hourly traffic flows of some 1,050 vph in the morning peak and nearly 1,400 vph in the evening peak. These flows are considered at or approaching the maximum capacity of such roads. This was checked by investigating SH16 east of Kumeu, which is a similar road environment but with regular queueing indicating it is at capacity. That analysis indicated that the rural form of road and key intersections resulted in maximum directional hourly flows of some 1,350 vph.

Figure 4-11 Traffic Counts on SH22 (Source: Waipupuke Traffic Assessment)

Figure 4-1: Traffic profile for westbound traffic on SH22

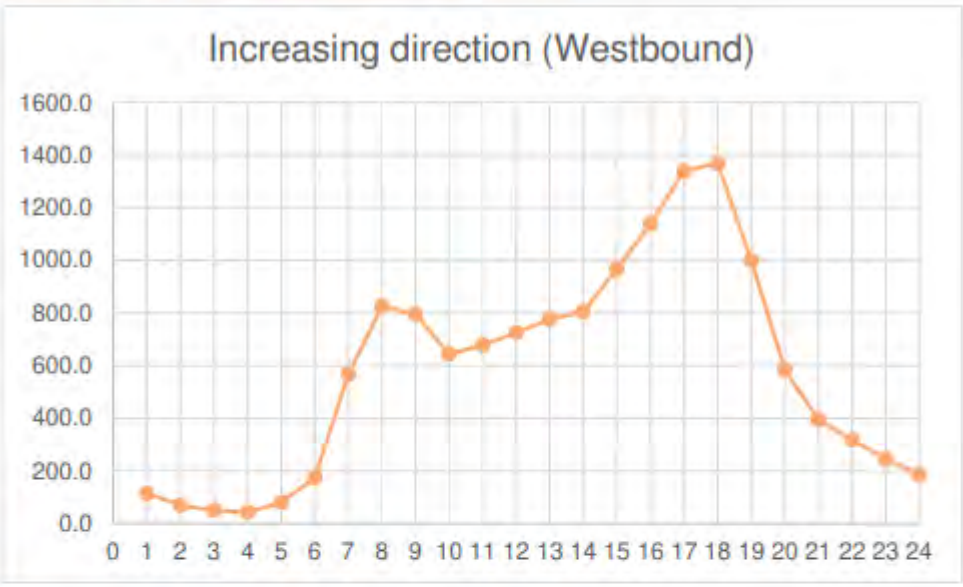
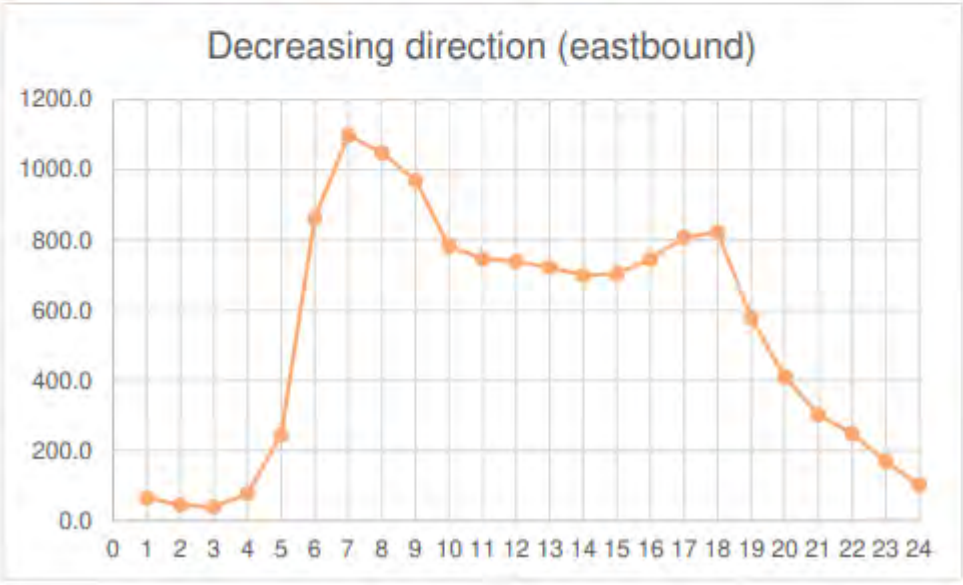


Figure 4-2: Traffic profile for Eastbound traffic on SH22



It is likely that the major intersections on SH16 contribute to this constrained capacity, due to the interruptions from turning and merging traffic. This suggests that while controlled intersections would be required to safely accommodate the expected traffic from Drury West, those intersections themselves are likely to reduce the throughput of SH22 below its current levels. Additional lanes on SH22 are therefore considered necessary to mitigate the additional access traffic, whilst maintaining the strategic function of the highway.

The specific location, form and timing of intersections with SH22 will remain to be agreed between developers and Waka Kotahi, however the following are indicated from the plan change documents:

- Oira Road – full controlled intersection, likely multi-lane roundabout
- Jesmond Road – full controlled, either roundabout or signals

- Town centre access (east of Jesmond Road) – likely to be controlled left-in/out movements only
- Realigned Burberry Road to near McPherson Road – controlled intersection suitable for walk/cycle crossing (it is noted that long-term with 4-tracking of the rail line, the height and width restrictions of the McPherson Road underpass mean it is likely to close to traffic
- Burberry Road – to be closed
- Gt South Road – full controlled, either signals or roundabout
- Victoria Street – no specific plans in Plan Changes, however the Papakura to Drury NZUP project has recently identified the need to install signals at this location for that project. The DIFF modelling indicated this road could attract high volumes of through traffic under some conditions on the wider network. As such, some traffic calming measures on Victoria Street may be needed to be considered if through traffic creates safety issues for the activities on Victoria Street

Model flows in Drury West are presented in **Table 4-3**, for the locations identified in **Figure 4-12**.

Figure 4-12 Location of Selected Model Flows in Drury West

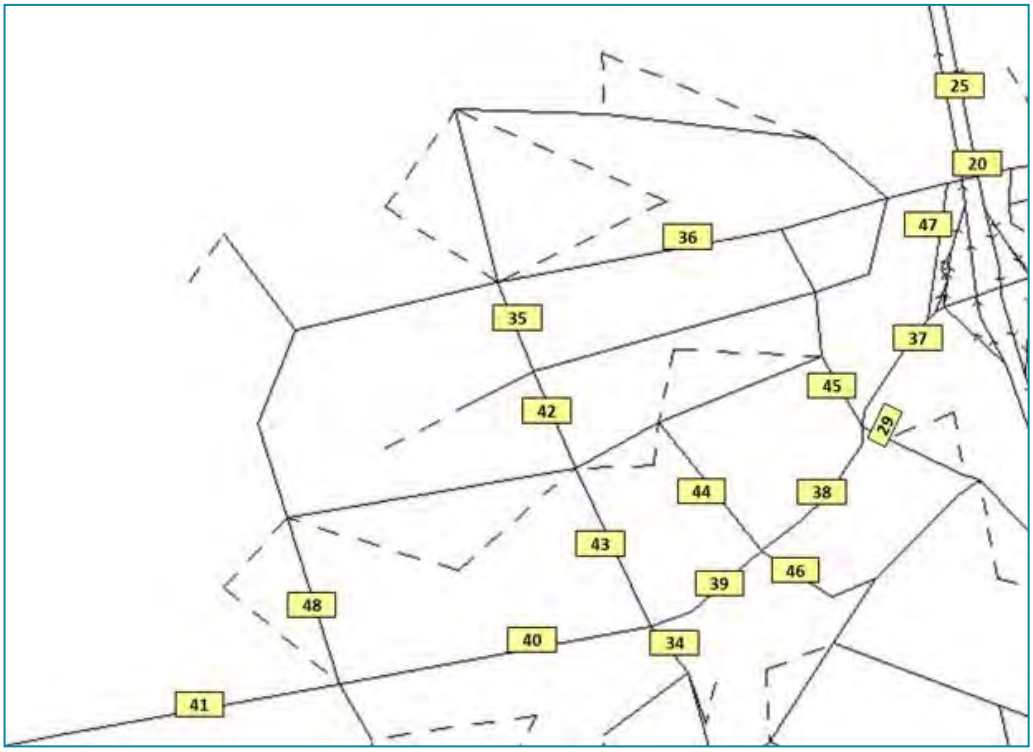


Table 4-3 Selected Daily Flows in Drury West

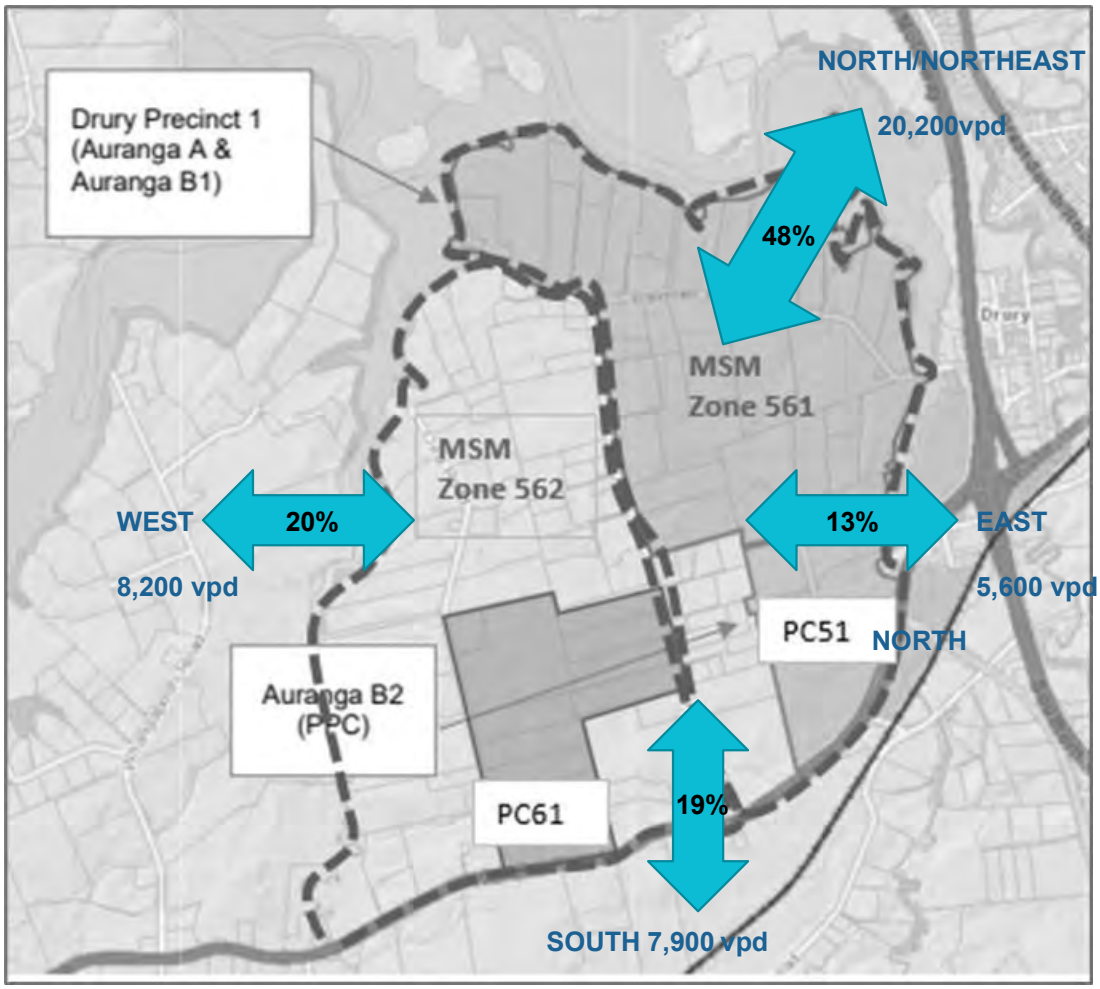
ID	Connection	2028				2038		2048+	
		Scenario A All Mill Rd	Scenario B Only Drury South I/C	Scenario C No Mill Rd	Scenario D No Mill Rd + access links	Scenario A All Mill Rd	Scenario B All Mill rd + access links	Scenario A All Mill Rd	Scenario D All Mill rd + access links
37	SH22	27,500	27,200	28,600	26,200	17,700	12,900	23,600	17,900
38	SH22	26,500	25,400	24,900	24,900	15,300	13,400	18,400	17,800
40	SH22	23,400	22,100	21,400	21,500	14,700	13,200	18,000	17,400
41	SH22	23,800	22,500	21,800	21,900	14,400	13,100	16,800	16,600
29	Great South Road	5,300	5,700	9,300	10,800	6,300	6,800	11,600	10,000
48	Oira Road	800	900	900	900	1,600	1,600	2,900	2,900
43	Jesmond Road	5,400	5,400	5,700	5,800	8,900	8,900	11,700	11,400
44	NewNSRoad	-	-	-	-	1,200	700	2,000	2,000
47	Victoria Street	3,000	2,700	2,900	3,300	4,300	4,400	3,800	3,600
20	Bremner Road	10,400	10,500	10,600	11,000	15,000	15,400	17,600	17,900

This data indicates:

- That except for Gt South Road, the presence of Mill Road has little impact on the traffic flows in Drury West
- The flows on SH22 are very high in 2028, but reduce in later years (due to the assumption that Pukekohe Expressway is included in those models)
- The flows on SH22 will require a four-lane facility to be accommodated
- The model indicates potential for high flows on Victoria Street
- Flows on other roads generally remain within desirable levels

The distribution and potential quantum of traffic from Drury West are indicated in **Figure 4-13**. This demonstrates the important role of SH22 in accessing Drury West for general traffic.

Figure 4-13 Estimated General Distribution of Vehicles



5 Infrastructure Project Assessments

This Chapter provides commentary on the main corridors, followed by presentation of the recommended staging plan.

5.1 Corridor Form and Function

Figure 5-1 indicates the corridors and project elements referred to in the Staging Schedule. **Table 5-1** summarises the intended function, form, staging opportunities and interdependencies of each corridor.

Figure 5-1 Corridors and Project Numbers

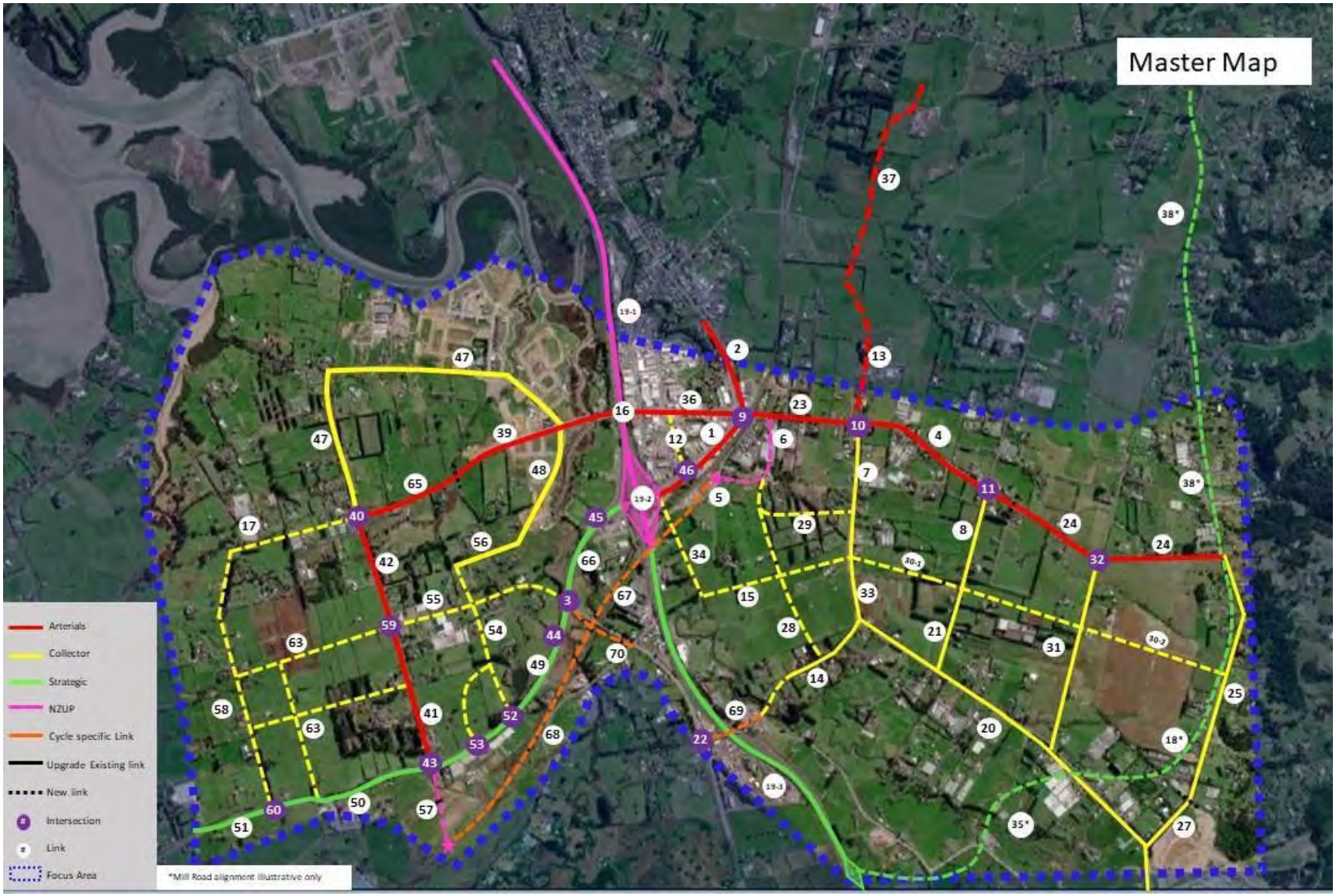


Table 5-1 Corridor Form and Function

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
Drury East				
23	Waihoehoe Road west (Gt South Road to North-South Arterial/Fitzgerald Road), including bridge replacement over the rail corridor	This is a key access link into Drury East for all modes (including to the Drury Central station), and part of the Jesmond-Bremner-Waihoehoe-Opaheke FTN	4-lane corridor with segregated walk/cycle and with widened/lengthened bridge over the rail. From an operational perspective there is some limited potential to have an interim upgrade focussed only on high-quality walk/cycle links (likely to require temporary bridges over the rail). However, the complexity of the design inter-dependencies suggests that this should be constructed directly to its ultimate form to avoid poor outcomes for the interim form, later re-work and traffic disruptions during construction. The potential need for major pavement rehabilitation and to manage concurrent traffic effects may also require the immediate formation of the ultimate form of key intersections, such as the Waihoehoe Road/Fitzgerald Road intersection.	Construction inter-dependencies with the station access road, closure of Flanagan Road, bridge lengthening for 4-tracks, vertical re-grading for sight distance, upgrade to adjacent Gt South Road intersection and urbanisation of the corridor and integration with adjacent land use development and timing and frequency of bus services. This will also be a key part of the network for managing effects during any concurrent development and road construction activities.
4, 24	Waihoehoe Road east (North-south arterial to Drury Hills Road	Arterial road linking Mill Road corridor into Drury and arterial corridor for walking/cycling movement and local bus services	2-lane urban corridor with segregated walk/cycle. The eastern extent will depend on the alignment for any Mill Road corridor. An NOR has been lodged that allows for a 24m corridor. Interim options within the existing 20m road reserve were considered, however Auckland Transport advised this would not be desirable, with direct development	Inter-dependencies include alignment of Mill Road, rate and location of development along the corridor and integration with earthworks/levels on adjacent development sites to optimise geometric profiles

[14] Note: While the proposed form of the arterial roads has been developed by SGA, the specific form of Collector and local streets will be determined between developers and Auckland Transport.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
			of the ultimate form requested to deliver the desired urban form, transport, constructability and landform integration outcomes.	
7,33,20	Fitzgerald Road	Urban collector Road for Drury East and walk/cycle and local bus connectivity to Drury South	2-lane urban collector road with segregated walk/cycle. Staging opportunities were considered based on location of adjacent development, however urbanisation should be contiguous from the north (to provide continuous walk/cycle links to the town centre and station). Safe walk/cycle connections through to Ramarama Road would also be needed to connect to the jobs and services and residential area n Drury South	Adjacent cycle/walk networks, location of development along the corridor and earthworks on adjacent development sites to integrate and optimise geometric profiles
14	Brookfield Road (including link to Quarry Road)	Proposed as important collector access to Drury East, to provide resilience and capacity to access routes and walk/cycle and local bus routes connecting Drury East and West	2 lane urban collector road with segregated walk/cycle. Potential for initial urban upgrade on existing section of Brookfield Road, prior to construction of link across Hingaia Stream to Quarry Road	A connection to Quarry Road would likely require intersection upgrades to Quarry/Gt South and Gt South/SH22 intersections. Also dependent on adjacent cycle networks, such as on Fitzgerald Road, Quarry Road, Gt South Road and/or the SH1 Drury-to-Drury-South project's walk/cycle links
1,2	Gt South Road (north of Drury Interchange)	Regional north-south arterial, access to Drury East and FTN route	4-lane urban corridor with segregated walk/cycle. Opportunities for interim walk/cycle facilities between Firth Street and Waihoehoe Road	Form of interim works will depend on timing of Norrie Road upgrade. Also related to the timing of FTN north of Waihoehoe
37	Opaheke North-South Arterial	New arterial connection between Drury and Papakura with FTN function	4-lane urban arterial with segregated walk/cycle. Opportunity for interim 2-lane corridor, with bus lanes added when traffic conditions demand	Timing and scale of Opaheke development, timing of Mill Road (Papakura-Drury), Fitzgerald/Waihoehoe intersection capacity and timing and frequency of bus services

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
34	Drury Interchange Ramp	Provide direct access (entry-only) from SH1 into the Drury East area, via a new ramp from the southbound off ramp	Feasible options have been identified by NZUP to include this ramp into the upgrade of Drury interchange, however, the construction of the ramp is not within the defined scope of the NZUP project. This ramp would therefore be subject to new local funding, which if available could allow construction concurrently with the NZUP project, or at a later date. With the removal of the Drury South interchange from delivery within the NZUP programme, there would be benefits in this ramp being provided early to provide alternative access into Drury East and provide construction efficiencies.	Ability to co-ordinate delivery with the NZUP Papakura-Drury project and form of connection of the ramp into the local street network within Drury East.
35	Mill Road: Drury South Interchange to Fitzgerald Road	Regional strategic arterial and access to Drury East and Drury South developments	4-lane regional arterial with segregated walk/cycle. Interim 2-lane versions and only north-facing ramps to SH1 could be potentially considered for interim access to Drury East, prior to any strategic function for Mill Road	Timing of development in Drury East, timing, form and alignment of Mill Road and Papakura-Drury South SH1 upgrade and timing of other accesses to Drury East such as Opaheke North-South arterial, Brookfield-Quarry Link, Waihoehoe Road upgrade and the Drury interchange access ramp
18	Mill Road: Maketu Road to Waihoehoe Road	Regional strategic arterial. **Note: The alignment of this section has not been confirmed**	4-lane regional arterial. Interim use of existing roads could be suitable for any interim Drury South interchange (assuming no strategic Mill Road function to the north)	Timing of development, timing, form and alignment of Mill Road and Drury South interchange and timing of other accesses to Drury East such as Opaheke North-South arterial, Brookfield-Quarry Link, Waihoehoe Road upgrade and the Drury interchange access ramp

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
31	Cosey Road: Fitzgerald Road to Waihoehoe Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function would be managed. **Note: This link could be replaced by Mill Road, depending on its chosen alignment**	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development and alignment for Mill Road
38	Mill Road: Drury to Papakura	Regional arterial and access to Drury East and Opaheke	4-lane regional arterial.	Timing of development in Drury East and Opaheke, timing, form and alignment of Mill Road and timing of Opaheke north-south arterial
30	East-West Collector	Urban collector road. Desirable this would allow quality east-west walk/cycle functions but east-west traffic function would be restricted to prioritise use of arterials and create low-traffic neighbourhood	2-lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Timing of urban development, alignment of Mill Road, timing of Waihoehoe Road upgrade
8,21	Fielding Road	Urban collector road. Desirable this would allow quality walk/cycle function but through traffic function managed	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development.
25,27	Drury Hills Road	Urban collector road.	2lane urban collector road with quality walk/cycle facilities. This should be developed contiguously and concurrently with development.	Urban development.
28	North-south town centre Boulevard	Town centre local boulevard, prioritising walk/cycle movement	2-lane boulevard	Town centre development and station access needs

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
29	East-west town centre access	Town centre local boulevard, station access to Fitzgerald Road prioritising walk/cycle movement	2-lane boulevard	Town centre development and station access needs
Drury East-West Connections				
36, 12, 46, 16	Bremner Road East	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle and new Norrie Road bridge alignment. Opportunities for interim walk/cycle upgrades between east and west Drury were identified via Firth Street and Gt South Road.	SH1 bridge upgrade as part of Papakura to Drury Project, and timing and frequency of bus services
3, 22	Gt South Road (west of SH21)	Arterial connection accessing adjacent development, east-west connection and alternative access to SH1 for Drury East	2-lane arterial with segregated walk/cycle. Interim version possible with major intersection upgrades prior to development of adjacent land use	Adjacent development, Brookfield/Quarry Link, SH22 upgrades
66, 67, 68, 69 and 70	Regional Active Mode Corridor (Drury West to Drury East)	Regional walk./cycle corridor connecting Drury East to Drury West, Paerata and Pukekohe	Separated walk/cycle facilities adjacent to rail corridor. Opportunity for interim stage for section between Drury East town centre/station and Drury West development station	Rail 4-track, Drury west station, development south of SH22 in Drury West
Drury West				
45,66,3,44,49, 52,53,43,50,60	SH22: Drury Interchange to west of Oira Road	Regional state highway (until any new Pukekohe expressway corridor) and local arterial road for Drury West development, providing walk/cycle, bus and vehicle access to SH1, Drury East, Opaheke and Papakura	4-lane urban arterial with segregated walk/cycle. Opportunities for interim versions were not considered suitable east of Jesmond Road, due to geometric reasons, scale of growth, the need to mitigate new access traffic and need to improve north-south crossings. This corridor will also transition to an urban form, so it would be desirable this was implemented concurrently with adjacent urban development, rather than after the	Pukekohe Expressway Rate and location of growth north of SH22 Rate and location of growth south of SH22, especially based around the Drury West station now committed for delivery through NZUP.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
			development had occurred. A single-stage upgrade would also remove the need for traffic impacts during construction associated with multi-staged construction. Hence it is recommended that this section east of Jesmond Road progresses directly to its 4-lane ultimate arterial form with high quality walk and cycle facilities. Opportunities for interim upgrades west of Jesmond Road were identified, including intersection treatments (Oira Road), lowered speed environment, retaining 2 traffic lanes and walk/cycle facilities only on the north side	
39,65	Bremner Road/New Bremner Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle (2 lanes for buses) Opportunities for interim 2-lane facility	Rate and location of development and timing and frequency of bus services
41,42	Jesmond Road	Arterial corridor for access to Drury West and FTN connecting Drury West to Drury East and Papakura	4-lane arterial with segregated walk/cycle (2 lanes for buses) Opportunities for interim 2-lane facility	Rate and location of development, Drury West station timing, timing and form of SH22 upgrades and timing and frequency of bus services
58	Oira Road	Collector road	2-lane collector with quality walk/cycle facilities and local bus services.	Rate and location of development and timing and form of SH22 upgrades
63, 17	Waipupuke area internal collector roads	Collector road	2-lane collector with quality walk/cycle facilities and local bus services. Desirably these would allow quality walk/cycle function but in some locations through traffic function could be restricted to prioritise use of arterials and support low-traffic neighbourhood	Rate and location of development, timing and form of SH22 upgrades and the timing and form of connections to Jesmond Road.

No	Corridor	Future Function	Ultimate form[14] and staging opportunities	Inter-dependencies
55,54,56	Auranga/Drury west collector roads	Collector roads	2-lane collector with quality walk/cycle facilities and local bus services. Desirably these would allow quality walk/cycle function but in some locations through traffic function could be restricted to prioritise use of arterials and support low-traffic neighbourhood	Rate and location of development and timing and form of SH22 upgrades
57	Drury West Station and access	Rail station and access and longer-term arterial south to Pukekohe Expressway	4-lane arterial with segregated walk/cycle. Opportunities for 2-lane interim prior to extension south of rail corridor	Development south of SH22 and timing and form of SH22 upgrades

5.2 Recommended Staging Schedule

5.2.1 Purpose and Context

An indicative staging schedule for the Drury projects has been developed from the preceding information. The context for this assessment is important, in that:

- It is for the purpose of Council considering funding and financing options, and as such has not explicitly considered funding constraints or delivery mechanisms
- It is based on transport facilities to serve the proposed plan changes in Drury, using assumed yield and build out rates. It therefore has not considered funding, network, economic or other constraints on growth
- It is based on SGA transport planning principles and processes, and hence does not reflect committed staging agreed by Auckland Transport, Auckland Council or Waka Kotahi
- The ultimate corridor forms are based on the SGA work. Opportunities for potential interim stages remain conceptual options only, with the design, form and timing of any works meaning for agreement between developers and relevant authority (Auckland Transport or Waka Kotahi)

The Staging Schedule is therefore likely to change in response to funding methods, delivery mechanisms, land use decisions and regional investment priorities.

5.2.2 Definitions

The proposed Staging Schedule provides the following information:

- Name of project/stage
- Description of ultimate or potential interim stage
- Corridor hierarchy
- The key growth areas/Developments for which the projects are needed
- An indicative timeframe for the works being needed
- The Staging Principles used in the assessment

Developer areas for which the projects are needed are designated as follows:

- Specific plan change areas
- Cumulative Development in Drury East
- Cumulative Development in Drury West
- Cumulative Development in Drury (being both east and west)
- Opaheke FUZ
- Drury West FUZ (excludes the plan change areas)
- Cumulative growth for Southwest (being Drury, Paerata, Pukekohe)
- Cumulative growth for South Auckland (being growth south of Manukau)

These designations refer to areas for which the project is needed to provide the outcomes identified in the Staging Principles. It is noted that the need, cause or beneficiary of the works may not be equal across all areas. That complexity could be addressed through funding mechanisms.

Timing is intended to be indicative rather than being specific to any year, as follows:

- '2022' refers to being needed at the outset of Plan Change development
- '2026' refers to within the first 5 years of development
- '2031' refers to within the first 10 years of development
- '2036' refers to within the first 15 years of development
- '2041' refers to within the first 20 years of development
- '2046' refers to within the first 25 years of development
- Under construction

5.2.3 Staging Schedule

The Staging Schedule is provided in the **Table 5-2** and following Figures.

Table 5-2 Staging Schedule

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
1a	DE	GSR improvements - Waihoehoe Rd to Drury Interchange	Interim	**2-lane urban**- with active modes on both sides + local intersection improvements (TDM)	Arterial	Cumulative Drury	2022
1b	DE	GSR improvements - Waihoehoe Rd to Drury Interchange	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2036
2a	DE	GSR improvements - From Drury School to Waihoehoe Rd	Interim	**2-lane urban**- with active modes on both sides + intersection improvements (TDM)	Arterial	Cumulative Drury East & local developments	2026
2b	DE	GSR improvements - From Drury School to Waihoehoe Rd	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative All South (Depends on Mill Rd & N-S Arterial)	2036
3	DW	Intersection upgrade on GSR/Karaka Rd intersection	Ultimate	**Ultimate intersection form**	Strategic	Drury All South + Auranga + Cumulative South West	2022
4	DE	Waihoehoe Rd East upgrades- from Fitzgerald Rd to before Cossey Rd (depending on development boundary)	Ultimate	**2-lane urban** - upgrade with active modes on both sides, 24m cross-section	Arterial	Fulton Hogan	2022
5	DE	Drury Central Station	NZUP	NZUP Delivered Rail Station	Rail	Cumulative Drury East + Auranga	2022
6	DE	Drury Station Connection	NZUP	NZUP Delivered Rail Station Access Road	Collector	Cumulative Drury East + Auranga	2022
7	DE	Fitzgerald Rd upgrades (from Waihoehoe Rd to First Stage development boundary , north of Brookefield)	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Collector	Fulton Hogan + Kiwi	2022
8	DE	Fielding Rd upgrades (from Waihoehoe Rd to development boundary)	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Collector	Fulton Hogan	2022
9a	DE	Upgrade in GSR/Waihoehoe intersection/Norrie Rd	Interim	**Upgrade intersection** with active mode crossings and additional approach capacity, tieing into Waihoehoe Road upgrade and bridge replacement	Arterial	Cumulative Drury East + Auranga + Station Park & Ride	2022
9b	DE	Additional Upgrade for Norrioe Apporach to tie-in to Norrie FTN Upgrade	Ultimate	**multi-lane signalised intersection** with active mode crossings, SGA design	Arterial	Cumulative Drury East	2036
10a	DE	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Interim	**Earthwork and land form for 2-lane roundabout but potential initial use as single-lane intersection** - with active mode crossings from outset	Arterial	Oyster+ Fulton Hogan	2022
10b	DE	New intersection on Waihoehoe Rd/Fitzgerald Rd(including approach cross-sections)	Ultimate	**Upgrade to ultimate form**	Arterial	Cumulative Drury East	2031
11	DE	Intersection upgrade Waihoehoe Rd/Fielding Rd/Appleby Rd	Ultimate	**Roundabout as per SGA NOR design**	Arterial	Fulton Hogan	2022
12	DE	Interim walking, cycling and bus connections to Drury Centre (includes Bremner/Norrie/Firth intersection upgrades, active mode on Norrie) -overlap with project 36 and 46	Interim	**Intersection improvements** on Bremner-Firth Rd, Norrie-Firth Rd, GSR-Firth Rd, Active mode facilities on both sides of Firth & Norrie Rd	Collector	Fulton Hogan + Kiwi + Oyster + Auranga	2022
13a	DE	N-S Opaheke Arterial across development (upto Waihoihoi Stream)	Interim	**2-lane urban**- new 2-lane arterial with active modes on both sides + intersection improvements (TDM)	Arterial	Oyster	2022
13b	DE	N-S Opaheke Arterial across development (upto Waihoihoi Stream)	Ultimate	**4-lane urban**- upgrade 2-lane arterial with SGA design + intersection improvements (TDM)	Arterial	Cumulative Drury East + Opaheke	2046
14	DE	Upgrade Brookefield Road from Fitzgerald to Quarry Rd+ New connection + Intersections on Quarry & Fitzgerald	Ultimate	**2-lane urban** upgrade with active modes on both sides + intersection improvements + new connection to Quarry Rd)	Collector	Cumulative Drury East	2026
15	DE	New Collector road E-W from Fitzgerald Rd (collector 1) + Intersections	Ultimate	**2-lane collector**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with development staging)	2026
16a	DE/DW	2-lane bridge over Bremner/Waihoehoe Rd **(included in NZUP project 19-1)**	NZUP	**2-lane urban** with active modes on both sides (replacing existing bridge as part of SH1 P2D NZUP)	Arterial	Cumulative Drury (funded through NZUP)	2022
16b	DE/DW	4-lane bridge over Bremner/Waihoehoe Rd	NZUP	**4-lane urban**- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	Cumulative Drury	2046
19-1	DE/DW	SH1 3-laning and cycleway upgrades from Papakura to Drury Interchange	NZUP	NZUP Delivered upgrade to SH1	Strategic	NZUP	Under Construction
19-2	DE/DW	SH1 Drury Interchange including ramps	NZUP	NZUP Delivered upgrade to Drury Interchange	Strategic	depends on NZUP P2D re-baselining scope	2022
19-3	DE/DW	SH1 3-laning and cycleway upgrades from Drury Interchange To Drury South	NZUP	Papakura-Drury South Stage 2 (prev NZUP)	Strategic	depends on NZUP P2D & Mill Rd re-baselining	2036

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
20	DE	Upgrade Fitzgerald Rd from Brookefield to Ramarama Road	Ultimate	**2-lane urban**- upgrade with active modes on both sides + intersection upgrades (TDM)	Collector	Fulton Hogan (progress with development staging) + Cumulative Drury East	2026
21	DE	Fielding Rd upgrades for active modes (from Fitzgerald Rd to development boundary)	Ultimate	**Active mode upgrades**- existing road layout with active modes on both sides + intersection upgrades for active mode crossing	Collector	Fulton Hogan (progress with development staging)	2026
22	DE/DW	Upgrade Intersection at Quarry/ GSR	Ultimate	**Upgrade intersection** (roundabout) with active modes facilities(TDM)	Collector	Cumulative East+ Drury South	2022
23	DE	Waihoehoe Rd West upgrades- between GSR & Fitzgerald Rd, including bridge replacement over rail corridor	Ultimate	**4-lane urban FTN**- upgrade with active modes on both sides, SGA design	Arterial	Cumulative Drury East and Opaheke (depends on Mill Rd & N-S Arterial & Brookefield Rd and four-tracking)	2022
24	DE	Upgrades on Waihoehoe Rd east- from project 4 to Drury Hills + Drury Hills Intersection	Ultimate	**2-lane urban** - upgrade with active modes on both sides	Arterial	Fulton Hogan (progress with development staging)	2031
25	DE	Upgrades on Drury Hills from Waihoehoe Rd to Macwhinney Dr	Ultimate	**2-lane urban**- upgrade to 2-lane urban collector with active modes on both sides	Collector	Fulton Hogan (progress with development staging)	2036
27a	DE	Active mode facilities from Drury Hills and Fitzgerald to Maketu Road	Interim	**Active mode upgrades**- active modes on both sides + intersection upgrades for active mode crossing	Collector	Cumulative Drury East (progress with development staging)	2026
27b	DE	Urban road with active mode facilities from Drury Hills and Fitzgerald to Maketu Road	Ultimate	**2-lane urban**- upgrade to urban collector with active modes on both sides + intersection upgrades	Collector	Drury East FUZ (Southeast)	2036
28	DE	New collector in N-S direction parallel to Fitzgerald Rd (Boulevard)	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with Town Centre development staging)	2026
29	DE	New collector in E-W direction between Flanagan & Fitzgerald Rd (collector 2)	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Kiwi (progress with development staging)	2026
30-1	DE	2-lane internal collector between Fitzgerald & Fielding Rd E-W direction	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Fulton Hogan (progress with development staging)	2022
30-2	DE	2-lane internal collector between Fielding & Drury Hills E-W direction	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Fulton Hogan (progress with development staging)	2031
31	DE	Upgrades on Cossey Rd between Fitzgerald & Waihoehoe Rd (Depends on Mill Rd Alignment)	Ultimate	**2-lane urban** - upgrade with active modes on both sides **(depends on Mill Road alignment)**	Collector	depends on Mill Rd alignment & timing	2031
32	DE	New Intersection on Cossey Rd/Waihoehoe Rd	Ultimate	**SGA design (depends on Mill Road design)**	Arterial	Fulton Hogan (progress with development staging)+ depends on Mill Rd	2031
33	DE	Upgrade Fitzgerald Rd from project 7 to Brookefield Rd	Ultimate	**2-lane urban**- upgrade to 2-lane urban with active modes on both sides (TDM)	Collector	Fulton Hogan + Kiwi	2022
34	DE	New Drury Interchange connection to Kiwi development	Ultimate	new direct access from SH1 into Kiwi development, potentially coordinated with reconstruction of Drury Interchange	Collector	Kiwi (depends on pace of centre development and coordination with P2D)	2026
35a	DE	Mill Road : Drury South connection from Fitzgerald/Cossey intersection to SH1 + Interchange (north facing ramps only)	Interim	**2-lane**- new road layout with active modes on both sides (depends on Mill Road design and sequencing)	Strategic	Cumulative East + Strategic	2031
35b	DE	Mill Road : Drury South connection from Fitzgerald/Cossey intersection to SH1 + Interchange (north and south ramps)	Ultimate	**4-lane**- new road layout with active modes on both sides (depends on Mill Road design and sequencing)	Strategic	Strategic	2041
36	DE/DW	Bremner-Norrie Road east of SH1 upto GSR (overlap with project 12)	Ultimate	**4-lane urban**- new road layout with active modes on both sides	Arterial	Cumulative Drury	2036
37a	DE	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM, depends on timing of #37)	Arterial	Cumulative Drury East and Opaheke (timing dependent on Mill Rd)	2041
37b	DE	N-S Opaheke Arterial from Oyster development to Ponga Rd (alternative project 38)	Ultimate	**4-lane urban**- upgrade 2-lane urban with active modes on both sides (SGA design)	Arterial	Cumulative Drury East and Opaheke (timing dependent on Mill Rd)	2046
38a	DE	Mill Road: From Waihoehoe Rd to Papakura (alternative project 37)	Interim	**2-lane urban**- new road layout with active modes on both sides, TDM , (depends on Mill Rd and timing of #37)	Strategic	Cumulative Drury East + Cumulative All South	2036
38b	DE	Mill Road: From Waihoehoe Rd to Papakura (alternative project 37)	Ultimate	**4-lane urban**- with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2046

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
18a	DE	Mill Road: From Waihoehoe Rd to Fitzgerald Road (depends on Mill Road alignment)	Interim	**2-lane urban**- new road layout with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2036
18b	DE	Mill Road: From Waihoehoe Rd to Fitzgerald Road (depends on Mill Road alignment)	Ultimate	**4-lane urban**- with active modes on both sides, TDM , (depends on Mill Rd)	Strategic	Cumulative Drury East + Cumulative All South	2046
39a	DW	New Bremner Rd arterial from SH1 to Auranga development	Interim	**2-lane urban**- new road layout with active modes on both sides (Under construction)	Arterial	Drury Precinct	Under Construction
39b	DW	New Bremner Rd arterial from SH1 to Auranga development	Ultimate	**4-lane urban FTN**- upgrade 2-lane urban with active modes on both sides (TDM)	Arterial	Cumulative Drury	2046
40a	DW	New intersection on Jesmond/Bremner Rd	Interim	**single-lane controlled intersection** (new intersection with active mode crossings)	Arterial	Cumulative Drury West (depends on surrounding growth and timing of project 65)	2026
40b	DW	Upgrade intersection on Jesmond/Bremner Rd	Ultimate	**Ultimate lane intersection** form	Arterial	Cumulative Drury + Future Growth (depends on surrounding growth and timing of project 65)	2036
41a	DW	Jesmond Rd upgrades from SH22 to (and including) Waipupuke development boundary	Interim	**2-lane urban** - upgrade with active modes on both sides (TDM)	Arterial	Waipupuke	2022
41b	DW	Jesmond Rd from SH22 to Waipupuke development boundary	Ultimate	**4-lane urban FTN**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury West	2046
42a	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Interim	**Interim active modes e.g. shared path on one side**	Arterial	Waipupuke	2022
42b	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	**2-lane urban- upgrade existing road with active mode facility on both sides (TDM)**	Arterial	Drury West FUZ	2031
42c	DW	Jesmond Rd upgrades from project 41 to New Bremner Rd	Ultimate	**4-lane urban FTN**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2046
43a	DW	Intersection upgrade on SH22 Rd/Jesmond Rd	Interim	**2-lane Roundabout** (active mode crossings) via NZUP Station access	Strategic	Cumulative Drury West + Station	2022
43b	DW	Intersection upgrade on SH22 Rd/Jesmond Rd	Ultimate	**Ultimate intersection form (for fully urbanised corridor)**	Strategic	Cumulative Drury West + subject to SH22 improvements and station timings	2031
44	DW	Intersection at SH22/Burberry Rd (likely to close entirely)	Ultimate	Aurunga develoment proposes intersection is closed	Strategic	Auranga B1	2022
45	DW	Upgrade intersection at SH22/Victoria Rd	Interim	Signals to be installed as part of Papakura-Drury Project	Strategic	Auranga B1	Under Construction
46	DW	Upgrades in GSR/Firth Rd intersection (overlap with project 12)	Interim	Possible signals for active mode crossings, depending on Statuion Access signals	Arterial	Fulton Hogan + Kiwi + Oyster + Auranga	2022
47	DW	Old Bremner Road Upgrade from Jesmond Road to Auranga Precinct	Ultimate	**2-lane urban**- new road layout with active modes on both sides (Under construction)	Collector	Auranga	Under Construction
17	DW	Jesmond Road to Oira Road Collector	Ultimate	**2-lane urban**- new road layout with active modes on both sides	Collector	Drury West FUZ	2036
48	DW	Collector road south of New Bremner/ Old Bremner intersection	Ultimate	**2-lane urban**- new road layout with active modes on both sides (Under construction)	Collector	Auranga	Under Construction
49	DW	SH22 improvements from GSR Intersection to Jesmond Rd	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides	Strategic	Waipupuke + Auranga + Drury West FUZ + Cumulative South/West	2022
50a	DW	SH22 improvements from Jesmond Rd to Oira Rd- active mode upgrades	Interim	**2-lane urban** - upgrade with active modes and urban frontage on north side only	Strategic	Waipupuke	2022
50b	DW	SH22 improvements from Jesmond Rd to Oira Rd	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes and urban frontage on both sides	Strategic	Drury West FUZ + Cumulative South/West	2031
51	DW	SH22 improvements from Oira Rd to Oira Creek - subject to design, could be incorporated with project 60	Interim	Upgrade road layout to future urban boundary + active modes and urban frontage on both sides	Strategic	Drury West FUZ + Cumulative South/West	2036
52	DW	Intersection upgrade- on SH22/ McPherson Rd/Karaka Rd (Auranga B1)	Ultimate	**Ultimate intersection form (note that McPherson bridge under rail likley to close to vehicles with rail 4-track)**	Strategic	Auranga	2022
53	DW	New intersection east of Jesmond Rd (Auranga B1 main street)	Ultimate	**Ultimate intersection form (left-in left-out)**	Strategic	Auranga	2022
54	DW	New N-S collectors internal to Auranga B1 (2 links)+ Intersections	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Auranga B2 (depends on pace of development)	2022

No	Location	Project	Project Stage	Project Description	Hierarchy	Developers	Indicative Timing
55	DW	New E-W collector to Jesmond Rd	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Drury West FUZ	2031
56	DW	Burberry Rd north connection to Auranga Precinct	Ultimate	**2-lane urban**- new collector with active mode on both sides + intersection improvements (TDM)	Collector	Auranga	Under Construction
57	DW	Drury West Station + New access road	NZUP	**2-lane urban** road layout with active modes on both sides for access to station	Arterial	Cumulative Drury West	2026
58	DW	Oira Rd upgrades from SH22 to Waipupuke development boundary	Ultimate	**2-lane urban**- upgrade with active modes on both sides + intersection improvements (TDM)	Collector	Waipupuke	2022
59	DW	New Intersection on Jesmond Rd/collector (PC61)	Ultimate	**2/4-lane intersection** (new intersection + active mode crossings)	Arterial	Waipupuke	2022
60a	DW	SH22 Intersection upgrade - Oira Rd (3 leg)	Interim	**Interim Roundabout**	Strategic	Waipupuke	2022
60b	DW	SH22 Intersection upgrade - Oira Rd (4 leg)	Ultimate	**Ultimate intersection form**	Strategic	Drury West FUZ	2036
63	DW	New collectors internal to Waipupuke PC61 (3 links)+ Intersections	Ultimate	**2-lane urban** - new collector with active mode on both sides + intersection improvements (TDM)	Collector	Waipupuke	2022
65a	DW	New Bremner Rd arterial from Auranga development to Jesmond Rd	Interim	**2-lane urban**- new road layout with active modes on both sides (TDM)	Arterial	Cumulative Drury West	2036
65b	DW	New Bremner Rd arterial from Auranga development to Jesmond Rd	Ultimate	**4-lane urban FTN** - upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Arterial	Cumulative Drury	2046
66	DW	SH22 improvements - west of SH1 interchange to GSR	Ultimate	**4-lane urban**- upgrade 2-lane urban to 4-lane with active modes on both sides, (TDM)	Strategic	Waipupuke + Auranga + Drury West FUZ + Cumulative South/West	2022
67	DW/DE	Active mode corridor from Drury East Town Centre to GSR	Ultimate	Segregated active-modes corridor beside rail corridor	Strategic	Cumulative Drury + Cumulative South-West	2026
68	DW	Active mode corridor from GSR to Drury West Town Centre/ Station	Ultimate	Segregated active-modes corridor beside rail corridor	Strategic	Cumulative Drury + Cumulative South-West	2031
69	DW/DE	Quarry Road walking cycling bridge	Interim	Active-modes facility over SH1	Collector	Cumulative Drury	2026
70	DW/DE	GSR Road walking cycling bridge	Interim	Active-modes facility over Rail corridor	Arterial	Cumulative Drury	2026

Figure 5-2 Stage 1 Projects



Figure 5-3 Stage 2 Projects

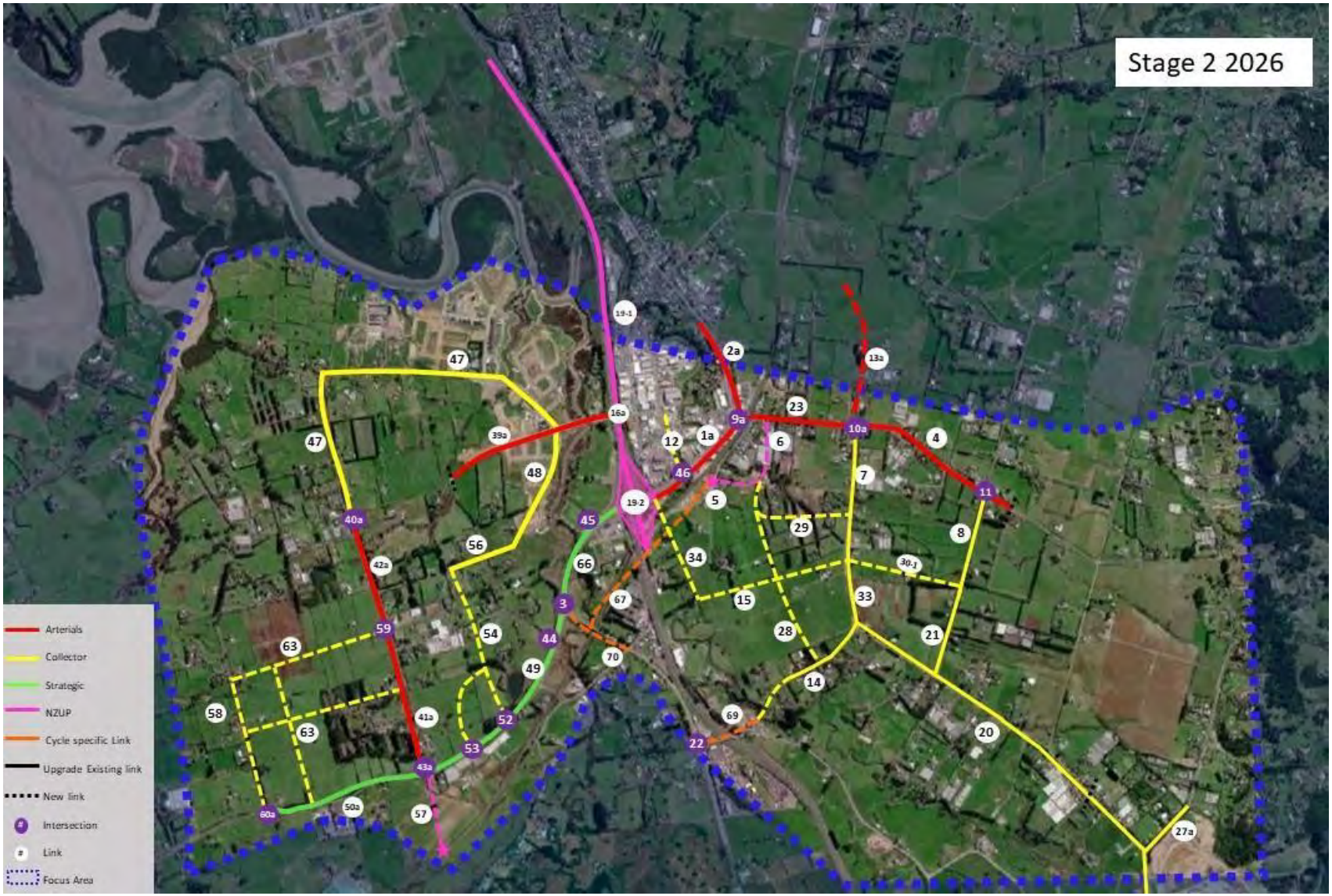


Figure 5-4 Stage 3 Projects

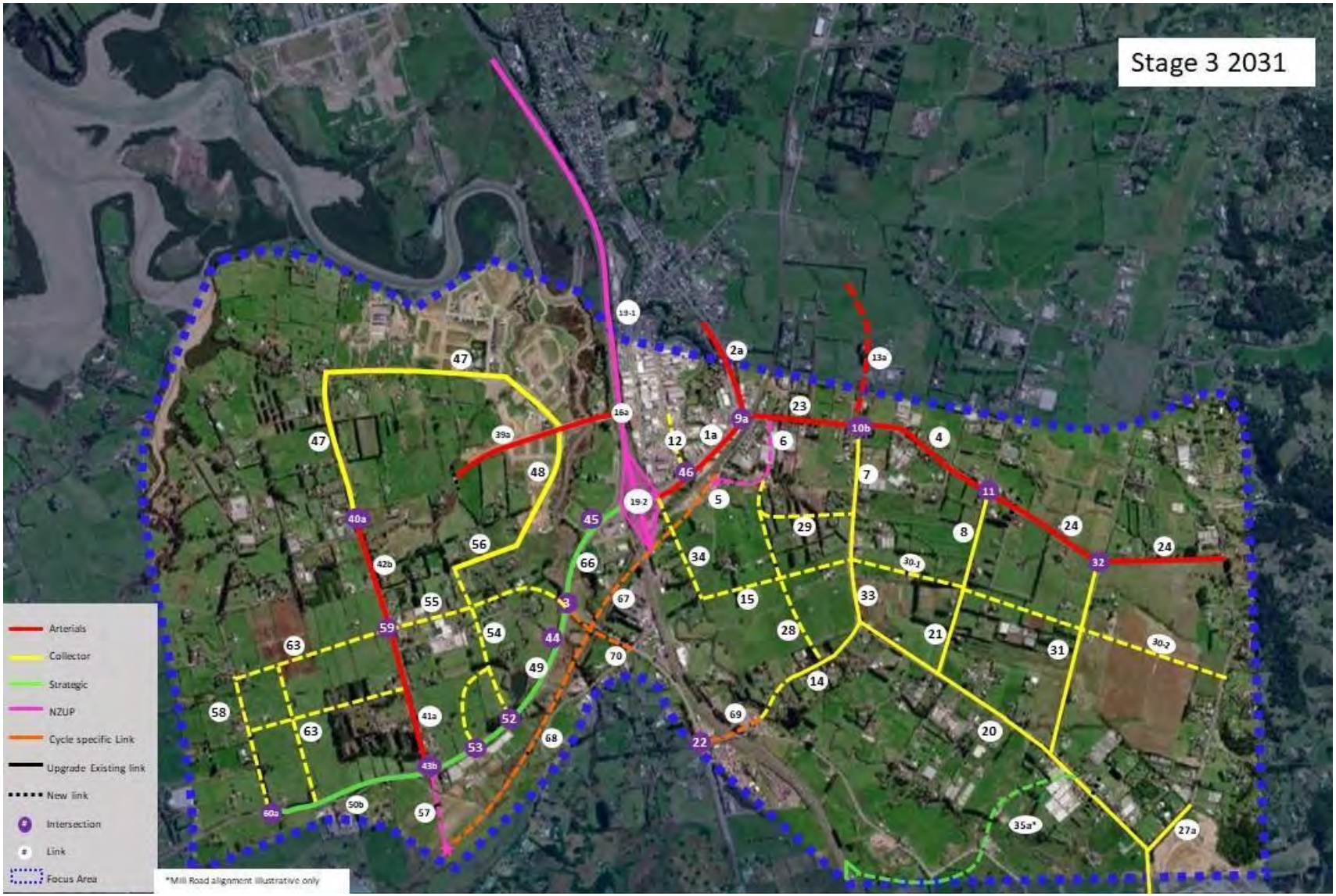


Figure 5-5 Stage 4 Projects



Figure 5-6 Stage 5 Projects



Figure 5-7 Stage 6 Projects



6 Conclusions

This assessment has identified a potential transport infrastructure Staging Schedule to support the plan changes in Drury. This has been developed with awareness of the uncertainties inherent in the timing of both the roll out of the development and the timing of major transport infrastructure. This assessment is to assist Council to consider funding and financing options, and as such has relied on inputs and assumptions that are subject to change. The Staging Schedule therefore is a technical assessment to inform subsequent decision making and should not be viewed as a committed programme of projects for delivery.

In reviewing this Schedule, the purpose, scope, and approach to the work should be kept in mind. Key conclusions of this work include:

- Both the Drury East and Drury West areas constitute a significant scale or urban growth
- That Drury growth is itself only a sub-set of the total growth planned and expected in the southern parts of Auckland
- This scale of growth requires an extensive network of new or upgraded transport infrastructure, both to the immediate growth area and the surrounding receiving environment
- The long-term arterial and strategic network to support this growth has been identified through the SGA IBC and is being further developed through SGA detailed business cases. Some opportunities for the staged implementation of those corridors has been identified in this assessment, however the feasibility, design and timing of any such interim upgrades will remain to be agreed directly with the appropriate road controlling authority
- It is not feasible to fully isolate the projects needed to support just the Drury plan change areas from growth in the wider network, as Drury is at the key location where all north-south movements must pass, including all movements between Auckland and the rest of the country to the south. While this assessment has focussed on the projects needed for Drury, the scale or need for some of those projects are to accommodate wider growth, while there are other wider-network projects which will benefit the Drury area

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Appendix A Yield and Trip Generation Review

Technical Note

Date Prepared: 16/03/2021

Prepared by: Andrew Murray, Subramanyam Uppuluri

Transport Assessment

Purpose

This note details the model test undertaken of the potential trip generation associated with the Drury East and West Plan Changes.

Document Status

Responsibility	Name
Author	Subramanyam Uppuluri
Reviewer	Andrew Murray
Approver	Andrew Murray

Revision Status

Version	Date	Reason for Issue
1	Draft for comment send to parties	1/4/21
2	Include Drury West assessment	12/5/21

Disclaimer

This is a draft document for review by specified persons at Auckland Transport and the New Zealand Transport Agency. This draft will subsequently be updated following consideration of the comments from the persons at Auckland Transport and the New Zealand Transport Agency. This document is therefore still in a draft form and is subject to change. The document should not be disclosed in response to requests under the Official Information Act 1982 or Local Government Official Information and Meetings Act 1987 without seeking legal advice.

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Appendices

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1 Purpose

This technical note details the traffic models developed to inform the Drury Infrastructure Funding and Finance (DIFF) study. Specifically, it updates the SGA traffic models to include refined estimates of the traffic associated with the Private Plan Changes.

This note covers:

- Drury East plan changes: PC48 (Kiwi), PC49 (Fulton Hogan) and PC50 (Oyster)
- Drury West plan changes: PC51 (Auranga B2), PC61 (Waipupuke)

The Auranga A and B1 area is live-zoned but is adjacent to the above private plan changes, so has been included in this consideration.

1.1 SGA Models

The various business cases being developed by SGA are focused on long-term route-protection of the transport facilities/corridors needed to support the identified growth. This includes a series of transport models, including:

- MSM regional multi-modal model: which estimates travel patterns based on input land use and network assumptions
- S3M area traffic model: Which assigns the MSM traffic demands via a more detailed representation of the road network

The key land use inputs to the models are:

- Land use forecasts developed by Auckland Council and the Auckland Forecasting Centre (AFC). The forecasts currently used by SGA are referred to as Scenario I11.5
- Yield estimates in the FUZ areas estimated by Auckland Council for a full build model scenario referred to as 2048+

As such, the models used by SGA reflect Council's yield estimates (including from available Structure Plans) and growth timing reflecting the Future Urban Land Supply Strategy (FULSS), as reflected in the Scenario I11.5 forecasts. The model scenarios used by SGA are regularly updated as the project options are developed.

1.2 Drury East Plan Change Models

The three private plan changes lodged with Council (PC48, PC49 and PC50) have been developed in an integrated way, based on common modelling. That modelling was undertaken some time ago, using early versions of the SGA S3M models. Key updates made to the SGA versions[15] since those IBC versions include:

- Refined zone system and road networks for use in the Drury-Opaheke Structure Plan

[15] Although referred to here as the 'SGA' versions, the SH1 model validation check was undertaken jointly with the Papakura to Drury Project (P2D) team for ongoing use by both studies.

- Explicit inclusion of vehicle trips accessing rail stations
- Updates to the various SGA projects as business cases developed
- A 'stocktake' review of the models that expanded the simulation area near Pukekohe and reviewed the model validation for the 2016 base year, specifically on the SH1 corridor

Although based on older versions of the SGA S3M models, the PPC models were updated with demands from a specific MSM model run with their proposed yields and land use forecasts to inform the ITA for the PPCs.

The modelling report for the PPCs has directly relied on the trip generation for the area estimated in MSM. The report includes a check of the implied vehicle trip rate for residential activities but has not included a first-principle assessment of the likely trip generation associated with the commercial or retail elements of the site.

1.3 Drury West Models

The Integrated Transport Assessments (ITA's_ for Waipupuke and Auranga B2 included some localised intersection assessments but have not created or used be-spoke area-wide models. They have instead relied on local data and assessments and previous Structure Plan modelling.

2 Drury East Trip Generation Review

SGA have tested the possible traffic generation from the Drury East PPCs by:

- Undertaking their own estimate of likely traffic generation for the PPC area
- Factoring the demands in the SGA S3M models to match those first-principal estimates
- Comparing traffic flows against those in the PPC models

Rather than a simple review of the PPC models, these 'test' models were developed in the SGA version of the models to take advantage of the more refined zone and network system.

The vehicle trip generation estimates developed here assume that the full suite of projects identified to support the growth areas are implemented, including the full network of walking, cycling and PT facilities and the desired land use outcomes identified in the Structure Plan. These vehicle trip rate estimates will therefore not be applicable for scenarios without those land use forms or supporting networks.

2.1 Spatial Area and Full-Build Yield

The three PPCs fall within two MSM model zones as follows:

- PC48 (Kiwi) and PC49 (Fulton Hogan) are both contained within MSM zone 554, and effectively comprise the whole of that zone
- PC50 (Oyster) falls within MSM zone 555, comprising approximately 1/3rd of that zone at the western end.

The MSM zone system is indicated in Figure 2-1 and the three PPCs in Figure 2. The PPC Modelling Report and associated ITAs indicate the following yields:

Table 2-1 Yields Indicated for Plan Change Areas

PPC	Dwellings	Retail GFA, m2	Commercial GFA, m2	Community GFA, m2
PC50 Oyster	1,000	•	•	•
PC49 Fulton Hogan	2,500	•	•	•
PC48 Kiwi	3,000	107,000	63,000	16,000

Figure 2-1 MSM Spatial (Zone) System

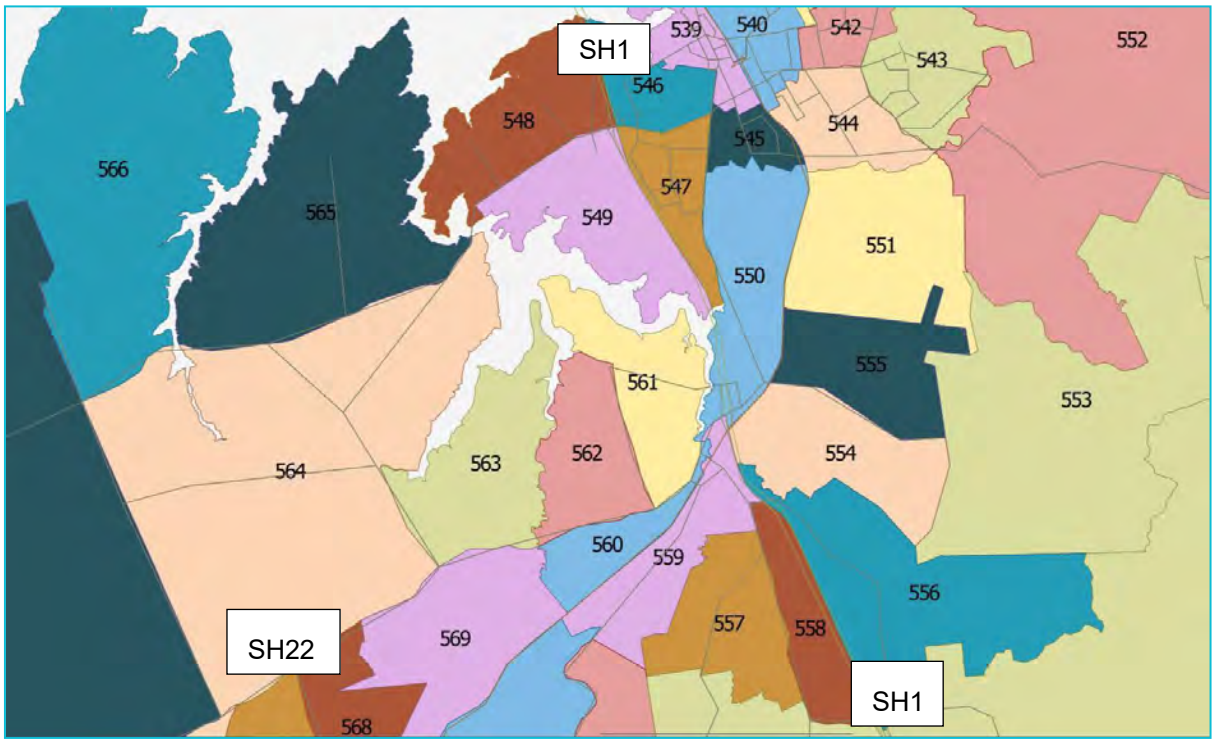
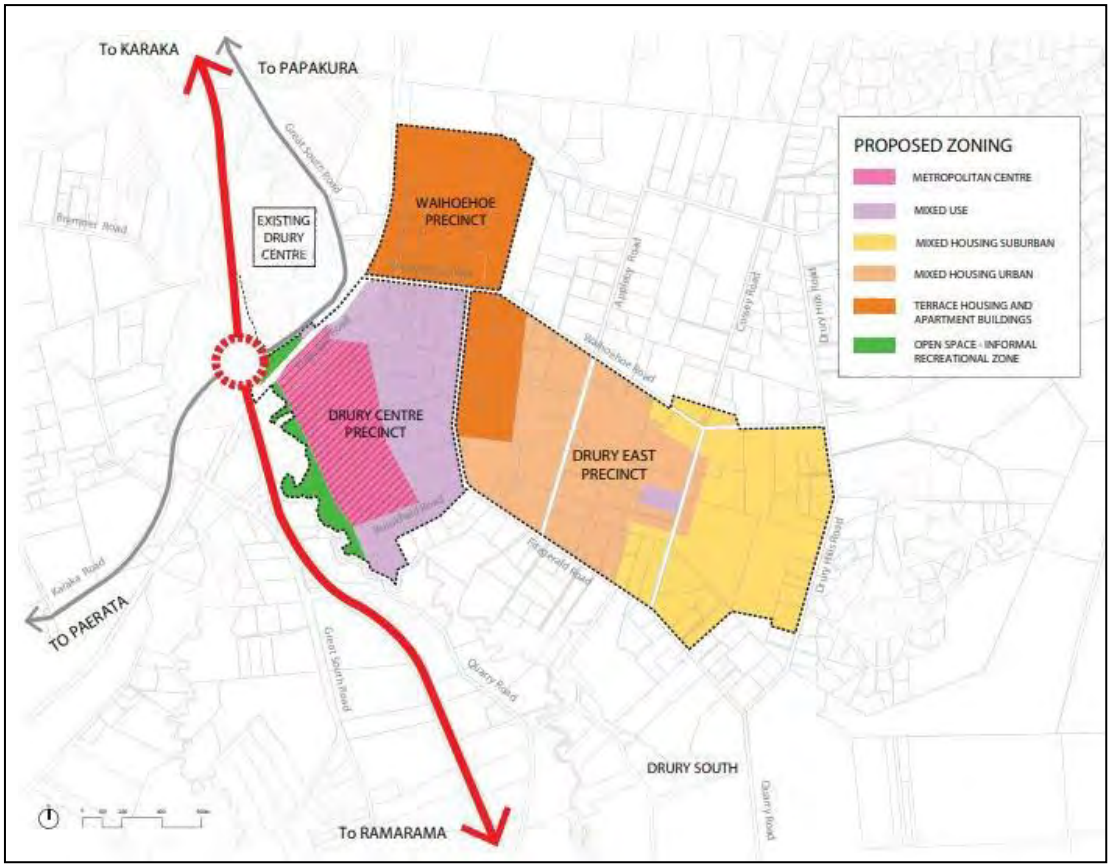


Figure 2-2 Drury East Plan Changes (Source: PC Documents)



The trip generation review has been undertaken for the complete area comprising MSM Zones 554 and 555. This therefore requires an estimate of the residential yield in MSM Zone 555 outside the Oyster Site. The Council's yield estimates for that zone are some 3,000 dwellings. With approximately 1,000 expected for the Oyster sites, 2,000 dwellings were assumed in the residual FUZ area. This assumption is considered plausible given that the Oyster site comprised approximately 1/3rd of that zone.

The trip generation estimates undertaken here are based on the detailed estimates of floor area contained in the PPCs. The regional modelling (via MSM) uses employment as the predictor for business generation, rather than floor areas. The Previous Structure Plan modelling included some 3,100 employees in the MSM Zone 554, which is noticeably larger than the 6,000[?] potential employees indicated in the PPC documents. For this test, the MSM has not been re-run with revised values, instead the traffic flow sin the S3M model have been directly factored to match the estimates.

2.2 Approach to Estimation of Trip Generation

The trip generation for Drury East area (MSM Zones 554 and 555) was estimated as follows:

- Estimate residential trip generation totals
- Estimate commercial/retail generation totals

- Apply 'pass-by' reductions to commercial/retail trips that are external to the Drury East Area (i.e. the pass-by reductions were not applied to internal trips)
- Increase the proportion of total trips expected to remain internal to the site from that estimated in MSM
- Derive target trip numbers for each zone for both total trips and external trips
- Develop factors to apply to the SGA demands to match the target trip totals

2.3 Residential Generation

Residential trip generation was estimated as follows:

7. Estimate average people per household for Low, Medium and High density dwellings
8. Apply a typical trip rate of 4.0 trips per person per day[16] to get person-trip generation estimates
9. Estimate PT/Active mode shares based on density and proximity to rail station
10. Subtract PT/Active trips to obtain estimated trip rates by vehicle
11. Apply average vehicle occupancy of 1.2 persons per vehicle to obtain daily vehicle trip rates
12. Apply percentages of the daily values to get AM (9%), interpeak (5.5%) and PM peak (9%) generation estimates

The total person trip rates and vehicle occupancies were kept constant over time, however other assumptions were varied through the modelled years as follows:

- The average people per household was reduced over time to reflect demographic trends (10% increase over 40 years was assumed)
- The PT/Active mode shares were increased over time to reflect expected increasing relative attractiveness of these modes relative to vehicle travel and completeness of the wide network.

The resulting daily person-trip rates (per dwelling) are provided in Table 2-2. Because the assumed mode shares varied by location, these are discussed further below.

Table 2-2 Estimated Daily Person Trip Rates

The potential active/PT mode shares were estimated based on density and proximity to key facilities. The S3M (yellow boxes) and MSM (red text) zone system is indicated in the following Figure 2-3. The assumed mode shares shown in Table 2-3. The mode shares were assumed to increase over time, based on the following broad assumptions:

- Low Density: 2018 Start value of 18%, increasing by 50% of that by full development (i.e. 9% point increase over 40 years)
- Medium Density: 2018 Start value of 20%, increasing by 80% of that by full development (i.e. 16% point increase over 40 years)

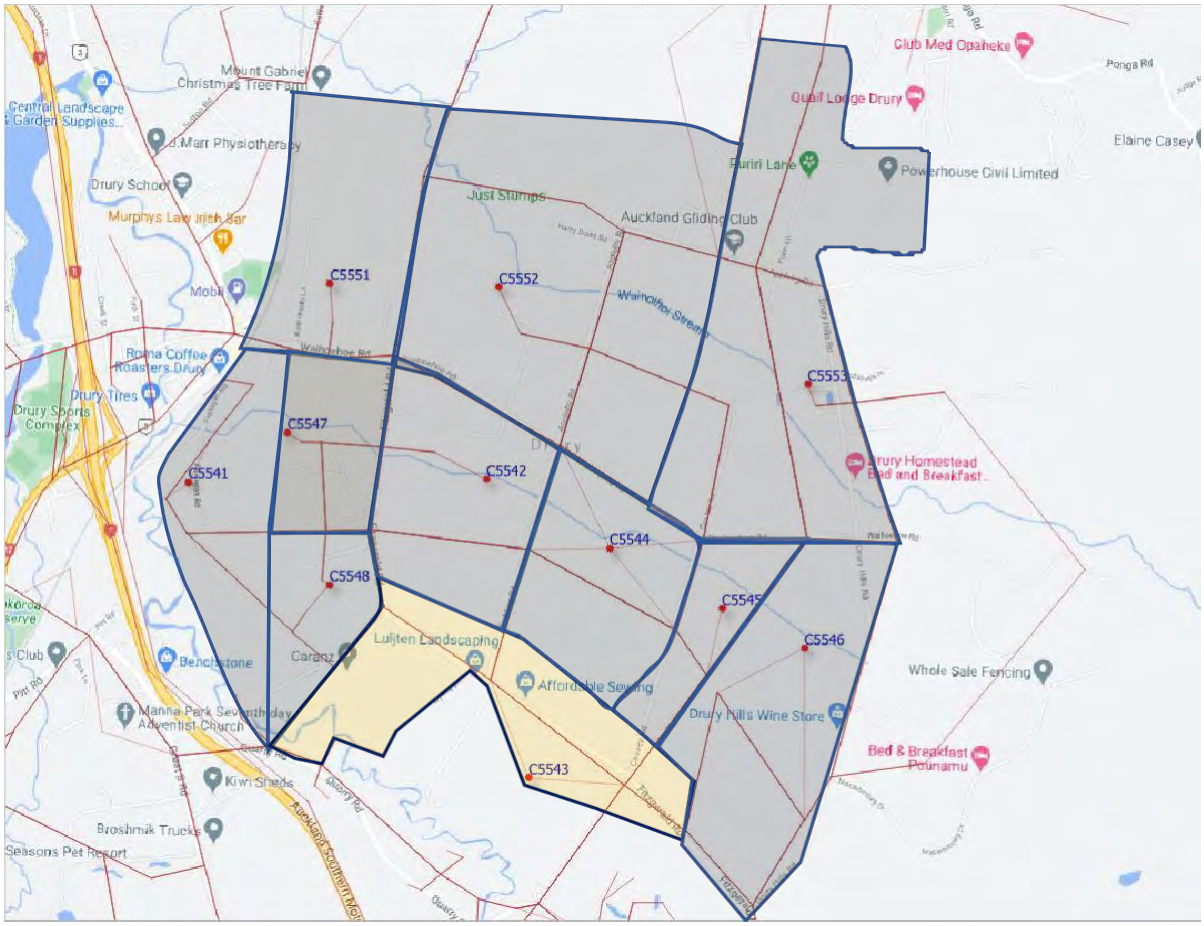
[16] This is based on typical combined rates in MSM

- High Density: 2018 Start value of 23%, increasing by 100% of that by full development (i.e. 23% point increase over 40 years)

Table 2-3 Activities Modelled for each S3M Model Zone and Assumed PT/Active mode share

MSM Model Zone	S3M Model Zone	Plan Change	Activity assumed (for modelling)	2028	2038	2048	2048+
554	5541	PC48 Kiwi	Retail/Commercial	See below for business trip generation			
	5547	PC48 Kiwi	High density residential	28.8%	34.5%	40.3%	46.0%
	5548	PC48 Kiwi	High density residential	28.8%	34.5%	40.3%	46.0%
	5542	PC49 Fulton Hogan	High density residential	22.8%	28.5%	34.3%	40.0%
	5543	PC49 Fulton Hogan	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5544	PC49 Fulton Hogan	Medium density residential	18.0%	22.0%	26.0%	30.0%
	5545	PC49 Fulton Hogan	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5546	PC49 Fulton Hogan	Low density residential	13.3%	15.5%	17.8%	20.0%
555	5551	PC50 Oyster	High density residential	22.8%	28.5%	34.3%	40.0%
	5552	N/A (FUZ)	Medium density residential	13.0%	17.0%	21.0%	25.0%
	5553	N/A (FUZ)	Low density residential	13.3%	15.5%	17.8%	20.0%

Figure 2-3 S3M Zone System for DIFF Test



The resulting peak-hour vehicle trip rates for each zone are therefore as indicated in Table 2-4. It should be noted that the resulting trip rates are heavily influenced by the assumptions on reducing household size and increasing active/PT mode share. As noted above, these vehicle trip rates could be expected to be significantly higher if those assumptions are not borne out, which could occur if the high-density land use with high quality network of active mode and PT facilities, and local employment and services does not occur.

Table 2-4 Residential Vehicle Peak Hour Trip Rates

	2028			2038			2048			2048+		
Zone	AM	IP	PM	AM	IP	PM	AM	IP	PM	AM	IP	PM
5542	0.45	0.27	0.45	0.40	0.25	0.40	0.36	0.22	0.36	0.32	0.20	0.32
5543	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5544	0.64	0.39	0.64	0.59	0.36	0.59	0.55	0.34	0.55	0.51	0.31	0.51
5545	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5546	0.75	0.46	0.75	0.72	0.44	0.72	0.68	0.41	0.68	0.64	0.39	0.64
5547	0.41	0.25	0.41	0.37	0.23	0.37	0.33	0.20	0.33	0.29	0.18	0.29
5548	0.41	0.25	0.41	0.37	0.23	0.37	0.33	0.20	0.33	0.29	0.18	0.29
5551	0.45	0.27	0.45	0.40	0.25	0.40	0.36	0.22	0.36	0.32	0.20	0.32
5552	0.68	0.42	0.68	0.63	0.39	0.63	0.59	0.36	0.59	0.54	0.33	0.54
5553	0.75	0.46	0.75	0.72	0.44	0.72	0.68	0.41	0.68	0.64	0.39	0.64

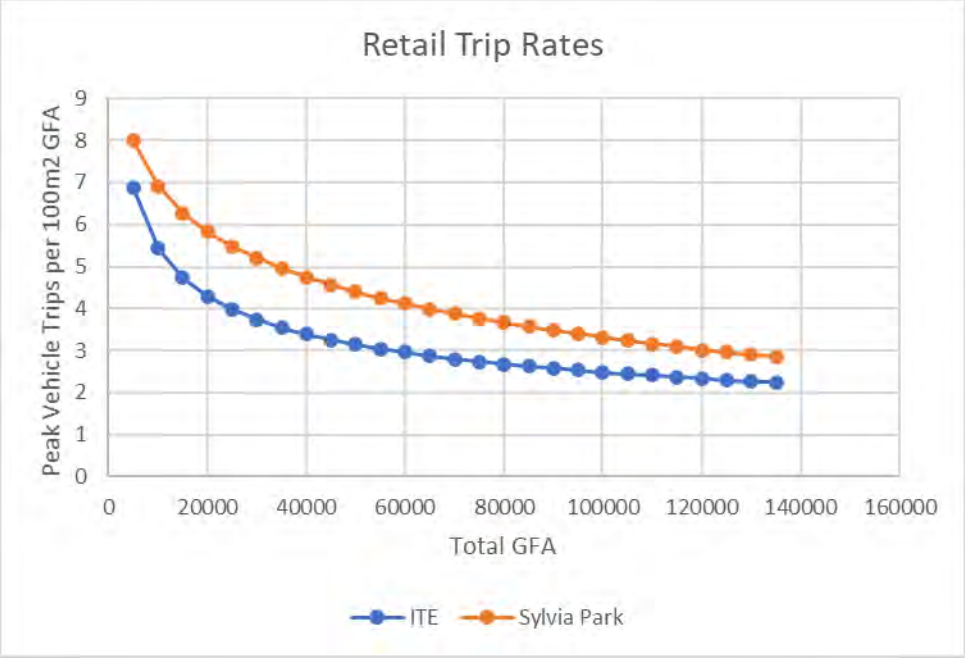
2.4 Business Trip Generation

The trip generation for the business areas were estimated as follows:

- Estimate peak-hour vehicle trip rates per 100m2 GFA from typical sources for each of the retail, commercial and community service activities
- Estimate the potential mode shift to active/PT modes for this location to derive reduced vehicle trip rates
- Apply the peak-hour trip rates to the relevant period (PM peak for retail, AM peak for Commercial and interpeak for community activities)
- Estimate trip rates for the other periods, as a percentage of the peak rates
- Apply pass-by discounts for the trips external to the site

Retail trip rates were based on data provided by Flow Transportation Ltd and used on other projects such as a plan change in Tauranga City. That data includes trip-rates from the ITE manual and also compiled from survey data from the Sylvia Park shopping Centre in Auckland. Both data are based on trip rates (per GFA) reducing as the scale of retail development increases, as shown in the Figure 2-4. The ITE data indicates rates lower than found at the Sylvia Park site. For the purposes of this analysis, rates half-way between the two data sets were adopted.

Figure 2-4 Retail Trip Rates



Peak hour vehicle trip rates for the commercial areas were assumed to be 1.8/100m2 GFA, while those for community services were assumed to be 1.0.

Mode share were then applied based on simple assumptions about potential mode share. The active/PT mode shares were assumed to grow from 0% in 2028 to 25% at full build-out (2048+).

The peak generation was then assigned to the respective model peaks and as assumed proportion applied for the other periods as indicated in the following Table 2-5. Because the starting trip rates were already vehicle trip rates, a factor for vehicle occupancy was not required.

Table 2-5 Proportion of Peak Generation

Activity Type	AM	Interpeak	PM
Retail	25%	80%	100%
Commercial	100%	30%	90%
Community	30%	100%	70%

Pass-by discounts were then applied to external trips as follows:

- Retail = 30%
- Commercial = 5%
- Community services = 40%

2.5 Combined Trip Generation

The total vehicle trip generation for the Drury East area (MSM zones 554 and 555) was therefore estimated as follows:

- Estimate the yield for each activity type/zone for each forecast year
- Combine the estimated residential and business trip generation
- Adjust the target value based on the expected level of internalisation

The build-out of the Drury East area was assumed based on the following information:

- Information provided by the Drury East developers of potential first stage of development, as indicated in the Figure 2-5
- Land use estimates for each year from Table A-1 of the PC Drury East Modelling Report

Figure 2-5 Potential Initial Stage of Development, as indicated by Drury East developers



Table 2-6 Assumed Business Build-out

Year	General Retail(sqm)	Commercial (sqm)	Community facilites(sqm)
2028	42%	20%	10%
2038	78%	50%	20%
2048	89%	70%	50%
2048+	100%	100%	100%

Table 2-7 Assumed Residential Build-out

Year	Zone 554	Zone 555
2028	36%	65%
2038	78%	85%
2048	89%	90%
2048+	100%	100%

The MSM-derived demands in the SGA models indicate some 6% of the trips generated within the two zones remain within the zone. While this could be plausible in early stages of development, it is considered potentially low for full build out. This could be influenced by the MSM having a lower number of jobs than is suggested by the plan change documents.

Although the proportion of total person trips remaining internal is expected to be relatively significant, a high proportion of those short internal trips are expected to be undertaken by active modes. Hence the proportion of vehicle trips remaining within the zone is not expected to be particularly high. To gauge a suitable value, the trip length distribution from MSM was investigated. Most internal trips within the two zones would be less than 2km, which the MSM data suggested would be about 12% of vehicle trips. Hence for full build-out, the internal and external target trip generation was modified to increase the internalisation from 6% to 12%. For modelling purposes, the rate of internalisation was assumed to be as follows:

- 6% in 2028
- 8% in 2038
- 10% in 2048
- 12% in 2048+

The target trip generation (inbound+outbound) was estimated for both total trips and external trips, as indicated in the Table 2-8.

Table 2-8 Target Trip Generation (Total Trips and Total External Trips)

Plan Change Area	MSM Zone	S3M Zone	2028				2038				2048				2048+			
			AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily
Total Trips (Includes Internal Trips and with Pass-by discounts)																		
Fulton Hogan	554	5542	57	35	57	635	113	69	113	1,256	116	71	116	1,284	115	71	115	1,282
		5543	87	53	87	966	177	108	177	1,968	188	115	188	2,083	195	119	195	2,163
		5544	82	50	82	910	167	102	167	1,850	176	107	176	1,951	182	111	182	2,019
		5545	87	53	87	966	177	108	177	1,968	188	115	188	2,083	195	119	195	2,163
		5546	257	157	257	2,854	535	327	535	5,938	579	354	579	6,425	616	376	616	6,835
		Total	**570**	**349**	**570**	**6,331**	**1,170**	**715**	**1,170**	**12,981**	**1,246**	**761**	**1,246**	**13,826**	**1,303**	**796**	**1,303**	**14,461**
Kiwi	554	5541	582	1,268	1,688	18,334	986	1,794	2,479	26,566	1,055	1,643	2,346	24,900	1,192	1,587	2,348	24,688
		5547	220	134	220	2,441	432	264	432	4,794	438	268	438	4,862	433	265	433	4,806
		5548	220	134	220	2,441	432	264	432	4,794	438	268	438	4,862	433	265	433	4,806
		Total	**1,022**	**1,537**	**2,128**	**23,217**	**1,850**	**2,322**	**3,343**	**36,155**	**1,931**	**2,178**	**3,222**	**34,624**	**2,058**	**2,116**	**3,214**	**34,300**
Oyster	555	5551	289	177	289	3,208	343	210	343	3,806	325	199	325	3,609	321	196	321	3,560
		5552	128	79	128	1,426	191	116	191	2,115	409	250	409	4,538	515	315	515	5,721
		5553	142	87	142	1,580	216	132	216	2,392	473	289	473	5,249	611	373	611	6,781
		Total	**560**	**342**	**560**	**6,214**	**749**	**458**	**749**	**8,314**	**1,207**	**738**	**1,207**	**13,396**	**1,447**	**884**	**1,447**	**16,062**
Grand Total Trips			**2,152**	**2,228**	**3,258**	**35,762**	**3,769**	**3,494**	**5,262**	**57,450**	**4,384**	**3,677**	**5,675**	**61,846**	**4,808**	**3,797**	**5,964**	**64,823**
Total External Trips (Excludes Internal Trips and with Pass-by discounts)																		
Fulton Hogan	554	5542	54	33	54	597	104	64	104	1,156	104	64	104	1,156	102	62	102	1,128
		5543	82	50	82	908	163	100	163	1,811	169	103	169	1,875	171	105	171	1,903
		5544	77	47	77	856	153	94	153	1,702	158	97	158	1,756	160	98	160	1,776
		5545	82	50	82	908	163	100	163	1,811	169	103	169	1,875	171	105	171	1,903
		5546	242	148	242	2,682	492	301	492	5,463	521	318	521	5,783	542	331	542	6,015
		Total	**536**	**328**	**536**	**5,951**	**1,076**	**658**	**1,076**	**11,942**	**1,121**	**685**	**1,121**	**12,443**	**1,147**	**701**	**1,147**	**12,726**
Kiwi	554	5541	547	1,192	1,587	17,234	908	1,650	2,281	24,441	950	1,479	2,111	22,410	1,049	1,396	2,066	21,726
		5547	207	126	207	2,295	397	243	397	4,411	394	241	394	4,376	381	233	381	4,229
		5548	207	126	207	2,295	397	243	397	4,411	394	241	394	4,376	381	233	381	4,229
		Total	**961**	**1,445**	**2,000**	**21,824**	**1,702**	**2,136**	**3,076**	**33,263**	**1,738**	**1,961**	**2,900**	**31,162**	**1,811**	**1,862**	**2,828**	**30,184**
Oyster	555	5551	272	166	272	3,015	316	193	316	3,502	293	179	293	3,248	282	172	282	3,133
		5552	121	74	121	1,340	175	107	175	1,946	368	225	368	4,084	454	277	454	5,035
		5553	134	82	134	1,485	198	121	198	2,201	426	260	426	4,725	538	329	538	5,967
		Total	**526**	**322**	**526**	**5,841**	**689**	**421**	**689**	**7,649**	**1,086**	**664**	**1,086**	**12,056**	**1,273**	**778**	**1,273**	**14,134**
Grand Total External Trips			**2,023**	**2,094**	**3,063**	**33,616**	**3,468**	**3,215**	**4,841**	**52,854**	**3,946**	**3,310**	**5,107**	**55,661**	**4,231**	**3,341**	**5,248**	**57,044**

2.5.1 Sensitivity Tests

A sensitivity test was undertaken on the vehicle trip generation by removing the future assumptions about mode share and demographic changes (that is, 2018 assumptions for people per household and active/PT mode share were retained in the future years. This implied daily residential vehicle trip rates similar to typical current values of between 5.1 (high density) and 8.1 (low density).

This indicated vehicle trip generation values are shown in Table 2-9.

Table 2-9 Total Daily Vehicle Trips in Drury East with 2018 Mode Share Assumptions

Scenario	2028	2038	2048	2048+
Base	35,800	57,400	61,800	64,800
Sensitivity test with 2018 parameters	36,100	60,800	69,000	76,800
Difference (Sensitivity Test- Base)	300	3,400	7,200	12,000
% Difference	0.8%	5.9%	11.7%	18.5%

An additional sensitivity test was undertaken using the retail trip rates assessed for the Sylvia Park shopping centre, rather than the average of those and the ITE rates. These indicate similar scale of impact as the mode share assumptions tested above.

Table 2-10 Total Daily Vehicle Trips in Drury East with 2018 Mode Share Assumptions

Scenario	2028	2038	2048	2048+
Base	35,800	57,400	61,800	64,800
Sensitivity test with Sylvia Park retail rates	38,400	61,200	67,300	76,800
Difference (Sensitivity Test- Base)	2,600	3,800	5,500	12,000
% Difference	7.3%	6.6%	8.9%	18.5%

Both tests indicate that the assumptions used for mode share, demographic trends and retail trip rates have resulted in significantly lower vehicle trip generation than would be the case with less optimistic assumptions. While the assumptions adopted here are considered plausible and suitable for the land use and transport systems proposed for those area assumed, it reinforces the fact that those assumptions are only valid if all the integrated waking, cycling, PT and land use outcomes are realised.

3 Comparison with Plan Change Models

The total trip generation from the Plan Change models provided by Stantec Ltd were compared for the same two MSM zones as shown in Table 3-1.

Table 3-1 Comparison of Total Trip Generation - DIFF Models vs Stantec Plan Change models

MSM Zone	SGA DIFF Models			Plan Change Models			Difference		
	2028	2038	2048+	2028	2038	2048+	2028	2038	2048+
AM Peak Hour									
554	1,593	3,020	3,361	1,989	3,510	3,800	-20%	-14%	-12%
555	560	749	1,447	374	575	1,299	50%	30%	11%
Total	**2,152**	**3,769**	**4,808**	**2,363**	**4,085**	**5,100**	**-9%**	**-8%**	**-6%**
PM Peak Hour									
554	2,698	4,513	4,517	2,059	3,735	4,088	31%	21%	10%
555	560	749	1,447	441	743	1,379	27%	1%	5%
Total	**3,258**	**5,262**	**5,964**	**2,500**	**4,478**	**5,467**	**30%**	**18%**	**9%**

Key points of note:

- The SGA DIFF models indicate different spatial allocation between the two MSM zones, especially in the morning peak
- The SGA DIFF models have higher trip generation in MSM Zone 555 in all peaks and all years. This is due to a higher total yield and an assumed faster build-out rate
- In the morning peak, the SGA DIFF models include slightly less potential traffic generation than the Plan Change models. The differences are small at full build-out but more pronounced in earlier years
- In the evening peak, the SGA DIFF models indicate significantly higher flows in the early years (2028), but only slightly higher at full build-out
- The differences are sensitive to key assumptions, such as mode share

Because the network detail of the models was so different, flow difference plots between the two models were not useful. Instead, predicted flows were compared at key locations on the network. Note that the differences will not just be due to the different trip generation estimates, but also due to differing assumptions about other projects in the wider network and differences in network and zonal detail.

4 Drury West Review

The same approach used for Drury East was adopted for Drury West, albeit without a specific Plan Change model to compare with.

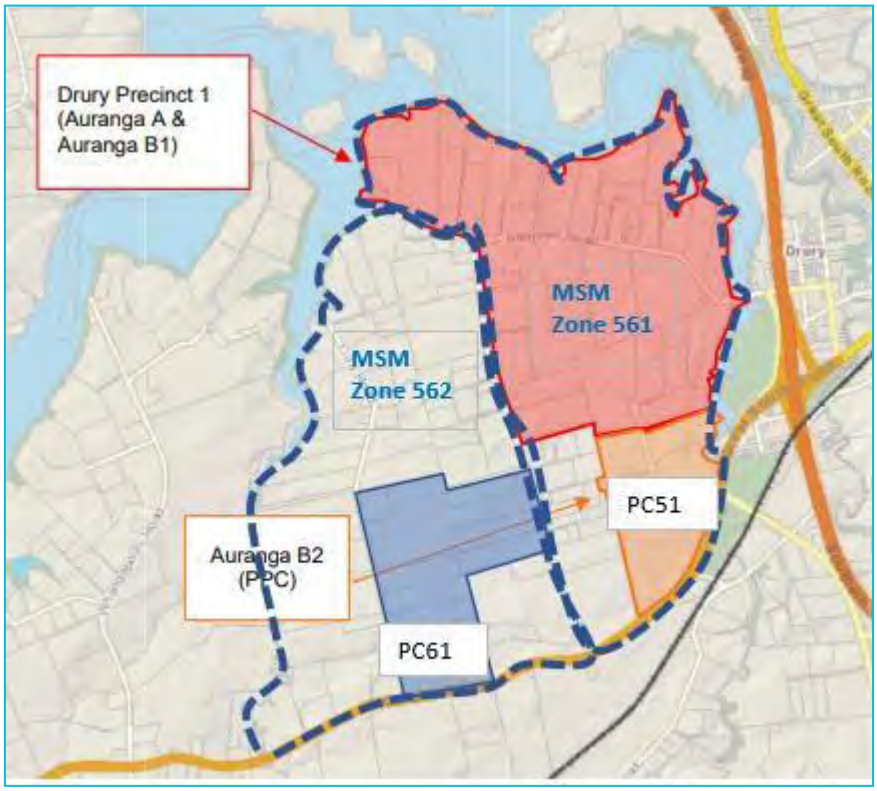
4.1 Spatial Area and Full-Build Yield

The live-zoned Auranga A/B1 area and the two new PPCs fall within two MSM model zones as follows:

The three PPCs fall within two MSM model zones as follows:

- Aurunga A and B1 and PPC 51 (Aurunga B2) fall within MSM zone 561. There is a residual area in zone 561 beside Jesmond Road not included in the plan changes
- PPC61 (Waipupuke) falls within MSM Zone 562, with residual areas north, west and south-east of the PPC

Figure 4-1 MSM Zones and Plan Change Areas



The MSM zone system is indicated in Figure 4-1 and the three PPCs in Figure 2. The PPC Modelling Report and associated ITAs indicate the following yields:

Table 4-1 Yields Indicated for Drury West Plan Change Areas

PPC	Dwellings	Centre GFA, m2	Source
Auranga A/B1	2,650	Local only	ITA for PC51
Auranga B2	890	7,000	ITA for PC51
Waipupuke	1,400-2,800	Local only	ITA and PC documents for PPC61

Figure 4-2 MSM Spatial (Zone) System

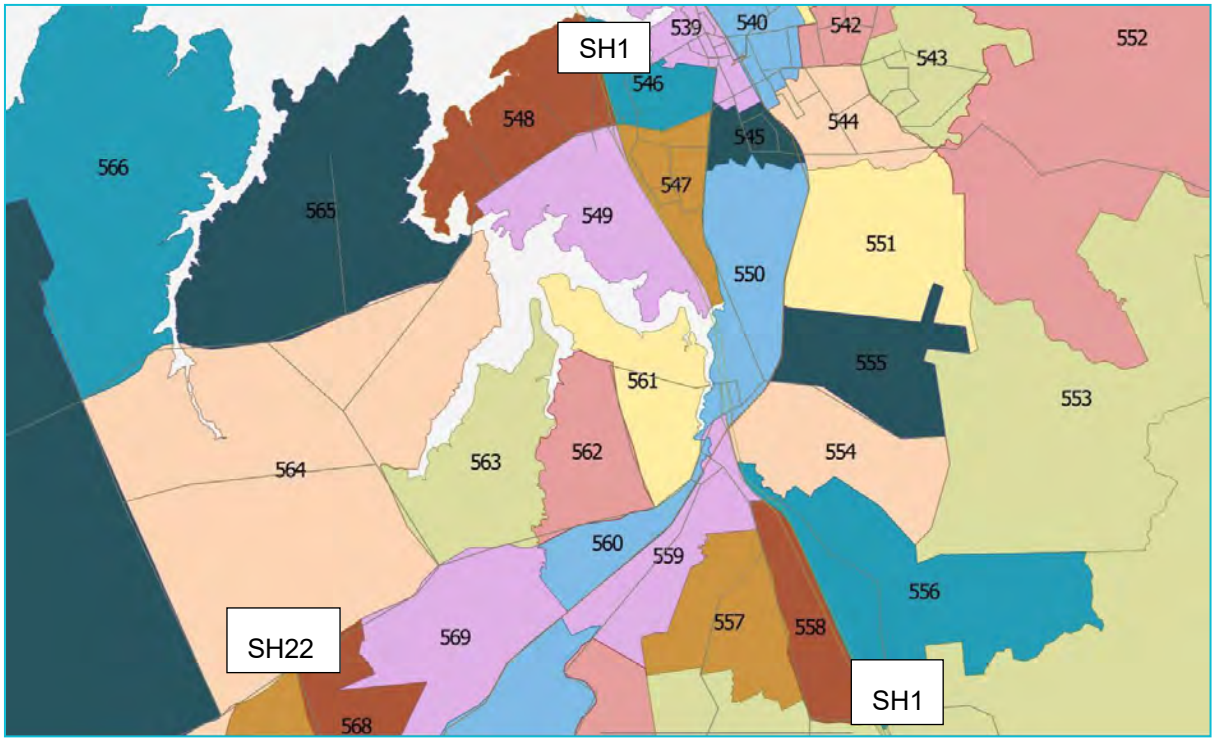


Figure 4-3 Aurunga B2 Plan Changes (Source: PC Documents)



Figure 4-4 Waipupuke Plan Changes (Source: PC Documents)



The trip generation review has been undertaken for the complete area comprising MSM Zones 561 and 562. This therefore requires an estimate of the yield outside the plan change areas.

For Zone 562, the following data and assumptions were used:

- The PPC 61 ITA indicates 1,400 dwellings, although the Economics report indicates a range up to 2,800
- It also indicates that the Waipupuke plan change comprises some 56 ha, comprising 21ha of MHU residential zoning and 35ha of THAB
- The residual 175 ha of FUZ in that MSM zone area was suggested to have some 85ha of MHSU, 64ha of MHU and 24ha of THAB
- Net developable area was assumed at 50% of the gross area, and density rates (dwellings/net ha) were assumed to be 16, 33 and 56 for MHSU, MHU and THAB respectively. These were compared with rates used in the Structure Plan, which included rates of 28, 33 and 56 dwellings per ha
- These density rates provided a range of 1330-1416 dwellings for the plan change area, matching the 1,400 used in the ITA
- Using the same two sets of density rates for the residual area gives between 2,200 and 2,900 dwellings, from which an assumption of 2,600 was adopted
- The combined total for the MSM zone therefore had a range between 3,600 and 4,200, from which an estimate of 4,000 was adopted for this assessment
- This is close to the total Structure Plan estimate of 3,990 dwellings

For Zone 561, the following data and assumptions were used:

- 168ha for Aurunga A/B1 and 33.6ha for Aurunga B2
- Some 2,650 dwellings for Aurunga A and B1 and 890 dwellings and a 7,000m2 Centre proposed for Aurunga B2 based on the plan change ITA
- Approximately 80ha for the residual FUZ area adjacent to Jesmond Road
- Similar zoning type and area indicated in the Structure Plan for the residual area as in Aurunga B2

- Hence similar assumptions were used for the residual FUZ area, giving a range between 1000-2200 dwellings and approximately a 5,000m2 centre
- This gives a total for MSM 561 of between 4,540 and 5,700 dwellings, which is significantly higher than the estimate of 3,820 in the Structure Plan. As such, the lower level of 4540 dwellings was adopted for this assessment, along with a combined total of a 12,000m2 Centre

4.2 Approach to Estimation of Trip Generation

The trip generation for Drury West (MSM Zones 561 and 562) was estimated using the same method as used for Drury East. The planned Centre in Drury West is smaller in scale than that proposed in Drury East, however for this assessment that area was assumed to be predominantly retail development.

The MSM zones are sub-divided in the SATURN model, as shown in Figure 4-5. Because detailed plan changes have not been completed for this area, the sub-zones were sub-divided based on likely loading points to the network, rather than on specific spatial areas with fixed boundaries. Hence the map shows the centroid location and assumed loading point, rather than zone boundaries.

The assumed build-out rate is shown in Table 4-2. Mode share assumptions were based on proximity to the stations, as indicated in Table 4-3.

Note: It was noted that the SATURN model has transposed the loading of zones 561 and 562.The yield and traffic generation remains correct for each zone, however the numbering is transposed. The following figure and tables show the SATURN zone numbers as they should be to avoid confusion, however they are transposed in the actual model.

Figure 4-5 Drury West SATURN Model Zones



Table 4-2 Drury West Build-Out Assumptions

PC/Activity	MSM Zone	Saturn Zone	2028	2038	2048	2048+
RESIDENTIAL UNITS						
THAB	562	5621	800	1,400	1,400	1,400
THAB/Med	562	5622	400	600	1,000	1,100
Med/Low	562	5623	100	200	400	834
Med/Low	562	5624	50	100	200	333
Med/Low	562	5625	50	100	200	333
SUM	**562**		**1,400**	**2,400**	**3,200**	**4,000**
FUZ, Residential	561	5611	10	100	500	1,000
Aurunga B2	561	5612	100	400	600	890
Aurunga B1	561	5613	500	1,350	1,350	1,350
Aurunga A	561	5614	1,000	1,300	1,300	1,300
SUM	**561**		**1,610**	**3,150**	**3,750**	**4,540**
TOTAL	561/562		**3,010**	**5,550**	**6,950**	**8,540**
BUSINESS (GFA, m2)						
FUZ, Residential	561	5611	-	1,500	3,000	5,000
Aurunga B2	561	5612	3,500	5,000	6,000	7,000
SUM	**561**		**3,500**	**6,500**	**9,000**	**12,000**

Table 4-3 Drury West Mode Share Assumptions

PC/Activity	MSM Zone	Saturn Zone	2028	2038	2048	2048+
THAB	562	5621	23%	29%	34%	40%
THAB/Med	562	5622	18%	22%	26%	30%
Med/Low	562	5623	18%	22%	26%	30%
Med/Low	562	5624	13%	16%	18%	20%
Med/Low	562	5625	13%	17%	21%	25%
FUZ, Residential	561	5611	23%	29%	34%	40%
Aurunga B2	561	5612	8%	14%	19%	25%
Aurunga B1	561	5613	13%	17%	21%	25%
Aurunga A	561	5614	18%	21%	23%	25%

4.3 Combined Trip Generation

The total vehicle trip generation for the Drury West area (MSM zones 561 and 562) was therefore estimated as follows:

Table 4-4 Drury West Target Trip Generation (Total Trips and Total External Trips)

Plan Change Area	MSM Zone	S3M Zone	2028				2038				2048				2048+			
			AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily	AM Trips	IP Trips	PM Trips	Daily
Total Trips (Includes Internal Trips and with Pass-by discounts)																		
	562	5621	358	219	358	3,972	565	345	565	6,269	506	309	506	5,613	449	274	449	4,984
		5622	256	157	256	2,846	357	218	357	3,957	549	335	549	6,092	556	340	556	6,168
		5623	64	39	64	712	119	73	119	1,319	220	134	220	2,437	421	257	421	4,676
		5624	38	23	38	418	72	44	72	794	136	83	136	1,505	214	131	214	2,371
		5625	34	21	34	377	63	39	63	702	117	72	117	1,301	180	110	180	2,001
		Total	**750**	**458**	**750**	**8,326**	**1,175**	**718**	**1,175**	**13,041**	**1,527**	**933**	**1,527**	**16,948**	**1,820**	**1,112**	**1,820**	**20,200**
	561	5611	4	3	4	50	49	54	77	851	195	155	236	2,622	339	256	395	4,388
		5612	82	125	169	1,880	225	216	316	3,511	294	252	377	4,189	383	302	461	5,120
		5613	340	208	340	3,775	854	522	854	9,474	791	483	791	8,780	731	447	731	8,110
		5614	710	434	710	7,882	875	535	875	9,709	828	506	828	9,186	782	478	782	8,678
		Total	**1,137**	**770**	**1,224**	**13,587**	**2,003**	**1,326**	**2,121**	**23,545**	**2,107**	**1,396**	**2,232**	**24,778**	**2,235**	**1,482**	**2,369**	**26,296**
Grand Total Trips			**1,887**	**1,228**	**1,974**	**21,913**	**3,178**	**2,044**	**3,296**	**36,586**	**3,634**	**2,329**	**3,759**	**41,726**	**4,055**	**2,594**	**4,189**	**46,496**
Total External Trips (Excludes Internal Trips and with Pass-by discounts)																		
	562	5621	337	201	336	3,688	521	312	519	5,718	465	279	463	5,105	407	246	407	4,489
		5622	241	144	241	2,643	329	197	328	3,609	504	303	503	5,541	504	304	503	5,555
		5623	60	36	60	661	110	66	109	1,203	202	121	201	2,216	382	231	382	4,211
		5624	35	21	35	388	66	40	66	724	125	75	124	1,369	194	117	194	2,135
		5625	32	19	32	350	58	35	58	640	108	65	107	1,183	163	99	163	1,802
		Total	**706**	**421**	**705**	**7,730**	**1,084**	**650**	**1,081**	**11,894**	**1,403**	**843**	**1,399**	**15,414**	**1,650**	**996**	**1,649**	**18,192**
	561	5611	4	3	4	46	46	49	70	775	179	140	216	2,383	308	229	358	3,950
		5612	78	115	159	1,741	208	195	291	3,198	270	227	346	3,807	347	270	418	4,609
		5613	320	191	319	3,505	788	472	785	8,641	727	436	725	7,985	663	400	662	7,304
		5614	669	399	667	7,318	807	484	804	8,856	761	457	758	8,355	709	428	708	7,815
		Total	**1,071**	**707**	**1,150**	**12,610**	**1,849**	**1,200**	**1,951**	**21,470**	**1,937**	**1,260**	**2,045**	**22,530**	**2,027**	**1,327**	**2,146**	**23,678**
Grand Total External Trips			**1,777**	**1,128**	**1,854**	**20,341**	**2,933**	**1,849**	**3,031**	**33,364**	**3,340**	**2,103**	**3,444**	**37,944**	**3,677**	**2,324**	**3,795**	**41,870**

Appendix D PT/Active Travel Mode Share

Daily MSM Mode Split

MSM Zone	2028			2038			2048			2048+		
	Car	PT	Active	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	79%	13%	8%	74%	16%	10%	70%	18%	11%	70%	19%	12%
554	83%	10%	7%	76%	16%	8%	71%	18%	11%	71%	18%	10%
556	90%	5%	5%	92%	5%	3%	91%	6%	3%	91%	6%	3%
561	84%	7%	9%	82%	9%	10%	79%	10%	11%	78%	10%	11%
562	86%	9%	5%	79%	11%	10%	75%	13%	12%	75%	13%	13%
East	81%	11%	8%	75%	16%	9%	71%	18%	11%	71%	18%	11%
West	84%	8%	8%	81%	9%	10%	77%	11%	12%	76%	12%	12%
South	90%	5%	5%	92%	5%	3%	91%	6%	3%	91%	6%	3%
All	86%	7%	7%	83%	10%	7%	79%	12%	9%	78%	13%	9%

MSM Mode Split using car and public transport trips to factor the daily active mode trips

2028 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	73%	19%	8%	81%	10%	8%	74%	18%	8%
554	78%	15%	7%	84%	8%	7%	79%	14%	7%
556	87%	8%	5%	92%	3%	5%	88%	7%	5%
561	80%	11%	9%	85%	6%	9%	81%	10%	9%
562	81%	13%	5%	87%	7%	5%	83%	12%	5%
East	76%	17%	8%	83%	9%	8%	77%	15%	8%
West	80%	12%	8%	86%	6%	8%	82%	10%	8%
South	87%	8%	5%	92%	3%	5%	88%	7%	5%
All	82%	11%	7%	88%	6%	7%	83%	10%	7%

2038 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	68%	22%	10%	75%	15%	10%	69%	21%	10%
554	70%	21%	8%	77%	14%	8%	71%	21%	8%
556	90%	7%	3%	93%	4%	3%	90%	7%	3%
561	78%	12%	10%	83%	7%	10%	79%	11%	10%
562	75%	15%	10%	81%	9%	10%	76%	14%	10%
East	70%	21%	9%	77%	14%	9%	70%	21%	9%
West	77%	13%	10%	82%	8%	10%	78%	12%	10%
South	90%	7%	3%	93%	4%	3%	90%	7%	3%
All	78%	14%	8%	84%	9%	7%	79%	13%	7%

2048 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	63%	22%	10%	72%	17%	11%	64%	25%	11%
554	64%	25%	11%	73%	16%	11%	65%	24%	11%
556	88%	8%	3%	92%	5%	3%	89%	8%	3%
561	74%	15%	11%	80%	8%	11%	75%	14%	11%
562	70%	18%	12%	77%	11%	12%	71%	17%	12%
East	64%	25%	11%	72%	16%	11%	65%	24%	11%
West	72%	16%	12%	79%	10%	12%	73%	15%	12%
South	88%	8%	3%	92%	5%	3%	89%	8%	3%
All	73%	17%	9%	80%	11%	9%	75%	16%	9%

2048+ Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	63%	22%	10%	71%	17%	12%	63%	25%	12%
554	65%	25%	10%	73%	16%	10%	65%	24%	10%
556	88%	8%	3%	92%	5%	3%	89%	8%	3%
561	73%	15%	11%	80%	9%	11%	74%	14%	11%
562	69%	18%	13%	76%	11%	13%	70%	17%	13%
East	64%	25%	11%	73%	17%	11%	64%	25%	11%
West	71%	17%	12%	78%	10%	12%	72%	16%	12%
South	88%	8%	3%	92%	5%	3%	89%	8%	3%
All	72%	18%	10%	79%	11%	9%	73%	18%	9%

MSM Mode Split using observed cycle counts to factor the daily active mode trips

2028 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	70%	18%	12%	85%	11%	4%	71%	17%	12%
554	75%	14%	11%	88%	9%	4%	76%	13%	11%
556	85%	8%	7%	94%	3%	2%	86%	7%	7%
561	77%	11%	12%	89%	6%	5%	78%	10%	13%
562	79%	13%	8%	90%	8%	3%	80%	12%	8%
East	73%	16%	11%	87%	10%	4%	74%	15%	11%
West	77%	11%	11%	89%	7%	4%	78%	10%	12%
South	85%	8%	7%	94%	3%	2%	86%	7%	7%
All	79%	11%	10%	91%	6%	3%	80%	10%	10%

2038 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	65%	21%	14%	79%	15%	5%	65%	20%	15%
554	67%	20%	12%	81%	15%	4%	68%	20%	12%
556	88%	7%	5%	94%	4%	2%	89%	6%	5%
561	75%	12%	14%	87%	8%	5%	75%	11%	14%
562	72%	14%	14%	85%	10%	5%	72%	13%	15%
East	67%	21%	13%	80%	15%	5%	67%	20%	13%
West	73%	13%	14%	86%	9%	5%	74%	12%	15%
South	88%	7%	5%	94%	4%	2%	89%	6%	5%
All	75%	14%	11%	87%	9%	4%	76%	13%	11%

2048 Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	60%	24%	16%	76%	18%	6%	60%	23%	17%
554	61%	24%	16%	77%	17%	6%	61%	23%	16%
556	86%	8%	5%	93%	5%	2%	87%	8%	5%
561	70%	14%	16%	85%	9%	6%	71%	13%	17%
562	66%	17%	17%	82%	12%	7%	66%	16%	18%
East	61%	24%	16%	77%	17%	6%	61%	23%	16%
West	68%	16%	17%	84%	10%	6%	68%	14%	17%
South	86%	8%	5%	93%	5%	2%	87%	8%	5%
All	70%	17%	13%	84%	11%	5%	71%	16%	13%

2048+ Model

MSM Zone	AM			IP			PM		
	Car	PT	Active	Car	PT	Active	Car	PT	Active
555	59%	24%	17%	76%	18%	6%	59%	24%	17%
554	61%	24%	15%	77%	17%	5%	62%	23%	15%
556	87%	8%	5%	93%	5%	1%	87%	8%	5%
561	69%	15%	16%	85%	9%	6%	70%	13%	17%
562	65%	17%	18%	81%	12%	7%	65%	16%	19%
East	61%	24%	16%	77%	18%	6%	61%	23%	16%
West	67%	16%	17%	83%	10%	6%	67%	15%	18%
South	87%	8%	5%	93%	5%	1%	87%	8%	5%
All	69%	18%	14%	83%	12%	5%	69%	17%	14%

Appendix E GSR/Waihoehoe Road Intersection Modelling

Colour Code:

Passing Scenario

Failing Scenario

Test 1 - Prior to Drury Interchange and SH1 Widening - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Roundabout - AM - PT Offset 10% - Background 1% - Drury (80%)	LOS F	97	6	61	250	17	10	55	387	32
Roundabout - PM - PT Offset 10% - Background 1% - Drury (80%)	LOS C	26	20	10	8	72	91	4	19	63
Roundabout - AM - PT Offset 10% - Background 1% - Drury (70%)	LOS F	172	6	46	501	23	10	45	643	51
Roundabout - PM - PT Offset 10% - Background 1% - Drury (70%)	LOS E	56	43	12	10	159	157	5	24	167

Test 2 - Prior to Drury Central Rail Station - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Roundabout - AM - PT Offset 10% - Background 0% - Drury (30%)	LOS F	123	7	12	466	16	8	8	434	43
Roundabout - PM - PT Offset 10% - Background 0% - Drury (30%)	LOS F	89	13	9	209	151	36	9	238	239
Roundabout - AM - PT Offset 10% - Background 0% - Drury (20%)	LOS F	215	7	12	839	23	9	9	644	69
Roundabout - PM - PT Offset 10% - Background 0% - Drury (20%)	LOS F	130	15	9	275	241	40	9	315	374

Test 3 - Drury Central Rail Station - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Roundabout - AM - FY28pc58y - Drury (20%)	LOS F	105	6	13	362	17	9	9	383	40
Roundabout - IP - FY28pc58y - Drury (20%)	LOS A	9	7	7	10	11	9	4	8	17
Roundabout - PM - FY28pc58y - Drury (20%)	LOS D	36	8	9	61	81	23	9	67	124
Roundabout - AM - FY28pc58y - Drury (10%)	LOS F	173	6	13	622	23	9	9	556	61
Roundabout - IP - FY28pc58y - Drury (10%)	LOS A	10	7	7	12	12	10	5	11	21
Roundabout - PM - FY28pc58y - Drury (10%)	LOS E	64	8	9	61	177	26	9	70	260

Test 3A - Brookfield Road to Quarry Road Link - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Roundabout - AM - FY28pc62a - Drury (20%)	LOS B	15	6	14	34	15	8	20	35	34
Roundabout - IP - FY28pc62a - Drury (20%)	LOS A	8	6	6	10	12	8	4	5	18
Roundabout - PM - FY28pc62a - Drury (20%)	LOS E	52	6	8	23	140	16	8	18	240
Roundabout - AM - FY28pc62a - Drury (10%)	LOS C	25	6	20	79	19	8	27	69	47
Roundabout - IP - FY28pc62a - Drury (10%)	LOS A	9	6	6	10	13	8	4	6	22
Roundabout - PM - FY28pc62a - Drury (10%)	LOS F	82	6	8	23	226	17	8	19	374

Test 3B - Firth Street Overbridge - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Roundabout - AM - FY28pc68a - Drury (10%)	LOS B	16	7	17	36	15	8	24	38	31
Roundabout - IP - FY28pc68a - Drury (10%)	LOS A	8	6	6	11	11	7	5	5	16
Roundabout - PM - FY28pc68a - Drury (10%)	LOS D	49	7	8	27	133	17	10	21	235
Roundabout - AM - FY28pc68a - Drury 0%	LOS C	29	7	26	93	17	8	35	87	42
Roundabout - IP - FY28pc68a - Drury 0%	LOS A	9	6	7	12	12	8	5	6	20
Roundabout - PM - FY28pc68a - Drury 0%	LOS F	72	7	8	29	200	18	11	24	341

Test 4 - Waihoehoe Road ATAP Scheme - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Signals - AM - FY28pc78 - Drury 18%	LOS E	62	48	73	69	62	72	137	75	189
Signals - IP - FY28pc78 - Drury 18%	LOS C	35	34	27	40	36	49	22	29	80
Signals - PM - FY28pc78 - Drury 18%	LOS E	79	97	47	73	76	311	57	76	244
Signals - AM - FY28pc78 - Drury 20%	LOS E	65	48	73	72	68	72	137	79	210
Signals - IP - FY28pc78 - Drury 20%	LOS C	35	34	27	40	37	49	22	29	83
Signals - PM - FY28pc78 - Drury 20%	LOS F	81	97	47	77	81	311	57	79	261

Test 5 - Mill Road South - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Signals - AM - FY33pc98 - Drury 0%	LOS D	51	44	43	60	55	74	85	107	126
Signals - IP - FY33pc98 - Drury 0%	LOS C	34	35	28	39	35	60	29	21	73
Signals - PM - FY33pc98 - Drury 0%	LOS F	91	108	84	42	91	391	101	46	238
Signals - AM - FY33pc98 - Drury 10%	LOS E	56	47	54	61	60	83	102	107	151
Signals - IP - FY33pc98 - Drury 10%	LOS D	36	35	29	41	39	62	30	24	91
Signals - PM - FY33pc98 - Drury 10%	LOS F	100	125	83	49	99	433	99	47	278

Test 6 - Full Mill Road - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Signals - AM - FY38pc11 - Drury 0%	LOS D	41	40	41	41	43	67	157	30	48
Signals - IP - FY38pc11 - Drury 0%	LOS C	30	33	25	31	31	53	31	19	50
Signals - PM - FY38pc11 - Drury 0%	LOS D	42	52	26	40	44	114	53	24	179
Signals - AM - FY38pc11 - Drury 10%	LOS D	44	43	43	44	45	72	166	32	57
Signals - IP - FY38pc11 - Drury 10%	LOS C	31	35	26	32	31	57	32	21	58
Signals - PM - FY38pc11 - Drury 10%	LOS D	51	61	26	44	58	127	55	29	263

Test 7 - Full Mill Road and N-S Arterial - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Signals - AM - FY38pc11 - Drury 10%	LOS D	38	44	37	37	33	72	98	39	30
Signals - IP - FY38pc11 - Drury 10%	LOS C	28	33	23	30	27	50	29	21	50
Signals - PM - FY38pc11 - Drury 10%	LOS D	44	55	27	43	46	122	50	32	184
Signals - AM - FY38pc11 - Drury 20%	LOS D	38	44	37	39	34	73	99	43	35
Signals - IP - FY38pc11 - Drury 20%	LOS C	28	33	24	30	28	50	31	23	57
Signals - PM - FY38pc11 - Drury 20%	LOS D	53	60	27	45	62	131	53	37	261

Test 8 - Year 2048 - Scenarios	LOS	Delay					Worst Queue			
		All	North	West	South	East	North	West	South	East
Signals - AM - FY48pc13 - Drury 10%	LOS E	64	40	76	74	47	71	235	165	59
Signals - IP - FY48pc13 - Drury 10%	LOS C	29	31	25	28	30	45	38	16	45
Signals - PM - FY48pc13 - Drury 10%	LOS E	56	63	38	43	65	153	75	42	221
Signals - AM - FY48pc13 - Drury 20%	LOS E	73	40	99	80	47	71	295	185	63
Signals - IP - FY48pc13 - Drury 20%	LOS C	30	31	26	28	32	43	41	17	50
Signals - PM - FY48pc13 - Drury 20%	LOS E	66	71	38	44	82	170	80	45	287

Test	Infrastructure										Trip Threshold (before fail point)	Landuse Equivalent			
	Wider Waihoehoe/ GSR Roundabout	One-way SH1 to TC	Train Station	Brookfield	Firth Street	W/GSR Signals	Mill Rd South	Full Mill Road	N-S Arterial	Pukekohe Express		Residential	Retail	Commercial	Community
1 - Prior to Drury Interchange and SH1 Widening	Y										406	710	-	-	-
2 - Prior to Drury Central Rail Station	Y										2,300	1,500	28,000	7,400	900
3 - Drury Central Rail Station	Y	Y	Y								2,500	1,800	32,000	8,700	1,100
3A - Brookfield Road to Quarry Road Link	Y	Y	Y	Y							2,500	1,800	32,000	8,700	1,100
3B - Firth Street Overbridge	Y	Y	Y		Y						2,800	2,000	36,000	9,700	1,300
4 - Waihoehoe Road ATAP Scheme		Y	Y			Y					3,800	3,300	56,000	17,900	2,000
5 - Mill Road South		Y	Y			Y	Y				4,300	3,800	64,000	21,000	2,400
6 - Full Mill Road		Y	Y			Y	Y	Y			5,100	4,900	82,000	29,400	3,100
7 - Full Mill Road and N-S Arterial		Y	Y			Y	Y	Y	Y		5,600	5,800	97,000	47,600	10,700
8 - 2048 Year		Y	Y			Y	Y	Y	Y	Y	6,000	6,400	107,650	60,000	16,000

Test	Network Performance (at fail point)				
	Intersection Delay / Queue	Norrie Road	Waihoehoe Road	Great South Road North	Great South Road South
1 - Prior to Drury Interchange and SH1 Widening	AM Intersection LOS: (F) Intersection Delay: (172s) Worst Approach: South: (643m over 450m) PM Intersection LOS: (E) Intersection Delay: (56s)	-	-	-	-
2 - Prior to Drury Central Rail Station	AM Intersection LOS: (F) Intersection Delay: (215s) Worst Approach: South: (644m over 450m) PM Intersection LOS: (F) Intersection Delay: (130s) Worst Approach: East: (374m over 250m)	-	-	-	-
3 - Drury Central Rail Station	AM Intersection LOS: (F) Intersection Delay: (173s) Worst Approach: South: (556m over 450m) IP Intersection LOS: (A) Intersection Delay: (10s) PM Intersection LOS: (E) Intersection Delay: (64s) Worst Approach: East: (260m over 250m)	10,300	19,900	25,600	11,400
3A - Brookfield Road to Quarry Road Link	AM Intersection LOS: (C) Intersection Delay: (25s) IP Intersection LOS: (A) Intersection Delay: (9s) PM Intersection LOS: (F) Intersection Delay: (82s) Worst Approach: East: (374m over 250m)	10,700	17,800	25,600	7,900
3B - Firth Street Overbridge	AM Intersection LOS: (C) Intersection Delay: (29s) IP Intersection LOS: (A) Intersection Delay: (9s) PM Intersection LOS: (F) Intersection Delay: (72s) Worst Approach: East: (341m over 250m)	11,600	18,500	26,300	7,000
4 - Waihoehoe Road ATAP Scheme	AM Intersection LOS: (E) Intersection Delay: (65s) IP Intersection LOS: (C) Intersection Delay: (35s) PM Intersection LOS: (F) Intersection Delay: (81s) Worst Approach: East: (261m over 250m)	11,000	26,300	28,000	15,000
5 - Mill Road South	AM Intersection LOS: (E) Intersection Delay: (56s) IP Intersection LOS: (D) Intersection Delay: (36s) PM Intersection LOS: (F) Intersection Delay: (100s) Worst Approach: East: (278m over 250m)	12,300	25,400	30,600	15,400
6 - Full Mill Road	AM Intersection LOS: (D) Intersection Delay: (44s) IP Intersection LOS: (C) Intersection Delay: (31s) PM Intersection LOS: (D) Intersection Delay: (51s) Worst Approach: East: (263m over 250m)	16,800	21,100	20,100	13,100
7 - Full Mill Road and N-S Arterial	AM Intersection LOS: (D) Intersection Delay: (38s) IP Intersection LOS: (C) Intersection Delay: (28s) PM Intersection LOS: (D) Intersection Delay: (53s) Worst Approach: East: (261m over 250m)	17,200	22,000	18,700	14,000
8 - 2048 Year	AM Intersection LOS: (E) Intersection Delay: (73s) IP Intersection LOS: (C) Intersection Delay: (30s) PM Intersection LOS: (E) Intersection Delay: (66s) Worst Approach: East: (287m over 250m)	19,100	22,500	23,300	16,800

Appendix F SIDRA Results

Appendix F Scenario (SIDRA Results)	Year	Pc (SATURN Scenario)
65	2025	52a
65a	2025	58a
65b	2025	68a
66	2026	52a
66a	2026	58a
66b	2026	68a
62	2028	52y
62a	2028	58y
62b	2028	68a
62c	2028	72
62d	2028	78
62e	2028	84
62f	2028	88
63	2030	78
63a	2030	84
63b	2030	88
63c	2030	98
63d	2030	104
63e	2030	108
64	2033	78
64a	2033	84
64b	2033	88
64c	2033	98
64d	2033	104
64e	2033	108
67	2038	118
67a	2038	119
67b	2038	98
68	2048	138
68a	2048	139
68b	2048	138b
68c	2048	139b

SIDRA Results AM

Year	pc(SATURN)	Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	52a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario65 : AM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.8	6.8	0.0	0.0	0.4	2.3
		Scenario65 : AM 2025 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	17.2	0.0	39.5	39.2	46.3	0.0	79.2	41.3
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	58a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario65a : AM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.6	0.0	5.6	6.6	0.0	0.0	0.4	2.3
		Scenario65a : AM 2025 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	16.5	0.0	40.6	39.1	46.2	0.0	79.0	41.1
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	68a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	0.0	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	0.0	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	0.0	14.3	108.6	6.3	16.6
		Scenario65b : AM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.6	0.0	5.6	0.0	0.0	0.0	0.4	2.3
		Scenario65b : AM 2025 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	17.2	0.0	39.5	40.5	47.0	0.0	76.8	43.4
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	52a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66 : AM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.9	6.9	0.0	0.0	0.5	2.6
		Scenario66 : AM 2026 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	17.2	0.0	40.8	39.1	46.4	0.0	85.9	45.2
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	58a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66a : AM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.6	0.0	5.7	6.8	0.0	0.0	0.4	2.7
		Scenario66a : AM 2026 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	18.1	0.0	39.6	39.7	49.0	0.0	85.8	47.1
			AM					LOS				Worst Delay				Worst Queue			
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	68a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66b : AM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.6	0.0	5.7	6.8	0.0	0.0	0.5	2.6
		Scenario66b : AM 2026 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	17.3	0.0	40.8	39.0	47.9	0.0	86.6	44.9
			AM					LOS				Worst Delay				Worst Queue			
		Scenario62 : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		25.9	32.5	14.4	0.0	9.3	6.9	42.7	0.0
		Scenario62 : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS B	LOS B	LOS A	LOS C	LOS A	12.1	7.8	26.5	13.1	3.1	10.3	67.2	8.6
		Scenario62 : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS D	LOS E	LOS D	LOS B	LOS D	60.7	49.1	50.1	62.6	37.8	126.5	76.7	59.6
2028	52y	Scenario62 : AM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS A	LOS B	LOS F	LOS C	8.8	15.6	1005.2	31.4	9.5	9.8	698.5	90.5
		Scenario62 : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	23.8	21.5	0.0	6.6	2.3	43.5	0.0
		Scenario62 : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS C	63.4	56.3	53.4	53.4	9.8	149.8	4.3	152.6
		Scenario62 : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.5	0.0	23.6	29.9	7.4	0.0	43.5	2.4
		Scenario62 : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	40.1	38.6	37.2	44.1	27.5	66.7	6.3	11.3
		Scenario62 : AM 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	6.5	7.4	0.0	0.0	0.6	2.8
		Scenario62 : AM 2028 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	17.3	0.0	38.9	41.8	48.5	0.0	83.1	43.1
			AM					LOS				Worst Delay				Worst Queue			
		Scenario62a : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		23.6	27.9	21.5	0.0	11.9	27.1	40.4	0.0
		Scenario62a : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS B	LOS A	LOS A	LOS B	LOS A	10.2	7.9	20.1	10.8	2.3	5.7	46.5	6.8
		Scenario62a : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	46.4	39.0	37.1	40.1	28.1	53.1	55.5	38.5
2028	58y	Scenario62a : AM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS A	LOS B	LOS F	LOS D	8.2	15.1	952.9	43.7	8.3	9.7	713.6	108.1
		Scenario62a : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	7.7	1.8	34.7	0.0
		Scenario62a : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	57.1	46.5	46.5	8.5	68.7	3.7	155.7
		Scenario62a : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	22.6	0.0	23.6	33.5	9.3	0.0	32.8	2.4
		Scenario62a : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	37.3	43.7	37.2	44.1	35.2	67.8	6.3	15.8
		Scenario62a : AM 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.6	0.0	6.2	7.3	0.0	0.0	0.4	3.1
		Scenario62a : AM 2028 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	18.2	0.0	39.9	42.3	51.7	0.0	97.1	52.1

			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario62b : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	33.9	23.4	0.0	17.7	47.2	49.3	0.0
		Scenario62b : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.0	7.9	13.9	11.2	2.2	6.1	24.1	6.7
		Scenario62b : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	43.5	41.1	37.1	43.3	24.9	62.0	38.6	38.8
2028	68a	Scenario62b : AM 2028 - GSR / Waihoehoe - Roundabout	LOS C	LOS A	LOS C	LOS F	LOS B	8.7	30.7	97.1	18.0	8.0	34.9	87.1	41.5
		Scenario62b : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS C		21.3	21.5	24.0	0.0	11.1	7.2	42.7	0.0
		Scenario62b : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.7	41.9	41.9	7.6	76.8	3.3	124.4
		Scenario62b : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.5	0.0	23.6	29.9	12.8	0.0	35.8	2.3
		Scenario62b : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.2	34.9	38.9	44.1	10.1	50.8	17.5	8.6
		Scenario62b : AM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	8.6	8.1	4.2	0.0	3.2	3.2
		Scenario62b : AM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.6	0.0	24.4	29.8	28.4	0.0	63.0	14.6
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario62c : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	29.9	14.1	0.0	5.9	7.1	28.9	0.0
		Scenario62c : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS B	LOS A	11.6	7.8	14.9	12.0	2.7	10.2	30.4	7.1
		Scenario62c : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	51.8	43.5	42.8	48.3	27.5	89.2	49.8	42.0
2028	72	Scenario62c : AM 2028 - GSR / Waihoehoe - Roundabout	LOS E	LOS A	LOS C	LOS F	LOS B	10.1	28.9	234.9	14.9	9.9	29.7	288.6	31.6
		Scenario62c : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.5	24.2	0.0	3.3	2.3	28.5	0.0
		Scenario62c : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	60.4	53.7	51.1	51.1	9.4	155.7	4.1	110.2
		Scenario62c : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	23.9	0.0	21.3	27.4	3.9	0.0	28.5	2.1
		Scenario62c : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	40.8	34.4	39.4	47.7	13.7	114.7	6.7	14.6
		Scenario62c : AM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.3	0.0	9.6	8.0	5.9	0.0	3.9	4.7
		Scenario62c : AM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.5	0.0	26.9	29.7	27.0	0.0	63.1	20.0
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario62d : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		25.9	30.9	22.4	0.0	15.7	47.3	41.8	0.0
		Scenario62d : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	10.1	7.8	16.2	10.7	1.9	5.3	34.4	6.3
		Scenario62d : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.9	37.1	37.1	39.4	22.3	48.9	50.5	36.9
2028	78	Scenario62d : AM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	49.1	53.3	51.7	45.7	44.7	105.5	49.0	107.0
		Scenario62d : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.5	24.0	0.0	9.3	2.2	32.4	0.0
		Scenario62d : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	48.6	46.5	46.5	8.5	70.0	3.7	136.4
		Scenario62d : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	23.7	0.0	23.6	29.9	11.6	0.0	32.9	2.2
		Scenario62d : AM 2028 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	41.2	35.7	39.4	47.5	15.8	67.8	6.7	12.8
		Scenario62d : AM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	9.2	8.0	4.2	0.0	3.5	4.2
		Scenario62d : AM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.6	0.0	24.4	31.5	26.7	0.0	58.4	19.2
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario62e : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	29.9	15.2	0.0	14.8	14.1	34.8	0.0
		Scenario62e : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.4	7.8	11.9	10.0	1.8	4.1	16.2	5.9
		Scenario62e : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	37.0	44.4	32.7	33.4	19.2	36.0	28.2	31.2
2028	84	Scenario62e : AM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	49.2	44.6	49.9	43.2	49.0	89.9	51.4	84.3
		Scenario62e : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.5	24.0	0.0	10.7	2.1	36.8	0.0
		Scenario62e : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	43.6	41.9	41.9	7.6	62.1	3.3	99.8
		Scenario62e : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	22.4	0.0	23.6	33.5	12.9	0.0	34.3	2.4
		Scenario62e : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	34.7	36.5	36.2	40.1	8.7	42.9	22.0	5.9
		Scenario62e : AM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.0	8.0	4.7	0.0	3.3	3.9
		Scenario62e : AM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.9	0.0	25.6	30.7	26.5	0.0	61.4	17.3
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario62f : AM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	27.9	26.5	0.0	16.4	41.3	50.6	0.0
		Scenario62f : AM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.9	13.0	10.8	2.0	5.6	20.5	6.5
		Scenario62f : AM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.9	38.6	37.1	39.8	22.3	52.3	34.6	37.7
2028	88	Scenario62f : AM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	45.1	48.7	48.0	46.4	45.0	96.9	54.9	94.0
		Scenario62f : AM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS C		21.3	21.5	24.0	0.0	9.9	2.2	38.5	0.0
		Scenario62f : AM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	43.6	41.9	41.9	7.6	68.0	3.3	110.6
		Scenario62f : AM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.5	0.0	23.6	29.9	11.4	0.0	33.4	2.3
		Scenario62f : AM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	37.1	35.1	38.5	42.2	9.7	49.6	22.7	8.4
		Scenario62f : AM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	9.0	8.0	4.3	0.0	3.6	3.6
		Scenario62f : AM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.6	0.0	24.4	30.4	29.2	0.0	59.8	16.6
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63 : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	32.6	24.7	0.0	17.3	55.3	42.2	0.0
		Scenario63 : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	10.4	7.8	19.1	11.0	2.2	6.0	43.6	6.8
		Scenario63 : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	43.7	40.8	37.1	40.3	25.1	56.6	56.8	38.8
2030	78	Scenario63 : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS D	LOS D	LOS D	59.3	51.0	48.0	49.4	51.5	96.3	69.8	101.3
		Scenario63 : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.7	24.2	0.0	9.5	2.9	29.7	0.0
		Scenario63 : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	57.5	51.7	48.8	48.8	8.9	79.1	3.9	144.8
		Scenario63 : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	11.1	0.0	29.8	2.6
		Scenario63 : AM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	42.1	36.8	40.5	49.9	19.5	74.7	6.9	18.2
		Scenario63 : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.3	0.0	9.6	8.1	5.1	0.0	4.1	5.3
		Scenario63 : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.9	0.0	25.7	31.1	29.0	0.0	69.8	23.1
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63a : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	29.9	14.1	0.0	17.8	12.9	28.5	0.0
		Scenario63a : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.6	7.8	11.7	10.5	2.1	5.1	13.8	6.8
		Scenario63a : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	43.5	36.0	37.1	38.2	24.8	41.1	27.8	39.4
2030	84	Scenario63a : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	53.7	48.1	49.6	47.1	55.4	94.3	80.0	82.8
		Scenario63a : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.6	24.0	0.0	13.0	2.4	28.3	0.0
		Scenario63a : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	46.7	41.5	39.6	39.6	7.2	84.3	3.1	103.5
		Scenario63a : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	23.9	0.0	21.3	27.4	15.3	0.0	28.3	2.2
		Scenario63a : AM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	35.1	42.9	38.3	40.4	11.9	53.8	46.7	6.8
		Scenario63a : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	9.2	8.1	5.3	0.0	3.8	4.3
		Scenario63a : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.1	0.0	26.8	32.1	27.5	0.0	66.6	20.3
			LOS					Worst Delay				Worst Queue			
			Intersectio	North	West	South	East								
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63b : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	34.7	24.1	0.0	18.0	53.5	45.9	0.0
		Scenario63b : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.0	7.9	13.3	11.1	2.3	6.2	19.9	7.3
		Scenario63b : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	43.7	41.8	37.1	42.3	25.1	58.4	33.2	42.6
2030	88	Scenario63b : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS D	LOS D	LOS D	57.4	53.3	50.4	47.9	56.0	106.6	73.3	95.8
		Scenario63b : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.7	24.3	0.0	10.5	2.7	34.3	0.0
		Scenario63b : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.0	41.9	41.9	7.6	80.0	3.3	109.5
		Scenario63b : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	22.6	0.0	23.6	33.5	12.6	0.0	32.5	2.4
		Scenario63b : AM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.4	37.3	41.7	44.3	12.5	55.2	39.0	8.9
		Scenario63b : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.3	0.0	9.3	8.1	5.0	0.0	4.1	4.3
		Scenario63b : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.8	0.0	25.6	31.6	28.8	0.0	64.9	19.4

			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63c : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	17.3	0.0	7.0	14.1	30.3	0.0
		Scenario63c : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.7	7.8	15.7	10.2	2.0	4.2	34.1	5.4
		Scenario63c : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	38.6	41.9	32.7	34.3	21.6	38.6	51.6	27.8
2030	98	Scenario63c : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	48.7	55.6	54.3	47.8	55.6	124.9	64.1	112.0
		Scenario63c : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.6	24.0	0.0	3.8	2.7	27.5	0.0
		Scenario63c : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	49.1	46.5	46.5	8.5	57.1	3.7	134.3
		Scenario63c : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	4.4	0.0	27.5	2.6
		Scenario63c : AM 2030 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	42.1	36.7	39.4	47.6	23.3	71.7	6.7	15.3
		Scenario63c : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	8.0	8.0	3.9	0.0	3.5	1.8
		Scenario63c : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.4	0.0	24.4	28.9	28.8	0.0	63.7	11.6
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63d : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	33.5	16.0	0.0	8.0	7.6	32.9	0.0
		Scenario63d : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.0	7.7	12.2	9.5	1.8	2.7	18.2	5.1
		Scenario63d : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	34.1	33.6	29.8	33.4	19.2	17.8	29.8	27.4
2030	104	Scenario63d : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	51.6	53.3	53.8	48.7	51.0	117.0	69.5	98.4
		Scenario63d : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.6	24.0	0.0	4.6	2.5	31.6	0.0
		Scenario63d : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.0	41.9	41.9	7.6	46.2	3.3	108.3
		Scenario63d : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.3	0.0	23.6	29.9	5.3	0.0	28.8	2.4
		Scenario63d : AM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.7	35.6	39.9	44.4	14.3	54.1	25.9	7.2
		Scenario63d : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	8.1	8.0	3.9	0.0	3.4	1.8
		Scenario63d : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.5	0.0	24.4	29.0	29.6	0.0	68.9	11.7
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario63e : AM 2030 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	33.5	15.8	0.0	8.2	11.3	32.1	0.0
		Scenario63e : AM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.5	7.9	12.5	10.4	2.0	4.6	19.3	5.7
		Scenario63e : AM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	40.2	36.1	35.8	38.0	23.5	41.6	34.3	33.2
2030	108	Scenario63e : AM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS D	49.1	57.9	53.7	53.7	51.2	120.2	78.8	105.3
		Scenario63e : AM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.6	24.0	0.0	4.8	2.6	30.1	0.0
		Scenario63e : AM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.0	41.9	41.9	7.6	59.2	3.3	105.3
		Scenario63e : AM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	5.6	0.0	30.1	2.4
		Scenario63e : AM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.9	35.5	40.0	44.3	15.3	56.8	26.5	10.2
		Scenario63e : AM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.3	0.0	8.2	8.0	4.1	0.0	3.6	1.9
		Scenario63e : AM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.5	0.0	24.5	28.9	30.7	0.0	65.7	11.2
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario64 : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	34.7	27.5	0.0	20.5	64.3	42.3	0.0
		Scenario64 : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	10.8	7.9	19.1	11.4	2.7	7.5	46.0	6.2
		Scenario64 : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	47.6	47.8	37.4	39.9	29.2	72.9	57.8	32.6
2033	78	Scenario64 : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS E	LOS E	LOS D	70.3	70.4	58.6	61.4	66.7	124.6	118.6	123.3
		Scenario64 : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.9	24.3	0.0	10.4	7.5	26.7	0.0
		Scenario64 : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	57.5	53.1	48.8	48.8	8.9	94.3	3.9	143.1
		Scenario64 : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.5	0.0	23.6	29.9	12.0	0.0	36.6	3.3
		Scenario64 : AM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	38.2	48.8	42.7	51.3	49.6	89.0	7.3	15.9
		Scenario64 : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.4	0.0	9.9	8.3	6.4	0.0	4.8	6.6
		Scenario64 : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	25.5	0.0	27.4	29.8	29.8	0.0	58.1	25.2
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario64a : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	17.4	0.0	19.8	8.7	30.5	0.0
		Scenario64a : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	11.5	10.8	2.4	5.7	13.9	6.4
		Scenario64a : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.4	40.1	35.8	39.1	26.1	50.6	28.6	36.0
2033	84	Scenario64a : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS E	LOS E	LOS E	60.8	65.9	57.9	67.6	69.2	125.9	132.9	109.4
		Scenario64a : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.7	24.0	0.0	13.8	3.1	27.6	0.0
		Scenario64a : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.7	41.9	41.9	7.6	99.9	3.3	92.2
		Scenario64a : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	16.2	0.0	27.6	2.7
		Scenario64a : AM 2033 - Firth / GSR - Signalised	LOS D	LOS C	LOS D	LOS D	LOS C	38.6	39.0	47.1	45.7	13.7	92.7	65.0	11.0
		Scenario64a : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.4	0.0	9.3	8.4	7.7	0.0	4.1	5.1
		Scenario64a : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.6	0.0	28.9	30.2	29.7	0.0	60.8	21.2
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario64b : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS C		25.9	29.6	26.8	0.0	21.1	49.8	45.8	0.0
		Scenario64b : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.3	8.0	12.6	11.6	2.7	7.6	17.3	7.1
		Scenario64b : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	47.1	51.9	37.4	43.3	28.8	78.5	29.7	38.8
2033	88	Scenario64b : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS C	LOS E	LOS E	LOS E	58.2	73.4	63.8	68.2	67.1	140.2	142.3	110.4
		Scenario64b : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.8	25.5	0.0	11.6	3.4	28.1	0.0
		Scenario64b : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS D	LOS D	LOS C	52.0	47.4	44.2	44.2	8.0	103.1	3.5	88.7
		Scenario64b : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	13.6	0.0	28.1	2.7
		Scenario64b : AM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS D	LOS C	41.1	43.3	45.7	47.5	17.4	70.1	63.1	11.5
		Scenario64b : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.4	0.0	9.3	8.3	6.2	0.0	4.2	5.1
		Scenario64b : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.2	0.0	27.1	29.9	30.8	0.0	56.1	20.3
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario64c : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		21.3	27.4	22.2	0.0	8.8	26.6	31.9	0.0
		Scenario64c : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.9	7.9	15.2	10.6	2.3	5.2	31.0	5.5
		Scenario64c : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.6	35.5	36.0	39.3	26.4	44.6	47.0	31.1
2033	98	Scenario64c : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS E	LOS E	LOS D	57.9	67.1	59.5	62.0	63.1	129.3	99.9	125.8
		Scenario64c : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.8	24.0	0.0	4.1	3.7	24.0	0.0
		Scenario64c : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	52.0	47.4	44.2	44.2	8.0	66.6	3.5	135.8
		Scenario64c : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	4.8	0.0	24.0	2.4
		Scenario64c : AM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	40.8	37.5	39.4	47.6	30.5	74.2	6.7	17.3
		Scenario64c : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.4	0.0	8.1	8.1	4.7	0.0	3.7	2.1
		Scenario64c : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.7	0.0	24.5	28.9	30.1	0.0	66.3	11.6
			LOS				Worst Delay				Worst Queue			
			Intersectio	North	West	South	East							
		Extracted Site name	n	Approach	Approach	Approach	Approach	North	West	South	East	North	West	South	East
		Scenario64d : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	17.3	0.0	10.1	16.2	30.2	0.0
		Scenario64d : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.1	7.7	11.8	9.8	2.0	3.3	16.6	5.0
		Scenario64d : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	35.6	46.7	29.8	32.3	21.7	30.1	28.2	24.6
2033	104	Scenario64d : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS D	LOS D	LOS E	51.7	63.0	60.3	60.4	58.8	124.1	98.9	110.2
		Scenario64d : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.8	24.0	0.0	5.9	3.3	27.3	0.0
		Scenario64d : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.7	41.9	41.9	7.6	55.9	3.3	101.4
		Scenario64d : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	7.0	0.0	27.3	2.4
		Scenario64d : AM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	37.7	34.8	38.8	42.8	15.3	67.3	25.2	7.4
		Scenario64d : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.4	0.0	8.1	8.2	5.1	0.0	3.8	2.1
		Scenario64d : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.8	0.0	24.6	28.9	32.0	0.0	75.7	11.2

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64e : AM 2033 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		23.6	27.9	18.2	0.0	10.4	22.1	30.9	0.0
		Scenario64e : AM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	8.0	12.4	10.8	2.4	5.7	18.7	5.7
		Scenario64e : AM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.5	37.9	36.3	39.5	26.4	50.8	32.4	31.6
2033	108	Scenario64e : AM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS C	LOS E	LOS E	LOS E	53.3	67.1	60.1	64.0	56.9	138.5	102.9	113.3
		Scenario64e : AM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.8	24.1	0.0	5.3	3.4	25.4	0.0
		Scenario64e : AM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	44.7	41.9	41.9	7.6	72.9	3.3	99.5
		Scenario64e : AM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	6.3	0.0	25.4	2.3
		Scenario64e : AM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	39.3	36.9	39.6	45.0	19.3	68.5	22.7	13.3
		Scenario64e : AM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.5	0.0	8.1	8.1	5.0	0.0	3.9	2.1
		Scenario64e : AM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.7	0.0	25.6	28.8	31.2	0.0	64.9	11.2
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67 : AM 2038 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	23.9	19.5	0.0	9.0	32.1	18.5	0.0
		Scenario67 : AM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.1	8.2	9.5	10.6	2.2	5.0	14.3	3.9
		Scenario67 : AM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS D	LOS B	LOS C	34.5	58.8	32.7	33.3	18.8	58.5	20.5	17.8
2038	118	Scenario67 : AM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS D	LOS D	LOS D	LOS D	43.4	50.9	45.2	59.7	67.0	156.7	30.1	48.3
		Scenario67 : AM 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.8	26.3	0.0	2.1	5.0	9.8	0.0
		Scenario67 : AM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	46.7	39.6	39.6	39.6	7.2	84.9	3.1	62.6
		Scenario67 : AM 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	2.8	0.0	10.2	2.0
		Scenario67 : AM 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	45.3	38.2	39.4	46.4	42.0	72.0	6.7	16.4
		Scenario67 : AM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	8.2	7.6	5.9	0.0	1.8	2.1
		Scenario67 : AM 2038 - SH22/GSR - Full Signals	LOS B	LOS C		LOS B	LOS C	30.4	0.0	21.3	28.8	18.3	0.0	51.2	11.6
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67a : AM 2038 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	23.9	19.4	0.0	9.1	22.8	18.5	0.0
		Scenario67a : AM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.0	9.5	9.7	11.1	3.1	7.1	16.9	3.3
		Scenario67a : AM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	36.3	44.8	32.7	33.4	24.9	46.4	35.6	12.5
2038	119	Scenario67a : AM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS D	LOS C	LOS C	LOS C	49.3	44.1	37.6	53.4	62.9	86.1	32.9	27.3
		Scenario67a : AM 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.8	26.3	0.0	2.6	5.0	9.5	0.0
		Scenario67a : AM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	46.5	46.5	8.5	133.0	3.7	54.7
		Scenario67a : AM 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	2.8	0.0	13.5	2.0
		Scenario67a : AM 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	45.0	39.0	37.2	44.1	41.5	66.0	6.3	17.9
		Scenario67a : AM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	8.2	7.6	5.4	0.0	1.8	2.1
		Scenario67a : AM 2038 - SH22/GSR - Full Signals	LOS B	LOS C		LOS B	LOS C	30.4	0.0	21.0	28.9	19.0	0.0	55.3	12.2
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67b : AM 2038 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		21.3	24.0	22.7	0.0	15.4	34.1	22.9	0.0
		Scenario67b : AM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.6	7.9	13.2	11.4	2.7	7.8	23.1	6.1
		Scenario67b : AM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	45.3	48.9	37.3	39.7	27.0	74.4	38.2	31.8
2038	98	Scenario67b : AM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS D	LOS D	LOS E	LOS E	116.6	53.4	77.3	92.8	93.6	101.2	187.9	159.7
		Scenario67b : AM 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	20.3	25.9	0.0	3.6	8.4	14.6	0.0
		Scenario67b : AM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	41.9	41.9	41.9	7.6	118.2	3.3	107.7
		Scenario67b : AM 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	4.5	0.0	14.4	2.7
		Scenario67b : AM 2038 - Firth / GSR - Signalised	LOS D	LOS D	LOS D	LOS D	LOS C	45.5	48.3	51.5	59.7	76.0	163.9	8.9	32.9
		Scenario67b : AM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	4.4	0.0	8.9	8.3	10.0	0.0	8.5	3.8
		Scenario67b : AM 2038 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	31.4	0.0	27.4	34.2	33.6	0.0	83.5	27.7
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68 : AM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		25.9	25.2	27.3	0.0	21.3	53.9	32.1	0.0
		Scenario68 : AM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.7	8.0	10.5	11.4	1.4	6.1	16.8	8.8
		Scenario68 : AM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	46.7	45.5	45.3	51.9	14.4	68.7	32.7	56.3
2048	138	Scenario68 : AM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS D	LOS F	LOS E	LOS E	48.1	82.6	68.0	93.5	85.6	309.5	160.1	51.4
		Scenario68 : AM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	22.9	25.1	0.0	5.2	9.6	16.1	0.0
		Scenario68 : AM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	41.9	41.9	41.9	7.6	99.6	3.3	80.6
		Scenario68 : AM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	6.6	0.0	17.5	2.0
		Scenario68 : AM 2048 - Firth / GSR - Signalised	LOS E	LOS E	LOS E	LOS D	LOS C	80.2	73.3	54.8	64.1	96.7	295.1	9.5	34.0
		Scenario68 : AM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	4.1	0.0	7.9	8.7	10.9	0.0	12.2	1.6
		Scenario68 : AM 2048 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	32.7	0.0	32.6	34.7	37.6	0.0	67.4	42.0
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68a : AM 2048 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		23.6	21.3	22.2	0.0	10.6	37.7	26.7	0.0
		Scenario68a : AM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	10.5	12.2	15.4	12.6	4.2	16.8	29.0	10.8
		Scenario68a : AM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS C	LOS D	44.3	46.6	37.3	44.4	30.5	45.9	59.9	34.0
2048	139	Scenario68a : AM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS F	LOS D	LOS F	LOS F	LOS D	55.1	135.9	109.2	92.4	85.1	370.1	185.0	47.8
		Scenario68a : AM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.8	26.7	0.0	3.2	4.9	8.3	0.0
		Scenario68a : AM 2048 - P&R / Waihoehoe - Signalised	LOS E	LOS F	LOS F	LOS E	LOS B	98.3	88.3	67.3	64.1	14.0	447.2	5.4	51.1
		Scenario68a : AM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.4	0.0	21.3	30.7	3.2	0.0	14.8	2.2
		Scenario68a : AM 2048 - Firth / GSR - Signalised	LOS E	LOS D	LOS F	LOS D	LOS B	58.2	104.2	54.8	67.6	31.7	427.5	9.5	19.5
		Scenario68a : AM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	4.2	0.0	7.7	8.7	10.6	0.0	8.3	1.4
		Scenario68a : AM 2048 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	29.8	0.0	31.2	33.2	39.0	0.0	50.9	29.4
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68b : AM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		25.9	28.7	27.6	0.0	19.6	58.0	37.3	0.0
		Scenario68b : AM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.3	8.0	12.5	11.7	1.7	7.0	23.9	10.2
		Scenario68b : AM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	54.8	45.2	50.6	46.3	19.7	74.9	44.5	62.7
2048	138b	Scenario68b : AM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS E	LOS F	LOS E	LOS E	113.1	118.5	74.2	86.2	130.7	223.1	184.1	101.6
		Scenario68b : AM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	22.7	25.1	0.0	5.7	8.7	19.4	0.0
		Scenario68b : AM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	52.0	44.2	44.2	44.2	8.0	118.4	3.5	96.5
		Scenario68b : AM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	7.2	0.0	21.7	2.1
		Scenario68b : AM 2048 - Firth / GSR - Signalised	LOS D	LOS D	LOS D	LOS C	LOS C	44.2	47.3	49.4	57.0	67.2	154.0	8.5	18.8
		Scenario68b : AM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	4.2	0.0	7.8	8.7	10.4	0.0	11.3	1.5
		Scenario68b : AM 2048 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	30.4	0.0	33.4	32.0	36.1	0.0	58.0	35.6
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection Approach	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68c : AM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		23.6	27.8	21.8	0.0	11.7	46.2	27.1	0.0
		Scenario68c : AM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS B	LOS A	LOS A	LOS B	LOS A	10.3	12.6	21.4	13.3	4.1	16.6	46.7	12.6
		Scenario68c : AM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS C	LOS D	48.1	51.3	39.8	44.5	30.4	45.9	67.9	33.8
2048	139b	Scenario68c : AM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS D	LOS E	LOS E	LOS D	45.4	76.8	68.6	73.8	70.0	229.7	144.6	55.2
		Scenario68c : AM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.8	26.9	0.0	4.4	8.0	15.5	0.0
		Scenario68c : AM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS E	LOS B	74.6	67.4	67.3	67.3	11.8	233.8	5.4	58.8
		Scenario68c : AM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	23.9	0.0	21.3	27.4	4.2	0.0	27.5	2.0
		Scenario68c : AM 2048 - Firth / GSR - Signalised	LOS D	LOS E	LOS E	LOS D	LOS B	60.6	71.3	54.8	68.1	58.0	340.7	9.5	19.9
		Scenario68c : AM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	4.3	0.0	7.7	8.7	11.0	0.0	8.5	1.4
		Scenario68c : AM 2048 - SH22/GSR - Full Signals	LOS B	LOS C		LOS B	LOS C	31.7	0.0	30.1	33.6	38.0	0.0	49.3	27.0

SIDRA Results PM

Year pc(SATURN)

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	52a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario65 : PM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.8	6.8	0.0	0.0	0.3	4.1
		Scenario65 : PM 2025 - SH22/GSR - Interim Signals	LOS C	LOS C		LOS B	LOS D	24.8	0.0	54.3	55.6	184.6	0.0	36.2	60.1

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	58a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario65a : PM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.7	6.7	0.0	0.0	0.3	4.0
		Scenario65a : PM 2025 - SH22/GSR - Interim Signals	LOS C	LOS C		LOS B	LOS D	23.2	0.0	60.7	53.9	180.2	0.0	36.3	58.2

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2025	68a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario65b : PM 2025 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.7	6.7	0.0	0.0	0.3	3.4
		Scenario65b : PM 2025 - SH22/GSR - Interim Signals	LOS C	LOS C		LOS B	LOS D	26.4	0.0	51.0	54.3	191.2	0.0	31.2	51.5

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	52a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66 : PM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.9	7.8	0.0	0.0	0.3	8.5
		Scenario66 : PM 2026 - SH22/GSR - Interim Signals	LOS D	LOS D		LOS B	LOS E	58.4	0.0	68.4	81.9	305.2	0.0	41.8	100.2

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	58a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66a : PM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.9	7.8	0.0	0.0	0.3	9.0
		Scenario66a : PM 2026 - SH22/GSR - Interim Signals	LOS D	LOS D		LOS B	LOS E	58.0	0.0	65.7	76.2	297.5	0.0	42.8	100.0

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario65 : AM 2025 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	27.4	18.2	0.0	13.8	2.9	22.7	0.0
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	7.8	9.1	10.3	1.0	6.2	9.0	3.7
		Scenario65 : AM 2025 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	45.9	38.5	36.3	10.1	75.2	16.2	19.9
2026	68a	Scenario65 : AM 2025 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	9.8	11.2	12.8	10.1	9.6	6.6	17.2	8.5
		Scenario65 : AM 2025 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.0	0.0	9.9	1.8	18.9	0.0
		Scenario65 : AM 2025 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	45.0	41.9	40.5	7.6	94.5	3.3	54.4
		Scenario65 : AM 2025 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.4	0.0	21.3	27.4	12.7	0.0	21.0	2.0
		Scenario65 : AM 2025 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS B	38.8	36.3	37.2	44.1	14.3	108.6	6.3	16.6
		Scenario66b : PM 2026 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.8	7.0	0.0	0.0	0.3	4.5
		Scenario66b : PM 2026 - SH22/GSR - Interim Signals	LOS C	LOS C		LOS B	LOS D	36.5	0.0	53.1	66.7	235.3	0.0	32.5	64.4

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62 : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		31.7	26.0	23.2	0.0	29.8	74.9	7.1	0.0
		Scenario62 : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS B	15.5	8.0	9.0	14.1	3.1	19.7	16.8	3.4
		Scenario62 : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS E	LOS F	LOS F	LOS B	LOS D	102.5	99.1	67.3	59.6	33.1	313.5	44.8	16.7
2028	52y	Scenario62 : PM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS B	LOS B	LOS F	LOS F	16.3	12.7	371.8	274.9	34.9	9.6	416.9	363.4
		Scenario62 : PM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		21.3	22.0	24.7	0.0	12.0	12.1	5.0	0.0
		Scenario62 : PM 2028 - P&R / Waihoehoe - Signalised	LOS D	LOS F	LOS E	LOS E	LOS B	98.3	67.3	76.8	67.3	14.0	396.2	31.7	75.7
		Scenario62 : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.7	0.0	21.3	30.7	12.6	0.0	14.0	2.2
		Scenario62 : PM 2028 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS B	44.5	39.3	40.5	48.7	32.7	138.1	6.9	30.1
		Scenario62 : PM 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS C	4.7	0.0	6.2	16.6	0.0	0.0	0.3	56.3
		Scenario62 : PM 2028 - SH22/GSR - Interim Signals	LOS F	LOS F		LOS C	LOS F	146.5	0.0	77.3	224.6	487.0	0.0	64.4	316.4

		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62a : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS D	LOS D	LOS D	LOS B		40.7	39.1	31.2	0.0	46.1	165.5	9.4	0.0
		Scenario62a : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	11.5	7.9	9.0	11.2	1.9	10.9	15.4	2.3
		Scenario62a : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS D	54.5	28.1	50.2	52.1	19.3	73.2	34.0	12.4
2028	58y	Scenario62a : PM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS A	LOS A	LOS E	LOS F	11.9	12.1	69.6	325.3	28.2	8.9	79.7	402.1
		Scenario62a : PM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		21.3	22.1	24.7	0.0	13.5	11.9	4.5	0.0
		Scenario62a : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	57.5	48.8	52.5	48.8	8.9	158.3	26.7	73.4
		Scenario62a : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	14.6	0.0	12.7	2.2
		Scenario62a : PM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	39.7	33.2	36.1	41.8	28.2	73.9	6.0	27.5
		Scenario62a : PM 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS C	4.7	0.0	6.1	22.4	0.0	0.0	0.2	78.5
		Scenario62a : PM 2028 - SH22/GSR - Interim Signals	LOS F	LOS F		LOS C	LOS F	154.9	0.0	95.4	236.7	488.0	0.0	68.5	352.9

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario62b : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS C		25.9	28.6	26.5	0.0	23.9	62.0	30.7	0.0
		Scenario62b : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.9	8.1	10.0	11.9	2.0	10.1	15.1	5.0
		Scenario62b : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	57.4	40.7	50.2	44.8	22.8	100.6	30.9	27.6
2028	68a	Scenario62b : PM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS A	LOS A	LOS C	LOS F	8.8	10.9	31.9	242.8	17.6	10.6	24.2	341.8
		Scenario62b : PM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.9	24.4	0.0	12.4	2.4	17.3	0.0
		Scenario62b : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	47.7	46.5	8.5	122.1	29.6	70.4
		Scenario62b : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	15.7	0.0	18.9	2.0
		Scenario62b : PM 2028 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	38.5	40.1	39.7	41.8	21.9	50.1	45.0	28.8
		Scenario62b : PM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	9.7	8.9	4.6	0.0	2.7	7.2
		Scenario62b : PM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS D	17.9	0.0	37.0	40.9	84.7	0.0	23.6	23.7

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario62c : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		21.3	26.4	18.2	0.0	19.4	38.9	11.0	0.0
		Scenario62c : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS B	LOS B	LOS A	LOS B	LOS A	15.0	7.9	19.3	14.7	2.8	17.9	73.8	5.8
		Scenario62c : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS D	LOS F	LOS E	LOS B	LOS E	119.1	76.1	67.3	67.6	37.8	240.4	102.5	33.6
2028	72	Scenario62c : PM 2028 - GSR / Waihoehoe - Roundabout	LOS F	LOS B	LOS A	LOS B	LOS F	16.4	11.3	19.0	517.8	32.2	8.0	23.5	700.2
		Scenario62c : PM 2028 - Fitzgerald / Pitt - Signalised	LOS C	LOS C	LOS C	LOS C		21.6	26.0	33.2	0.0	32.1	76.2	8.4	0.0
		Scenario62c : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS E	LOS B	74.6	67.3	72.1	67.3	11.8	278.3	38.6	141.7
		Scenario62c : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS C	LOS D	17.1	0.0	32.7	44.8	51.5	0.0	106.6	3.3
		Scenario62c : PM 2028 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS C	46.2	43.3	40.5	49.9	38.5	75.8	6.9	49.3
		Scenario62c : PM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	10.8	8.8	5.3	0.0	3.0	11.9
		Scenario62c : PM 2028 - SH22/GSR - Full Signals	LOS C	LOS B		LOS B	LOS D	19.6	0.0	38.9	39.7	93.4	0.0	26.0	31.5

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario62d : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		31.9	31.6	25.2	0.0	31.7	98.1	12.5	0.0
		Scenario62d : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	11.9	7.9	13.8	11.7	1.8	10.3	46.8	3.8
		Scenario62d : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	55.1	46.0	50.0	44.8	20.1	113.7	71.3	20.8
2028	78	Scenario62d : PM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS D	73.5	67.1	75.9	68.8	209.7	38.3	49.6	138.4
		Scenario62d : PM 2028 - Fitzgerald / Pitt - Signalised	LOS D	LOS C	LOS B	LOS F		21.4	20.4	434.5	0.0	20.7	59.2	40.4	0.0
		Scenario62d : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	46.5	48.4	46.5	8.5	142.2	25.7	151.1
		Scenario62d : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS D	18.0	0.0	30.4	41.9	17.8	0.0	73.4	3.1
		Scenario62d : PM 2028 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS C	44.9	42.8	40.5	48.7	34.5	69.3	6.9	53.6
		Scenario62d : PM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	11.4	8.9	4.3	0.0	3.0	14.3
		Scenario62d : PM 2028 - SH22/GSR - Full Signals	LOS C	LOS B		LOS B	LOS C	20.1	0.0	36.5	37.3	85.1	0.0	28.2	32.8

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario62e : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		21.3	31.3	20.8	0.0	22.9	41.4	24.4	0.0
		Scenario62e : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.8	7.8	9.6	10.9	1.8	9.0	11.9	4.1
		Scenario62e : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	48.5	36.7	44.2	41.1	19.1	76.3	26.1	23.2
2028	84	Scenario62e : PM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS D	59.8	63.9	77.0	59.3	169.2	48.6	44.2	126.3
		Scenario62e : PM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.4	0.0	14.9	1.8	17.0	0.0
		Scenario62e : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	48.3	46.5	8.5	134.1	25.7	65.0
		Scenario62e : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	19.2	0.0	18.6	2.0
		Scenario62e : PM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS B	LOS C	32.1	40.7	35.7	40.3	15.2	25.3	40.0	25.8
		Scenario62e : PM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	9.8	8.9	4.8	0.0	2.3	7.4
		Scenario62e : PM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS D	18.1	0.0	36.9	41.5	90.3	0.0	23.5	24.3

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario62f : PM 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS C		26.5	27.4	26.2	0.0	30.7	59.5	30.2	0.0
		Scenario62f : PM 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	11.2	8.1	9.8	11.8	2.0	10.6	13.4	4.9
		Scenario62f : PM 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	56.7	47.6	50.2	44.7	22.2	118.8	27.9	26.4
2028	88	Scenario62f : PM 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS D	LOS D	LOS D	49.5	62.5	65.4	56.0	141.0	73.8	45.6	112.3
		Scenario62f : PM 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	22.5	24.4	0.0	14.1	3.6	17.1	0.0
		Scenario62f : PM 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	48.3	46.5	8.5	127.9	25.7	65.4
		Scenario62f : PM 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	18.1	0.0	18.7	2.0
		Scenario62f : PM 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS C	36.1	41.0	38.0	46.2	20.4	37.8	46.1	31.5
		Scenario62f : PM 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.7	8.9	4.6	0.0	2.5	7.2
		Scenario62f : PM 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS D	17.9	0.0	37.3	40.7	89.4	0.0	22.9	23.6

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63 : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS B		40.2	32.2	30.1	0.0	35.3	127.6	16.0	0.0
		Scenario63 : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	12.0	7.9	14.2	11.6	1.9	10.9	49.3	3.8
		Scenario63 : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	55.8	50.9	50.0	44.8	20.9	124.7	72.5	20.5
2030	78	Scenario63 : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS E	LOS C	LOS E	LOS E	106.4	67.1	93.6	90.5	253.0	43.8	53.3	188.1
		Scenario63 : PM 2030 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS C	LOS C		19.0	25.6	33.5	0.0	17.3	72.7	7.8	0.0
		Scenario63 : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	60.4	51.1	52.2	51.1	9.4	151.8	33.2	135.2
		Scenario63 : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS D	18.0	0.0	30.4	41.9	21.6	0.0	80.2	3.1
		Scenario63 : PM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS C	37.6	40.0	33.9	44.0	28.5	54.3	5.7	51.0
		Scenario63 : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	12.7	9.2	4.6	0.0	3.8	20.0
		Scenario63 : PM 2030 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	21.2	0.0	37.4	39.0	86.2	0.0	28.8	39.8

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63a : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		21.3	32.8	23.1	0.0	24.8	43.4	28.3	0.0
		Scenario63a : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	11.1	7.8	9.7	11.2	2.0	9.8	12.7	4.4
		Scenario63a : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	49.3	40.9	44.2	41.2	20.3	87.9	28.0	23.8
2030	84	Scenario63a : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS E	77.0	67.1	76.5	71.5	207.2	44.4	61.1	143.5
		Scenario63a : PM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.5	0.0	15.7	1.8	18.6	0.0
		Scenario63a : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	57.5	48.8	50.8	48.8	8.9	153.8	26.6	68.6
		Scenario63a : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	20.5	0.0	20.8	2.0
		Scenario63a : PM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	35.6	46.2	39.2	40.3	17.0	33.9	54.0	31.6
		Scenario63a : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	10.0	9.1	5.2	0.0	2.9	8.5
		Scenario63a : PM 2030 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	21.5	0.0	38.4	37.8	108.1	0.0	25.3	24.5

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63b : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS C		28.7	31.4	29.8	0.0	33.7	68.7	35.2	0.0
		Scenario63b : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	11.7	8.1	10.0	12.3	2.3	12.0	15.2	5.3
		Scenario63b : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS D	LOS E	LOS D	LOS B	LOS D	61.9	47.6	54.4	49.5	26.0	136.5	34.5	30.2
2030	88	Scenario63b : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS D	57.2	67.1	71.3	65.6	175.3	46.4	65.0	136.5
		Scenario63b : PM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	22.6	24.5	0.0	14.7	3.9	18.6	0.0
		Scenario63b : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	57.5	48.8	50.8	48.8	8.9	149.4	26.6	71.6
		Scenario63b : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	19.0	0.0	20.7	2.0
		Scenario63b : PM 2030 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS C	38.4	46.3	40.7	48.5	21.4	42.9	57.1	33.3
		Scenario63b : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	10.0	8.9	4.8	0.0	2.7	8.4
		Scenario63b : PM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	19.3	0.0	38.5	37.2	98.5	0.0	24.1	23.6

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63c : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		29.8	23.4	26.4	0.0	22.9	70.2	15.8	0.0
		Scenario63c : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS A	11.7	7.8	15.8	11.2	1.8	9.4	58.4	3.5
		Scenario63c : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	48.3	42.6	44.2	41.4	18.4	91.7	106.0	18.4
2030	98	Scenario63c : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS E	LOS C	LOS E	LOS E	125.3	67.1	122.3	107.0	307.1	39.3	44.6	206.0
		Scenario63c : PM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS C	LOS B	LOS C		24.3	26.0	39.1	0.0	17.0	62.8	9.0	0.0
		Scenario63c : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	57.5	48.8	50.4	48.8	8.9	119.9	28.0	160.1
		Scenario63c : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS D	17.0	0.0	32.7	44.8	20.2	0.0	92.7	3.3
		Scenario63c : PM 2030 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	42.2	39.8	37.2	45.3	34.3	48.1	6.3	63.3
		Scenario63c : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	9.0	8.7	4.1	0.0	2.7	5.7
		Scenario63c : PM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	17.9	0.0	36.2	34.8	94.9	0.0	28.8	22.1
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63d : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		21.3	23.9	20.2	0.0	20.1	27.9	18.0	0.0
		Scenario63d : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.8	7.8	9.4	11.1	1.8	8.9	11.8	3.6
		Scenario63d : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	48.4	38.1	44.2	40.7	18.8	80.3	25.3	19.4
2030	104	Scenario63d : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS E	64.5	63.9	74.2	65.2	193.7	47.7	45.9	136.0
		Scenario63d : PM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.5	0.0	12.2	1.8	11.7	0.0
		Scenario63d : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	48.3	46.5	8.5	124.4	25.1	63.6
		Scenario63d : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	15.0	0.0	12.2	2.2
		Scenario63d : PM 2030 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS B	LOS C	38.0	41.0	42.0	43.7	18.2	42.4	47.7	33.8
		Scenario63d : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	8.8	8.9	4.4	0.0	2.6	4.4
		Scenario63d : PM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	18.6	0.0	38.7	34.5	100.9	0.0	26.3	21.6
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario63e : PM 2030 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		23.6	23.9	21.2	0.0	21.8	41.9	19.7	0.0
		Scenario63e : PM 2030 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	11.3	8.1	9.6	11.8	2.1	10.8	13.7	4.2
		Scenario63e : PM 2030 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	56.4	47.2	50.2	44.2	21.8	117.5	27.7	21.9
2030	108	Scenario63e : PM 2030 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS E	LOS E	65.7	63.9	70.6	71.0	200.3	44.3	51.2	142.7
		Scenario63e : PM 2030 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.5	0.0	12.4	1.8	11.9	0.0
		Scenario63e : PM 2030 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	54.7	46.5	48.3	46.5	8.5	130.9	25.1	64.6
		Scenario63e : PM 2030 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	15.2	0.0	12.6	2.2
		Scenario63e : PM 2030 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS C	39.8	42.1	46.1	48.7	23.7	59.4	49.9	34.0
		Scenario63e : PM 2030 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	8.8	8.9	4.6	0.0	2.7	4.5
		Scenario63e : PM 2030 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	20.2	0.0	38.1	34.5	108.2	0.0	25.3	21.5
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64 : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		48.0	34.1	42.5	0.0	32.4	197.9	17.0	0.0
		Scenario64 : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	12.4	7.9	12.5	11.4	2.2	12.0	42.9	2.9
		Scenario64 : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	57.5	46.2	50.0	44.3	22.8	111.8	72.8	15.4
2033	78	Scenario64 : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS F	LOS C	LOS E	LOS E	156.2	67.1	121.4	111.8	354.7	42.1	69.7	199.8
		Scenario64 : PM 2033 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS C	LOS C		19.3	26.4	32.9	0.0	11.3	73.9	9.2	0.0
		Scenario64 : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	66.7	55.7	56.9	55.7	10.3	180.5	35.6	122.7
		Scenario64 : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS D	18.0	0.0	30.4	41.9	20.1	0.0	78.3	3.1
		Scenario64 : PM 2033 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS C	44.2	44.8	40.5	50.9	31.5	89.5	6.9	58.6
		Scenario64 : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS B	LOS A		LOS B	LOS B	3.1	0.0	15.7	13.1	5.8	0.0	7.3	48.4
		Scenario64 : PM 2033 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS D	26.3	0.0	41.2	42.3	97.4	0.0	34.1	53.9
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64a : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		23.6	27.6	20.9	0.0	30.1	45.9	23.8	0.0
		Scenario64a : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	11.6	7.9	10.4	11.8	2.2	10.8	17.8	4.7
		Scenario64a : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	49.9	53.4	44.2	41.4	21.1	108.6	36.7	24.5
2033	84	Scenario64a : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS E	LOS C	LOS E	LOS E	114.5	67.1	88.1	85.9	292.5	40.1	100.4	149.2
		Scenario64a : PM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.5	24.6	0.0	16.8	2.0	15.0	0.0
		Scenario64a : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	63.4	53.4	55.6	53.4	9.8	165.4	28.5	81.9
		Scenario64a : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.7	0.0	21.3	27.4	22.2	0.0	17.4	2.0
		Scenario64a : PM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	38.0	44.2	45.0	43.7	18.2	50.8	70.3	38.7
		Scenario64a : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	10.7	9.2	5.5	0.0	3.4	11.9
		Scenario64a : PM 2033 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	28.2	0.0	40.8	39.0	126.6	0.0	28.1	30.7
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64b : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		30.4	30.0	25.4	0.0	42.0	79.1	32.6	0.0
		Scenario64b : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	12.5	8.2	11.6	13.1	2.9	14.4	23.0	6.1
		Scenario64b : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS D	LOS E	LOS D	LOS B	LOS D	71.1	52.8	62.9	60.7	32.1	159.9	50.9	38.2
2033	88	Scenario64b : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS D	LOS C	LOS D	LOS E	78.5	67.1	74.0	78.9	237.5	39.8	84.5	144.3
		Scenario64b : PM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	22.8	24.9	0.0	15.3	6.5	15.3	0.0
		Scenario64b : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	66.7	55.7	58.0	55.7	10.3	172.8	30.2	83.8
		Scenario64b : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	17.9	0.0	20.5	2.0
		Scenario64b : PM 2033 - Firth / GSR - Signalised	LOS D	LOS D	LOS E	LOS D	LOS D	58.4	82.7	99.1	88.1	33.5	86.7	134.7	75.1
		Scenario64b : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	10.6	9.1	5.3	0.0	3.5	11.1
		Scenario64b : PM 2033 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	20.9	0.0	41.5	36.6	100.1	0.0	27.6	27.2
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64c : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS D	LOS B		32.9	37.1	28.8	0.0	25.2	135.1	13.1	0.0
		Scenario64c : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	12.3	7.9	14.3	11.7	2.2	11.5	52.6	3.4
		Scenario64c : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS E	LOS C	LOS B	LOS D	61.4	30.6	54.2	56.6	25.2	78.0	85.7	20.9
2033	98	Scenario64c : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS F	LOS C	LOS E	LOS E	175.1	67.9	103.1	117.6	391.1	41.0	62.5	216.9
		Scenario64c : PM 2033 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS C	LOS C		19.7	28.6	32.9	0.0	14.4	89.4	9.2	0.0
		Scenario64c : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	63.4	53.4	54.5	53.4	9.8	165.5	33.8	134.7
		Scenario64c : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS C	LOS D	18.0	0.0	30.4	41.9	24.8	0.0	89.7	3.1
		Scenario64c : PM 2033 - Firth / GSR - Signalised	LOS D	LOS D	LOS E	LOS D	LOS C	61.4	75.5	54.8	74.0	46.9	126.3	9.5	78.6
		Scenario64c : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.5	8.8	4.4	0.0	3.3	7.3
		Scenario64c : PM 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	18.2	0.0	36.6	35.7	95.8	0.0	32.0	25.5
			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64d : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		21.3	26.6	19.6	0.0	20.4	39.2	16.2	0.0
		Scenario64d : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.9	7.8	9.5	11.3	2.0	9.2	12.7	3.8
		Scenario64d : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	49.5	47.8	44.2	40.8	20.6	100.5	27.3	19.8
2033	104	Scenario64d : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS D	LOS E	LOS C	LOS D	LOS E	95.6	65.4	71.4	75.4	268.0	44.9	67.6	144.7
		Scenario64d : PM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.5	24.6	0.0	12.0	2.0	9.9	0.0
		Scenario64d : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	57.5	48.8	50.7	48.8	8.9	137.9	25.5	66.8
		Scenario64d : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	14.7	0.0	10.5	2.2
		Scenario64d : PM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	41.6	51.2	46.6	46.6	21.0	47.7	65.0	44.9
		Scenario64d : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	9.1	9.2	5.1	0.0	2.9	5.7
		Scenario64d : PM 2033 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	24.4	0.0	41.5	35.1	125.0	0.0	27.7	23.5

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario64e : PM 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		25.5	23.8	24.3	0.0	23.6	46.6	21.6	0.0
		Scenario64e : PM 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	11.8	8.2	9.9	12.3	2.5	12.6	16.9	4.6
		Scenario64e : PM 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS E	LOS C	LOS B	LOS D	62.3	33.4	54.4	58.9	26.3	99.1	36.1	28.3
2033	108	Scenario64e : PM 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS E	LOS E	LOS C	LOS D	LOS E	97.4	67.1	72.3	88.6	269.2	45.2	71.2	167.9
		Scenario64e : PM 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.6	24.6	0.0	11.9	3.6	11.5	0.0
		Scenario64e : PM 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS D	LOS B	60.4	51.1	52.9	51.1	9.4	157.3	27.8	74.0
		Scenario64e : PM 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	15.2	0.0	16.9	2.0
		Scenario64e : PM 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS D	LOS C	LOS C	38.5	44.3	42.5	47.9	22.0	39.7	61.0	39.3
		Scenario64e : PM 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.1	9.0	5.0	0.0	3.0	5.8
		Scenario64e : PM 2033 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS C	23.0	0.0	41.5	34.8	119.5	0.0	26.5	23.7

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67 : PM 2038 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		48.2	32.1	51.5	0.0	15.7	195.8	38.3	0.0
		Scenario67 : PM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS C	LOS A	LOS A	LOS D	LOS A	10.9	8.0	48.2	12.3	3.7	4.5	151.3	3.8
		Scenario67 : PM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS C	LOS D	48.1	42.6	42.4	49.2	51.3	51.5	144.4	20.8
2038	118	Scenario67 : PM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS D	LOS C	LOS D	LOS D	58.1	57.1	44.8	62.9	114.2	52.7	23.7	179.4
		Scenario67 : PM 2038 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS B	LOS D		25.3	39.4	40.3	0.0	20.3	83.2	22.6	0.0
		Scenario67 : PM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS B	LOS D	LOS C	63.4	53.4	53.4	53.4	9.8	61.3	12.1	175.2
		Scenario67 : PM 2038 - Fulton Access / Fitzgerald - Signalised	LOS C	LOS B		LOS C	LOS D	18.0	0.0	30.4	41.9	19.9	0.0	102.1	3.1
		Scenario67 : PM 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	37.9	35.0	33.9	41.0	29.7	37.3	5.7	80.1
		Scenario67 : PM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	10.0	7.8	3.0	0.0	2.0	6.5
		Scenario67 : PM 2038 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	18.1	0.0	35.7	34.4	66.2	0.0	27.0	46.2

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67a : PM 2038 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		39.6	32.5	40.0	0.0	13.6	140.7	29.7	0.0
		Scenario67a : PM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS F	LOS A	LOS A	LOS F	LOS A	10.2	8.9	202.2	13.6	5.8	5.2	464.3	6.3
		Scenario67a : PM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS C	LOS D	43.9	45.6	36.8	41.7	66.0	45.4	96.1	26.2
2038	119	Scenario67a : PM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS D	LOS C	LOS D	LOS D	53.9	56.3	42.4	68.0	110.2	47.2	26.7	119.6
		Scenario67a : PM 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		14.6	39.5	40.2	0.0	25.3	96.5	24.6	0.0
		Scenario67a : PM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS B	LOS D	LOS C	60.4	51.1	51.1	51.1	9.4	61.2	11.5	161.7
		Scenario67a : PM 2038 - Fulton Access / Fitzgerald - Signalised	LOS C	LOS A		LOS C	LOS D	14.3	0.0	46.0	57.9	35.6	0.0	197.6	4.5
		Scenario67a : PM 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS D	LOS C	LOS B	47.9	43.2	40.5	49.6	47.6	90.7	6.9	78.6
		Scenario67a : PM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	10.1	7.9	3.0	0.0	2.0	6.9
		Scenario67a : PM 2038 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	18.9	0.0	33.5	34.3	61.6	0.0	27.3	44.1

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67b : PM 2038 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		54.1	34.1	56.9	0.0	32.0	238.8	36.3	0.0
		Scenario67b : PM 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	13.0	7.9	13.5	11.5	2.4	13.7	49.6	3.2
		Scenario67b : PM 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS D	57.2	32.2	50.0	52.0	22.5	83.4	80.7	17.4
2038	98	Scenario67b : PM 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS F	LOS F	LOS D	LOS E	LOS F	181.6	51.9	163.6	139.8	431.6	82.2	72.5	213.3
		Scenario67b : PM 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		15.2	33.8	34.9	0.0	16.8	65.1	18.4	0.0
		Scenario67b : PM 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS E	LOS B	71.9	65.0	65.0	65.0	11.4	223.2	14.8	129.1
		Scenario67b : PM 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS C	LOS C	18.1	0.0	30.5	41.9	27.3	0.0	96.0	3.1
		Scenario67b : PM 2038 - Firth / GSR - Signalised	LOS E	LOS D	LOS F	LOS D	LOS D	60.1	110.7	54.8	114.3	42.4	190.5	9.5	106.9
		Scenario67b : PM 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS B	3.4	0.0	12.0	12.6	8.7	0.0	7.8	28.8
		Scenario67b : PM 2038 - SH22/GSR - Full Signals	LOS C	LOS C		LOS B	LOS D	24.8	0.0	45.6	43.6	122.5	0.0	44.8	69.5

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68 : PM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS D	LOS C		53.7	37.5	55.6	0.0	11.2	232.5	52.9	0.0
		Scenario68 : PM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS D	LOS A	LOS A	LOS F	LOS A	10.7	8.2	76.6	11.3	2.6	5.0	197.2	6.5
		Scenario68 : PM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS C	LOS C	42.9	37.7	39.2	38.4	28.9	38.3	109.8	35.6
2048	138	Scenario68 : PM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS E	LOS C	LOS D	LOS E	74.5	63.9	44.7	74.1	151.7	90.8	28.4	238.7
		Scenario68 : PM 2048 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS B	LOS D		25.1	38.9	41.4	0.0	20.3	84.2	24.9	0.0
		Scenario68 : PM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS B	LOS D	LOS C	60.4	51.1	51.1	51.1	9.4	75.9	16.1	175.1
		Scenario68 : PM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS C	LOS D	17.0	0.0	32.7	44.8	19.0	0.0	103.4	3.3
		Scenario68 : PM 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	42.7	37.1	39.4	50.4	28.5	68.1	6.7	88.7
		Scenario68 : PM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	10.2	9.3	4.3	0.0	3.6	12.6
		Scenario68 : PM 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.1	0.0	28.6	29.5	43.3	0.0	13.4	27.0

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68a : PM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		46.0	33.0	53.7	0.0	12.1	176.9	52.7	0.0
		Scenario68a : PM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS F	LOS A	LOS A	LOS F	LOS A	10.3	8.9	262.3	13.4	5.3	5.5	521.0	9.7
		Scenario68a : PM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS C	LOS C	39.6	43.5	33.8	39.7	55.5	33.2	88.4	37.6
2048	139	Scenario68a : PM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS E	LOS E	LOS C	LOS D	LOS E	87.9	63.9	46.7	78.0	165.6	69.3	38.4	163.0
		Scenario68a : PM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		14.8	39.2	39.1	0.0	21.8	88.9	24.7	0.0
		Scenario68a : PM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS B	LOS D	LOS C	60.4	51.1	51.1	51.1	9.4	80.4	16.1	162.9
		Scenario68a : PM 2048 - Fulton Access / Fitzgerald - Signalised	LOS C	LOS A		LOS C	LOS D	15.5	0.0	37.3	50.7	26.7	0.0	143.8	3.8
		Scenario68a : PM 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	44.3	38.0	40.5	50.3	32.1	79.4	6.9	94.1
		Scenario68a : PM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	10.1	9.3	4.3	0.0	3.6	12.8
		Scenario68a : PM 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	22.7	0.0	28.6	29.7	44.2	0.0	13.7	26.1

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68b : PM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		55.9	35.0	60.6	0.0	15.1	228.3	61.2	0.0
		Scenario68b : PM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS B	LOS A	LOS A	LOS C	LOS A	10.7	8.2	37.2	11.4	3.0	5.2	119.0	4.4
		Scenario68b : PM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS C	LOS D	40.9	35.4	36.9	42.1	30.6	39.0	102.9	23.5
2048	138b	Scenario68b : PM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS E	LOS D	LOS D	LOS E	68.7	53.0	47.6	70.8	147.1	80.4	29.4	183.5
		Scenario68b : PM 2048 - Fitzgerald / Pitt - Signalised	LOS C	LOS B	LOS C	LOS C		24.1	39.4	39.2	0.0	21.6	87.1	24.9	0.0
		Scenario68b : PM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS B	LOS D	LOS C	60.4	51.1	51.1	51.1	9.4	80.2	16.1	152.9
		Scenario68b : PM 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS C	LOS D	17.0	0.0	32.7	44.8	19.3	0.0	104.3	3.3
		Scenario68b : PM 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	40.4	38.5	36.1	43.3	30.6	50.6	6.0	61.7
		Scenario68b : PM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	10.8	9.4	4.2	0.0	4.0	15.0
		Scenario68b : PM 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	22.2	0.0	28.6	29.9	45.6	0.0	13.5	32.2

			LOS				Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68c : PM 2048 - Brookfield / Fitzgerald - Signalised	LOS C	LOS D	LOS C	LOS C		46.0	35.1	52.6	0.0	13.3	186.1	51.6	0.0
		Scenario68c : PM 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS F	LOS A	LOS A	LOS F	LOS A	10.2	9.0	165.6	12.9	5.3	5.5	363.6	7.7
		Scenario68c : PM 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS C	LOS C	42.8	39.5	34.6	38.1	52.4	30.9	72.6	27.5
2048	139b	Scenario68c : PM 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS E	LOS D	LOS D	LOS D	63.9	55.2	46.5	67.9	134.1	71.0	38.1	167.1
		Scenario68c : PM 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		15.6	33.6	36.5	0.0	21.2	78.4	22.1	0.0
		Scenario68c : PM 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS B	LOS D	LOS C	57.5	48.8	48.8	48.8	8.9	82.3	15.3	145.7
		Scenario68c : PM 2048 - Fulton Access / Fitzgerald - Signalised	LOS C	LOS B		LOS C	LOS D	16.3	0.0	35.0	47.7	27.2	0.0	125.2	3.6
		Scenario68c : PM 2048 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS C	36.8	41.6	33.9	43.8	25.4	51.0	5.7	63.9
		Scenario68c : PM 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	10.7	9.4	4.3	0.0	4.0	14.7
		Scenario68c : PM 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	22.3	0.0	28.6	29.9	46.4	0.0	14.0	30.7

SIDRA Results IP

Year	pc(SATURN)	Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62 : IP 2028 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	30.7	15.5	0.0	13.3	12.8	15.4	0.0
		Scenario62 : IP 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS B	LOS A	LOS A	LOS A	13.7	7.9	10.0	14.0	1.9	14.7	23.1	5.5
		Scenario62 : IP 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS D	LOS E	LOS E	LOS B	LOS D	73.7	67.3	67.3	59.5	21.5	250.7	54.5	31.1
2028	52y	Scenario62 : IP 2028 - GSR / Waihoehoe - Roundabout	LOS B	LOS B	LOS B	LOS D	LOS B	13.5	13.6	38.4	13.7	16.9	7.7	51.7	24.7
		Scenario62 : IP 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.6	21.4	24.0	0.0	10.1	8.2	13.6	0.0
		Scenario62 : IP 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS E	LOS C	LOS E	LOS B	71.9	65.0	65.0	65.0	11.4	243.8	5.2	92.6
		Scenario62 : IP 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	14.9	0.0	23.2	2.0
		Scenario62 : IP 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.1	32.7	36.1	41.8	17.2	88.8	6.0	26.7
		Scenario62 : IP 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.9	6.9	0.0	0.0	0.2	4.8
		Scenario62 : IP 2028 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	21.7	0.0	45.3	29.2	58.6	0.0	56.0	47.8
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62a : IP 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		21.3	24.3	20.2	0.0	13.1	33.7	17.6	0.0
		Scenario62a : IP 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.2	7.9	9.9	10.3	1.1	6.8	21.9	3.4
		Scenario62a : IP 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.4	43.2	38.5	36.2	11.4	70.9	39.6	18.0
2028	58y	Scenario62a : IP 2028 - GSR / Waihoehoe - Roundabout	LOS B	LOS A	LOS A	LOS B	LOS B	9.0	10.3	16.2	15.8	10.1	5.2	13.7	27.0
		Scenario62a : IP 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.3	0.0	8.6	9.4	13.1	0.0
		Scenario62a : IP 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	41.9	41.9	41.9	7.6	88.4	3.3	106.1
		Scenario62a : IP 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	10.2	0.0	24.0	2.0
		Scenario62a : IP 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	35.9	35.6	33.9	39.5	16.6	37.6	5.7	31.3
		Scenario62a : IP 2028 - Great South Rd / Quarry Rd - Give-Way	LOS NA	LOS NA		LOS A	LOS A	4.7	0.0	5.9	7.0	0.0	0.0	0.2	4.9
		Scenario62a : IP 2028 - SH22/GSR - Interim Signals	LOS B	LOS B		LOS B	LOS C	21.9	0.0	44.6	30.1	62.0	0.0	54.6	48.4
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62b : IP 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		21.3	26.5	23.4	0.0	16.5	38.0	23.4	0.0
		Scenario62b : IP 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.7	7.9	9.1	10.4	1.0	6.6	9.9	3.3
		Scenario62b : IP 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.2	51.9	38.6	36.8	10.8	84.4	18.3	16.7
2028	68a	Scenario62b : IP 2028 - GSR / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS B	LOS B	8.5	9.4	13.3	12.6	7.6	5.0	6.2	19.5
		Scenario62b : IP 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.5	0.0	10.5	1.8	15.9	0.0
		Scenario62b : IP 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS B	49.3	41.9	41.9	41.9	7.6	87.7	3.3	53.3
		Scenario62b : IP 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	13.4	0.0	17.4	2.0
		Scenario62b : IP 2028 - Firth / GSR - Signalised	LOS B	LOS C	LOS C	LOS B	LOS B	34.0	33.5	33.4	37.2	10.1	24.5	14.3	9.1
		Scenario62b : IP 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.2	8.4	3.5	0.0	2.2	5.0
		Scenario62b : IP 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	24.5	0.0	27.5	25.7	30.6	0.0	33.7	14.6
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario62d : IP 2028 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		23.6	22.0	25.1	0.0	15.8	40.1	22.2	0.0
		Scenario62d : IP 2028 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.9	7.9	9.5	10.0	1.0	6.0	19.7	3.2
		Scenario62d : IP 2028 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	40.2	37.4	38.5	36.1	10.6	59.3	37.4	17.2
2028	78	Scenario62d : IP 2028 - GSR / Waihoehoe - Signalised DDO Phasing	LOS C	LOS C	LOS C	LOS D	LOS C	43.1	41.8	45.2	37.2	37.6	29.0	17.8	58.6
		Scenario62d : IP 2028 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	21.4	24.7	0.0	9.0	7.0	13.4	0.0
		Scenario62d : IP 2028 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	46.7	39.6	39.6	39.6	7.2	78.4	3.1	108.4
		Scenario62d : IP 2028 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.0	0.0	21.3	27.4	10.6	0.0	21.2	2.0
		Scenario62d : IP 2028 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	35.7	35.6	33.9	39.5	15.8	37.6	5.7	27.3
		Scenario62d : IP 2028 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	9.4	8.3	3.5	0.0	2.3	5.6
		Scenario62d : IP 2028 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	25.6	0.0	27.5	24.7	31.5	0.0	34.9	15.3
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario64 : IP 2033 - Brookfield / Fitzgerald - Signalised	LOS C	LOS C	LOS C	LOS B		25.9	28.6	25.6	0.0	21.7	61.7	28.3	0.0
		Scenario64 : IP 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.9	7.8	12.7	10.9	1.4	8.1	38.7	3.9
		Scenario64 : IP 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	47.1	40.1	44.2	40.9	15.3	86.3	61.1	21.2
2033	78	Scenario64 : IP 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS C	LOS C	LOS C	LOS D	LOS C	46.5	44.1	51.2	40.8	55.3	37.9	23.0	81.0
		Scenario64 : IP 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		21.3	19.3	30.5	0.0	15.1	27.7	16.1	0.0
		Scenario64 : IP 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	46.5	46.5	46.5	8.5	100.9	3.7	133.1
		Scenario64 : IP 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	19.2	0.0	28.1	39.1	13.8	0.0	58.7	2.9
		Scenario64 : IP 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.1	34.3	36.1	43.4	17.5	46.0	6.0	30.6
		Scenario64 : IP 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.2	0.0	9.9	8.4	4.6	0.0	3.1	7.1
		Scenario64 : IP 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	25.1	0.0	28.9	25.1	33.2	0.0	36.5	19.1
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario64c : IP 2033 - Brookfield / Fitzgerald - Signalised	LOS B	LOS B	LOS C	LOS B		21.3	23.9	18.7	0.0	11.0	24.0	15.2	0.0
		Scenario64c : IP 2033 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.3	7.8	9.9	10.4	1.3	6.9	24.0	2.9
		Scenario64c : IP 2033 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS C	40.7	47.5	38.5	36.6	13.2	77.8	46.2	14.5
2033	98	Scenario64c : IP 2033 - GSR / Waihoehoe - Signalised DDO Phasing	LOS C	LOS C	LOS C	LOS D	LOS C	50.8	41.8	47.0	38.6	48.4	36.6	20.7	63.3
		Scenario64c : IP 2033 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		21.3	19.3	28.1	0.0	8.4	20.6	8.7	0.0
		Scenario64c : IP 2033 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	49.3	41.9	41.9	41.9	7.6	92.4	3.3	116.8
		Scenario64c : IP 2033 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	21.5	0.0	23.6	29.9	7.6	0.0	35.5	2.2
		Scenario64c : IP 2033 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	38.6	33.8	36.1	42.2	20.9	43.6	6.0	31.5
		Scenario64c : IP 2033 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.1	0.0	8.4	8.4	4.0	0.0	2.6	3.1
		Scenario64c : IP 2033 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	23.5	0.0	25.4	28.6	32.8	0.0	33.1	10.5
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario67 : IP 2038 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		23.6	24.0	20.5	0.0	9.1	46.9	23.0	0.0
		Scenario67 : IP 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.0	7.9	9.2	10.4	1.8	4.9	16.8	2.4
		Scenario67 : IP 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	41.3	33.8	38.6	37.4	18.0	49.4	34.3	10.7
2038	118	Scenario67 : IP 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS C	LOS C	LOS C	LOS C	41.2	39.1	33.8	45.6	52.8	31.4	19.1	50.0
		Scenario67 : IP 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		19.0	19.4	26.4	0.0	4.5	7.6	4.5	0.0
		Scenario67 : IP 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	44.0	37.3	37.3	37.3	6.8	71.7	2.9	90.5
		Scenario67 : IP 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	25.6	0.0	21.3	30.7	4.5	0.0	13.9	2.2
		Scenario67 : IP 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	40.9	34.6	36.1	41.8	31.8	47.6	6.0	27.4
		Scenario67 : IP 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	8.6	7.7	3.0	0.0	2.4	2.9
		Scenario67 : IP 2038 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	27.2	0.0	22.4	27.3	22.3	0.0	32.6	11.2
		Extracted Site name	LOS Intersection	LOS North Approach	LOS West Approach	LOS South Approach	LOS East Approach	Worst Delay North	Worst Delay West	Worst Delay South	Worst Delay East	Worst Queue North	Worst Queue West	Worst Queue South	Worst Queue East
		Scenario67a : IP 2038 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		23.6	21.3	20.6	0.0	9.6	36.9	22.6	0.0
		Scenario67a : IP 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	10.0	8.7	9.6	11.3	2.8	5.6	19.7	2.7
		Scenario67a : IP 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS C	LOS B	LOS C	43.6	32.8	38.6	37.4	27.5	45.8	29.7	10.8
2038	119	Scenario67a : IP 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS C	LOS C	LOS C	LOS C	43.0	37.2	32.7	40.8	49.8	27.0	19.4	44.5
		Scenario67a : IP 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.4	26.4	0.0	4.7	14.6	4.3	0.0
		Scenario67a : IP 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	44.0	37.3	37.3	37.3	6.8	72.8	2.9	76.0
		Scenario67a : IP 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	24.2	0.0	21.3	27.4	4.6	0.0	23.5	2.1
		Scenario67a : IP 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	41.1	34.5	36.1	41.8	32.3	47.1	6.0	27.0
		Scenario67a : IP 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	2.9	0.0	8.6	7.7	2.9	0.0	2.5	2.8
		Scenario67a : IP 2038 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	27.2	0.0	22.4	27.4	22.1	0.0	33.1	11.1

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario67b : IP 2038 - Brookfield / Fitzgerald - Signalised	LOS C	LOS B	LOS C	LOS B		21.3	28.6	20.6	0.0	15.3	42.0	20.4	0.0
		Scenario67b : IP 2038 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	11.1	7.9	13.3	11.1	1.4	8.9	41.1	4.3
		Scenario67b : IP 2038 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS D	LOS D	LOS B	LOS D	47.2	45.8	44.4	41.2	15.5	97.9	62.4	22.4
2038	98	Scenario67b : IP 2038 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS D	LOS D	LOS C	LOS D	LOS D	53.7	38.6	46.2	50.2	79.9	44.2	30.7	93.8
		Scenario67b : IP 2038 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS B		19.0	19.4	26.3	0.0	10.3	34.0	11.4	0.0
		Scenario67b : IP 2038 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS D	LOS C	54.7	46.5	46.5	46.5	8.5	117.4	3.7	141.1
		Scenario67b : IP 2038 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	19.3	0.0	28.1	39.1	9.8	0.0	61.4	3.0
		Scenario67b : IP 2038 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	39.3	34.6	36.1	42.6	26.0	47.4	6.0	37.7
		Scenario67b : IP 2038 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.5	0.0	9.3	8.5	6.2	0.0	5.3	5.9
		Scenario67b : IP 2038 - SH22/GSR - Full Signals	LOS B	LOS C		LOS B	LOS C	26.8	0.0	25.1	28.1	43.0	0.0	40.4	15.1

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68 : IP 2048 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		25.9	21.8	23.8	0.0	10.3	51.8	20.0	0.0
		Scenario68 : IP 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.9	8.0	9.7	10.5	2.1	5.2	14.6	3.9
		Scenario68 : IP 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS D	LOS B	LOS C	35.3	47.5	33.0	37.5	17.3	49.3	25.8	16.8
2048	138	Scenario68 : IP 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS D	LOS C	LOS C	LOS C	45.4	41.3	33.4	50.8	71.3	43.2	15.8	36.6
		Scenario68 : IP 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		21.3	22.3	25.6	0.0	3.5	3.9	8.3	0.0
		Scenario68 : IP 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS C	LOS C	LOS C	LOS C	46.7	39.6	39.6	39.6	7.2	74.9	3.1	71.4
		Scenario68 : IP 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	3.8	0.0	8.2	2.0
		Scenario68 : IP 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	41.6	35.2	37.2	44.1	32.2	52.2	6.3	27.3
		Scenario68 : IP 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	8.1	8.4	3.5	0.0	2.8	2.4
		Scenario68 : IP 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	21.9	0.0	28.3	27.6	19.0	0.0	21.4	12.7

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68a : IP 2048 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		23.6	23.3	20.9	0.0	8.4	44.2	22.1	0.0
		Scenario68a : IP 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.6	8.9	11.1	11.7	3.1	5.3	20.8	3.9
		Scenario68a : IP 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	39.6	35.7	33.0	33.7	27.0	34.8	31.0	14.0
2048	139	Scenario68a : IP 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS C	LOS C	LOS C	LOS C	39.4	41.8	31.7	48.3	58.3	37.5	17.3	35.6
		Scenario68a : IP 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		19.0	19.5	28.5	0.0	3.8	9.1	7.7	0.0
		Scenario68a : IP 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	46.7	39.6	39.6	39.6	7.2	74.1	3.1	64.1
		Scenario68a : IP 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	4.0	0.0	16.1	2.0
		Scenario68a : IP 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	41.8	35.0	37.2	44.1	32.7	51.0	6.3	29.2
		Scenario68a : IP 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	8.1	8.4	3.5	0.0	2.8	2.3
		Scenario68a : IP 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	22.0	0.0	28.3	27.7	19.5	0.0	21.6	12.9

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68b : IP 2048 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		25.9	22.6	23.9	0.0	10.0	54.7	19.7	0.0
		Scenario68b : IP 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.8	8.0	9.8	10.6	2.0	4.9	14.9	4.0
		Scenario68b : IP 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	35.9	40.8	33.0	38.7	17.4	42.2	28.0	17.4
2048	138b	Scenario68b : IP 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS C	LOS C	LOS C	LOS C	45.1	36.8	34.1	43.5	49.3	40.5	15.7	34.0
		Scenario68b : IP 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		21.3	22.3	25.6	0.0	3.1	4.0	8.3	0.0
		Scenario68b : IP 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	44.0	37.3	37.3	37.3	6.8	74.0	2.9	80.5
		Scenario68b : IP 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	3.4	0.0	7.9	2.0
		Scenario68b : IP 2048 - Firth / GSR - Signalised	LOS C	LOS D	LOS C	LOS C	LOS B	40.8	34.3	36.1	43.3	31.4	46.3	6.0	27.7
		Scenario68b : IP 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	8.1	8.4	3.5	0.0	2.8	2.4
		Scenario68b : IP 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	21.9	0.0	28.3	27.6	19.0	0.0	21.5	12.8

			LOS					Worst Delay				Worst Queue			
		Extracted Site name	Intersection	North Approach	West Approach	South Approach	East Approach	North	West	South	East	North	West	South	East
		Scenario68c : IP 2048 - Brookfield / Fitzgerald - Signalised	LOS B	LOS C	LOS C	LOS B		23.6	22.9	20.9	0.0	8.3	42.9	22.3	0.0
		Scenario68c : IP 2048 - Fitzgerald / Waihoehoe - Roundabout	LOS A	LOS A	LOS A	LOS A	LOS A	9.6	8.9	12.2	11.9	3.2	5.1	23.4	4.1
		Scenario68c : IP 2048 - Fitzgerald / Waihoehoe - Signalised with Bus Lane	LOS C	LOS C	LOS C	LOS B	LOS C	40.2	38.5	31.7	34.0	28.1	34.6	31.0	14.5
2048	139b	Scenario68c : IP 2048 - GSR / Waihoehoe - Signalised v9 Opposed Phasing	LOS C	LOS C	LOS C	LOS C	LOS C	37.6	37.2	32.1	41.4	45.1	35.5	15.4	41.1
		Scenario68c : IP 2048 - Fitzgerald / Pitt - Signalised	LOS B	LOS B	LOS B	LOS C		19.0	19.5	28.1	0.0	3.7	9.7	7.3	0.0
		Scenario68c : IP 2048 - P&R / Waihoehoe - Signalised	LOS C	LOS D	LOS C	LOS C	LOS C	44.0	37.3	37.3	37.3	6.8	75.6	2.9	75.4
		Scenario68c : IP 2048 - Fulton Access / Fitzgerald - Signalised	LOS B	LOS B		LOS B	LOS C	27.6	0.0	21.3	27.4	3.9	0.0	17.2	2.0
		Scenario68c : IP 2048 - Firth / GSR - Signalised	LOS C	LOS C	LOS C	LOS C	LOS B	37.5	37.9	33.9	40.2	27.7	45.1	5.7	29.7
		Scenario68c : IP 2048 - Great South Rd / Quarry Rd - Roundabout	LOS A	LOS A		LOS A	LOS A	3.0	0.0	8.1	8.4	3.6	0.0	2.8	2.4
		Scenario68c : IP 2048 - SH22/GSR - Full Signals	LOS B	LOS B		LOS B	LOS C	22.0	0.0	28.3	27.7	19.6	0.0	21.8	12.9

Appendix G SATURN Plots

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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Appendix B Plan Change Modelling Update

Drury East Traffic Memorandum

Modelling Update

Plan Changes 48,49 & 50

We design with community in mind

Stantec

Revision Schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0	16/11/21	Final	SV/EM	HP	DH	DH

Quality Statement

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1 Background

As a result of discussions at the Drury East Plan Changes 48,49 & 50 Traffic Expert Caucusing, Stantec NZ has updated the modelling results for the Drury East development. This update covers the early development years prior to the introduction of the proposed ATAP improvements in the area, specifically, three scenarios – Test 1, 2 and 3, discussed in the modelling report. This update supersedes previous results for these scenarios reported in the Modelling Report dated 30th September 2021.

The key change for this updated modelling assessment is the introduction of an interim signalised intersection at the Great South Road (**GSR**)/Waihoehoe Road intersection. The interim signalised intersection replaces the previously proposed upgraded roundabout layout and is now considered a preferred layout based on discussions held in the expert conferencing meetings between September through October 2021.

Three tests that were remodelled are described below:

- **Test 1** – models the first development years, prior to Drury Central station and prior to completion of SH1 widening between Drury and Papakura, with improvements to the GSR/Waihoehoe Road intersection (signalised interim layout). This incorporates a lower Public Transport (PT) mode share uptake percentage assumption, as it would occur prior to Drury Central rail station construction.
- **Test 2** – assesses the impact of the SH1 widening and Drury Interchange improvements. As with Test 1, this model includes lower PT mode share uptake percentage without the train station.
- **Test 3** – assesses the impact of Drury Central station and models the impact of the immediate larger PT % mode share uptake that it enables. It also includes the impact of the direct connection from SH1 (in the vicinity of the Drury interchange) to the Kiwi Property development site.

The updated modelling also provides additional information on the Drury East development traffic impact on the road network in Drury South and assess additional intersection of Fitzgerald Road/Road 8/Jack Stevenson Road.

The additional data also provides more information on Drury East traffic wider network rerouting and assess the SH22/SH1 interchange in more detail.

2 GSR / Waihoehoe Rd Intersection Layout

The interim signalised layout takes into account existing private property boundaries and provides active mode facilities on all approaches. The layout concept drawing is shown below in Figure 1.

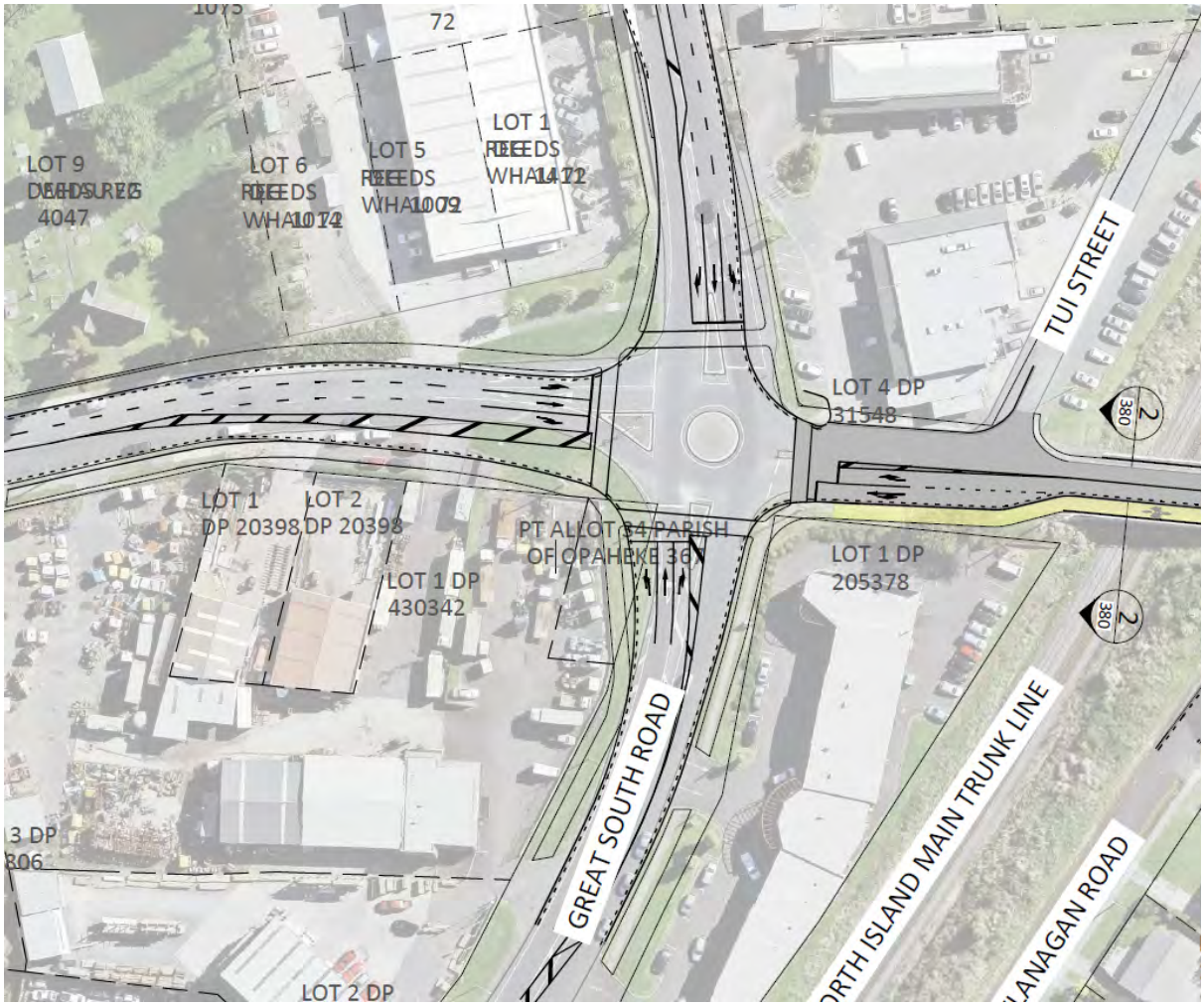


Figure 1: Great South Road / Waihoehoe Road Intersection

3 SH22 / SH1 Interchange Modelling

The SH22/SH1 Interchange was modelled in more detail, as a network in SIDRA, to assess the operation of AM and PM peaks. Previously this interchange was only assessed in SATURN. The critical model for this interchange is Test 2, where due to lack of the direct SH 1 – Drury East town centre connection the traffic at the southbound off-ramp during the PM peak are higher than in other early year scenarios.

The SIDRA model for the interchange is shown below in Figure 2.

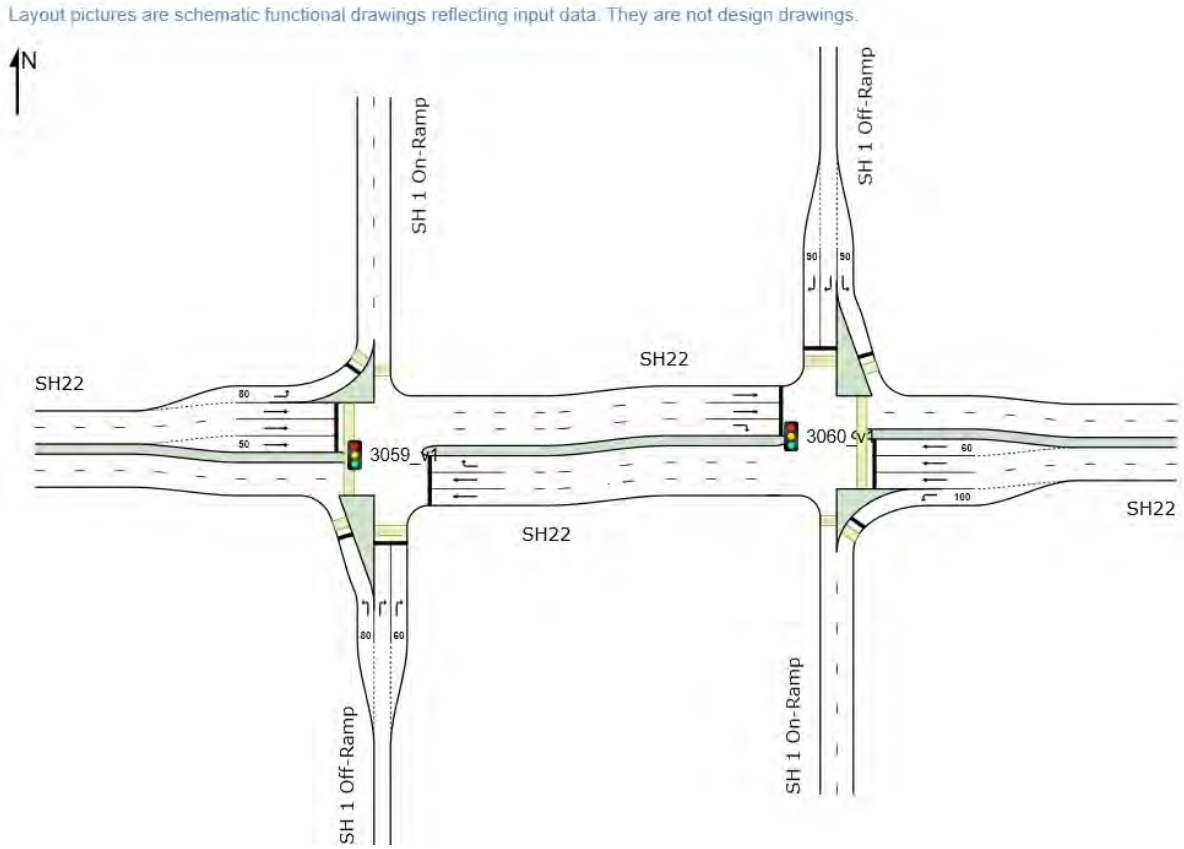


Figure 2: SH22 / SH1 Interchange SIDRA Network

4 Modelling Outputs

All three scenarios were modelled in SIDRA. In addition, Test 2 and Test 3 previously defined '*pass*' scenarios were remodelled in SATURN to capture potential wider area rerouting. Test 1 was not rerun in SATURN as there is no strategic model available model from SGA developed for the base year.

4.1 SATURN modelling results for Test 2 and Test 3

The strategic model results for Test 2 and Test 3 show noticeably lower rerouting of Drury East traffic through Drury South network after introduction of the signalised intersection at the GSR/Waihoehoe Road intersection. This is mainly due to additional capacity provided by the interim signalised intersection when compared to the roundabout and lower delays at the Waihoehoe Road approach to the GSR/Waihoehoe Road intersection.

The figure showing PM peak model traffic distribution along Fitzgerald Road link (southbound section of Fitzgerald Road between Drury Hills Road and Quarry Road) is shown below – Test 2 results are shown in Figure 1 and Test 3 results are in Figure 2.

These results show that slightly larger volumes use Fitzgerald Road southern connection to Drury South in Test 3 however overall traffic volumes on Quarry Road and within Drury South are similar.

Detailed traffic distribution from the SATURN model is shown in **Appendix A**.

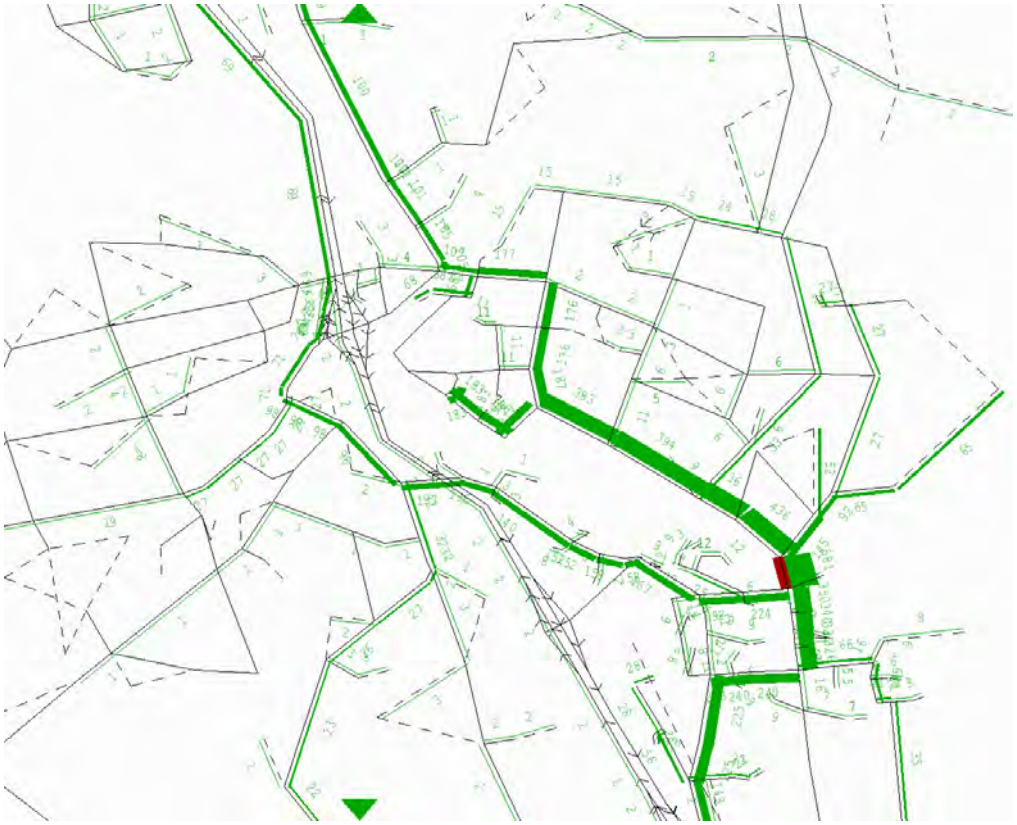


Figure 3: SATURN Results, Test 2, PM Peak

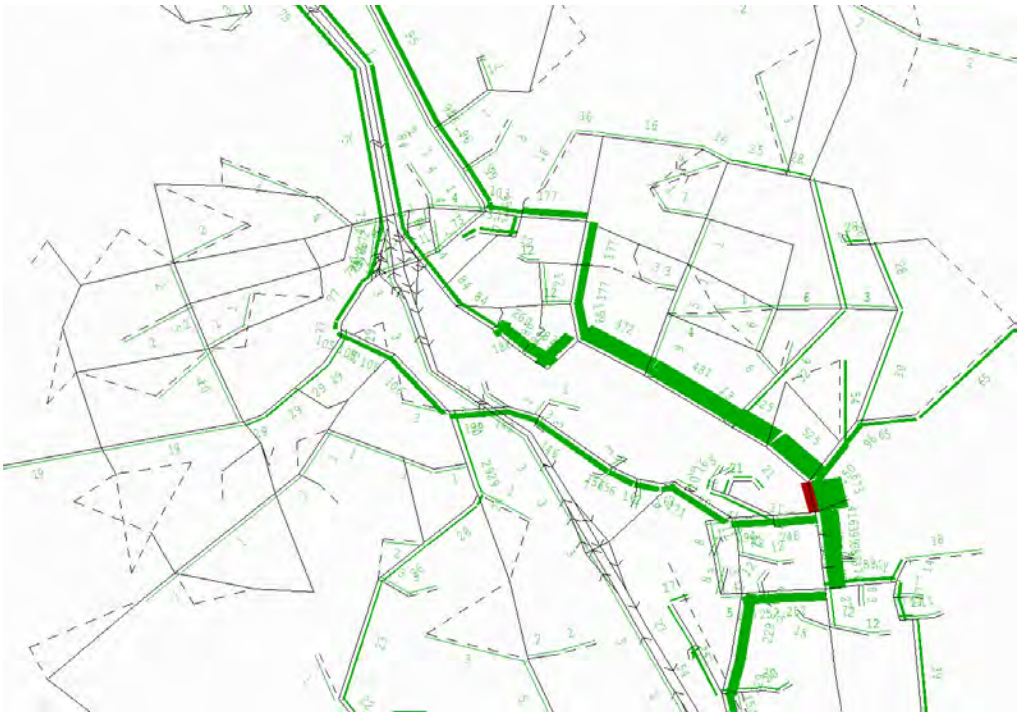


Figure 4: SATURN Results, Test 3, PM Peak

The wider network routing data of Drury East development traffic is discussed below. The map with the location references is shown in Figure 3.

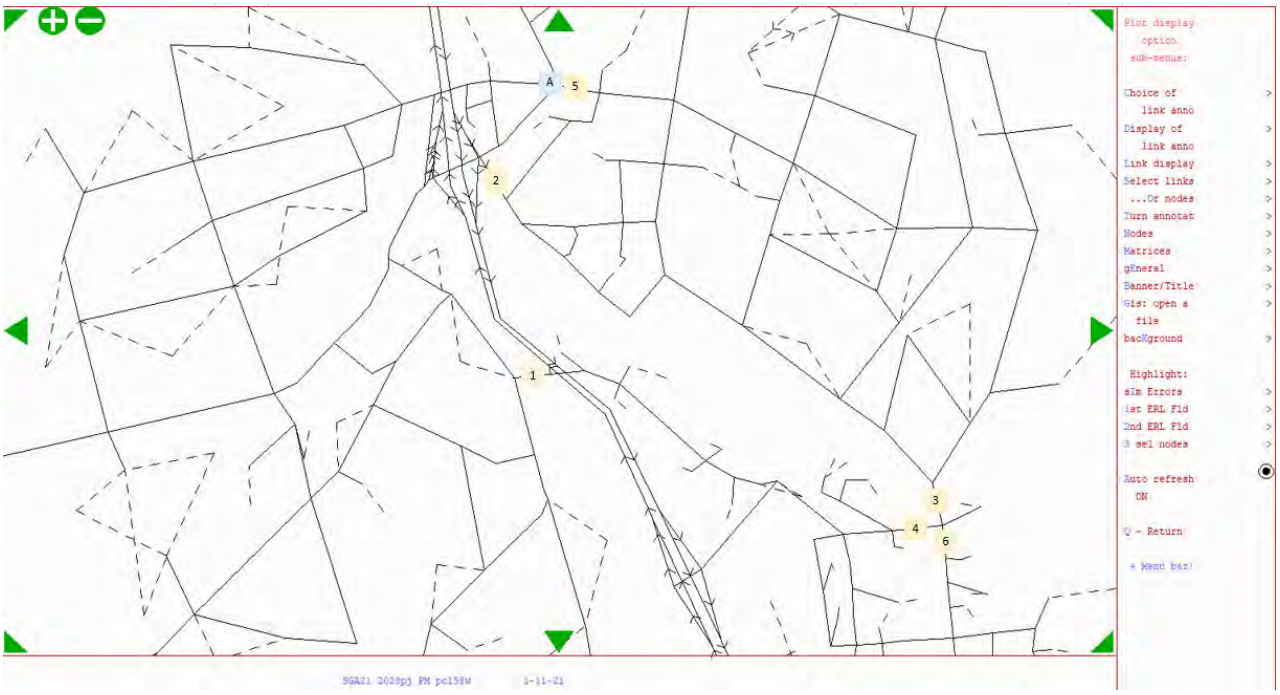


Figure 5: SATURN Network, Drury East

In Test 2, the scenario without the direct SH 1 connection to the Drury East town centre, around 70% of the development traffic travel through the GSR/Waihoehoe Road intersection, 20% through Fitzgerald Road connection to the south and approximately 10% remain internally. This data is shown in Table 1 below.

Table 1: Test 2 Trips

Drury East Trips (incl. zones 5552 and 5553)	**Trip counts**					**Trip Proportions**		
Cross-section Location (as per map above)	**AM**	**PM**	**IP**	**ADT**		**AM**	**PM**	**IP**
A. GSR/Waihoehoe	1198	1713	1062	17686		71%	69%	71%
2. SH1 SB Off-ramp connection	0	0	0	0		0%	0%	0%
3. Fitzgerald Rd (Sth) SB	186	335	137	2643		11%	13%	9%
3. Fitzgerald Rd (Sth) NB	156	245	142	2397		9%	10%	10%
Internal	140	207	154			8%	8%	10%
Drury East Vol	**1680**	**2500**	**1495**			**100%**	**100%**	**100%**

In Test 3, around 55% of the development traffic travel through the GSR/Waihoehoe Road intersection, 15% of traffic use SH1 – Town Centre connection, 20% through Fitzgerald Road connection to the south and approximately 10% remain internally. As shown in Table 2: Test 3 Trips below.

Table 2: Test 3 Trips

Drury East Trips (incl. zones 5552 and 5553)	Trip counts					Trip Proportions		
Cross-section Location (as per map above)	AM	PM	IP	ADT		AM	PM	IP
A. GSR/Waihoehoe	949	1461	829	14311		56%	58%	55%
2. SH1 SB Off-ramp connection	270	299	238	3806		16%	12%	16%
3. Fitzgerald Rd (Sth) SB	181	335	133	2617		11%	13%	9%
3. Fitzgerald Rd (Sth) NB	137	195	141	2237		8%	8%	9%
Internal	143	210	154			9%	8%	10%
Drury East Vol	**1680**	**2500**	**1495**			**100%**	**100%**	**100%**

4.2 SIDRA modelling results

4.2.1 GSR/Waihoehoe Test 1

This test assessed the modelling of the early development years, prior to the construction of SH1 widening. No SATURN modelling was completed for this scenario (as the base year was not available) therefore the base year SIDRA model for the GSR/Waihoehoe Road intersection was used and development traffic added. The traffic survey data from 2017, during the construction of SH 1 section between Papakura and Manukau, was used. This is considered a conservative scenario as volumes on GSR are likely to be higher than post SH1 construction due to traffic bypassing congestion on SH1 and using GSR as an alternative route.

Same development yield of 710 houses was used as identified in the modelling report for Test 1 assessment point. The modelled intersection layout is shown below in Figure 6.

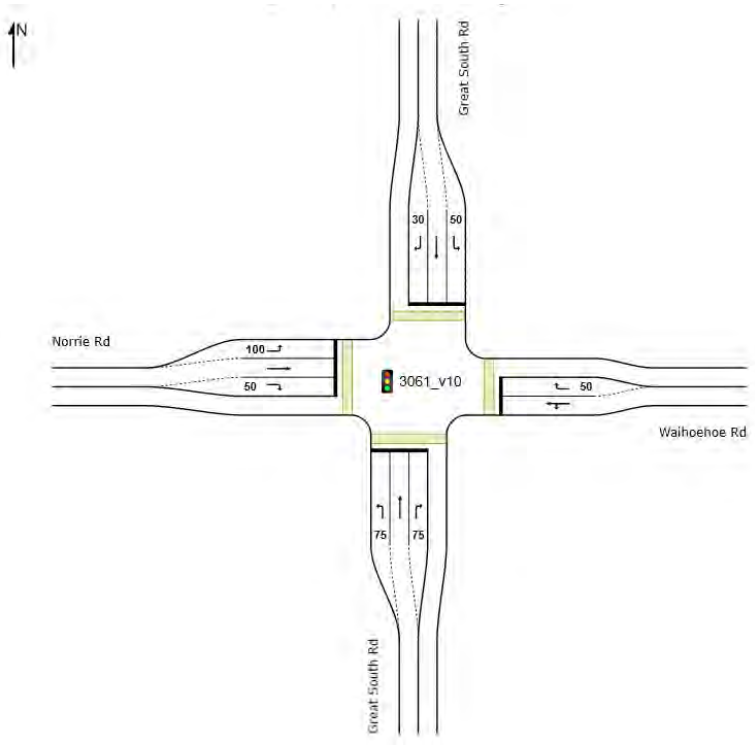


Figure 6: Great South Road / Waihoehoe Road SIDRA Layout, Signalised

The modelled intersection phasing for Test 1 is shown in Figure 7.

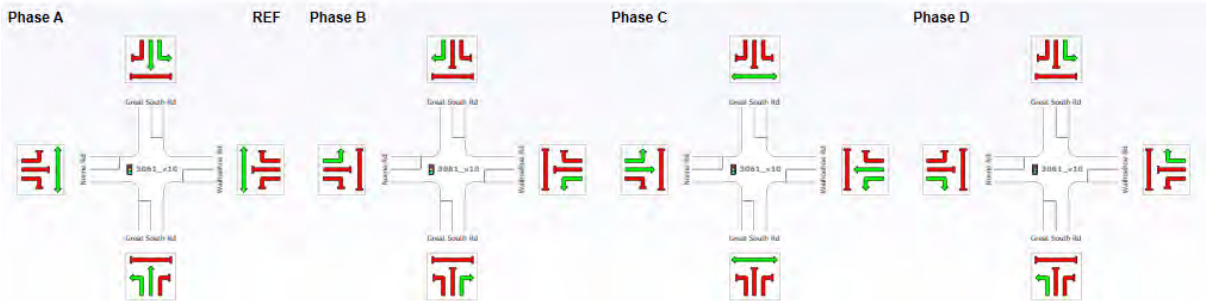


Figure 7: SIDRA Phasing, Test 1

Modelling results show that the intersection will be operating close to its capacity and the critical peak is expected to be the morning peak. The largest queues and delays are expected on the southern and eastern approaches of the GSR/Waihoehoe Road intersection, however, the intersection performance parameters are within the defined modelling thresholds (for modelling thresholds see Section 2.3 in the modelling report).

SIDRA results for the GSR/Waihoehoe Road intersection for Test 1 (AM peak) is shown in Figure 8.

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m
South: Great South Rd										
1	L2	20	0	20	0.0	0.014	10.0	LOS A	0.2	1.5
2	T1	674	49	674	7.3	1.019	110.0	LOS F	42.3	314.2
3	R2	106	7	106	6.6	0.551	70.5	LOS E	4.3	32.1
Approach		800	56	800	7.0	1.019	102.2	LOS F	42.3	314.2
East: Waihoehoe Rd										
4	L2	83	8	83	9.6	0.885	85.8	LOS F	6.1	46.4
5	T1	47	4	47	8.5	0.885	81.1	LOS F	6.1	46.4
6	R2	528	34	528	6.4	1.024	122.5	LOS F	34.0	251.1
Approach		658	46	658	7.0	1.024	114.9	LOS F	34.0	251.1
North: Great South Rd										
7	L2	125	10	125	8.0	0.097	10.4	LOS B	1.5	11.1
8	T1	356	35	356	9.8	0.631	38.3	LOS D	11.8	89.4
9	R2	115	13	115	11.3	0.943	96.1	LOS F	5.8	44.3
Approach		596	58	596	9.7	0.943	43.6	LOS D	11.8	89.4
West: Norne Rd										
10	L2	373	20	373	5.4	1.028	128.6	LOS F	23.4	171.5
11	T1	32	3	32	9.4	0.303	71.7	LOS E	1.4	10.2
12	R2	22	2	22	9.1	0.037	37.6	LOS D	0.6	4.6
Approach		427	25	427	5.9	1.028	119.6	LOS F	23.4	171.5
All Vehicles		2481	185	2481	7.5	1.028	84.5	LOS F	42.3	314.2

Figure 8: GSR / Waihoehoe Road SIDRA Results, Test 1, AM Peak

PM peak results presented below (Figure 9) show that the most congested approach during the afternoon peak is expected to be the eastern approach, however, same as in the AM peak model, the intersection is operating within the acceptable performance limits.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Veh. veh	AVERAGE BACK OF QUEUE Dist] m
South: Great South Rd										
1	L2	20	0	20	0.0	0.015	10.1	LOS B	0.2	1.4
2	T1	438	19	438	4.3	0.470	19.3	LOS B	9.1	65.7
3	R2	210	9	210	4.3	0.989	91.3	LOS F	9.2	67.0
Approach		668	28	668	4.2	0.989	41.7	LOS D	9.2	67.0
East: Waihoehoe Rd										
4	L2	167	10	167	6.0	0.939	74.0	LOS E	8.2	60.3
5	T1	42	3	42	7.1	0.939	69.4	LOS E	8.2	60.3
6	R2	266	12	266	4.5	1.013	104.0	LOS F	12.8	93.2
Approach		475	25	475	5.3	1.013	90.4	LOS F	12.8	93.2
North: Great South Rd										
7	L2	270	10	270	3.7	0.214	11.1	LOS B	3.1	22.1
8	T1	846	30	846	3.5	0.986	70.2	LOS E	37.6	271.2
9	R2	85	8	85	9.4	0.422	52.6	LOS D	2.6	19.4
Approach		1201	48	1201	4.0	0.986	55.6	LOS E	37.6	271.2
West: Norrie Rd										
10	L2	121	2	121	1.7	0.289	41.2	LOS D	3.2	22.5
11	T1	44	3	44	6.8	0.403	54.6	LOS D	1.4	10.5
12	R2	32	0	32	0.0	0.108	45.8	LOS D	0.9	6.1
Approach		197	5	197	2.5	0.403	45.0	LOS D	3.2	22.5
All Vehicles		2541	106	2541	4.2	1.013	57.6	LOS E	37.6	271.2

Figure 9: GSR / Waihoehoe Road SIDRA Results, Test 1, PM Peak

Overall, the optimised signal controlled interim GSR/Waihoehoe intersection layout operates better previously tested improved roundabout layout.

4.2.2 Test 2 and Test 3 modelling results

Test 2 and 3 SIDRA models are based on traffic flows from the strategic SATURN model and as such all key intersection in the area are assessed. The summary of intersection performance is shown in Tables Table 3 through Table 8 overleaf. A detailed summary of intersection SIDRA performance is shown in **Appendix B**, with Test 2 and Test 3 results (intersection model layouts and movement summaries) shown in **Appendix C** and **D** respectively.

Different signal phasing (shown in Figure 10 below) was used for GSR/Waihoehoe intersection as traffic flow patterns changed with the completion of the SH 1 widening.

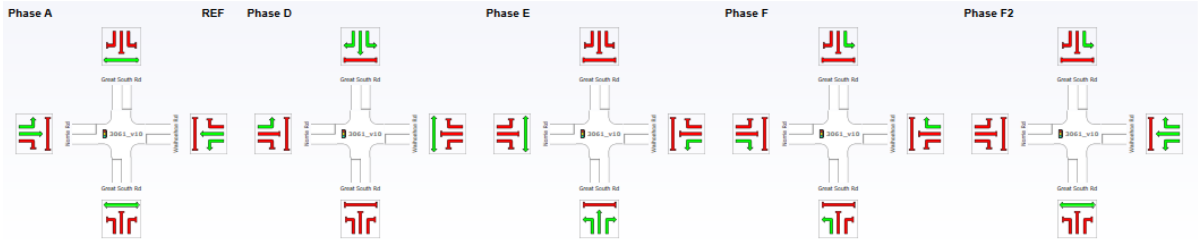


Figure 10: SIDRA Phasing, Test 2/3

Table 3: Test 2 AM Peak SIDRA Results

	LOS					Worst Delay				Worst Queue				DoS				
Extracted Site name	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	8	5	0	0	0	0	0	0	0.4	0.0	0.4		0.4
Fitzgerald / Waihoehoe - Signalised	C	D	C	C	D	45	34	42	44	20	78	73	41	0.8	0.6	0.8	0.7	0.7
Brookfield / Fitzgerald - Signalised	B	B	C	B		21	27	15	0	12	4	20	0	0.5	0.3	0.2	0.5	
GSR / Waihoehoe - Signalised	C	C	D	D	C	45	45	39	42	40	84	71	58	0.8	0.8	0.8	0.8	0.8
Fitzgerald / Pitt - Signalised	B	B	C	B		27	27	19	0	10	2	18	0	0.3	0.2	0.1	0.3	
P&R / Waihoehoe - Roundabout	A	B	A	A	A	14	8	13	9	2	20	2	25	0.7	0.1	0.6	0.1	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	28	0	21	27	12	0	21	2	0.6	0.4		0.6	0.2
Firth / GSR - Signalised	C	C	D	C	B	42	40	41	49	16	140	7	21	0.9	0.3	0.9	0.1	0.2
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	8	0	0	0	4	0.3	0.2		0.1	0.3
SH22/GSR - Signalised	B	B		B	C	16	0	37	41	42	0	72	36	0.7	0.4		0.7	0.7
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	34	30	28	30	54	41	36	5	0.8	0.8	0.5	0.8	0.2

Table 4: Test 2 Interpeak SIDRA Results

Extracted Site name	LOS					Worst Delay				Worst Queue				DoS				
	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	8	5	0	0	0	0	0	0	0.4	0.0	0.4		0.4
Fitzgerald / Waihoehoe - Signalised	C	D	C	C	D	44	32	42	44	12	91	74	22	0.8	0.4	0.8	0.7	0.7
Brookfield / Fitzgerald - Signalised	B	B	C	B		21	27	16	0	13	9	13	0	0.4	0.4	0.3	0.4	
GSR / Waihoehoe - Signalised	C	C	C	D	C	40	38	42	34	36	30	45	60	0.8	0.8	0.5	0.8	0.8
Fitzgerald / Pitt - Signalised	B	B	B	B		21	21	24	0	10	2	12	0	0.3	0.3	0.1	0.3	
P&R / Waihoehoe - Roundabout	A	B	A	B	A	13	8	13	8	2	18	2	18	0.5	0.1	0.5	0.1	0.5
Fulton Access / Fitzgerald - Signalised	B	B		B	C	28	0	21	27	12	0	13	2	0.4	0.4		0.4	0.2
Firth / GSR - Signalised	C	C	C	C	B	36	36	34	39	20	56	6	21	0.7	0.4	0.7	0.1	0.2
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	7	0	0	0	5	0.3	0.2		0.0	0.3
SH22/GSR - Signalised	B	B		B	C	16	0	44	34	49	0	44	31	0.5	0.5		0.5	0.5
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	32	30	27	30	40	30	34	6	0.7	0.7	0.4	0.7	0.2

Table 5:Test 2 PM Peak SIDRA Results

Extracted Site name	LOS					Worst Delay				Worst Queue				DoS				
	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	B	NA		NA	11	5	0	0	0	0	0	0	0.5	0.0	0.5		0.5
Fitzgerald / Waihoehoe - Signalised	C	D	D	C	E	61	46	59	67	20	168	141	39	0.9	0.5	0.9	0.8	0.8
Brookfield / Fitzgerald - Signalised	B	B	C	B		21	27	15	0	23	22	7	0	0.7	0.7	0.7	0.2	
GSR / Waihoehoe - Signalised	E	D	D	F	D	85	49	145	74	88	59	85	134	1.1	1.0	0.9	1.1	1.0
Fitzgerald / Pitt - Signalised	B	B	B	B		21	20	25	0	20	25	3	0	0.6	0.6	0.6	0.1	
P&R / Waihoehoe - Roundabout	A	B	A	C	A	18	9	29	8	3	33	17	35	0.8	0.2	0.8	0.6	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	23	0	24	33	20	0	35	2	0.7	0.4		0.7	0.5
Firth / GSR - Signalised	C	D	C	C	B	41	38	37	46	32	64	6	41	0.8	0.7	0.8	0.1	0.5
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	9	0	0	0	13	0.6	0.2		0.1	0.6
SH22/GSR - Signalised	C	C		B	D	22	0	58	47	178	0	33	56	0.9	0.9		0.8	0.8
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	28	38	37	37	74	43	19	8	0.7	0.7	0.3	0.5	0.4

Table 6: Test 3 AM Peak SIDRA Results

Extracted Site name	LOS					Worst Delay				Worst Queue				DoS				
	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	6	5	0	0	0	0	0	0	0.5	0.0	0.2		0.5
Fitzgerald / Waihoehoe - Signalised	C	C	D	C	C	39	38	34	39	17	44	87	36	0.9	0.6	0.8	0.9	0.8
Brookfield / Fitzgerald - Signalised	B	B	C	B		21	27	19	0	12	24	25	0	0.7	0.4	0.7	0.7	
GSR / Waihoehoe - Signalised	C	C	D	D	C	38	40	38	38	36	79	50	59	0.9	0.8	0.9	0.9	0.8
Fitzgerald / Pitt - Signalised	B	B	C	B		27	27	19	0	9	2	20	0	0.3	0.2	0.1	0.3	
P&R / Waihoehoe - Roundabout	A	A	A	B	A	11	8	13	9	1	11	2	26	0.7	0.1	0.4	0.1	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	24	0	21	27	10	0	21	2	0.5	0.3		0.5	0.2
Firth / GSR - Signalised	C	C	C	C	B	39	37	37	44	14	61	6	20	0.7	0.3	0.7	0.1	0.2
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	7	0	0	0	3	0.3	0.2		0.1	0.3
SH22/GSR - Signalised	B	B		B	C	16	0	39	41	44	0	71	34	0.7	0.4		0.7	0.7
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	33	33	34	34	65	39	43	7	0.7	0.7	0.4	0.7	0.3

Table 7: Test 3 Interpeak SIDRA Results

Extracted Site name	LOS					Worst Delay				Worst Queue				DoS				
	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	6	5	0	0	0	0	0	0	0.4	0.0	0.2		0.4
Fitzgerald / Waihoehoe - Signalised	C	C	C	C	D	39	35	30	40	10	49	77	20	0.7	0.3	0.7	0.7	0.7
Brookfield / Fitzgerald - Signalised	B	B	C	B		21	24	20	0	12	25	16	0	0.7	0.5	0.7	0.6	
GSR / Waihoehoe - Signalised	C	C	C	D	C	36	37	38	29	35	30	16	54	0.7	0.7	0.5	0.5	0.7
Fitzgerald / Pitt - Signalised	B	B	B	B		21	21	24	0	9	2	12	0	0.3	0.2	0.1	0.3	
P&R / Waihoehoe - Roundabout	A	A	A	B	A	10	8	13	8	1	9	2	18	0.5	0.1	0.4	0.1	0.5
Fulton Access / Fitzgerald - Signalised	B	B		B	C	28	0	21	27	11	0	13	2	0.4	0.4		0.4	0.2
Firth / GSR - Signalised	C	C	C	C	B	36	36	34	39	20	37	6	23	0.7	0.4	0.7	0.1	0.3
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	7	0	0	0	5	0.3	0.1		0.0	0.3
SH22/GSR - Signalised	B	B		B	C	17	0	42	35	53	0	42	31	0.5	0.5		0.5	0.5
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	30	31	28	30	44	29	27	6	0.7	0.7	0.3	0.6	0.2

Table 8: Test 3 PM Peak SIDRA Results

Extracted Site name	LOS					Worst Delay				Worst Queue				DoS				
	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	8	5	0	0	0	0	0	0	0.5	0.0	0.4		0.5
Fitzgerald / Waihoehoe - Signalised	C	D	C	C	D	53	39	41	56	17	98	144	32	0.8	0.4	0.8	0.8	0.8
Brookfield / Fitzgerald - Signalised	C	C	C	B		24	31	18	0	26	57	6	0	0.9	0.8	0.9	0.2	
GSR / Waihoehoe - Signalised	E	E	D	E	E	121	44	73	104	122	65	49	175	1.1	1.1	0.8	1.0	1.0
Fitzgerald / Pitt - Signalised	B	B	B	B		19	19	25	0	19	27	2	0	0.7	0.7	0.6	0.1	
P&R / Waihoehoe - Roundabout	A	B	A	C	A	13	8	27	8	2	18	15	32	0.7	0.1	0.6	0.6	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	21	0	24	30	17	0	35	2	0.7	0.4		0.7	0.2
Firth / GSR - Signalised	C	D	C	C	B	44	36	39	48	34	71	7	46	0.7	0.7	0.7	0.1	0.4
Great South Rd / Quarry Rd - Give-Way	NA	NA		A	A	5	0	6	9	0	0	0	14	0.6	0.2		0.1	0.6
SH22/GSR - Signalised	C	C		B	D	26	0	55	50	198	0	33	63	0.9	0.9		0.8	0.9
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	27	37	38	37	75	30	18	8	0.7	0.7	0.2	0.5	0.4

Overall, in both scenarios results show that the GSR/Waihoehoe interim signalised intersection layout provides slightly more capacity than the previously tested improved roundabout layout

Modelling results show that in both scenarios all intersections are operating within acceptable limits except for the SH22/GSR intersection. The model with the single right turn lane from GSR can result in long queues (400m+) on both the northern approach of SH 22 and the GSR approach (see *SH22/GSR v3* results in Appendix **D**). To mitigate this the second short right turn lane is proposed at the GSR approach (see *SH22/GSR - Signalised* in the results tables above).

SH22/SH1 interchange modelling for Test 2 scenario showed that both AM and PM peaks operate within the available queueing storage capacity. Summary of the results is shown below in Figure 11 and Figure 12, and detailed results in Appendix **C**.

AM Peak

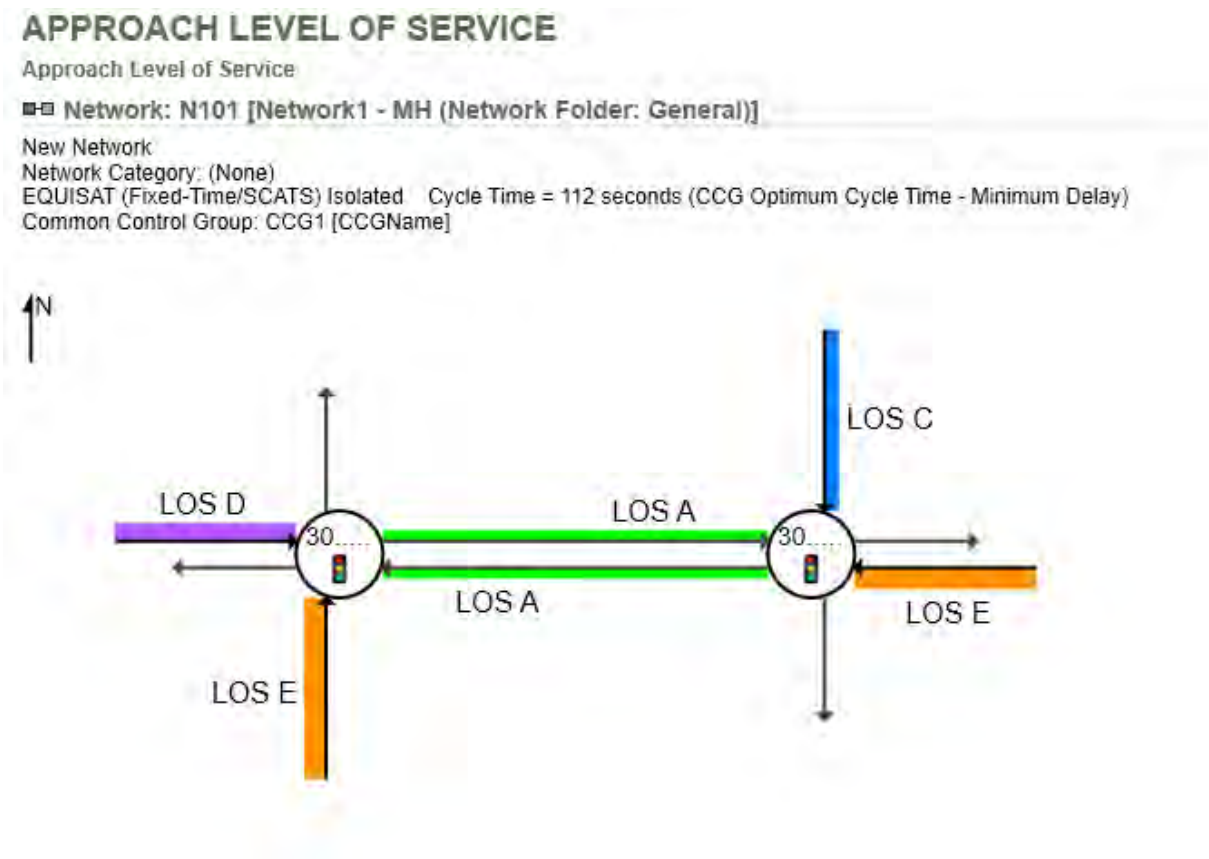


Figure 11: SH22/SH1 Interchange Network SIDRA LOS Results, Test 2, AM Peak

PM Peak

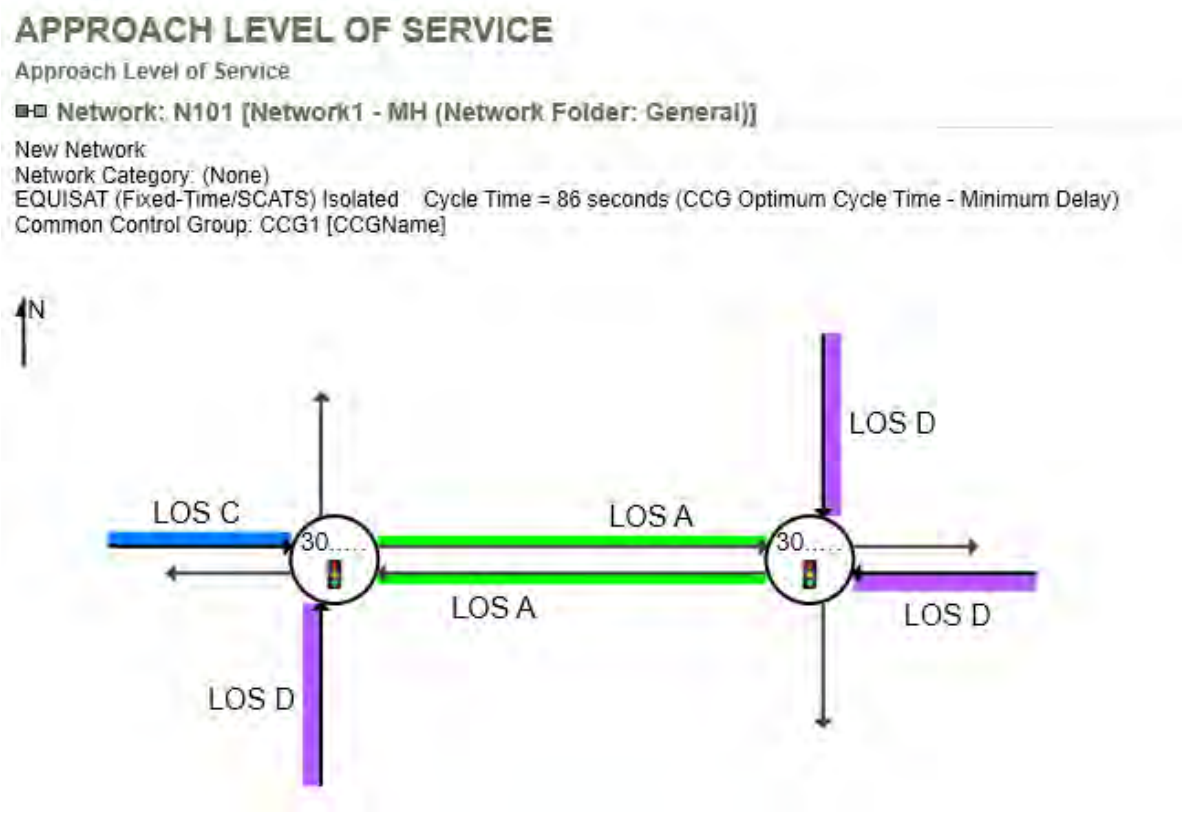


Figure 12: SH22/SH1 Interchange Network SIDRA LOS Results, Test 2, PM Peak

Detailed SIDRA results are presented in **Appendix C** (Test 2) and **Appendix D** (Test 3).

5 Conclusion

The early years of the development have been remodelled to assess the impact of Drury East development with the signalised GSR/Waihoehoe Road intersection. The results also included more detailed assessment of the development on the Drury South network operation.

Overall, the results showed that the pre-ATAP improvements, the signalised intersection layout at the GSR/Waihoehoe intersection will operate slightly better than the previously tested roundabout layout and as such these results supersede the results in the Modelling Report dated 30/09/2021 for Tests 1, 2 and 3. The development yield levels remain unchanged and are reported in the Modelling Report.

Appendices

We design with community in mind

Appendix A SATURN Traffic Distribution

Test 2

					Drury East SZA – Test 2								Link	%age
					pcu				vehs			veh	Total	Drury
					AM	PM	IP	Daily	AM	PM	IP	Daily	ADT	East
a_b	Location (see Map sheet)	Anode	Bnode											
3056_3035	1. Quarry Rd WB	3056	3035		37	96	25	584	27	85	19	470	5511	9%
3035_3056	1. Quarry Rd EB	3035	3056		40	34	11	297	35	28	9	250	3590	7%
_														
9143_9141	2. SH1 SB Off-ramp connection	9143	9141		0	0	0	0	0	0	0	0	0	0%
_														
3039_6106	3. Fitzgerald Rd (Sth) SB	3039	6106		207	365	170	3130	186	334	135	2643	5861	45%
6106_3039	3. Fitzgerald Rd (Sth) NB	6106	3039		173	280	183	2956	156	244	140	2397	5273	45%
_														
6106_6141	4. Road 8 WB	6106	6141		168	133	125	2007	139	125	96	1617	5201	31%
6141_6106	4. Road 8 EB	6141	6106		151	226	140	2339	137	201	108	1928	3926	49%
_														
9144_3061	5. Waihoehoe WB	9144	3061		699	1060	662	11000	626	961	532	9277	13355	69%

3061_9144	5. Waihoehoe EB	3061	9144		611	833	637	9967	564	754	525	8534	12931	66%
–														
6106_6176	6. Jack Stevenson SB	6106	6176		36	229	42	1081	30	201	31	884	2539	35%
6176_6106	6. Jack Stevenson NB	6176	6106		22	50	40	578	17	41	28	427	3227	13%
	A. GSR/Waihoehoe								1198	1707	1044	17686	40786	43%
9144_3061	GSR/Waihoehoe - Waihoehoe Appr	9144	3061		699	1060	662	11000	626	961	532	9277	13355	69%
9901_3061	GSR/Waihoehoe - GSR Sth Appr	9901	3061		306	243	280	4164	267	207	219	3369	7519	45%
4553_3061	GSR/Waihoehoe - GSR Nth Appr	4553	3061		254	453	292	4686	226	407	237	3951	13713	29%
3069_3061	GSR/Waihoehoe - Norrie Appr	3069	3061		85	141	65	1210	79	131	56	1088	6199	18%

Test 3

					Drury East SZA - Test 3							Drury East	Link	%age
					pcu				vehs			veh	Total	Drury
					AM	PM	IP	Daily	AM	PM	IP	Daily	ADT	East
a_b	Location (see Map sheet)	Anode	Bnode											
3056_3035	1. Quarry Rd WB	3056	3035		37	105	25	610	27	92	19	490	5610	9%
3035_3056	1. Quarry Rd EB	3035	3056		21	18	11	208	19	15	9	179	3064	6%
_														
9143_9141	2. SH1 SB Off-ramp connection	9143	9141		300	349	293	4550	270	301	238	3806	6778	56%
_														
3039_6106	3. Fitzgerald Rd (Sth) SB	3039	6106		208	383	172	3193	181	337	133	2617	7824	33%
6106_3039	3. Fitzgerald Rd (Sth) NB	6106	3039		154	227	183	2779	137	196	141	2237	5106	44%
_														
6106_6141	4. Road 8 WB	6106	6141		168	138	126	2021	139	124	102	1678	4918	34%
6141_6106	4. Road 8 EB	6141	6106		130	173	140	2156	118	154	109	1765	3857	46%
_														
9144_3061	5. Waihoehoe WB	9144	3061		715	1069	676	11208	641	973	544	9465	13650	69%
3061_9144	5. Waihoehoe EB	3061	9144		346	559	358	5839	316	504	290	4946	8612	57%
_														

6106_6176	6. Jack Stevenson SB	6106	6176		37	243	43	1129	30	210	31	912	4297	21%
6176_6106	6. Jack Stevenson NB	6176	6106		22	49	41	585	17	41	31	452	2642	17%
	A. GSR/Waihoehoe								949	1467	829	14311	37757	38%
9144_3061	GSR/Waihoehoe - Waihoehoe Appr	9144	3061		715	1069	676	11208	641	973	544	9465	13650	69%
9901_3061	GSR/Waihoehoe - GSR Sth Appr	9901	3061		104	106	101	1536	87	85	74	1171	4360	27%
4553_3061	GSR/Waihoehoe - GSR Nth Appr	4553	3061		161	380	191	3257	142	339	153	2727	13306	20%
3069_3061	GSR/Waihoehoe - Norrie Appr	3069	3061		84	74	66	1057	78	69	58	947	6441	15%

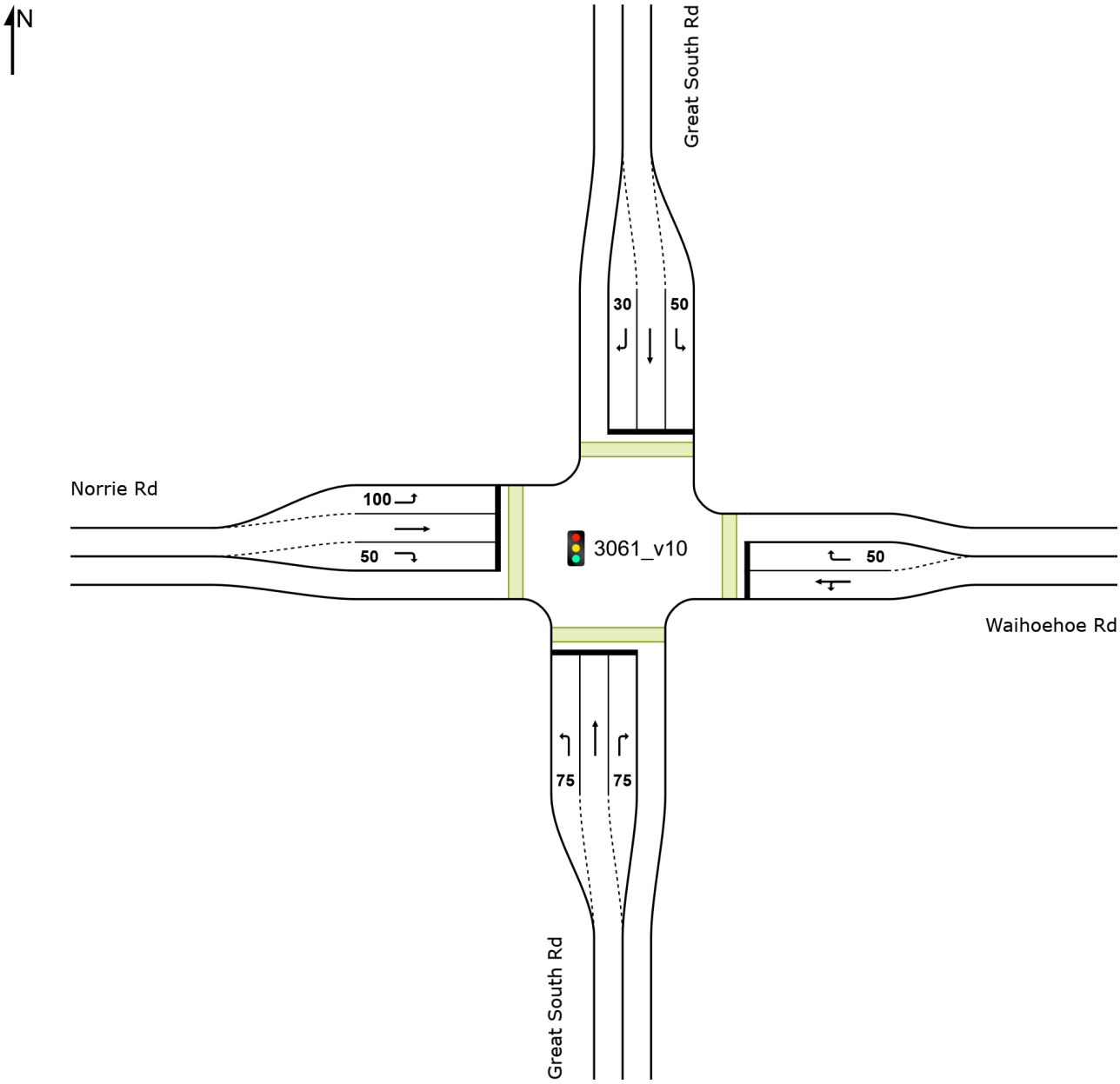
Appendix B Test 2 SIDRA Results

SITE LAYOUT

Site: 3061_v10 [Scenario62n : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62n : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 82 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	20	0	20	0.0	0.036	26.8	LOS C	0.3	2.4	0.74	0.67	0.74	34.1
2	T1	353	34	353	9.6	0.826	38.5	LOS D	9.4	70.9	1.00	1.01	1.22	32.8
3	R2	301	17	301	5.6	0.716	38.1	LOS D	7.2	52.9	0.98	0.87	1.05	29.0
Approach		674	51	674	7.6	0.826	38.0	LOS D	9.4	70.9	0.98	0.94	1.13	31.3
East: Waihoehoe Rd														
4	L2	247	12	247	4.9	* 0.687	24.3	LOS C	5.8	42.1	0.94	0.86	0.97	34.7
5	T1	112	5	112	4.5	* 0.687	19.7	LOS B	5.8	42.1	0.94	0.86	0.97	31.7
6	R2	306	24	306	7.8	0.785	41.6	LOS D	7.8	58.5	1.00	0.93	1.16	28.1
Approach		665	41	665	6.2	0.785	31.5	LOS C	7.8	58.5	0.97	0.89	1.06	30.9
North: Great South Rd														
7	L2	390	15	390	3.8	* 0.692	20.3	LOS C	4.8	34.7	0.94	0.85	0.95	35.9
8	T1	132	22	132	16.7	0.481	35.3	LOS D	3.1	24.6	0.96	0.77	0.96	33.8
9	R2	210	13	210	6.2	0.790	45.2	LOS D	5.5	40.4	1.00	0.94	1.23	28.2
Approach		732	50	732	6.8	0.790	30.2	LOS C	5.5	40.4	0.96	0.86	1.03	32.9
West: Norrie Rd														
10	L2	447	18	447	4.0	0.828	39.8	LOS D	11.6	84.2	1.00	0.95	1.18	29.6
11	T1	103	3	103	2.9	0.358	35.2	LOS D	2.4	16.9	0.94	0.74	0.94	26.5
12	R2	20	0	20	0.0	* 0.142	45.2	LOS D	0.5	3.4	0.97	0.69	0.97	28.3
Approach		570	21	570	3.7	0.828	39.2	LOS D	11.6	84.2	0.99	0.91	1.13	29.1
All Vehicles		2641	163	2641	6.2	0.828	34.4	LOS C	11.6	84.2	0.97	0.90	1.08	31.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	29.9	LOS C	0.1	0.1	0.86	0.86	59.2	38.0	0.64
East: Waihoehoe Rd												

P2	Full	50	53	35.3	LOS D	0.1	0.1	0.93	0.93	61.5	34.0	0.55
North: Great South Rd												
P3	Full	50	53	35.3	LOS D	0.1	0.1	0.93	0.93	64.5	38.0	0.59
West: Norrie Rd												
P4	Full	50	53	34.4	LOS D	0.1	0.1	0.92	0.92	63.6	38.0	0.60
All Pedestrians		0	211	33.7	LOS D	0.1	0.1	0.91	0.91	62.2	37.0	0.59

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

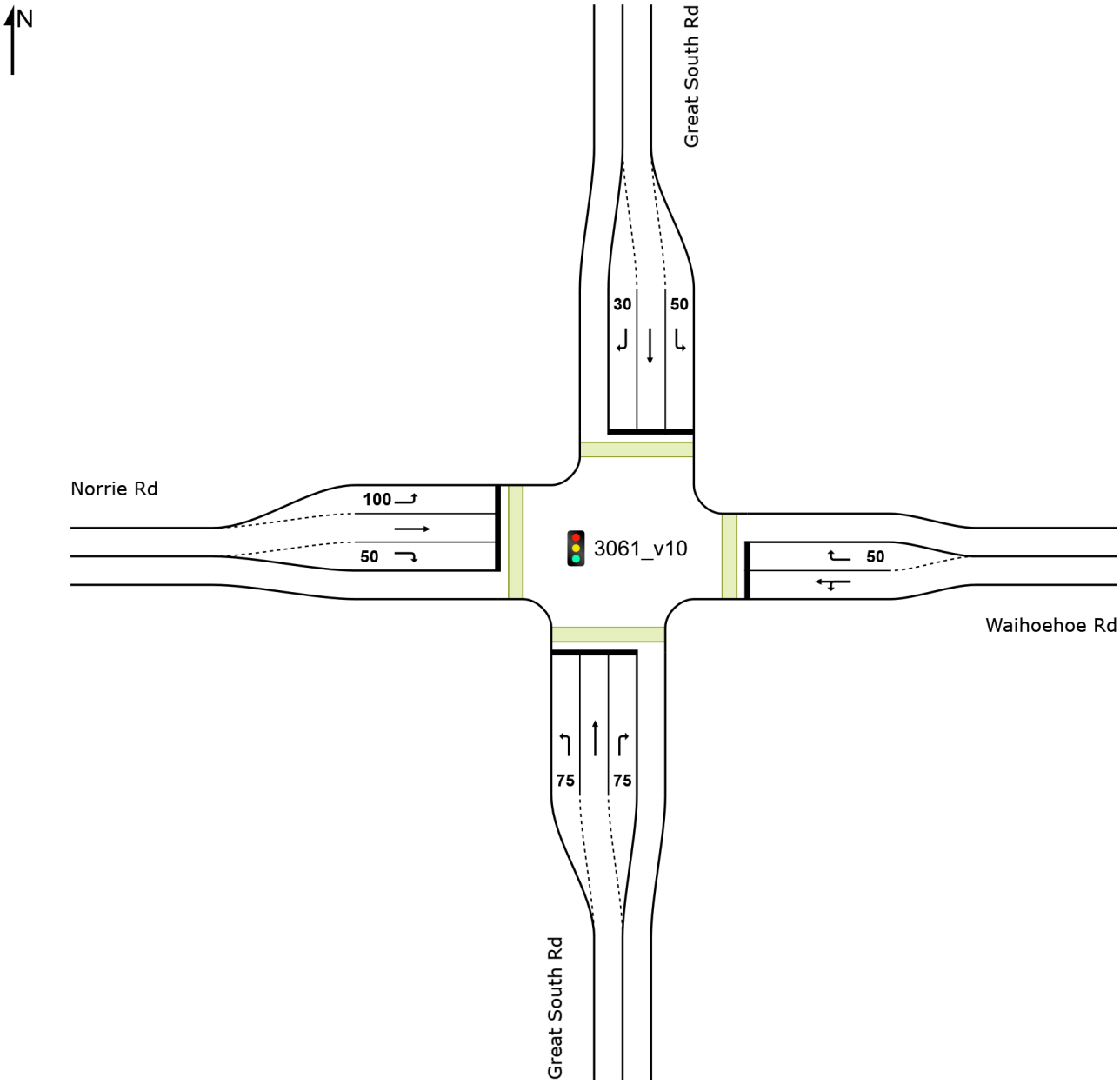
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SITE LAYOUT

Site: 3061_v10 [Scenario62n : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62n : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	20	0	20	0.0	0.043	26.5	LOS C	0.3	2.3	0.79	0.68	0.79	34.1
2	T1	97	26	97	26.8	0.355	28.9	LOS C	1.9	16.2	0.92	0.73	0.92	35.9
3	R2	245	29	245	11.8	0.837	42.3	LOS D	5.8	45.0	1.00	1.00	1.35	27.7
Approach		362	55	362	15.2	0.837	37.9	LOS D	5.8	45.0	0.97	0.91	1.21	30.3
East: Waihoehoe Rd														
4	L2	244	40	244	16.4	* 0.612	16.7	LOS B	3.3	25.9	0.90	0.80	0.90	38.2
5	T1	70	7	70	10.0	* 0.612	12.0	LOS B	3.3	25.9	0.90	0.80	0.90	35.9
6	R2	357	46	357	12.9	0.778	34.2	LOS C	7.7	60.1	0.98	0.93	1.14	30.5
Approach		671	93	671	13.9	0.778	25.5	LOS C	7.7	60.1	0.94	0.87	1.03	33.4
North: Great South Rd														
7	L2	362	44	362	12.2	* 0.620	18.4	LOS B	3.9	30.2	0.89	0.84	0.89	36.8
8	T1	126	31	126	24.6	0.494	30.7	LOS C	2.6	21.6	0.96	0.76	0.96	35.2
9	R2	215	17	215	7.9	0.771	39.6	LOS D	4.8	36.2	1.00	0.93	1.23	29.8
Approach		703	92	703	13.1	0.771	27.1	LOS C	4.8	36.2	0.93	0.86	1.00	34.0
West: Norrie Rd														
10	L2	223	16	223	7.2	0.485	29.1	LOS C	4.1	30.3	0.90	0.80	0.90	33.1
11	T1	64	7	64	10.9	0.307	32.5	LOS C	1.3	10.0	0.96	0.72	0.96	27.4
12	R2	20	0	20	0.0	* 0.121	38.3	LOS D	0.4	2.9	0.95	0.69	0.95	30.3
Approach		307	23	307	7.5	0.485	30.4	LOS C	4.1	30.3	0.91	0.78	0.91	31.9
All Vehicles		2043	263	2043	12.9	0.837	29.0	LOS C	7.7	60.1	0.94	0.86	1.03	32.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	26.6	LOS C	0.1	0.1	0.87	0.87	55.9	38.0	0.68
East: Waihoehoe Rd												

P2	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	55.5	34.0	0.61
North: Great South Rd												
P3	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	58.6	38.0	0.65
West: Norrie Rd												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	58.6	38.0	0.65
All Pedestrians		0	211	28.7	LOS C	0.1	0.1	0.91	0.91	57.1	37.0	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

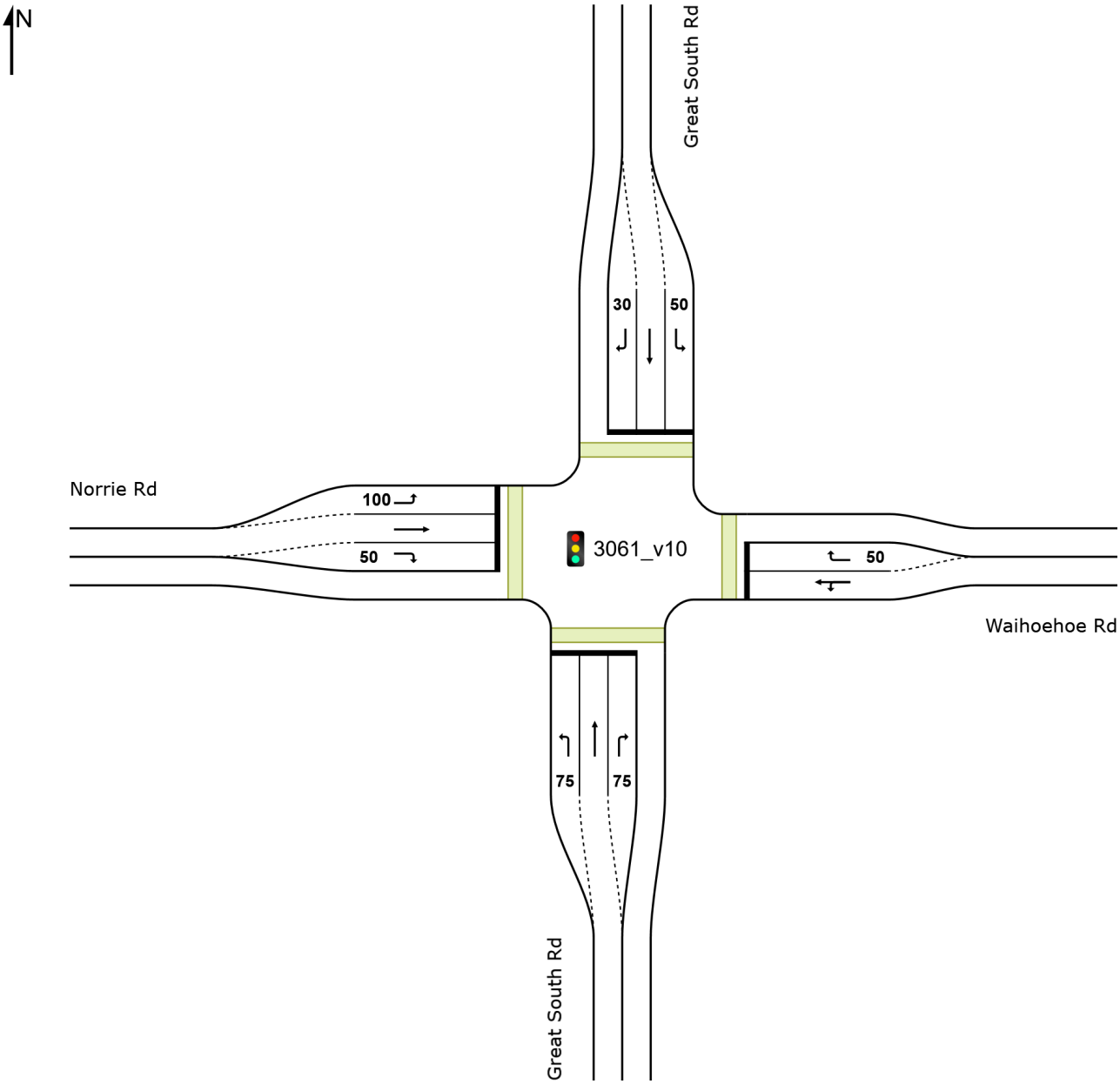
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SITE LAYOUT

Site: 3061_v10 [Scenario62n : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

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MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62n : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62n : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 84 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	22	2	22	9.1	0.075	37.1	LOS D	0.5	3.6	0.87	0.69	0.87	30.4
2	T1	212	23	212	10.8	1.085	135.3	LOS F	11.1	84.8	1.00	1.62	2.53	17.3
3	R2	209	15	209	7.2	1.092	145.1	LOS F	11.2	83.1	1.00	1.56	2.58	13.2
Approach		443	40	443	9.0	1.092	135.0	LOS F	11.2	84.8	0.99	1.55	2.47	15.7
East: Waihoehoe Rd														
4	L2	470	25	470	5.3	* 0.769	24.4	LOS C	10.8	79.0	0.91	0.93	0.96	34.5
5	T1	130	6	130	4.6	0.769	19.8	LOS B	10.8	79.0	0.91	0.93	0.96	31.4
6	R2	493	28	493	5.7	* 0.983	74.0	LOS E	18.2	133.8	0.86	1.20	1.60	21.0
Approach		1093	59	1093	5.4	0.983	46.2	LOS D	18.2	133.8	0.89	1.05	1.25	26.4
North: Great South Rd														
7	L2	533	29	533	5.4	* 0.586	15.3	LOS B	5.7	41.8	0.76	0.82	0.76	38.5
8	T1	291	22	291	7.6	1.008	84.8	LOS F	11.8	87.8	1.00	1.43	1.97	23.1
9	R2	204	10	204	4.9	0.830	48.3	LOS D	5.6	40.8	1.00	0.98	1.32	27.4
Approach		1028	61	1028	5.9	1.008	41.5	LOS D	11.8	87.8	0.87	1.03	1.21	29.5
West: Norrie Rd														
10	L2	320	14	320	4.4	0.770	41.1	LOS D	8.2	59.5	0.99	0.91	1.12	29.2
11	T1	140	4	140	2.9	* 0.855	49.2	LOS D	4.0	28.8	1.00	1.00	1.45	22.3
12	R2	20	0	20	0.0	0.145	46.3	LOS D	0.5	3.5	0.97	0.69	0.97	28.0
Approach		480	18	480	3.8	0.855	43.6	LOS D	8.2	59.5	1.00	0.93	1.21	27.3
All Vehicles		3044	178	3044	5.8	1.092	57.1	LOS E	18.2	133.8	0.92	1.10	1.41	24.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	21.5	LOS C	0.1	0.1	0.72	0.72	50.7	38.0	0.75
East: Waihoehoe Rd												

P2	Full	50	53	36.3	LOS D	0.1	0.1	0.93	0.93	62.4	34.0	0.54
North: Great South Rd												
P3	Full	50	53	36.3	LOS D	0.1	0.1	0.93	0.93	65.5	38.0	0.58
West: Norrie Rd												
P4	Full	50	53	36.3	LOS D	0.1	0.1	0.93	0.93	65.5	38.0	0.58
All Pedestrians		0	211	32.6	LOS D	0.1	0.1	0.88	0.88	61.1	37.0	0.61

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

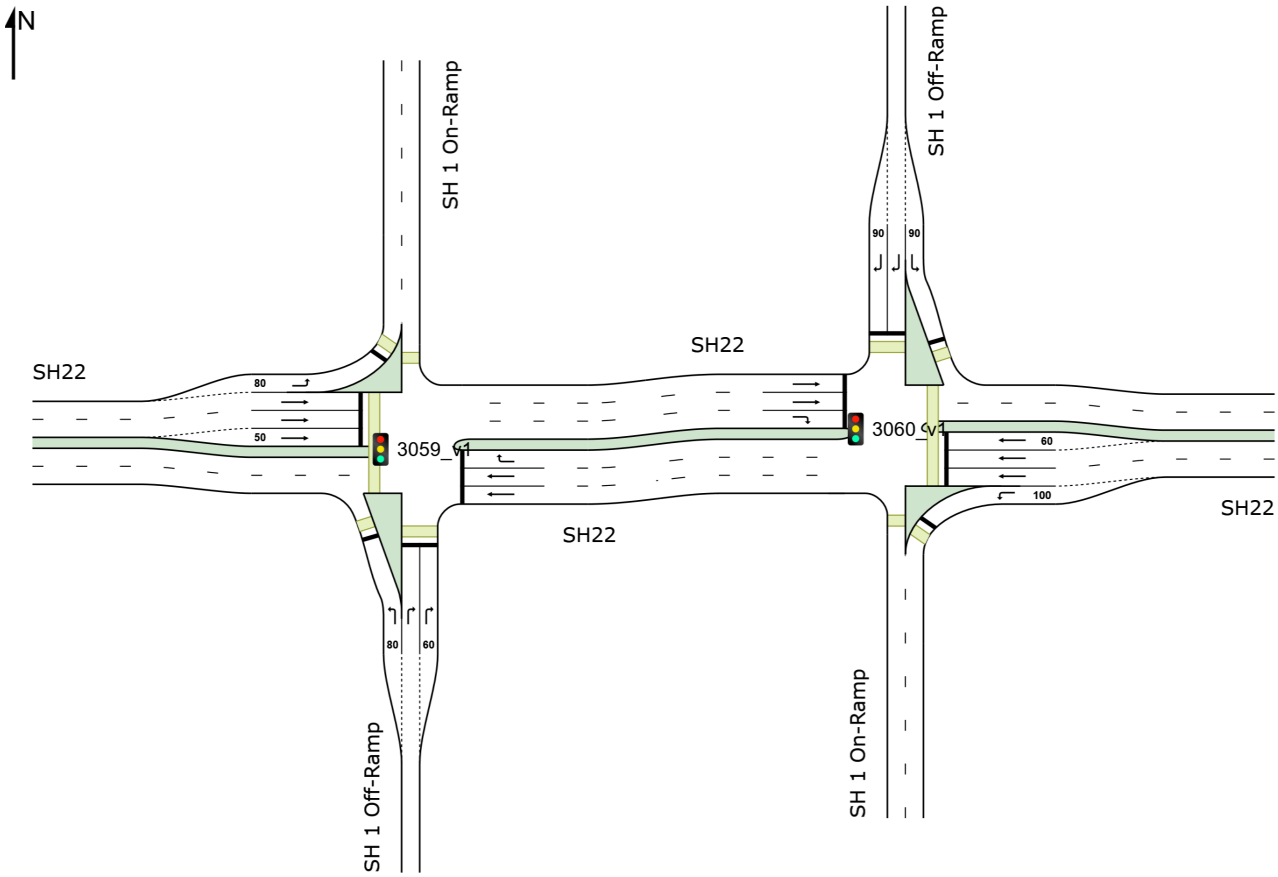
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NETWORK LAYOUT

Network: N101 [Network1 - MH (Network Folder: General)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
3059_v1	CCG1	Scenario62n : AM 2028 - 3059_SH1_SH22_Interchange_West
3060_v1	CCG1	Scenario62n : AM 2028 - 3060_SH1_SH22_Interchange_East

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Project: \\nz4105-ppfss01\shared_projects\310203562\4.0 Technical\4.9 Transportation\Modelling\SIDRA\Scenario 62n\Scenario62n AM sip files\3059_3060_SH1_SH22_Interchange_Both.sip9

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCGName]

Network: N101 [Network1 - MH (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 112 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 3059_v1 [Scenario62n : AM 2028 - 3059_SH1_SH22_Interchange_West]														
South: SH 1 Off-Ramp														
7	L2	62	1.6	62	1.6	0.540	63.2	LOS E	3.5	25.0	1.00	0.76	1.02	18.2
9	R2	104	9.6	104	9.6	0.479	63.2	LOS E	2.9	22.3	1.00	0.75	1.00	14.7
Approach		166	6.6	166	6.6	0.540	63.2	LOS E	3.5	25.0	1.00	0.75	1.01	16.1
East: SH22														
11	T1	688	8.6	688	8.6	0.224	0.3	LOS A	0.5	3.5	0.03	0.02	0.03	49.3
9	R2	169	4.1	169	4.1	0.148	5.1	LOS A	0.2	1.5	0.02	0.54	0.02	43.3
Approach		857	7.7	857	7.7	0.224	1.2	LOS A	0.5	3.5	0.03	0.13	0.03	47.1
West: SH22														
1	L2	1189	12.9	1189	12.9	* 0.938	33.8	LOS C	59.3	460.6	0.68	0.90	0.86	27.6
5	T1	348	11.8	348	11.8	0.598	49.5	LOS D	8.2	63.0	0.98	0.79	0.98	8.6
Approach		1537	12.6	1537	12.6	0.938	37.3	LOS D	59.3	460.6	0.75	0.87	0.88	23.9
All Vehicles		2560	10.6	2560	10.6	0.938	26.9	LOS C	59.3	460.6	0.52	0.61	0.61	26.4
Site: 3060_v1 [Scenario62n : AM 2028 - 3060_SH1_SH22_Interchange_East]														
East: SH22														
1	L2	85	13.6	85	13.6	0.061	6.3	LOS A	0.8	6.3	0.19	0.53	0.19	44.9
5	T1	373	9.3	373	9.3	* 0.970	69.2	LOS E	10.2	77.3	1.00	1.01	1.42	6.1
Approach		458	10.1	458	10.1	0.970	57.5	LOS E	10.2	77.3	0.85	0.92	1.19	11.2
North: SH 1 Off-Ramp														
7	L2	519	5.5	519	5.5	0.581	25.6	LOS C	19.8	145.2	0.76	0.80	0.76	29.7
9	R2	528	6.6	528	6.6	0.298	22.1	LOS C	8.4	61.9	0.63	0.74	0.63	28.2
Approach		1047	6.0	1047	6.0	0.581	23.8	LOS C	19.8	145.2	0.69	0.77	0.69	29.0
West: SH22														
11	T1	462	11.6	462	11.6	0.324	1.5	LOS A	0.7	5.7	0.05	0.05	0.05	46.3
9	R2	21	0.0	21	0.0	0.044	11.8	LOS B	0.2	1.3	0.17	0.56	0.17	39.2
Approach		483	11.1	483	11.1	0.324	1.9	LOS A	0.7	5.7	0.06	0.07	0.06	45.5
All Vehicles		1988	8.2	1988	8.2	0.970	26.2	LOS C	19.8	145.2	0.57	0.63	0.65	24.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 3059_v1 [Scenario62n : AM 2028 - 3059_SH1_SH22_Interchange_West]											

South: SH 1 Off-Ramp											
P3	Full	5	50.2	LOS E	0.0	0.0	0.95	0.95	210.6	208.6	0.99
P3B	Slip/ Bypass	5	50.2	LOS E	0.0	0.0	0.95	0.95	207.3	204.3	0.99
North: SH 1 On-Ramp											
P4	Full	53	50.3	LOS E	0.2	0.2	0.95	0.95	210.7	208.6	0.99
West: SH22											
P2	Full	5	50.2	LOS E	0.0	0.0	0.95	0.95	219.8	220.5	1.00
P2B	Slip/ Bypass	5	50.2	LOS E	0.0	0.0	0.95	0.95	207.3	204.3	0.99
All Pedestrians		74	50.2	LOS E	0.2	0.2	0.95	0.95	210.9	208.8	0.99
Site: 3060_v1 [Scenario62n : AM 2028 - 3060_SH1_SH22_Interchange_East]											
South: SH 1 On-Ramp											
P4	Full	53	50.3	LOS E	0.2	0.2	0.95	0.95	210.7	208.6	0.99
East: SH22											
P2	Full	5	50.2	LOS E	0.0	0.0	0.95	0.95	219.8	220.5	1.00
P2B	Slip/ Bypass	5	50.2	LOS E	0.0	0.0	0.95	0.95	207.3	204.3	0.99
North: SH 1 Off-Ramp											
P3	Full	5	50.2	LOS E	0.0	0.0	0.95	0.95	210.6	208.6	0.99
P3B	Slip/ Bypass	5	50.2	LOS E	0.0	0.0	0.95	0.95	207.3	204.3	0.99
All Pedestrians		74	50.2	LOS E	0.2	0.2	0.95	0.95	210.9	208.8	0.99

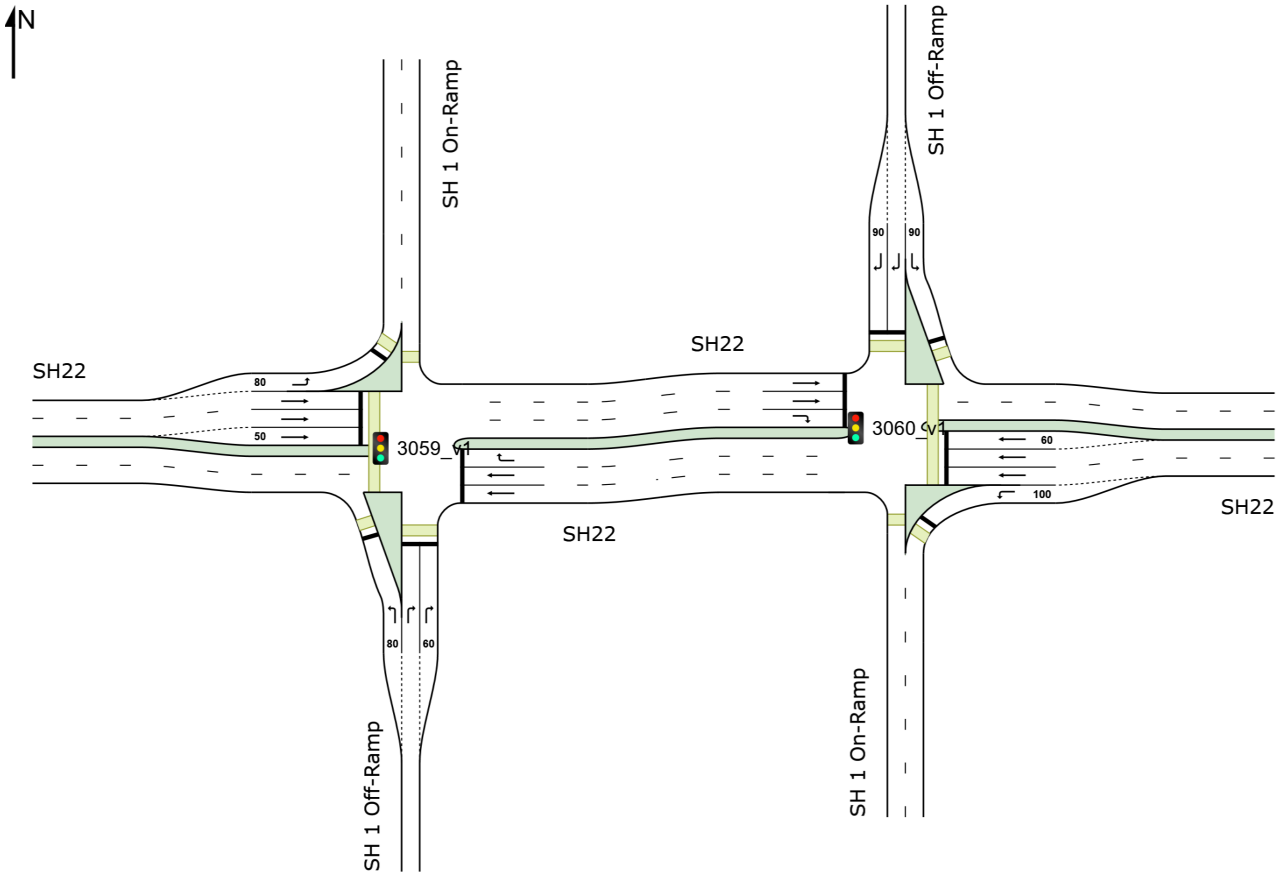
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

NETWORK LAYOUT

Network: N101 [Network1 - MH (Network Folder: General)]

New Network
Network Category: (None)
EQUISAT (Fixed-Time/SCATS) Isolated
Common Control Group: CCG1 [CCGName]

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
3059_v1	CCG1	Scenario62n : PM 2028 - 3059_SH1_SH22_Interchange_West
3060_v1	CCG1	Scenario62n : PM 2028 - 3060_SH1_SH22_Interchange_East

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CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCGName]

Network: N101 [Network1 - MH (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 86 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 3059_v1 [Scenario62n : PM 2028 - 3059_SH1_SH22_Interchange_West]														
South: SH 1 Off-Ramp														
7	L2	83	3.6	83	3.6	* 0.657	50.9	LOS D	3.7	27.0	1.00	0.83	1.14	20.8
9	R2	56	26.8	56	26.8	0.257	49.0	LOS D	1.2	10.4	0.98	0.72	0.98	17.5
Approach		139	12.9	139	12.9	0.657	50.1	LOS D	3.7	27.0	0.99	0.78	1.08	19.6
East: SH22														
11	T1	1497	5.5	1497	5.5	0.503	0.4	LOS A	1.2	9.0	0.04	0.04	0.04	49.1
9	R2	351	7.1	351	7.1	0.305	5.0	LOS A	0.4	3.1	0.03	0.54	0.03	43.3
Approach		1848	5.8	1848	5.8	0.503	1.3	LOS A	1.2	9.0	0.04	0.13	0.04	47.0
West: SH22														
1	L2	912	10.0	912	10.0	0.839	21.3	LOS C	32.0	242.9	0.80	0.87	0.87	33.3
5	T1	139	13.7	139	13.7	* 0.494	44.7	LOS D	2.7	21.1	1.00	0.74	1.00	9.4
Approach		1051	10.5	1051	10.5	0.839	24.4	LOS C	32.0	242.9	0.83	0.86	0.89	30.4
All Vehicles		3038	7.8	3038	7.8	0.839	11.5	LOS B	32.0	242.9	0.36	0.41	0.38	35.6
Site: 3060_v1 [Scenario62n : PM 2028 - 3060_SH1_SH22_Interchange_East]														
East: SH22														
1	L2	167	4.8	167	4.8	0.118	6.6	LOS A	1.6	11.5	0.25	0.56	0.25	44.7
5	T1	697	6.7	697	6.7	* 0.951	47.3	LOS D	20.6	152.6	0.96	1.02	1.27	8.4
Approach		864	6.4	864	6.4	0.951	39.4	LOS D	20.6	152.6	0.82	0.93	1.07	15.0
North: SH 1 Off-Ramp														
7	L2	538	5.8	538	5.8	0.811	35.2	LOS D	22.4	164.9	0.96	0.93	1.08	25.8
9	R2	1152	5.4	1152	5.4	* 0.915	49.7	LOS D	31.9	233.8	0.98	1.05	1.34	18.2
Approach		1690	5.5	1690	5.5	0.915	45.1	LOS D	31.9	233.8	0.98	1.01	1.25	20.5
West: SH22														
11	T1	178	18.5	178	18.5	0.105	0.5	LOS A	0.1	0.7	0.02	0.02	0.02	48.7
9	R2	21	4.8	21	4.8	0.056	9.2	LOS A	0.1	0.8	0.13	0.56	0.13	41.0
Approach		199	17.1	199	17.1	0.105	1.4	LOS A	0.1	0.8	0.04	0.08	0.04	46.7
All Vehicles		2753	6.6	2753	6.6	0.951	40.2	LOS D	31.9	233.8	0.86	0.92	1.11	19.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 3059_v1 [Scenario62n : PM 2028 - 3059_SH1_SH22_Interchange_West]											

South: SH 1 Off-Ramp											
P3	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	197.7	208.6	1.06
P3B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
North: SH 1 On-Ramp											
P4	Full	53	37.3	LOS D	0.1	0.1	0.93	0.93	197.8	208.6	1.05
West: SH22											
P2	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	206.8	220.5	1.07
P2B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
All Pedestrians		74	37.3	LOS D	0.1	0.1	0.93	0.93	197.9	208.8	1.06
Site: 3060_v1 [Scenario62n : PM 2028 - 3060_SH1_SH22_Interchange_East]											
South: SH 1 On-Ramp											
P4	Full	53	37.3	LOS D	0.1	0.1	0.93	0.93	197.8	208.6	1.05
East: SH22											
P2	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	206.8	220.5	1.07
P2B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
North: SH 1 Off-Ramp											
P3	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	197.7	208.6	1.06
P3B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
All Pedestrians		74	37.3	LOS D	0.1	0.1	0.93	0.93	197.9	208.8	1.06

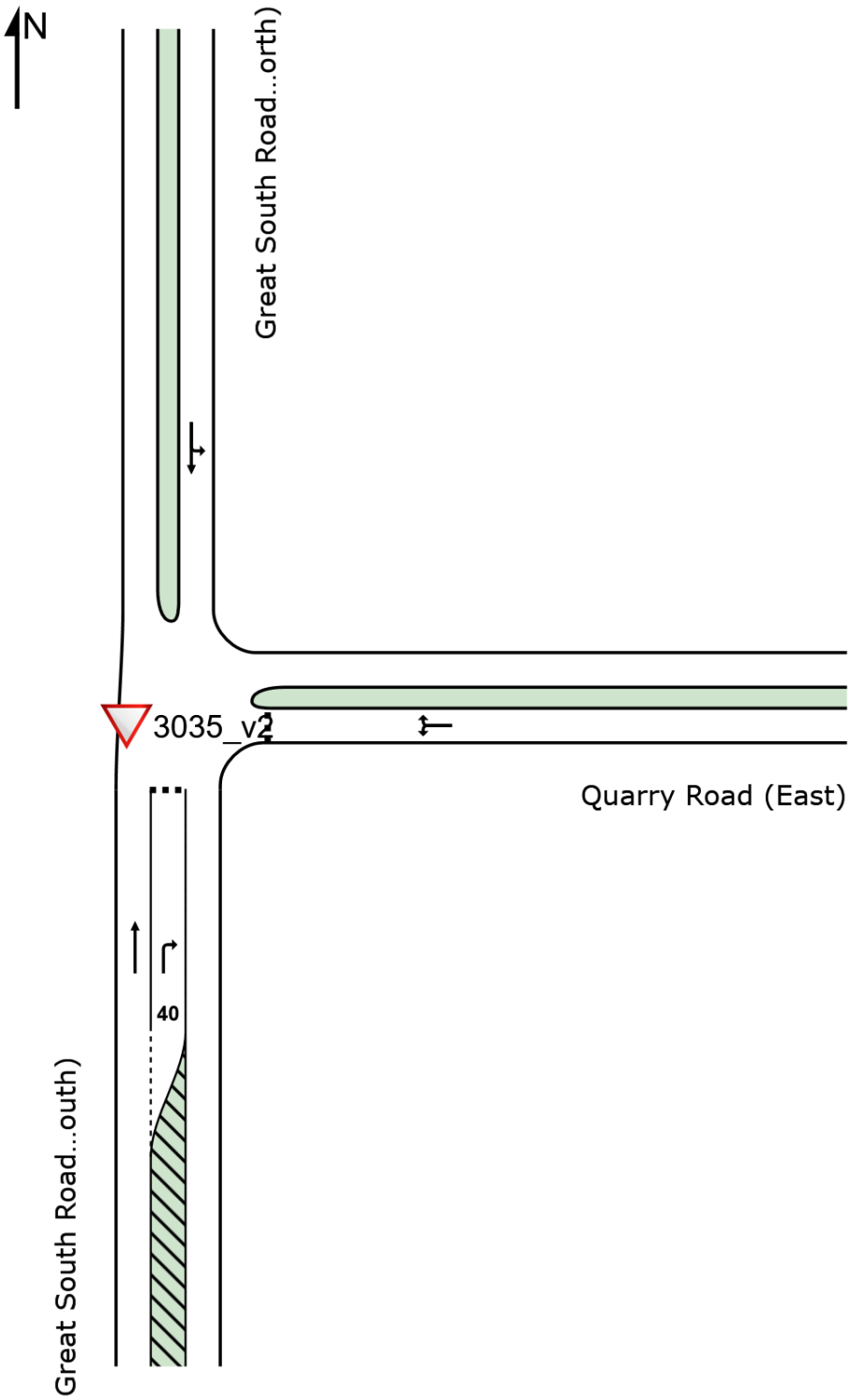
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 3035_v2 [Scenario62n : AM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : AM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62n : AM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : AM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	130	21	137	16.2	0.078	3.3	LOS A	0.0	0.0	0.00	0.46	0.00	45.0
6	R2	33	3	35	9.1	0.043	6.4	LOS A	0.1	0.4	0.39	0.63	0.39	41.4
Approach		163	24	172	14.7	0.078	3.9	LOS A	0.1	0.4	0.08	0.50	0.08	44.2
East: Quarry Road (East)														
7	L2	21	1	22	4.8	0.295	5.0	LOS A	0.5	4.0	0.40	0.69	0.42	41.5
9	R2	197	42	207	21.3	0.295	7.6	LOS A	0.5	4.0	0.40	0.69	0.42	41.0
Approach		218	43	229	19.7	0.295	7.4	LOS A	0.5	4.0	0.40	0.69	0.42	41.0
North: Great South Road (North)														
10	L2	258	17	272	6.6	0.192	4.6	LOS A	0.0	0.0	0.00	0.42	0.00	45.1
11	T1	69	6	73	8.7	0.192	0.0	LOS A	0.0	0.0	0.00	0.42	0.00	45.5
Approach		327	23	344	7.0	0.192	3.7	NA	0.0	0.0	0.00	0.42	0.00	45.2
All Vehicles		708	90	745	12.7	0.295	4.9	NA	0.5	4.0	0.14	0.52	0.15	43.6

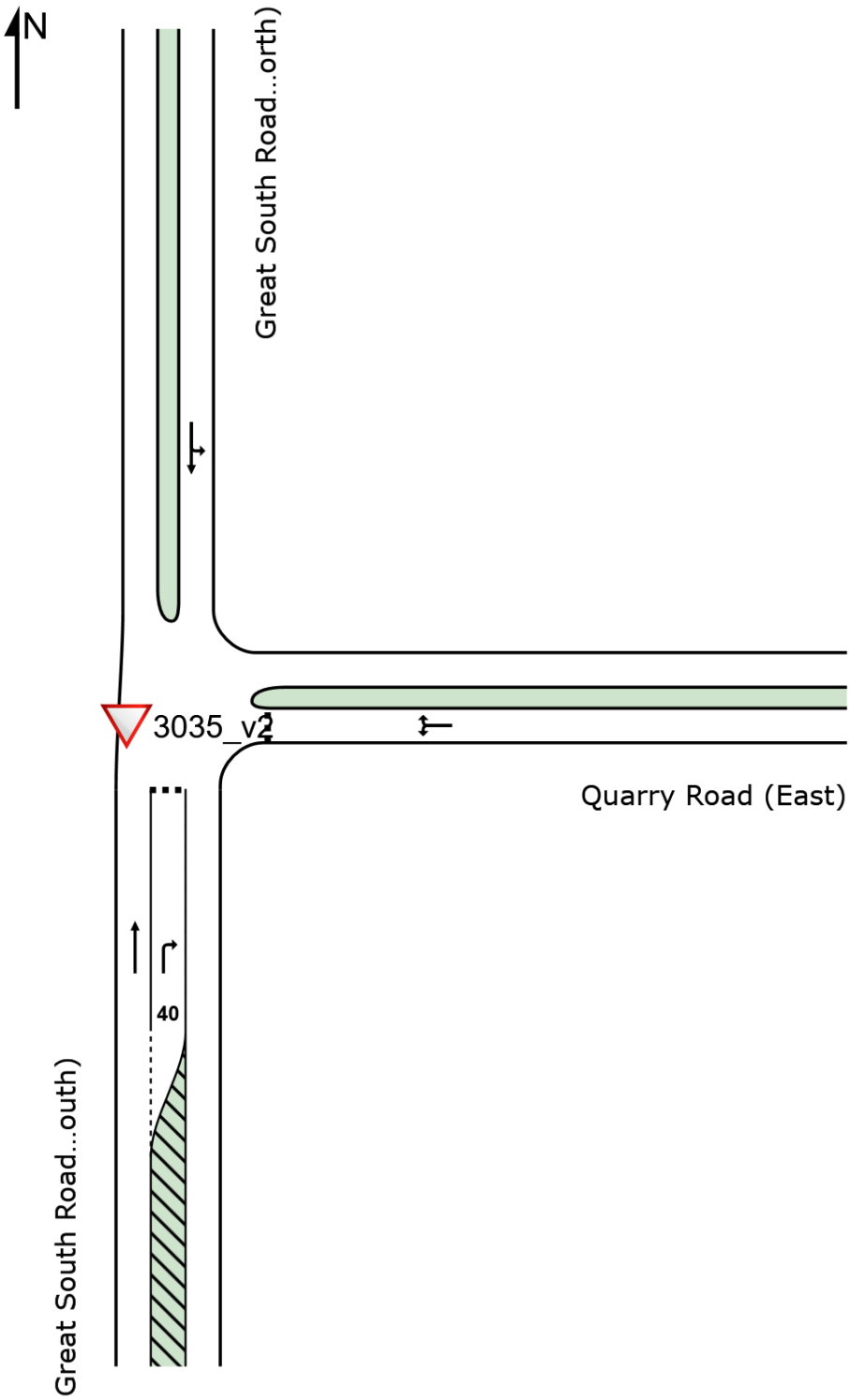
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3035_v2 [Scenario62n : IP 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : IP 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62n : IP 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : IP 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	81	9	85	11.1	0.047	3.3	LOS A	0.0	0.0	0.00	0.46	0.00	45.1
6	R2	22	2	23	9.1	0.026	6.0	LOS A	0.0	0.3	0.34	0.59	0.34	41.9
Approach		103	11	108	10.7	0.047	3.8	LOS A	0.0	0.3	0.07	0.49	0.07	44.3
East: Quarry Road (East)														
7	L2	23	3	24	13.0	0.331	5.1	LOS A	0.6	4.7	0.39	0.66	0.40	41.9
9	R2	249	50	262	20.1	0.331	6.8	LOS A	0.6	4.7	0.39	0.66	0.40	41.5
Approach		272	53	286	19.5	0.331	6.7	LOS A	0.6	4.7	0.39	0.66	0.40	41.6
North: Great South Road (North)														
10	L2	174	20	183	11.5	0.152	4.7	LOS A	0.0	0.0	0.00	0.37	0.00	45.5
11	T1	79	7	83	8.9	0.152	0.0	LOS A	0.0	0.0	0.00	0.37	0.00	46.1
Approach		253	27	266	10.7	0.152	3.2	NA	0.0	0.0	0.00	0.37	0.00	45.7
All Vehicles		628	91	661	14.5	0.331	4.8	NA	0.6	4.7	0.18	0.51	0.19	43.5

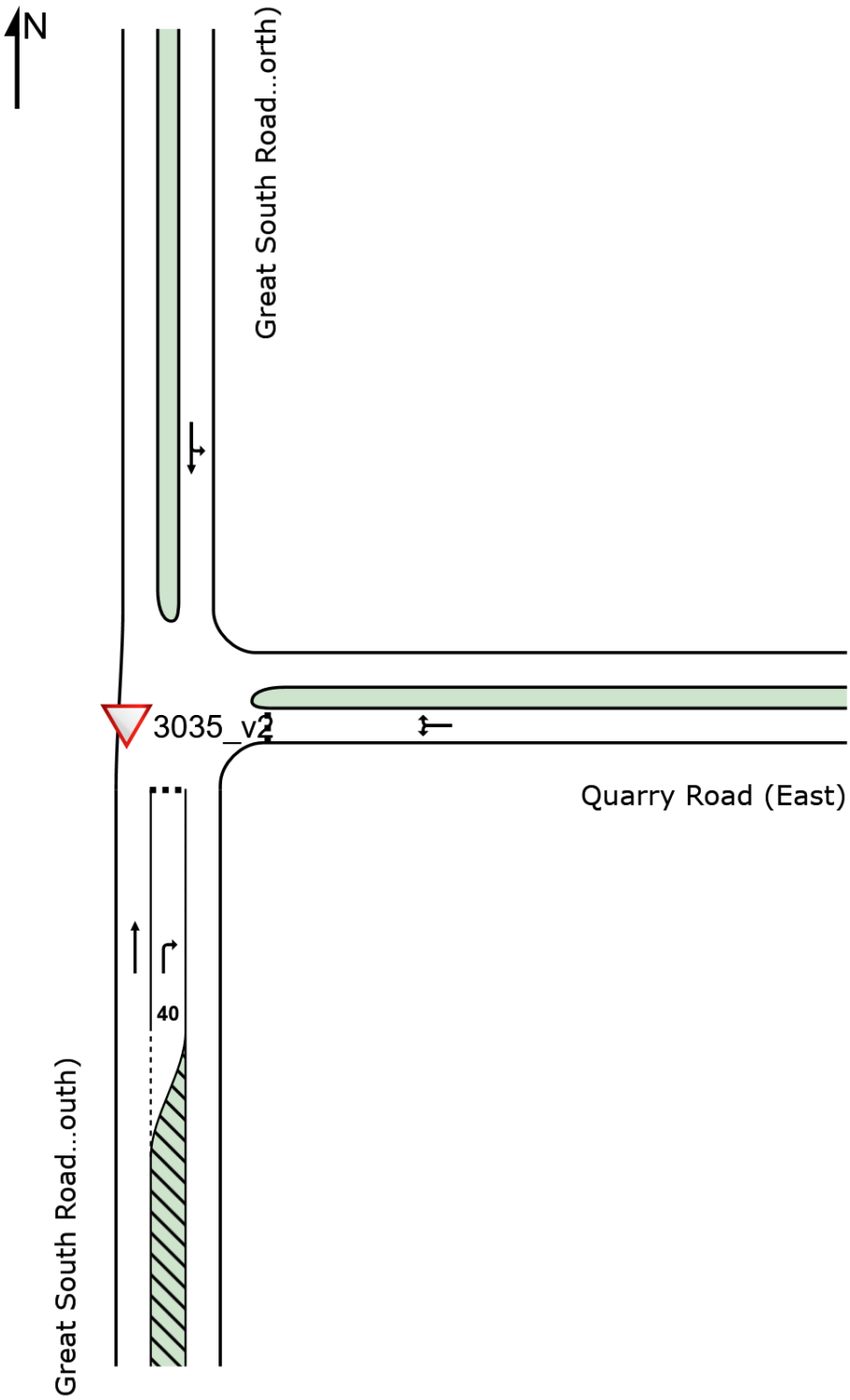
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3035_v2 [Scenario62n : PM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : PM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62n : PM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62n : PM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	98	6	103	6.1	0.055	3.2	LOS A	0.0	0.0	0.00	0.46	0.00	45.2
6	R2	22	1	23	4.5	0.026	6.0	LOS A	0.0	0.2	0.35	0.60	0.35	41.9
Approach		120	7	126	5.8	0.055	3.7	LOS A	0.0	0.2	0.06	0.49	0.06	44.5
East: Quarry Road (East)														
7	L2	61	1	64	1.6	0.564	6.6	LOS A	1.7	12.9	0.53	0.83	0.76	40.6
9	R2	420	32	442	7.6	0.564	8.6	LOS A	1.7	12.9	0.53	0.83	0.76	40.4
Approach		481	33	506	6.9	0.564	8.4	LOS A	1.7	12.9	0.53	0.83	0.76	40.4
North: Great South Road (North)														
10	L2	120	18	126	15.0	0.154	4.7	LOS A	0.0	0.0	0.00	0.25	0.00	46.5
11	T1	140	9	147	6.4	0.154	0.0	LOS A	0.0	0.0	0.00	0.25	0.00	47.4
Approach		260	27	274	10.4	0.154	2.2	NA	0.0	0.0	0.00	0.25	0.00	47.0
All Vehicles		861	67	906	7.8	0.564	5.9	NA	1.7	12.9	0.30	0.60	0.43	42.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

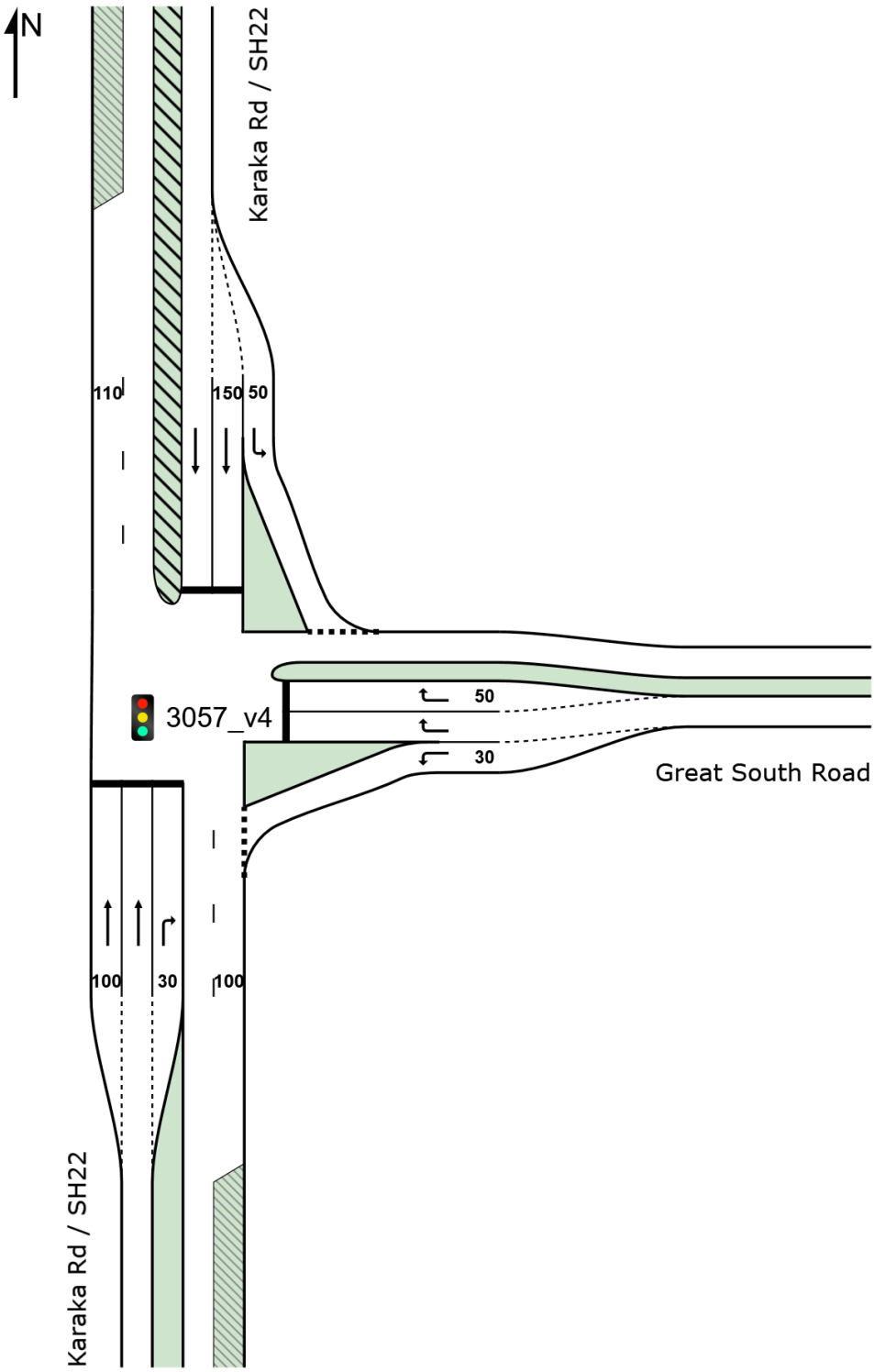
Appendix C Test 3 SIDRA Results

SITE LAYOUT

Site: 3057_v4 [Scenario62o : PM 2028 - SH22/GSR - Signalised (extra 50m RT lane) (Site Folder: 3057 SH22/GSR)]

Scenario62o : PM 2028 - SH22/GSR - Signalised (extra 50m RT lane)
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3057_v4 [Scenario62o : PM 2028 - SH22/GSR - Signalised (extra 50m RT lane) (Site Folder: 3057 SH22/GSR)]

Scenario62o : PM 2028 - SH22/GSR - Signalised (extra 50m RT lane)
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Karaka Rd / SH22														
5	T1	681	69	717	10.1	0.402	6.1	LOS A	4.4	33.2	0.42	0.36	0.42	44.6
6	R2	105	6	111	5.7	* 0.796	55.1	LOS E	3.3	24.2	1.00	0.93	1.32	20.8
Approach		786	75	827	9.5	0.796	12.6	LOS B	4.4	33.2	0.50	0.44	0.54	39.5
East: Great South Road														
7	L2	142	3	149	2.1	0.236	20.4	LOS C	2.4	17.0	0.68	0.72	0.68	33.8
9	R2	410	39	432	9.5	* 0.870	49.6	LOS D	8.3	63.0	0.98	0.93	1.20	28.2
Approach		552	42	581	7.6	0.870	42.1	LOS D	8.3	63.0	0.91	0.87	1.07	29.0
North: Karaka Rd / SH22														
10	L2	187	14	197	7.5	0.142	5.6	LOS A	0.8	5.6	0.23	0.57	0.23	46.0
11	T1	1341	65	1412	4.8	* 0.895	25.9	LOS C	27.1	197.9	0.86	0.87	0.97	32.8
Approach		1528	79	1608	5.2	0.895	23.5	LOS C	27.1	197.9	0.78	0.83	0.88	34.4
All Vehicles		2866	196	3017	6.8	0.895	24.1	LOS C	27.1	197.9	0.73	0.73	0.82	34.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

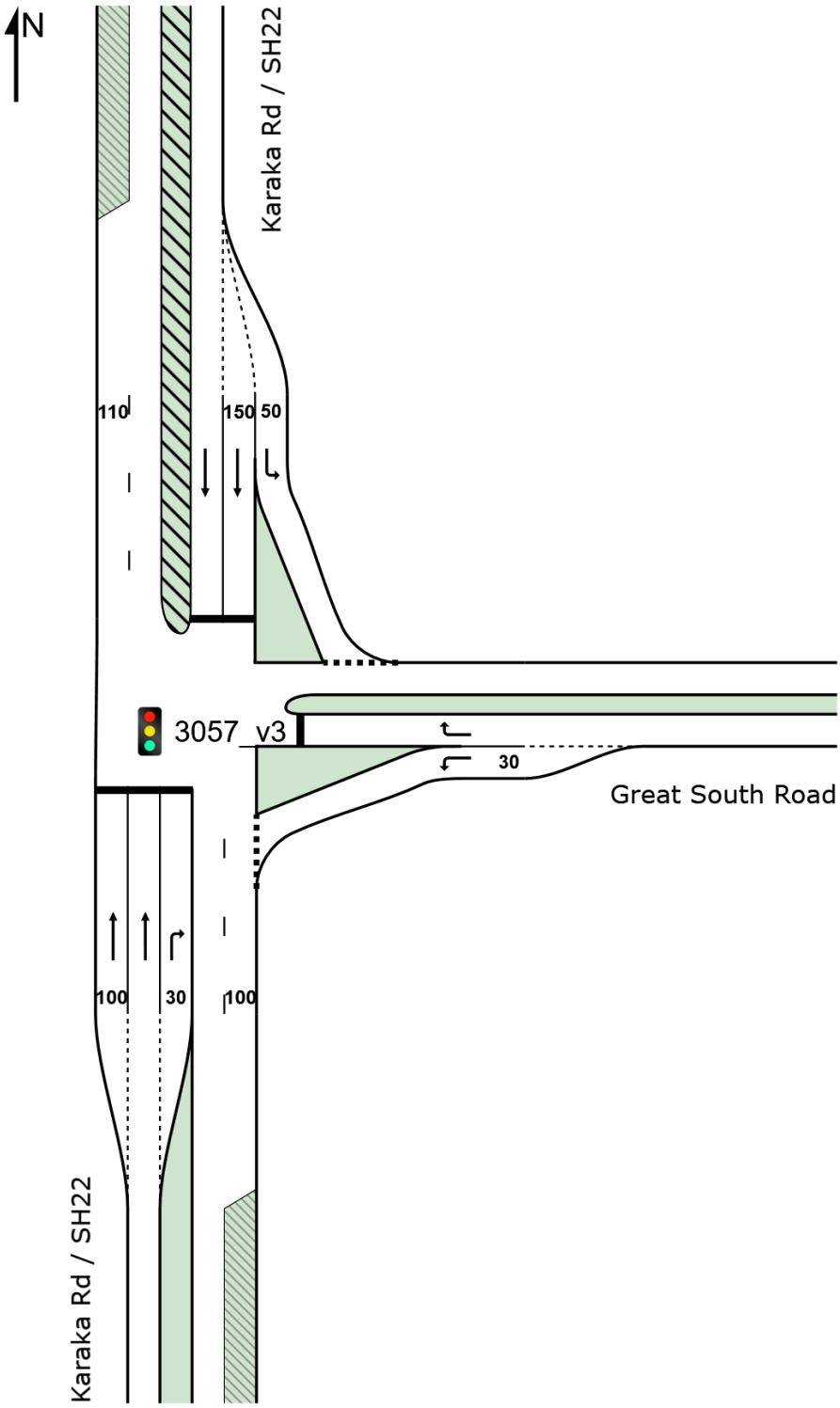
* Critical Movement (Signal Timing)

SITE LAYOUT

Site: 3057_v3 [Scenario62o : PM 2028 - SH22/GSR - Signalised_v3 (Site Folder: 3057 SH22/GSR)]

Scenario62o : PM 2028 - SH22/GSR - Signalised_v3
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3057_v3 [Scenario62o : PM 2028 - SH22/GSR - Signalised_v3 (Site Folder: 3057 SH22/GSR)]

Scenario62o : PM 2028 - SH22/GSR - Signalised_v3
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Karaka Rd / SH22														
5	T1	681	69	717	10.1	0.465	9.9	LOS A	5.7	43.7	0.54	0.47	0.54	41.6
6	R2	105	6	111	5.7	* 0.929	65.7	LOS E	3.7	27.1	1.00	1.10	1.74	18.6
Approach		786	75	827	9.5	0.929	17.4	LOS B	5.7	43.7	0.60	0.55	0.70	36.5
East: Great South Road														
7	L2	142	3	149	2.1	0.203	21.4	LOS C	2.4	17.4	0.69	0.71	0.69	33.0
9	R2	410	39	432	9.5	* 1.109	164.2	LOS F	26.5	200.8	1.00	1.58	2.48	13.9
Approach		552	42	581	7.6	1.109	127.5	LOS F	26.5	200.8	0.92	1.35	2.02	15.4
North: Karaka Rd / SH22														
10	L2	187	14	197	7.5	0.145	5.6	LOS A	0.7	5.6	0.23	0.57	0.23	46.0
11	T1	1341	65	1412	4.8	* 1.088	97.2	LOS F	55.4	404.1	0.92	1.46	1.71	16.4
Approach		1528	79	1608	5.2	1.088	86.0	LOS F	55.4	404.1	0.84	1.35	1.53	18.3
All Vehicles		2866	196	3017	6.8	1.109	75.2	LOS E	55.4	404.1	0.79	1.13	1.40	20.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

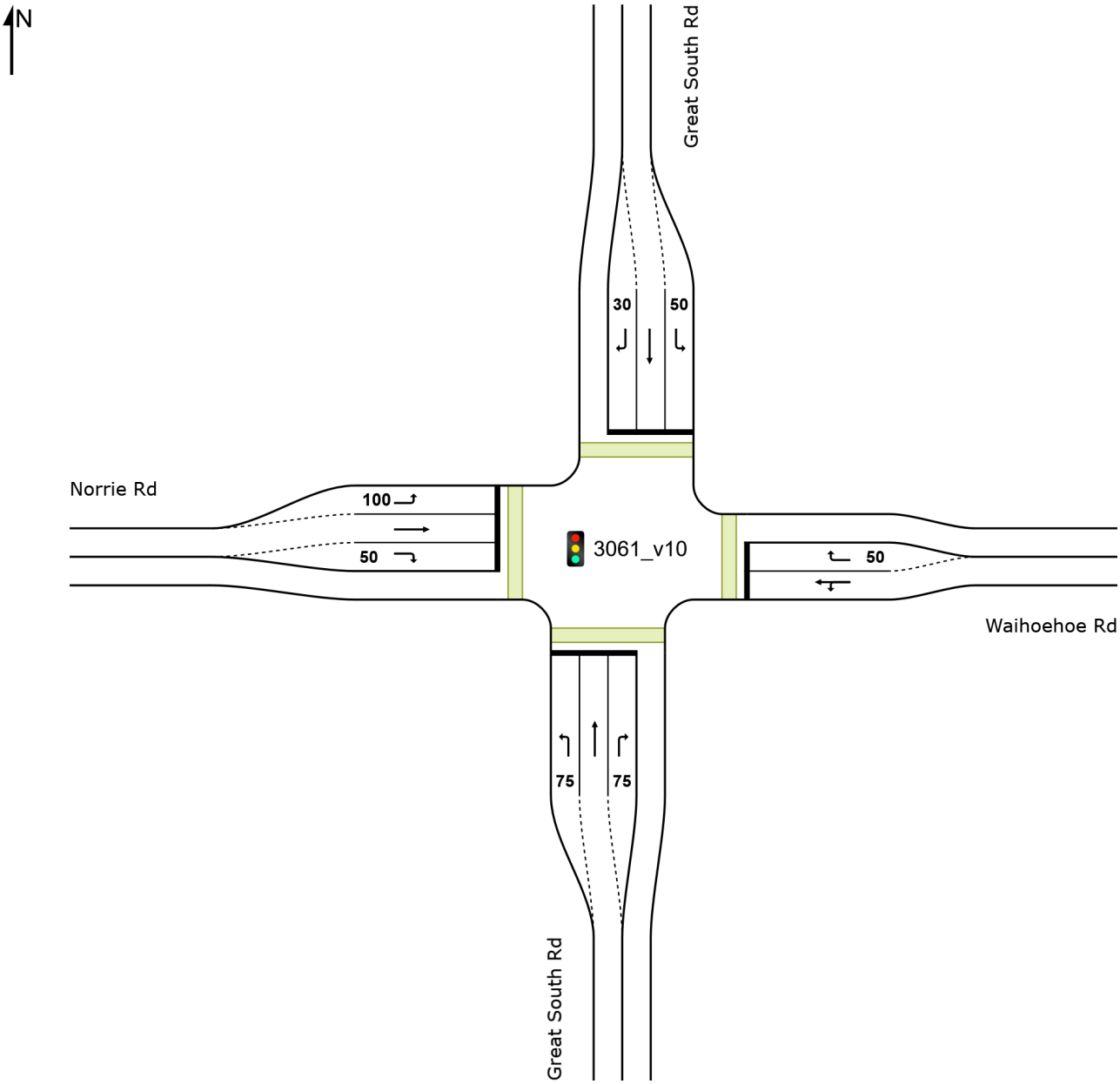
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SITE LAYOUT

Site: 3061_v10 [Scenario62o : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62o : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62o : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62o : AM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 68 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	20	0	20	0.0	0.042	25.5	LOS C	0.3	2.2	0.78	0.67	0.78	34.6
2	T1	277	30	277	10.8	0.861	37.9	LOS D	6.6	50.3	1.00	1.07	1.40	33.0
3	R2	122	12	122	9.8	0.397	32.6	LOS C	2.3	17.5	0.93	0.78	0.93	30.8
Approach		419	42	419	10.0	0.861	35.8	LOS D	6.6	50.3	0.97	0.97	1.24	32.5
East: Waihoehoe Rd														
4	L2	241	13	241	5.4	* 0.673	18.7	LOS B	3.8	28.0	0.94	0.84	0.98	37.3
5	T1	92	5	92	5.4	* 0.673	14.1	LOS B	3.8	28.0	0.94	0.84	0.98	34.7
6	R2	350	25	350	7.1	0.832	38.0	LOS D	7.9	59.0	1.00	0.99	1.28	29.3
Approach		683	43	683	6.3	0.832	28.0	LOS C	7.9	59.0	0.97	0.92	1.13	32.3
North: Great South Rd														
7	L2	305	12	305	3.9	* 0.535	16.0	LOS B	3.1	22.2	0.87	0.79	0.87	38.1
8	T1	148	24	148	16.2	0.526	29.7	LOS C	2.9	23.2	0.96	0.77	0.96	35.6
9	R2	223	13	223	5.8	0.761	38.0	LOS D	4.8	35.6	1.00	0.93	1.21	30.3
Approach		676	49	676	7.2	0.761	26.3	LOS C	4.8	35.6	0.94	0.83	1.00	34.6
West: Norrie Rd														
10	L2	453	18	453	4.0	0.878	40.3	LOS D	11.0	79.5	1.00	1.03	1.35	29.4
11	T1	106	3	106	2.8	0.408	30.7	LOS C	2.1	14.9	0.96	0.75	0.96	28.1
12	R2	20	0	20	0.0	* 0.118	37.1	LOS D	0.4	2.8	0.95	0.69	0.95	30.6
Approach		579	21	579	3.6	0.878	38.4	LOS D	11.0	79.5	0.99	0.97	1.27	29.3
All Vehicles		2357	155	2357	6.6	0.878	31.4	LOS C	11.0	79.5	0.97	0.91	1.15	32.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	27.4	LOS C	0.1	0.1	0.90	0.90	56.7	38.0	0.67
East: Waihoehoe Rd												

P2	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	54.5	34.0	0.62
North: Great South Rd												
P3	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	57.6	38.0	0.66
West: Norrie Rd												
P4	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	57.6	38.0	0.66
All Pedestrians		0	211	28.1	LOS C	0.1	0.1	0.91	0.91	56.6	37.0	0.65

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62o : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62o : IP 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 68 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	20	0	20	0.0	0.059	30.2	LOS C	0.3	2.4	0.86	0.68	0.86	32.8
2	T1	88	26	88	29.5	0.548	34.2	LOS C	1.9	16.3	0.99	0.79	1.03	34.1
3	R2	82	12	82	14.6	0.479	38.2	LOS D	1.7	13.4	0.98	0.77	0.98	28.9
Approach		190	38	190	20.0	0.548	35.5	LOS D	1.9	16.3	0.98	0.77	0.99	31.9
East: Waihoehoe Rd														
4	L2	234	40	234	17.1	*0.572	17.6	LOS B	3.2	25.2	0.88	0.81	0.88	37.8
5	T1	75	7	75	9.3	*0.572	12.8	LOS B	3.2	25.2	0.88	0.81	0.88	35.4
6	R2	366	46	366	12.6	0.699	28.6	LOS C	7.0	54.0	0.94	0.87	0.99	32.5
Approach		675	93	675	13.8	0.699	23.0	LOS C	7.0	54.0	0.91	0.84	0.94	34.5
North: Great South Rd														
7	L2	269	36	269	13.4	*0.403	13.5	LOS B	2.6	20.0	0.76	0.76	0.76	39.4
8	T1	160	40	160	25.0	0.561	29.1	LOS C	3.1	26.7	0.96	0.78	0.96	35.8
9	R2	224	17	224	7.6	0.713	36.0	LOS D	4.7	34.9	0.99	0.89	1.13	31.0
Approach		653	93	653	14.2	0.713	25.0	LOS C	4.7	34.9	0.89	0.81	0.93	35.1
West: Norrie Rd														
10	L2	234	16	234	6.8	0.467	27.1	LOS C	4.1	30.0	0.88	0.80	0.88	33.9
11	T1	66	8	66	12.1	0.311	31.4	LOS C	1.3	10.1	0.95	0.72	0.95	27.9
12	R2	20	0	20	0.0	*0.118	37.1	LOS D	0.4	2.8	0.95	0.69	0.95	30.6
Approach		320	24	320	7.5	0.467	28.6	LOS C	4.1	30.0	0.90	0.77	0.90	32.6
All Vehicles		1838	248	1838	13.5	0.713	26.0	LOS C	7.0	54.0	0.91	0.81	0.94	34.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	23.9	LOS C	0.1	0.1	0.84	0.84	53.2	38.0	0.71
East: Waihoehoe Rd												

P2	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	54.5	34.0	0.62
North: Great South Rd												
P3	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	57.6	38.0	0.66
West: Norrie Rd												
P4	Full	50	53	28.3	LOS C	0.1	0.1	0.91	0.91	57.6	38.0	0.66
All Pedestrians		0	211	27.2	LOS C	0.1	0.1	0.90	0.90	55.7	37.0	0.66

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 3061_v10 [Scenario62o : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing (Site Folder: 3061 - GSR / Waihoehoe)]

Scenario62o : PM 2028 - GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Rd														
1	L2	21	1	21	4.8	0.071	35.8	LOS D	0.4	3.2	0.88	0.69	0.88	30.8
2	T1	172	28	172	16.3	0.990	73.5	LOS E	6.1	49.1	1.00	1.32	2.03	25.0
3	R2	87	8	87	9.2	0.497	43.9	LOS D	2.1	15.9	0.99	0.77	0.99	27.3
Approach		280	37	280	13.2	0.990	61.4	LOS E	6.1	49.1	0.99	1.10	1.62	25.9
East: Waihoehoe Rd														
4	L2	441	25	441	5.7	* 0.788	26.5	LOS C	10.4	76.1	0.94	0.96	1.02	33.6
5	T1	126	4	126	3.2	0.788	21.9	LOS C	10.4	76.1	0.94	0.96	1.02	30.4
6	R2	511	27	511	5.3	* 1.031	103.6	LOS F	24.0	175.3	1.00	1.42	2.06	17.0
Approach		1078	56	1078	5.2	1.031	62.5	LOS E	24.0	175.3	0.97	1.18	1.52	22.6
North: Great South Rd														
7	L2	462	25	462	5.4	* 0.521	12.8	LOS B	4.6	34.0	0.73	0.77	0.73	39.9
8	T1	329	31	329	9.4	1.068	121.4	LOS F	16.2	122.3	1.00	1.71	2.39	18.6
9	R2	237	11	237	4.6	0.952	64.3	LOS E	7.6	55.7	1.00	1.21	1.77	23.9
Approach		1028	67	1028	6.5	1.068	59.4	LOS E	16.2	122.3	0.88	1.17	1.50	25.1
West: Norrie Rd														
10	L2	366	14	366	3.8	0.792	39.2	LOS D	9.1	65.5	0.99	0.93	1.15	29.8
11	T1	76	3	76	3.9	* 0.447	39.8	LOS D	1.8	13.3	0.99	0.75	0.99	24.9
12	R2	20	0	20	0.0	0.139	44.0	LOS D	0.5	3.3	0.96	0.69	0.96	28.6
Approach		462	17	462	3.7	0.792	39.5	LOS D	9.1	65.5	0.99	0.89	1.11	29.0
All Vehicles		2848	177	2848	6.2	1.068	57.5	LOS E	24.0	175.3	0.94	1.12	1.46	24.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	22.5	LOS C	0.1	0.1	0.75	0.75	51.8	38.0	0.73
East: Waihoehoe Rd												

P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	60.5	34.0	0.56
North: Great South Rd												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	63.5	38.0	0.60
West: Norrie Rd												
P4	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	63.5	38.0	0.60
All Pedestrians		0	211	31.4	LOS D	0.1	0.1	0.88	0.88	59.8	37.0	0.62

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

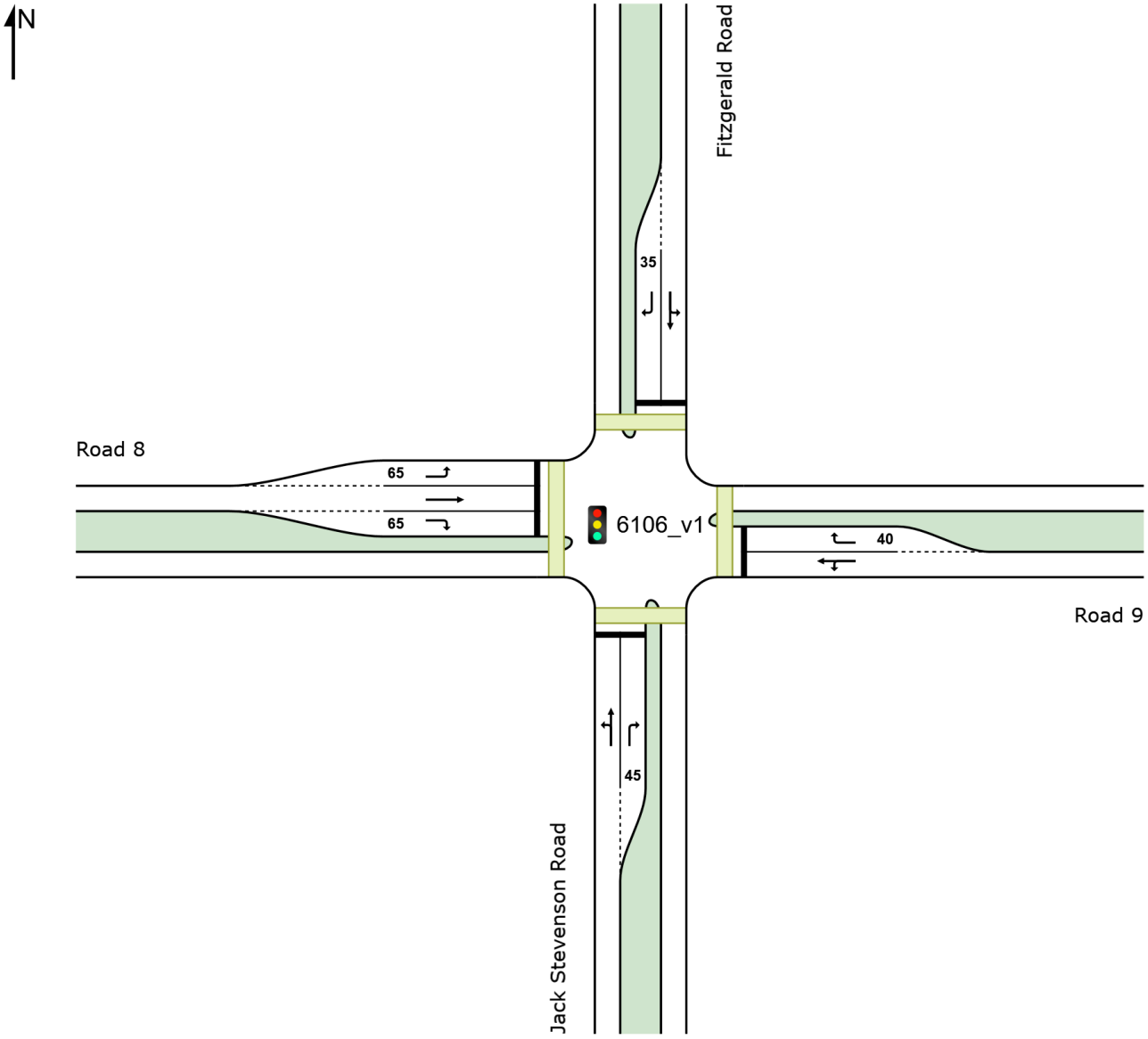
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SITE LAYOUT

Site: 6106_v1 [Scenario62o : PM 2028 - Fitzgerald / Jack Stevenson / Rd 8 / Rd 9 (Site Folder: General)]

Scenario62o : PM 2028 - Fitzgerald / Jack Stevenson / Rd 8 / Rd 9
Site Category: -
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 6106_v1 [Scenario62o : PM 2028 - Fitzgerald / Jack Stevenson / Rd 8 / Rd 9 (Site Folder: General)]

Scenario62o : PM 2028 - Fitzgerald / Jack Stevenson / Rd 8 / Rd 9
Site Category: -
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	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
South: Jack Stevenson Road														
1	L2	39	7.7	41	7.7	* 0.452	23.3	LOS C	2.3	17.5	0.96	0.76	0.96	30.5
2	T1	56	12.5	59	12.5	0.452	18.7	LOS B	2.3	17.5	0.96	0.76	0.96	28.0
3	R2	20	0.0	21	0.0	0.132	38.5	LOS D	0.7	5.0	0.95	0.70	0.95	24.2
Approach		115	8.7	121	8.7	0.452	23.7	LOS C	2.3	17.5	0.96	0.74	0.96	27.9
East: Road 9														
4	L2	20	0.0	21	0.0	* 0.361	27.1	LOS C	1.1	8.1	0.99	0.72	0.99	29.6
5	T1	21	4.8	22	4.8	* 0.361	22.5	LOS C	1.1	8.1	0.99	0.72	0.99	32.9
6	R2	21	4.8	22	4.8	0.123	37.3	LOS D	0.7	5.3	0.94	0.70	0.94	25.7
Approach		62	3.2	65	3.2	0.361	29.0	LOS C	1.1	8.1	0.97	0.71	0.97	29.3
North: Fitzgerald Road														
7	L2	21	4.8	22	4.8	0.651	23.0	LOS C	10.0	75.0	0.83	0.72	0.84	33.8
8	T1	328	8.8	345	8.8	* 0.651	18.4	LOS B	10.0	75.0	0.83	0.72	0.84	29.3
9	R2	277	5.8	292	5.8	0.545	27.2	LOS C	8.5	62.8	0.89	0.81	0.89	28.5
Approach		626	7.3	659	7.3	0.651	22.5	LOS C	10.0	75.0	0.86	0.76	0.86	29.0
West: Road 8														
10	L2	165	7.3	174	7.3	0.246	19.8	LOS B	4.0	29.6	0.70	0.74	0.70	32.1
11	T1	20	0.0	21	0.0	0.108	32.4	LOS C	0.7	4.8	0.94	0.66	0.94	29.8
12	R2	24	4.2	25	4.2	0.140	37.4	LOS D	0.8	6.0	0.94	0.70	0.94	23.1
Approach		209	6.2	220	6.2	0.246	23.0	LOS C	4.0	29.6	0.75	0.73	0.75	30.6
All Vehicles		1012	7.0	1065	7.0	0.651	23.1	LOS C	10.0	75.0	0.85	0.75	0.86	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Jack Stevenson Road												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	1.10
East: Road 9												
P2	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	1.10

North: Fitzgerald Road											
P3 Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	1.10
West: Road 8											
P4 Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	196.4	217.2	1.11
All Pedestrians	200	211	29.3	LOS C	0.1	0.1	0.92	0.92	194.5	214.7	1.10

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

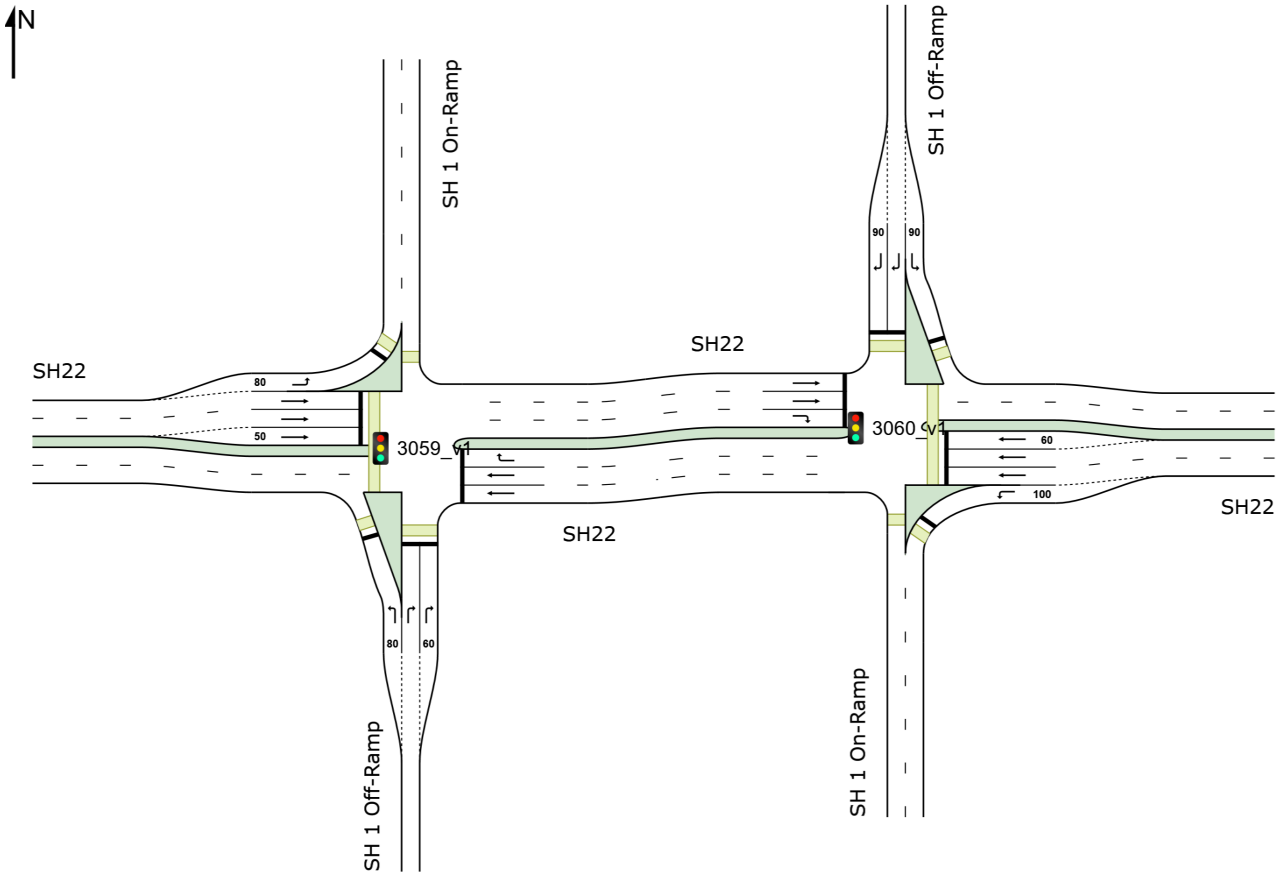
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NETWORK LAYOUT

Network: N101 [Network1 - MH (Network Folder: General)]

New Network
Network Category: (None)
EQUISAT (Fixed-Time/SCATS) Isolated
Common Control Group: CCG1 [CCGName]

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
3059_v1	CCG1	Scenario62o : AM 2028 - 3059_SH1_SH22_Interchange_West
3060_v1	CCG1	Scenario62o : AM 2028 - 3060_SH1_SH22_Interchange_East

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CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCGName]

Network: N101 [Network1 - MH (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 118 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 3059_v1 [Scenario62o : AM 2028 - 3059_SH1_SH22_Interchange_West]														
South: SH 1 Off-Ramp														
7	L2	61	1.6	61	1.6	0.392	62.1	LOS E	3.5	24.7	0.99	0.75	0.99	18.5
9	R2	94	10.6	94	10.6	0.321	61.9	LOS E	2.7	20.4	0.98	0.74	0.98	14.9
Approach		155	7.1	155	7.1	0.392	62.0	LOS E	3.5	24.7	0.98	0.75	0.98	16.4
East: SH22														
11	T1	676	8.3	676	8.3	0.225	0.3	LOS A	0.5	3.6	0.03	0.02	0.03	49.2
9	R2	163	4.3	163	4.3	0.159	5.2	LOS A	0.2	1.6	0.03	0.54	0.03	43.2
Approach		839	7.5	839	7.5	0.225	1.3	LOS A	0.5	3.6	0.03	0.12	0.03	47.0
West: SH22														
1	L2	1202	13.0	1202	13.0	* 0.930	29.4	LOS C	57.9	450.6	0.67	0.86	0.80	29.3
5	T1	312	10.9	312	10.9	0.391	44.8	LOS D	7.0	54.0	0.91	0.73	0.91	9.4
Approach		1514	12.5	1514	12.5	0.930	32.6	LOS C	57.9	450.6	0.72	0.84	0.82	25.9
All Vehicles		2508	10.5	2508	10.5	0.930	23.9	LOS C	57.9	450.6	0.50	0.59	0.57	28.1
Site: 3060_v1 [Scenario62o : AM 2028 - 3060_SH1_SH22_Interchange_East]														
East: SH22														
1	L2	90	12.2	90	12.2	0.065	6.7	LOS A	1.0	7.7	0.21	0.53	0.21	44.5
5	T1	353	9.9	353	9.9	* 0.972	72.8	LOS E	10.1	77.0	1.00	1.01	1.42	5.8
Approach		443	10.4	443	10.4	0.972	59.4	LOS E	10.1	77.0	0.84	0.91	1.17	11.2
North: SH 1 Off-Ramp														
7	L2	300	7.3	300	7.3	0.386	28.3	LOS C	11.5	85.8	0.72	0.76	0.72	28.5
9	R2	486	5.8	486	5.8	0.309	27.4	LOS C	9.0	65.8	0.69	0.75	0.69	25.5
Approach		786	6.4	786	6.4	0.386	27.7	LOS C	11.5	85.8	0.70	0.75	0.70	26.8
West: SH22														
11	T1	382	11.3	382	11.3	0.230	0.8	LOS A	0.3	2.1	0.03	0.02	0.03	48.0
9	R2	23	0.0	23	0.0	0.037	5.4	LOS A	0.0	0.2	0.02	0.54	0.02	44.0
Approach		405	10.6	405	10.6	0.230	1.0	LOS A	0.3	2.1	0.03	0.05	0.03	47.4
All Vehicles		1634	8.5	1634	8.5	0.972	29.7	LOS C	11.5	85.8	0.57	0.62	0.66	22.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 3059_v1 [Scenario62o : AM 2028 - 3059_SH1_SH22_Interchange_West]											

South: SH 1 Off-Ramp											
P3	Full	5	53.2	LOS E	0.0	0.0	0.95	0.95	213.6	208.6	0.98
P3B	Slip/ Bypass	5	53.2	LOS E	0.0	0.0	0.95	0.95	210.3	204.3	0.97
North: SH 1 On-Ramp											
P4	Full	53	53.3	LOS E	0.2	0.2	0.95	0.95	213.7	208.6	0.98
West: SH22											
P2	Full	5	53.2	LOS E	0.0	0.0	0.95	0.95	222.8	220.5	0.99
P2B	Slip/ Bypass	5	53.2	LOS E	0.0	0.0	0.95	0.95	210.3	204.3	0.97
All Pedestrians		74	53.2	LOS E	0.2	0.2	0.95	0.95	213.9	208.8	0.98
Site: 3060_v1 [Scenario62o : AM 2028 - 3060_SH1_SH22_Interchange_East]											
South: SH 1 On-Ramp											
P4	Full	53	53.3	LOS E	0.2	0.2	0.95	0.95	213.7	208.6	0.98
East: SH22											
P2	Full	5	53.2	LOS E	0.0	0.0	0.95	0.95	222.8	220.5	0.99
P2B	Slip/ Bypass	5	53.2	LOS E	0.0	0.0	0.95	0.95	210.3	204.3	0.97
North: SH 1 Off-Ramp											
P3	Full	5	53.2	LOS E	0.0	0.0	0.95	0.95	213.6	208.6	0.98
P3B	Slip/ Bypass	5	53.2	LOS E	0.0	0.0	0.95	0.95	210.3	204.3	0.97
All Pedestrians		74	53.2	LOS E	0.2	0.2	0.95	0.95	213.9	208.8	0.98

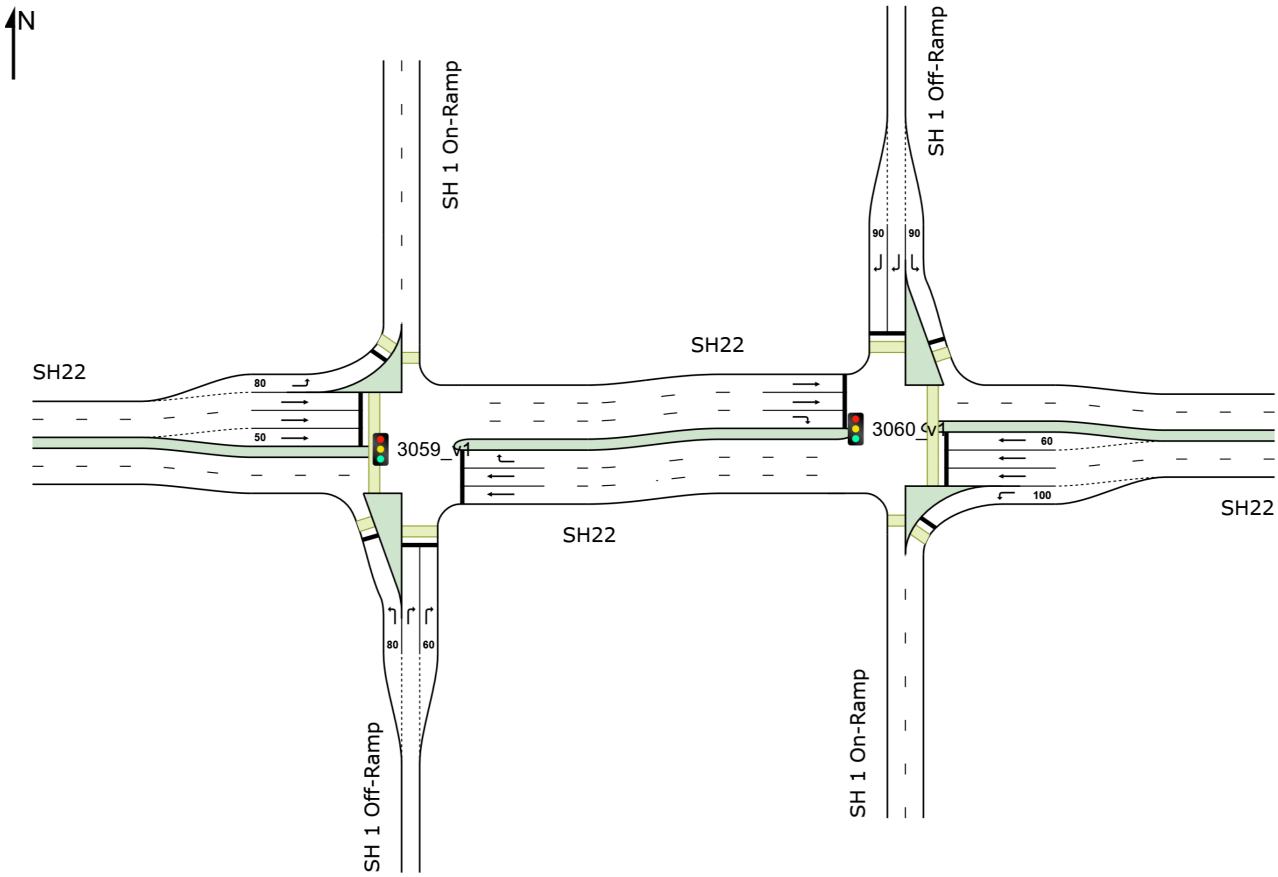
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

NETWORK LAYOUT

Network: N101 [Network1 - MH (Network Folder: General)]

New Network
Network Category: (None)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



SITES IN NETWORK		
Site ID	**CCG ID**	**Site Name**
3059_v1	CCG1	Scenario62o : PM 2028 - 3059_SH1_SH22_Interchange_West
3060_v1	CCG1	Scenario62o : PM 2028 - 3060_SH1_SH22_Interchange_East

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Project: \\nz4105-ppfss01\shared_projects\310203562\4.0 Technical\4.9 Transportation\Modelling\SIDRA\Scenario 62o\Scenario62o PM sip files\3059_3060_SH1_SH22_Interchange_Both.sip9

CCG MOVEMENT SUMMARY

Common Control Group: CCG1 [CCGName]

Network: N101 [Network1 - MH (Network Folder: General)]

EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 86 seconds (CCG Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance (CCG)

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	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
Site: 3059_v1 [Scenario62o : PM 2028 - 3059_SH1_SH22_Interchange_West]														
South: SH 1 Off-Ramp														
7	L2	83	3.6	83	3.6	0.657	50.9	LOS D	3.7	27.0	1.00	0.83	1.14	20.8
9	R2	64	25.0	64	25.0	0.291	49.1	LOS D	1.4	11.8	0.98	0.72	0.98	17.5
Approach		147	12.9	147	12.9	0.657	50.1	LOS D	3.7	27.0	0.99	0.78	1.07	19.5
East: SH22														
11	T1	1489	5.2	1489	5.2	0.499	0.4	LOS A	1.2	8.8	0.04	0.04	0.04	49.1
9	R2	324	8.0	324	8.0	0.283	5.0	LOS A	0.4	2.8	0.03	0.54	0.03	43.3
Approach		1813	5.7	1813	5.7	0.499	1.2	LOS A	1.2	8.8	0.04	0.13	0.04	47.1
West: SH22														
1	L2	938	9.5	938	9.5	* 0.841	20.1	LOS C	31.8	240.5	0.77	0.86	0.84	33.9
5	T1	190	12.6	190	12.6	0.672	46.2	LOS D	3.8	29.6	1.00	0.82	1.14	9.1
Approach		1128	10.0	1128	10.0	0.841	24.5	LOS C	31.8	240.5	0.81	0.85	0.89	29.9
All Vehicles		3088	7.6	3088	7.6	0.841	12.0	LOS B	31.8	240.5	0.37	0.42	0.40	35.0
Site: 3060_v1 [Scenario62o : PM 2028 - 3060_SH1_SH22_Interchange_East]														
East: SH22														
1	L2	182	8.2	182	8.2	0.131	6.7	LOS A	1.7	13.1	0.25	0.56	0.25	44.6
5	T1	714	6.7	714	6.7	* 0.856	39.5	LOS D	14.0	104.0	0.98	0.90	1.11	9.8
Approach		896	7.0	896	7.0	0.856	32.8	LOS C	14.0	104.0	0.83	0.83	0.93	17.2
North: SH 1 Off-Ramp														
7	L2	375	6.1	375	6.1	0.533	26.1	LOS C	12.1	89.4	0.82	0.80	0.82	29.5
9	R2	1098	4.9	1098	4.9	0.774	31.4	LOS C	21.3	155.5	0.94	0.89	0.99	23.8
Approach		1473	5.2	1473	5.2	0.774	30.0	LOS C	21.3	155.5	0.91	0.87	0.95	25.3
West: SH22														
11	T1	253	15.4	253	15.4	0.153	0.8	LOS A	0.2	1.6	0.04	0.03	0.04	47.8
9	R2	20	0.0	20	0.0	0.051	12.4	LOS B	0.2	1.3	0.23	0.57	0.23	38.8
Approach		273	14.3	273	14.3	0.153	1.7	LOS A	0.2	1.6	0.05	0.07	0.05	46.1
All Vehicles		2642	6.8	2642	6.8	0.856	28.1	LOS C	21.3	155.5	0.79	0.77	0.85	23.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
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.
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.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance (CCG)

Mov ID	Crossing	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
Site: 3059_v1 [Scenario62o : PM 2028 - 3059_SH1_SH22_Interchange_West]											

South: SH 1 Off-Ramp											
P3	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	197.7	208.6	1.06
P3B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
North: SH 1 On-Ramp											
P4	Full	53	37.3	LOS D	0.1	0.1	0.93	0.93	197.8	208.6	1.05
West: SH22											
P2	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	206.8	220.5	1.07
P2B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
All Pedestrians		74	37.3	LOS D	0.1	0.1	0.93	0.93	197.9	208.8	1.06
Site: 3060_v1 [Scenario62o : PM 2028 - 3060_SH1_SH22_Interchange_East]											
South: SH 1 On-Ramp											
P4	Full	53	37.3	LOS D	0.1	0.1	0.93	0.93	197.8	208.6	1.05
East: SH22											
P2	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	206.8	220.5	1.07
P2B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
North: SH 1 Off-Ramp											
P3	Full	5	37.2	LOS D	0.0	0.0	0.93	0.93	197.7	208.6	1.06
P3B	Slip/ Bypass	5	37.2	LOS D	0.0	0.0	0.93	0.93	194.4	204.3	1.05
All Pedestrians		74	37.3	LOS D	0.1	0.1	0.93	0.93	197.9	208.8	1.06

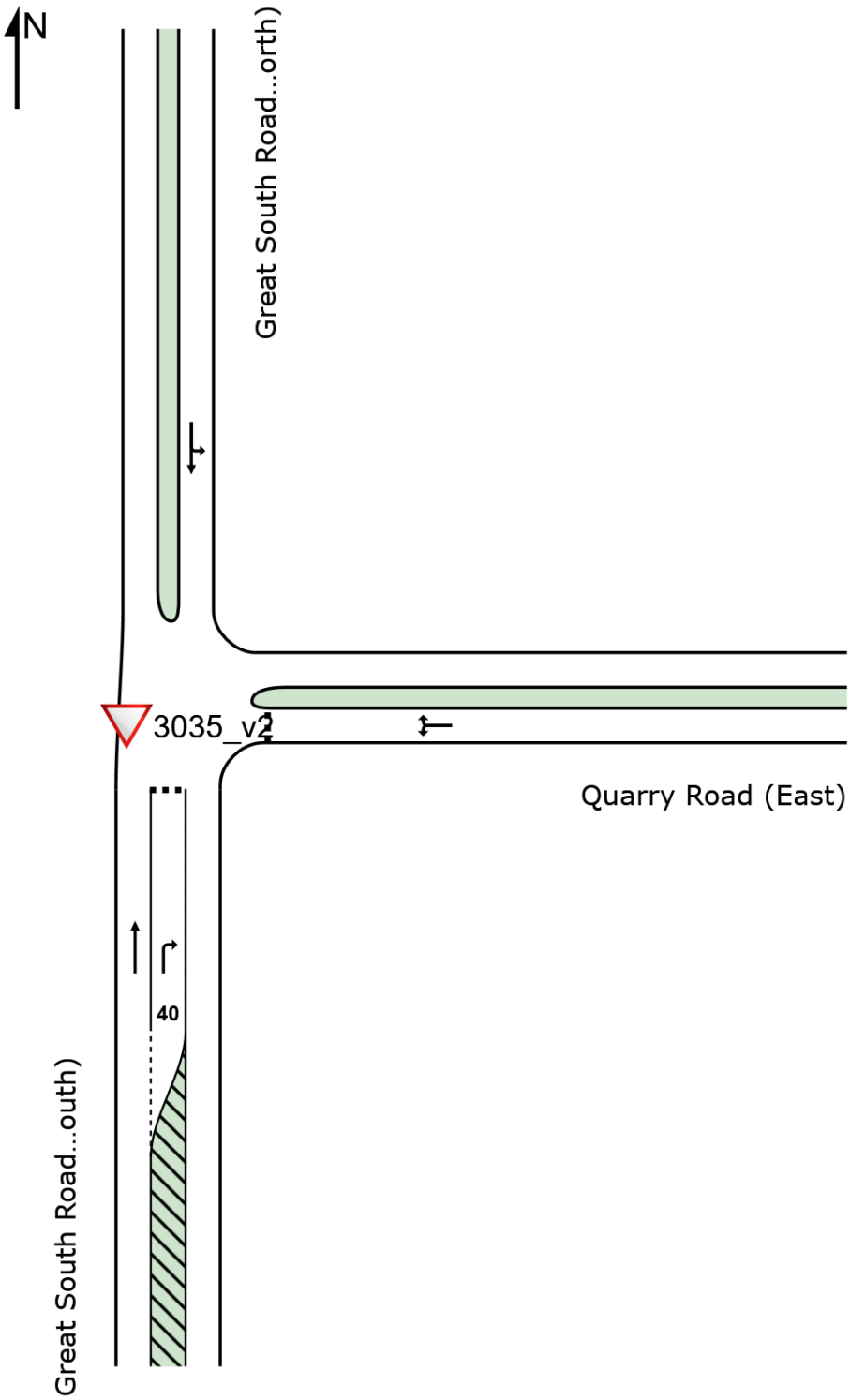
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

SITE LAYOUT

Site: 3035_v2 [Scenario62o : AM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : AM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62o : AM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : AM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	131	24	138	18.3	0.079	3.3	LOS A	0.0	0.0	0.00	0.46	0.00	44.9
6	R2	31	3	33	9.7	0.038	6.1	LOS A	0.0	0.4	0.36	0.61	0.36	41.7
Approach		162	27	171	16.7	0.079	3.9	LOS A	0.0	0.4	0.07	0.49	0.07	44.2
East: Quarry Road (East)														
7	L2	21	1	22	4.8	0.273	4.9	LOS A	0.4	3.5	0.38	0.67	0.38	41.8
9	R2	185	41	195	22.2	0.273	7.3	LOS A	0.4	3.5	0.38	0.67	0.38	41.2
Approach		206	42	217	20.4	0.273	7.1	LOS A	0.4	3.5	0.38	0.67	0.38	41.3
North: Great South Road (North)														
10	L2	215	13	226	6.0	0.166	4.6	LOS A	0.0	0.0	0.00	0.40	0.00	45.3
11	T1	69	6	73	8.7	0.166	0.0	LOS A	0.0	0.0	0.00	0.40	0.00	45.7
Approach		284	19	299	6.7	0.166	3.5	NA	0.0	0.0	0.00	0.40	0.00	45.4
All Vehicles		652	88	686	13.5	0.273	4.7	NA	0.4	3.5	0.14	0.51	0.14	43.7

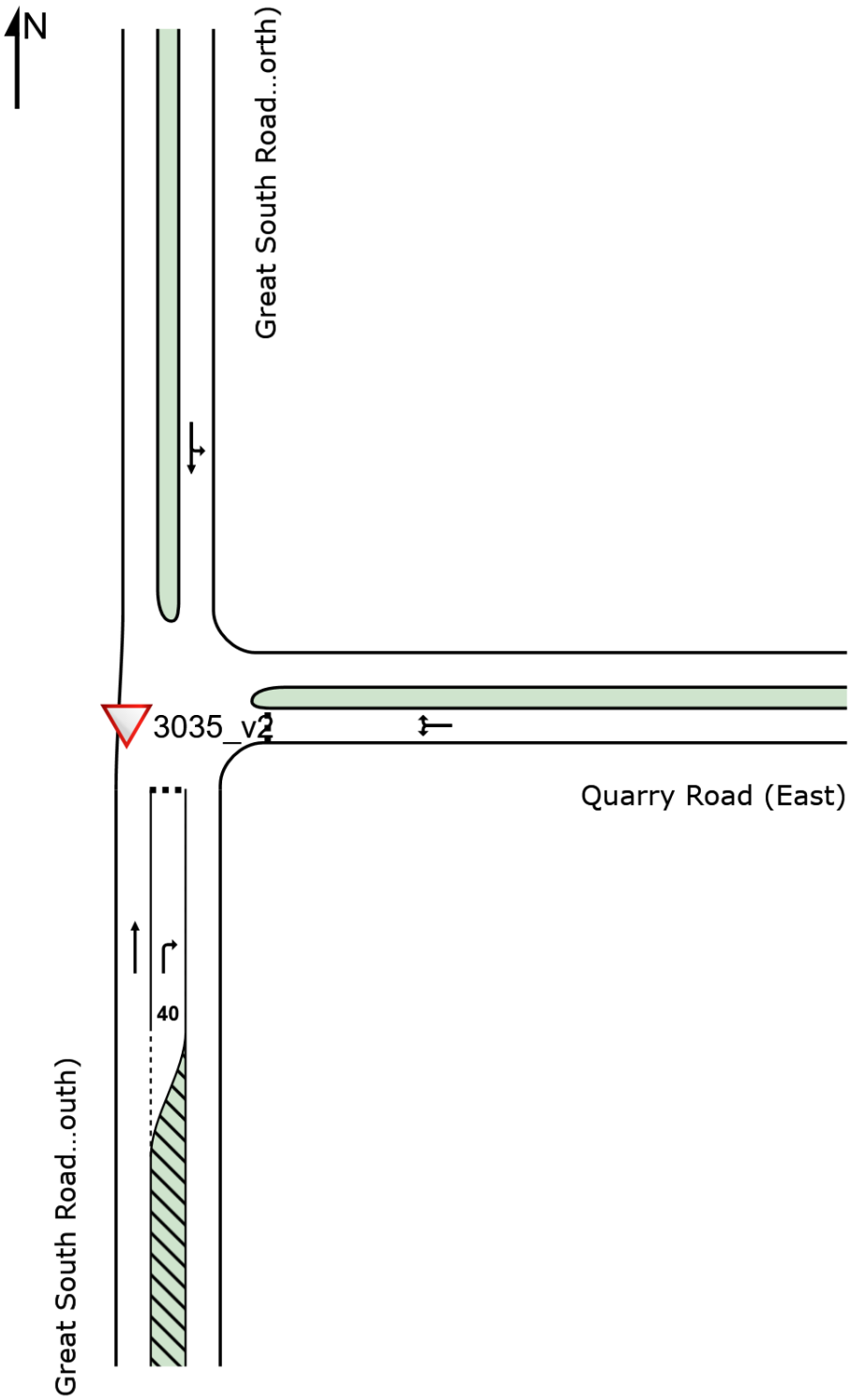
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3035_v2 [Scenario62o : IP 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : IP 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62o : IP 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : IP 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	82	9	86	11.0	0.047	3.3	LOS A	0.0	0.0	0.00	0.46	0.00	45.1
6	R2	22	2	23	9.1	0.026	5.9	LOS A	0.0	0.2	0.33	0.58	0.33	41.9
Approach		104	11	109	10.6	0.047	3.8	LOS A	0.0	0.2	0.07	0.49	0.07	44.3
East: Quarry Road (East)														
7	L2	23	3	24	13.0	0.328	5.2	LOS A	0.6	4.6	0.41	0.67	0.42	41.8
9	R2	245	49	258	20.0	0.328	6.9	LOS A	0.6	4.6	0.41	0.67	0.42	41.5
Approach		268	52	282	19.4	0.328	6.7	LOS A	0.6	4.6	0.41	0.67	0.42	41.5
North: Great South Road (North)														
10	L2	143	13	151	9.1	0.143	4.7	LOS A	0.0	0.0	0.00	0.31	0.00	46.0
11	T1	100	7	105	7.0	0.143	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	46.6
Approach		243	20	256	8.2	0.143	2.8	NA	0.0	0.0	0.00	0.31	0.00	46.2
All Vehicles		615	83	647	13.5	0.328	4.7	NA	0.6	4.6	0.19	0.50	0.19	43.7

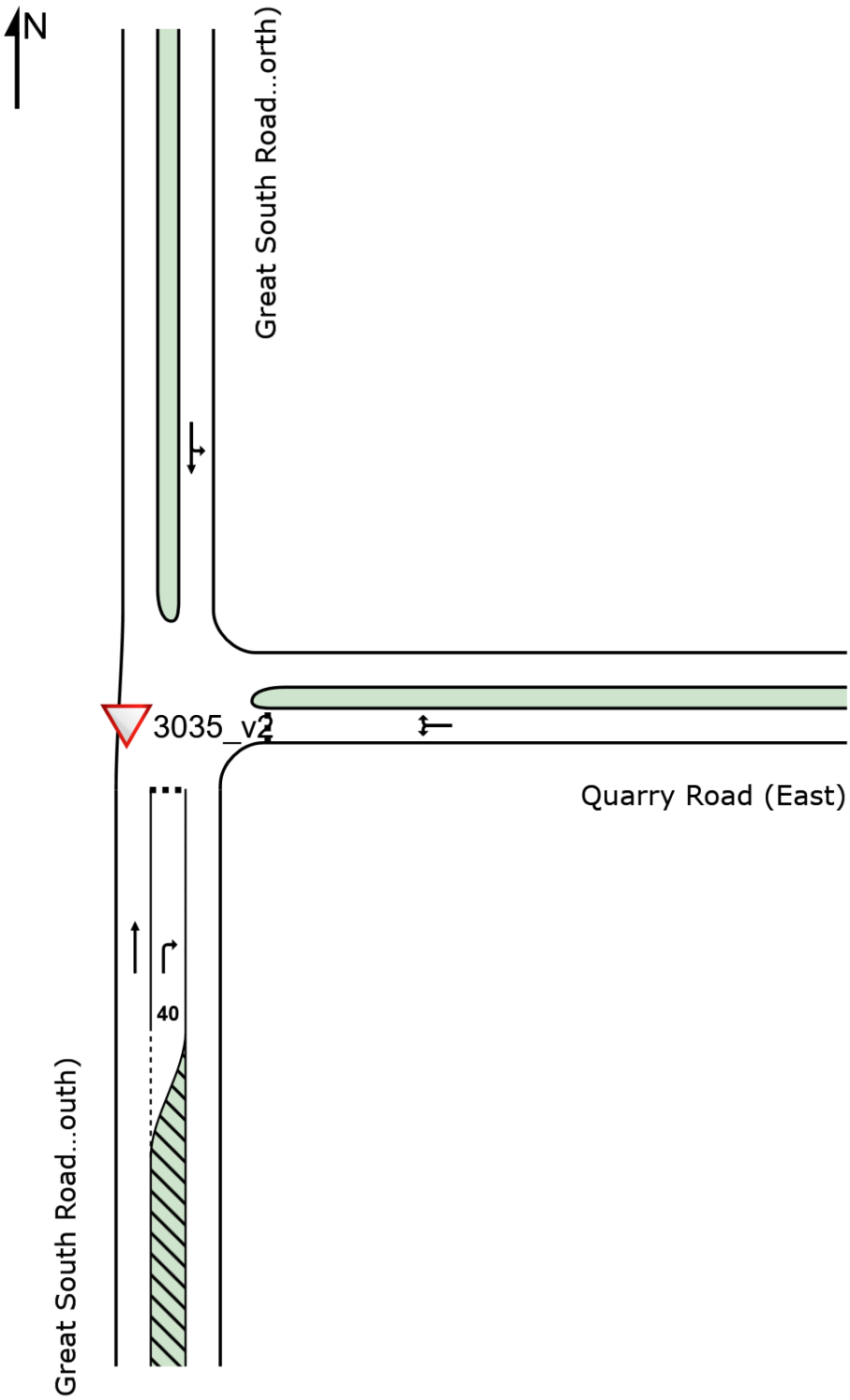
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 3035_v2 [Scenario62o : PM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : PM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 3035_v2 [Scenario62o : PM 2028 - Great South Rd / Quarry Rd - Give-Way (Site Folder: 3035 Great South Rd / Quarry Rd)]

Scenario62o : PM 2028 - Great South Rd / Quarry Rd - Give-Way
Site Category: (None)
Give-Way (Two-Way)

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	AVERAGE BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Great South Road (South)														
5	T1	94	6	99	6.4	0.053	3.2	LOS A	0.0	0.0	0.00	0.46	0.00	45.2
6	R2	21	1	22	4.8	0.025	6.0	LOS A	0.0	0.2	0.35	0.59	0.35	41.9
Approach		115	7	121	6.1	0.053	3.7	LOS A	0.0	0.2	0.06	0.49	0.06	44.5
East: Quarry Road (East)														
7	L2	62	1	65	1.6	0.590	6.8	LOS A	1.9	14.4	0.55	0.85	0.82	40.3
9	R2	438	36	461	8.2	0.590	8.9	LOS A	1.9	14.4	0.55	0.85	0.82	40.2
Approach		500	37	526	7.4	0.590	8.7	LOS A	1.9	14.4	0.55	0.85	0.82	40.2
North: Great South Road (North)														
10	L2	112	11	118	9.8	0.152	4.7	LOS A	0.0	0.0	0.00	0.23	0.00	46.8
11	T1	150	9	158	6.0	0.152	0.0	LOS A	0.0	0.0	0.00	0.23	0.00	47.5
Approach		262	20	276	7.6	0.152	2.0	NA	0.0	0.0	0.00	0.23	0.00	47.2
All Vehicles		877	64	923	7.3	0.590	6.0	NA	1.9	14.4	0.32	0.62	0.47	42.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Appendix C Fast Track Modelling Results

SIDRA Intersection Performance Summary

Scenario 152y – Fast Track without SH1 Direct Connection

AM – Scenario 152y	LOS					Worst Delay				Worst Queue				DoS				
Extracted Site name	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	6.5	4.6	0.0	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.3		0.4
Fitzgerald / Waihoehoe - Signalised	C	C	C	C	C	37.9	35.3	31.7	35.7	20.3	43.1	67.7	28.6	0.8	0.7	0.8	0.8	0.7
Brookfield / Fitzgerald - Signalised	B	B	C	B		21.3	27.4	14.9	0.0	10.5	3.5	20.5	0.0	0.5	0.3	0.2	0.5	
GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing	C	C	C	D	C	39.7	38.3	39.7	32.7	36.5	53.4	36.7	55.8	0.8	0.8	0.7	0.8	0.7
Fitzgerald / Pitt - Signalised	B	B	C	B		27.0	27.0	18.8	0.0	9.7	2.1	19.8	0.0	0.3	0.2	0.1	0.3	
P&R / Waihoehoe - Roundabout	A	A	A	A	A	11.8	7.7	12.3	9.1	1.5	13.3	1.9	23.3	0.7	0.1	0.5	0.1	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	24.2	0.0	21.3	27.4	10.5	0.0	20.5	4.4	0.5	0.3		0.5	0.2
Firth / GSR - Signalised	C	D	C	C	B	41.6	35.4	39.4	46.4	19.8	66.4	6.7	18.5	0.7	0.4	0.7	0.1	0.2
Great South Rd / Quarry Rd - Roundabout	A	A		A	A	3.0	0.0	8.5	8.1	4.6	0.0	2.2	2.8	0.2	0.2		0.1	0.1
SH22/GSR - Signalised (extra 50m RT lane)	B	B		A	C	13.5	0.0	39.3	41.6	38.5	0.0	58.6	24.5	0.6	0.4		0.6	0.6
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	B	31.3	27.4	35.0	27.1	31.0	26.9	41.7	4.5	0.9	0.7	0.4	0.9	0.2
Maketu / Rd 8	C	C	C	C	C	40.6	33.2	36.2	36.5	21.0	10.3	40.8	32.9	0.6	0.5	0.2	0.5	0.6
Waihoehoe / Fielding Sig	C	C	C	C	C	28.1	29.4	27.5	28.0	7.4	15.5	4.5	21.9	0.6	0.3	0.6	0.2	0.6

Scenario 152y – Fast Track without SH1 Direct Connection

IP – Scenario 152y	LOS					Worst Delay				Worst Queue				DoS				
Extracted Site name	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	8.3	4.6	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.0	0.4		0.4
Fitzgerald / Waihoehoe - Signalised	C	D	D	C	D	43.8	40.8	42.0	44.2	13.4	116.0	83.7	18.3	0.9	0.4	0.9	0.7	0.6
Brookfield / Fitzgerald - Signalised	B	B	C	B		21.3	27.4	16.1	0.0	10.6	9.4	11.0	0.0	0.4	0.4	0.3	0.4	
GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing	C	C	C	D	C	46.5	42.9	42.3	37.1	41.8	34.0	50.4	66.9	0.8	0.8	0.5	0.8	0.8
Fitzgerald / Pitt - Signalised	B	B	B	B		19.0	19.2	24.7	0.0	8.3	2.5	9.6	0.0	0.4	0.3	0.1	0.4	
P&R / Waihoehoe - Roundabout	A	B	A	B	A	13.4	7.8	13.7	7.8	1.9	19.2	1.9	20.2	0.6	0.1	0.6	0.1	0.6
Fulton Access / Fitzgerald - Signalised	B	B		B	C	27.9	0.0	21.3	27.4	9.9	0.0	13.5	2.0	0.4	0.3		0.4	0.2
Firth / GSR - Signalised	C	C	C	C	B	35.3	36.7	32.8	37.2	19.7	58.0	5.4	22.5	0.7	0.5	0.7	0.1	0.3
Great South Rd / Quarry Rd - Roundabout	A	A		A	A	3.0	0.0	9.3	8.2	4.0	0.0	2.0	5.0	0.2	0.2		0.1	0.2
SH22/GSR - Signalised (extra 50m RT lane)	B	B		B	C	16.4	0.0	43.4	33.2	45.4	0.0	40.5	29.6	0.4	0.4		0.4	0.4
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	C	C	33.3	29.1	28.6	30.0	35.7	29.0	32.8	5.4	0.7	0.7	0.4	0.7	0.3
Maketu / Rd 8	C	C	C	D	C	37.8	32.3	41.6	35.1	21.0	11.0	29.4	29.4	0.5	0.4	0.2	0.5	0.4
Waihoehoe / Fielding Sig	C	C	C	C	C	28.1	27.6	27.5	27.3	7.4	12.7	4.5	11.4	0.4	0.3	0.4	0.2	0.4

Scenario 158w - Fast Track without SH1 Direct Connection with revised phasing for PM Peak only

PM – Scenario 158w	LOS					Worst Delay				Worst Queue				DoS				
Extracted Site name	Intersection	North	West	South	East	North	West	South	East	North	West	South	East	Intersection	North	West	South	East
Oyster / Waihoehoe - LILO_Give Way	NA	A	NA		NA	8.0	4.6	0.0	0.1	0.3	0.0	0.0	0.0	0.5	0.0	0.4		0.5
Fitzgerald / Waihoehoe - Signalised	C	D	C	C	D	53.5	36.8	42.4	55.9	20.9	99.9	149.3	27.5	0.8	0.5	0.8	0.8	0.8
Brookfield / Fitzgerald - Signalised	C	C	C	B		23.6	21.7	19.5	0.0	17.9	39.5	8.4	0.0	0.7	0.7	0.7	0.2	
GSR / Waihoehoe_Sig_Fast_Track_Optm_Phasing	D	D	D	D	E	79.4	44.0	50.3	102.2	86.8	59.5	35.9	178.2	1.0	1.0	0.8	0.9	1.0
Fitzgerald / Pitt - Signalised	B	B	B	B		19.0	19.0	24.9	0.0	13.8	29.4	2.3	0.0	0.7	0.6	0.7	0.1	
P&R / Waihoehoe - Roundabout	A	B	A	C	A	13.0	8.3	28.3	8.0	1.9	17.8	16.1	33.3	0.7	0.1	0.6	0.6	0.7
Fulton Access / Fitzgerald - Signalised	B	B		B	C	21.7	0.0	23.6	29.9	12.9	0.0	36.2	2.8	0.7	0.3		0.7	0.2
Firth / GSR - Signalised	C	D	C	C	B	45.8	36.7	40.5	50.6	37.5	74.1	6.9	43.5	0.7	0.7	0.7	0.1	0.5
Great South Rd / Quarry Rd - Roundabout	A	A		A	A	3.0	0.0	10.4	8.8	4.0	0.0	2.9	9.3	0.4	0.2		0.2	0.4
SH22/GSR - Signalised (extra 50m RT lane)	B	B		B	D	18.6	0.0	48.2	42.6	131.6	0.0	32.5	48.9	0.8	0.8		0.7	0.8
Fitzgerald / Jack Stevenson / Rd 8 / Rd 9	C	C	C	B	C	28.2	33.0	32.7	32.9	74.4	27.5	15.6	6.2	0.7	0.7	0.3	0.4	0.3
Maketu / Rd 8	C	C	C	C	C	38.7	33.1	35.8	35.6	17.5	9.4	26.5	23.5	0.4	0.4	0.2	0.4	0.4
Waihoehoe / Fielding Sig	C	C	C	C	C	28.0	26.6	27.5	28.7	7.1	14.9	4.5	12.7	0.5	0.3	0.5	0.2	0.5

Appendix D Construction Traffic Management Plan

Drury Centre Precinct Construction Traffic Management Plan

PREPARED FOR KIWI PROPERTY HOLDINGS NO.2 LIMITED | NOVEMBER 2022

We design with community in mind

Stantec

Revision schedule

Rev No	Date	Description	Signature of Typed Name (documentation on file)			
			Prepared by	**Checked by**	**Reviewed by**	**Approved by**
1	16/4/21	Work in Progress (WIP)	Casey Guan	Martin Huang	Alasdair McGeachie	Daryl Hughes
2	18/11/21	Final	Casey Guan	Martin Huang	Alasdair McGeachie	Daryl Hughes
3	23/11/22	Updated for fast-track application and Finalised	Aninda Das	Daryl Hughes	Daryl Hughes	Daryl Hughes

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Quality statement

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STATUS Final | Project No 310203562

Executive summary

This Construction Traffic Management Plan (**CTMP**) report assesses the temporary traffic management measures that may be proposed during construction by Kiwi Property related to the development of a contiguous landholding bounded by Fitzgerald and Brookfield Road in Drury which includes 139, 155, 173 and 189 Fitzgerald Road, 61 Brookfield Road, 108, 116, 120, 124 and 132 Flanagan Road, Drury. The development proposes to provide a new "Drury Centre" including large format retail (**LFR**) and super lots enabling future development. This project is proposed under the Covid-19 recovery (Fast-track Consenting) Act 2020 (the "**Act**") to utilise the fast-track consenting process via an expert consenting panel.

The main access to the development will be via Fitzgerald Road where the new roads which are proposed as part of the development will intersect with the existing road network.

Fitzgerald Road is a primary collector road that currently links the wider road network via Waihoehoe Road and State Highway 22 (**SH22**) with the Drury area to the north or south to the interchange with State Highway 1 (**SH1**). The site thus has good direct connections to the wider public road network to allow for efficient movement of deliveries and staff.

The primary construction works are site preparation and earthworks to form the super lots and building construction works for the LFR centre. Physical construction works for the development considered by this CTMP scope are thus expected to be primarily confined on-site.

Although a new internal road network and associated intersections have been scheduled to be constructed, the project team consider using the current access of No.133 Fitzgerald Road would be suitable during initial construction stages as it would allow heavy vehicles to utilise an existing facility, that is suitably sited in terms of spacing to other nearby accesses and intersection, enjoys good sightlines and would be familiar to road users in the vicinity. While some temporary works will be required to modify the vehicle crossing for regular heavy vehicle usage, utilising an existing facility will minimise the works in the road corridor. At the end of the works, the removal of the then redundant vehicle crossing will require some short-term temporary traffic management (**TTM**) in the road corridor.

Estimated construction truck movements peak at approximately 50-60 movements (inbound plus outbound) per day, which in terms of an hourly volume is 5-6 truck movements.

The expected temporary traffic effects during construction are primarily associated with traffic generation associated with transport of materials and staff to / from the site. The anticipated programme of construction works is around four years.

In order to minimise any impact on the proposed construction operations, it is intended to employ several mitigations. These measures are discussed and assessed in the course of this report and are summarised here for clarity:

- Construction access is to be at 133 Fitzgerald Road;
- Apart from any specific short-term arrangements, the existing traffic lanes will be maintained;
- A clearly delineated vehicular paths and associated turning areas will be identified for heavy vehicle manoeuvres during the construction so that pedestrians and cyclists can temporarily stop and wait for safe movements;
- Apart from any specific arrangements, loading will occur on-site;
- Truck arrivals will be co-ordinated to prevent on-street waiting, and
- Ride-sharing/ reduction by construction staff to be encouraged.

Based on the analyses undertaken within this report it is considered that any impact arising during construction will be managed with minimal impact on the operation of the local / wider road network subject to the implementation of the mitigation / management measures set out in this report.

The proposed temporary traffic management measures in this report are in general accordance with the Waka Kotahi (NZTA) Code of Practise for Temporary Traffic Management (**CoPTTM**).

This report has been prepared based on information available at the time of writing (prior to the start of works). If the construction or temporary traffic management methodology need to change during the course of the construction works, then the CTMP or TMP should be modified and reapproved as necessary.

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Abbreviations

Enter Abbreviation	Enter Full Name
AADT	Annual Average Daily Traffic
COPTTM	Code of Practise Temporary Traffic Management
TC	Traffic Controller
TMP	Traffic Management Plan
TTM	Temporary Traffic Management

1 Introduction

This Construction Traffic Management Plan (**CTMP**) report assesses the temporary traffic management measures that are proposed during construction by Kiwi Property Holdings No.2 Limited related to new metropolitan centre development including large format retail and super lots on a contiguous landholding at 139, 155, 173 and 189 Fitzgerald Road, 61 Brookfield Road, 108, 116, 120, 124 and 132 Flanagan Road, Drury.

The CTMP examines the potential impact of the proposed development on the existing local / wider network whilst construction works are ongoing including:

- The traffic environment in which the works will occur;
- assessing the anticipated construction traffic volumes and any impact of these on the adjacent road network; and
- providing an overview of the proposed pedestrian / traffic control measures during construction.

Physical construction works at the development under this CTMP scope will be primarily confined on-site. To enable the safe and efficient movement of heavy vehicles to and from the site it is proposed to utilise the existing vehicle access of No.133 Fitzgerald Road to the north of the Fitzgerald Road / Brookfield Road intersection during the initial stages of construction. Some works in the road corridor will be required to modify this vehicle crossing for heavy vehicle usage, and again at the end of the works to removal then then redundant crossing.

The works required for the development considered in this CTMP will include site preparation, earthworks, internal road construction and the new residential houses and retail construction.

The expected temporary traffic effects during construction are related to traffic generation associated with transport of materials and staff to / from the site. The anticipated programme of construction works is around four years.

Based on the analyses undertaken within this report it is considered that any impact arising during construction will be managed with minimal impact on the operation of the local / wider road network.

This report has been prepared based on information available at the time of writing (prior to the start of works). If the construction or temporary traffic management methodology need to change during the course of the construction works, then the CTMP or TMP should be modified and reapproved as necessary. Likewise, there are some as yet not confirmed details for certain aspects of the construction methodology that will be confirmed closer to the construction date, and in an updated version of this CTMP. These mostly relate to those works either on the existing street network, or where a contractor methodology has not yet been established.

2 Site Environment

2.1 Site Location

The development site is a contiguous landholding at 133 Fitzgerald Road and 61 Brookfield Road. The 48.9 ha site for the Drury Centre Precinct project forms part of a larger land area within Drury which was recently rezoned as part of Private Plan Change – Drury Central ("**PC48**") promulgated by Kiwi Property. PC48 has rezoned the land from its former Future Urban Zone (FUZ) to urban zones which include Business - Metropolitan Centre, Business - Mixed Use and Open Space – Informal Recreation zones under the Auckland Unitary Plan ("**AUP(OP)**"). The relationship of this project and PC48 is detailed in the Assessment of Environmental Effects ("**AEE**") prepared by Barker and Associates ("**B&A**").

The site is located approximately 30km southeast of Auckland's central business district,14km southeast of Manukau, 6km south of Papakura, and within 1km of the existing Drury Town Centre. The site is bound by Fitzgerald Road to the east, Brookfield Road to the south and SH1 to the west. Fitzgerald Road and Brookfield Road are currently rural roads with no separate walking or cycling facilities. The North Island Main Trunk (railway) runs north-south to the northwest of the site. The site is located near the confluence of several major roads such as SH1, SH22 and Great South Road. The site thus has good connections to the arterial and strategic road network.

Figure 1 shows the site location within the context of the surrounding environment while **Figure 2** shows the wider road network.



Figure 1:Subject Site in Context with the Local Road Network (Source: Ignite)



Figure 2: The site in context with the wider road network (Source: Ignite)

2.2 Proposed Development Works

The site will be divided into three areas connected by a new internal road (Pitt Road) running east-west across the site. Access to the proposed developments will be mainly through this new internal road which adjoins Fitzgerald Road and is located close to the northern boundary of the proposed developments. The western portion of the site will consist of two super lots for large format retail with surrounding ancillary car parking areas for this retail space. An open space in the form of Hingaia Reserve is proposed directly adjacent to the Hingaia Stream at the western boundary of the site. The eastern portion of the site will include 13 balance lots for future development.

Construction works will include site preparation, bulk earthworks, civil construction including construction of several new internal roads running east-west and north-south through the site, construction of large format retail buildings , and forming super lots for future development.

During the initial construction works, construction traffic will access the site via the existing driveway at 133 Fitzgerald Road whilst the internal roads and other connecting intersections with the public roads are built. This is discussed in Section 4.

It is noted that for the purpose of this CTMP, only the construction traffic effects related to the movements in and out of the site are considered to be within the scope of assessment. The potential external effects of works along the public road corridor (e.g., during the new intersection construction) will be assessed in a subsequent CTMP as required.

2.3 Traffic Environment

Access to the site will be from Fitzgerald Road. The existing driveway at 133 Fitzgerald Road is approximately 260m north of the Brookfield Road/ Fitzgerald Road intersection.

Fitzgerald Road forms a key north-south road in the Drury area to the east of the proposed development. It currently has a predominantly collector road function in connecting the low-density residential housing and lifestyle blocks in Drury East to Great South Road and the Drury Interchange. The cross section of Fitzgerald Road comprises of one lane in each direction separated by solid double yellow lines with the exception of a right turning bay into Brookfield Road. Fitzgerald Road currently has a posted speed limit of 80km/h.

Fitzgerald Road continues northward to connect with Waihoehoe Road, which provides access to Great South Road and the existing Drury Town Centre. To the south, Fitzgerald Road connects with Ramarama Road and Quarry Road where the Stevenson Drury Quarry is located.

The Waihoehoe Road/ Fitzgerald Road intersection is a priority controlled "T" intersection located approximately 720m north of the driveway to 133 Fitzgerald Road. Waihoehoe Road forms the head of the T and movements on this road have priority over those on Fitzgerald Road (Give-Way controlled). Waihoehoe Road continues westward to connect with Great South Road and the existing Drury Town Centre.

The Brookfield Road/ Fitzgerald Road intersection located south of driveway to 133 Fitzgerald Road is a "T" intersection with give-controlled priority to Fitzgerald Road. Brookfield Road runs along the southern frontage of the site and is currently classified as an access road.

No existing footpaths are provided on either side of the road on Fitzgerald Road. A narrowly sealed shoulder with wide grass berms is provided on both sides of the road within the vicinity of the driveway at 133 Fitzgerald Road.

2.4 Traffic Volumes

Traffic Count data provided by Mobile Road online database for the immediate section of Fitzgerald Road along the site frontage indicated a two-way 5-day average daily traffic flow of 1,508 vehicles per day with 26% of heavy vehicles (2020 estimate).

The volumes indicate that Fitzgerald Road is a classified as a level 1- low to moderate volume roads (AADT 500 to 10,000 vpd) under the CoPTTM road hierarchy.

2.5 Road Safety

The Waka Kotahi New Zealand Transport Agency (Waka Kotahi) Crash Analysis System (CAS) database has been examined to ascertain the five-year road safety record during the period 2016 to 2020, plus all available data for 2021. The search area included:

- A 50m radius of Waihoehoe Road/ Fitzgerald Road
- A 50m radius of Brookfield Road / Fitzgerald Road
- Fitzgerald Road between Waihoehoe Road and Brookfield Road
- Brookfield Road

A total of six crashes were reported within the study area.

No recorded crashes at the Waihoehoe Road/ Fitzgerald Road intersection between 2016 and 2021.

A total of two crashes have been recorded at the Brookfield Road / Fitzgerald Road intersection, one of the crashes resulted in injuries. A summary of the crashes that have occurred are provided as follows:

- One crash occurred on Fitzgerald Road involving an eastbound vehicle losing control while avoiding a stray cat and hitting the grass embankment and power pole which brought the lines down across the road. This crash resulted in serious injuries.
- One crash occurred on Fitzgerald Road involving a westbound vehicle losing control while turning right and hitting the property fence. This crash resulted in no injuries and occurred during wet weather conditions.

A total of four crashes have been recorded on Fitzgerald Road between Waihoehoe Road and Brookfield Road, one of the crashes resulted in injuries. A summary of the crashes that have occurred are provided as follows:

- One crash occurred on Fitzgerald Road involving a crossing pedestrian being hit by a truck. This crash, resulting in a minor injury to the pedestrian occurred 60m west of the Waihoehoe Road/ Kath Henry Lane intersection.
- One crash occurred on Fitzgerald Road involving a southbound vehicle losing control and hitting a few property fences and paddocks before coming to a stop. This crash resulted in no injuries.
- Two crash occurred on Fitzgerald Road involving a northbound vehicle losing control and hitting the power pole on the opposite side of the road. One of the crashes was due to wet weather conditions and intoxication. The other crash involved a driver with no licence. This crash resulted in no injuries.

No recorded crashes Brookfield Road between 2016 and 2021.

The recorded crash history indicated that a loss of vehicle control is a common factor in the study area, potentially due to road conditions or alignment in a high-speed environment. Although there are no specific crashes related to traffic movements in and out of the current site access, it is considered appropriate to implement speed control mechanism as part of CTMP for this project.

2.6 Occupation of the Road Corridor

Predominantly the development works covered by this CTMP will be within the development site, with only minor works in the road corridor required to upgrade the existing driveway at 133 Fitzgerald Road to allow its utilisation for heavy vehicles and machineries as the initial construction access and connection of the new internal roads to Fitzgerald Road.

If subsequent works are expected have effects in the road corridor beyond the scope of this CTMP, Auckland Transport will be advised proceed to commencement and an appropriate TMP prepared.

3 Construction Operations

3.1 Staging of Works and Construction Timeframe

The overall duration of the construction programme from the start of the site preparation works through to completion of the first stage is estimated at approximately 4 years.

The existing site is largely vacant, so only minor demolition is required to remove the existing houses. House removal/ demolition is expected to be part of the initial site preparation and earthworks to level the site. To protect against unauthorised or inadvertent entry the site should be securely fenced.

Designated area(s) within the site will need to be provided for the construction staff parking, site offices / facilities and a staging area. These areas should be established at the start of the works programme.

Table 1 below sets out a high-level construction programme. An approximate programme is set out below.

Table 1: Construction Staging and Estimated Traffic Volumes

Construction Stage	Construction Operations	Estimated Duration*	Estimated Average Daily Truck Movements**	Traffic Management Scenario
Site Establishment /Season 1 Earthworks	Demolition, site clearance, fencing, establishment of offices/ facilities, earthworks.	Q4 2022 to Q1 2023	20-30	A
Season 2 Earthworks	Excavation, stockpiling stormwater drainage management,	Q4 2023 to Q1 2024	20-30	A
Civil construction	Includes construction of internal roading network and residential super lots.	Q1 2024 to Q3 2025	To be Confirmed	To Be Confirmed
LFR construction	Retail construction elements	Q4 2025 to Q1 2027	To be confirmed	A (until building works finished and ready for driveway removal)

*It is expected there will be some overlap between construction stages e.g., fitout works will likely commence before the end of building construction, so the initial programme duration may be less than the total length of the individual stages.

**This is inbound plus outbound traffic (i.e. one delivery will generate two movements. Some construction elements e.g., concrete pours will not occur continuously across the construction period. The average daily volume is only a high-level estimate to indicative the possible traffic volume pattern.

Heavy vehicle movements associated with construction are expected to be relatively consistent throughout the construction programme, but there will be some day-to-day variable depending on the particular activities in progress (e.g., there may be higher traffic volumes on days with concrete pours). Construction traffic effects are discussed in Section 6.

3.2 Hours of Operation

It is proposed that the construction works will be limited to 6am to 6pm Monday to Friday and only half days for weekends. The delivery of specific construction items and machinery may need to occur outside of these hours for the purposes of efficient traffic control. Applications for such out of hours works would be made as, and if required.

4 Construction Access

Access to the subject site will be via the existing driveway to 133 Fitzgerald Road for the construction until the new Pitt Road/ Fitzgerald Road intersection is formed.

Once this intersection has been constructed, the main access route may be relocated to use this intersection. Another access route to the development is also proposed in the north-south direction connecting with Brookfield Road.

However, for the purpose of this CTMP, it is considered that only the 133 Fitzgerald Road access will be operative and only the effects and associated mitigations of utilising this existing access have been assessed. A separate assessment may be required if the construction access has changed to suit the subsequent construction programme.

Currently the driveway at 133 Fitzgerald Road is approximately 6m in width at the site boundary, which is readily available to allow two-way heavy vehicle movements. At the access, sight distance is sufficient to both left and right due to the straight road alignment.

5 Traffic Management

5.1 Overview

From a construction traffic management perspective for the purpose of this current CTMP assessment, it will focus on works on-site using an internal loading bay for the site traffic management.

5.2 Scenario A - Works on-site with internal loading bay

This scenario constitutes the significant majority of the works programme under the current CTMP scope. The site will be securely fenced off to prevent inadvertent or unauthorised pedestrian access and outside of working hours the site gates will be closed.

Appropriate road signage and markings of the site access will be installed to direct site traffic to the designated vehicle access, and additionally to advise other road users including pedestrians to the potential of heavy vehicles manoeuvring in the vicinity of the site access. Advance warning signage will also be installed on Fitzgerald Road.

All heavy vehicle movements will be in a forward gear / direction and there will be a dedicated turning area on-site to support this recommendation.

Given the rural nature of Fitzgerald Road, it is anticipated that pedestrian and cyclist will be low/ infrequent.

It is proposed that all vehicle movements are in a forward direction, thus ensuring that drivers have the best line of sight to a crossing pedestrian or cyclist. During the project induction, drivers should be reminded or the need to give way to pedestrians and to be alert for cyclists. The vehicle crossing is of sufficient dimensions that trucks will note need to track outside of the seal area to enter or exit the site (therefore pedestrians on the grass berm will be out of the path of turning vehicles.) All heavy vehicles should have an all-round flashing orange beacon(s) which are operated when entering or leaving the site to make their movements more visible. It is considered that if these mitigations are in place, the effect on the public road network will be minimal.



Figure 3: shows the proposed traffic controls during this phase of the works.

When the works involve the movement of site vehicles across the exposed ground, a wheel wash or other truck cleaning facility will be installed to wash trucks prior to their exit onto the road network.

Sufficient loading and truck waiting areas should be provided on-site so that trucks do not need to queue onto Fitzgerald Road. Similarly, any gate or access control should be located so that trucks do not need queue into Fitzgerald Road, or opened prior to the start of the workday.

The traffic effects of this scenario are discussed in Sections 6.1.4 and 6.1.5.

5.3 Works in the Road Corridor

Works in the road corridor will be required to construct four new intersections to the proposed development and to widen the existing access at 133 Fitzgerald Road for construction traffic if required. One of these intersections will be with Fitzgerald Road and the other three with Brookfield Road.

The anticipated construction period for this stage is approximately between second quarter of 2022 until the third quarter of 2023. It is expected a separate CTMP will be completed prior to this construction programme when more detailed information can be confirmed.

5.4 Other Works

Additional short-term traffic management scenarios and traffic management plans may be required to accommodate specific short-term operations at the site to suit special construction needs. These plans will be prepared as and when required by the contractor.

6 Traffic Effects of Construction

6.1 Road Network Effects

6.1.1 Overview

The works associated with the proposed construction programme under this CTMP scope are primarily confined within the site.

Whilst some works in the berm area will occur these are expected to occur very short periods over the course of whole construction period.

Accordingly, the primary traffic effects are anticipated to be trucks and construction staff vehicles to / from the site for the purpose of this CTMP.

6.1.2 At the site access

The detailed construction information is still yet to be confirmed at the moment apart from the preliminary indication for the anticipated stages. It is considered that the effects of the Fitzgerald Road corridor are confined to the immediate site access and adjacent road reserve areas. In this regard, the key traffic effect to manage is pedestrian/ cyclist movement across the site access. As discussed in the earlier section, it is proposed to identify heavy vehicle turning paths and associated manoeuvring areas then pedestrians and / or cyclists can expect where to temporarily stop and wait in the vicinity of the vehicle crossing so that safe movements for these road users along the site frontage can be maintained.

6.1.3 Off-Peak Period Traffic Effects

As set out in Table 1 heavy vehicle traffic volumes will be relatively consistent throughout the various stages of construction, with a typical maximum being 50-60 movements (in plus out) per day.

Given the 9-10 hour working day and allowing for some concentration of the movement pattern in the network off-peak hours to minimise truck movements (and hence potential delivery delays) during road network peak periods, there would typically be 6-8 trucks movements (in plus out) during an hour, which is equivalent to approximately one movement every 6-8 minutes. Consequently, it is not considered that there will be discernible delays associated with the movements of heavy vehicles to or from the site.

Nonetheless to prevent queuing on-street and to manage truck manoeuvring efficiently within the site, it is recommended that a site traffic co-ordinator is appointed to liaise with the material delivery points to ensure trucks arrive in at the site in a co-ordinated manner. In event of an equipment breakdown or other issue on site which may affect unloading operations the traffic co-ordinator should contact the necessary dispatch points to advise them of the delay.

6.1.4 Peak Period Traffic Effects

The proposed site working hours are expected to be 6am to 6pm on weekdays with construction staff on-site between these hours. Stantec have been advised that there would be approximately 40 staff on-site during the earthworks' phases with higher staffing numbers during the building construction phases. It is likely there will be limited staff traffic movements during the commuter / network peak hour periods. Some staff arrivals are likely to occur after 7am hence partially overlapping with the early part of the morning peak period and similarly some staff departures may occur before 6pm coinciding with the latter part of the afternoon peak period, however such effects would be minor.

Whilst a few deliveries may arrive on-site between 7-9am or 4-6pm, it is proposed to limit these to minimise any impact on the wider road network during these periods.

Assuming a truck generation rate of half that of the off-peak periods (i.e., 3-4 movements per hour) or one heavy vehicle movement every 15 to 20 minutes it is considered any impact of heavy vehicle movements during these periods will be minimal.

Accordingly, it is considered that there will be limited impact from site traffic on the operation of the adjacent road network during peak periods.

6.1.5 Interaction with Other Works

At time of preparing this report, no other works have been confirmed in the vicinity of the subject site. However, if new works in the nearby area have become aware to the project team, liaison with the respective project teams will be required to ensure that any work conflicts are mitigated and avoided.

6.1.6 Truck Waiting

Due to the site location in relation to the surrounding public road network, it is considered the majority of heavy vehicles will come from the west via the state highway network. In this regard, no impacts to the general traffic flow are anticipated for exit movements given they will be left turn movements and trucks will be waiting within the development therefore general traffic will not be impeded.

In terms of trucks arriving on site to make right turn ingress movements, they will be required to wait within the existing carriageway on Fitzgerald Road for a suitable gap to turn right into the development. This may result in a minor delay to general traffic as the cars wait and/or negotiate to manoeuvre around the waiting truck. However, as assessed earlier, the expected truck movements of 6-8 per hour into the development from both directions during off-peak hours and 3-4 movements per hour during peak hours, it is considered any impacts or delays to the general traffic flow will be minimal.

If a large number of trucks is expected to arrive on site at the same time, a site traffic co-ordinator should be appointed to manage truck arrivals and general traffic flow. This is likely to require the establishment of a communication protocol between the site and the truck operators s and / or the trucks themselves.

6.2 Parking

It is considered that there is sufficient space within the site to create staff parking areas. Given the scale of the development there are at peak construction times (particularly during the house building phases) there may be a reasonable parking demand for construction staff on-site, and to more efficiently manage parking provisions and traffic flows, consideration should be given to providing staff shuttles/ mini-buses to encourage higher vehicle occupancy. To support this the staff facilities on-site should include secure lockers for personal tool and equipment storage.

Given the rural environment of the road and narrow shoulders, it is unlikely drivers are currently parking on Fitzgerald Road, therefore it is considered any impacts on on-street parking will be minimal.

7 Liaison

7.1 Project Manager

TBC

7.2 Site Traffic Management Supervisor (STMS)

TBC

7.3 Affected Parties

The primary affected parties under the current CTMP scope will be the tenants and properties owners surrounding the development site and along Fitzgerald Road and Brookfield Road. Consultation with these groups will be undertaken before and regularly updated during construction.

7.4 Consultation with adjoining works

Potential clashes and overlaps with other adjacent works will be discussed and resolved with those parties as such situations arose.

8 Mitigation Summary

In order to minimise any impact on the proposed construction operations, it is intended to employ the following mitigations. These measures have been discussed and assessed in the course of the previous sections of this report but are summarised here for clarity:

- Construction access is to be from the existing vehicle crossing at 133 Fitzgerald Road;
- Apart from specific arrangements, the existing traffic lanes will be maintained;
- A clearly delineated vehicular paths and associated turning areas will be identified for heavy vehicle manoeuvres during the construction so that pedestrians and cyclists can temporarily stop and wait for safe movements;
- Apart from specific arrangements, loading will occur on-site;
- Truck arrivals will be co-ordinated to prevent on-street waiting, and
- Ride-sharing/reduction by construction staff to be encouraged.

9 Conclusion

This CTMP examines the potential impact of the proposed construction works to be undertaken by Kiwi Property at the 133 Fitzgerald Road and 61 Brookfield Road, Drury site.

Physical construction works at the development under this CTMP scope will be primarily confined on-site. However, to enable the safe and efficient movement of heavy vehicles to and from the site it is proposed to utilise the existing driveway and vehicle crossing (which may be removed at the latter part of the construction programme). The installation and later removal of this vehicle crossing may require some short term works in the road corridor but will be assessed in a subsequent CTMP as appropriate.

Estimated construction truck movements peak at approximately 50-60 movements (inbound plus outbound) per day, which in terms of an hourly volume is 5-6 truck movements per hour.

The expected temporary traffic effects during construction are associated with:

- Traffic generation associated with transport of materials and staff to / from the site; and
- Temporary provision on Fitzgerald Road to maintain pedestrian and cyclist safety.

The anticipated programme of construction works is around four years.

Based on the analyses undertaken within this report it is considered that any impact arising during construction will be managed with minimal impact on the operation of the local / wider road network subject to the implementation of the mitigation / management measures set out in this report.

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IJ

Appendix E LFR Travel Plan

Drury Centre Precinct

Large Format Retail

Draft Travel Plan

PREPARED FOR KIWI PROPERTY GROUP | NOVEMBER 2022

We design with community in mind

Revision Schedule

Rev No	Date	Description				
			Prepared by	Checked by	Reviewed by	Approved by
1	14/11/2022	Draft for review	GS	HP	HP	DH
2	23/11/2022	Finalised Travel Plan	GS	HP	HP	DH

This document was prepared by Stantec New Zealand ("Stantec") for the account of Kiwi Property Group (the "Client"). The conclusions in the Report titled Drury Centre Precinct are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Quality statement

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1 Introduction

Stantec New Zealand (**Stantec**) has been commissioned by Kiwi Property Holdings No 2 Limited (**Kiwi Property**) to prepare a Travel Plan for its proposed Drury Centre Precinct Large Format Retail development. The Large Format Retail development is proposed to be constructed as part of a wider Kiwi Property development known as the Drury Centre Precinct, a referred project under the Covid 19 Recovery (Fast track Consenting) Act 2020 ("**the Act**").

This Travel Plan has been developed to satisfy Special Information Requirement under IX.9(3) of the Drury Centre Precinct provisions. The Special Information Requirement requires a travel plan to be prepared for integrated retail development, hence the need for this travel plan for the Large Format Retail development accompanying the application.

1.1 Travel Plan Definition

A workplace Travel Plan is a regularly updated document that aims to manage car dependency and improve travel efficiency by providing employees with realistic alternatives to travel by car e.g. public transport, cycling, walking, or car sharing.

1.2 Travel Plan Development / Process

This Travel Plan has been developed in line with the guidance outlined in NZTA's Workplace Travel Plan Guidelines.

As the Large Format Retail development is proposed to be opened in phases, this Travel Plan includes discussion on the transport infrastructure that is expected to be in place prior to the opening of Phase 1. Following the opening of further stages, the Travel Plan will be updated to reflect the changes in the local transportation infrastructure/facilities as well as within the site itself.

1.3 Travel Plan Objectives

The key objectives of this Travel Plan are to:

- Enable the Drury Centre Precinct Large Format Retail to reduce potential parking demand and single occupancy car use by employees when commuting and travelling for work;
- Inform all Drury Centre Precinct Large Format Retail employees of the Travel Plan and raises awareness of more sustainable travel choices that are available;
- Increase the number of Drury Centre Precinct Large Format Retail employees walking, cycling and travelling by bus or rail to work.

The aforementioned objectives are also expected to result in a number of other benefits such as:

- Reducing traffic volumes in the road network surrounding the subject site.
- Reducing the organisation's carbon footprint due to fewer vehicle kilometres travelled.
- Potentially improve staff fitness and wellbeing levels by encouraging the use of more active forms of transport.

2 Precinct Provisions

In association with the application for the Drury Centre Precinct project, the following are required to be satisfied by this Travel Plan under the 'Special information requirements' section of the Drury Centre Precinct provisions:

(3) Travel Plan

A travel plan is required for offices greater than 500m2 and integrated retail development, or where development infringes standard IX.6.2. A travel plan must be prepared by suitably qualified and experienced person and include:

a) operational measures to be established on-site to encourage reduced vehicle trips, including car sharing schemes, public transport use incentives, flexitime, staggered working hours;
b) operational measures to be established to restrict the use of any employee parking area(s) during peak periods, including the allocation of on-site parking between staff, company cars and visitors;
c) details of the management structure within the building or site in which the activity is to be located which has overall responsibility to oversee the implementation and monitoring of travel management measures;
d) the methods by which the effectiveness of the proposed measures outlined in the travel plan can be independently measured/monitored and reviewed by a suitably qualified and experienced traffic engineer,

including a commitment to undertake travel surveys at the time of building occupation or as otherwise required to provide on-going information regarding travel behaviour;

e) the design of transport infrastructure proposed as part of the development that encourages a mode shift;

f) an objective or target for mode share or travel associated with offices, retail or commercial activities.

Assessment Criteria IX.8.2 (3)(n)
Travel demand management measures:

(n) For commercial activities offices greater than 500m2 or integrated retail development, whether it can be demonstrated by the measures outlined in a travel plan that the activities will be managed on an on-going basis, to minimise private vehicle travel to and from precinct and promote the use of public transport.

3 Drury Centre Precinct

The wider Drury Centre Precinct development site compromises land at 33, 139, 155, 173 and 189 Fitzgerald Road; 61 and 97 Brookfield Road; and 108, 116, 120, 124, 128 and 132 Flanagan Road, Drury, Auckland. The proposed Large Format Retail development site is immediately north of Brookfield Road to the east of the Hingaia Reserve.

The site location with respect to the surrounding road network is shown in Figure 3-1.



Figure 3-1: Location of the Drury Centre Precinct in context with the wider transport network (Source: Oculus

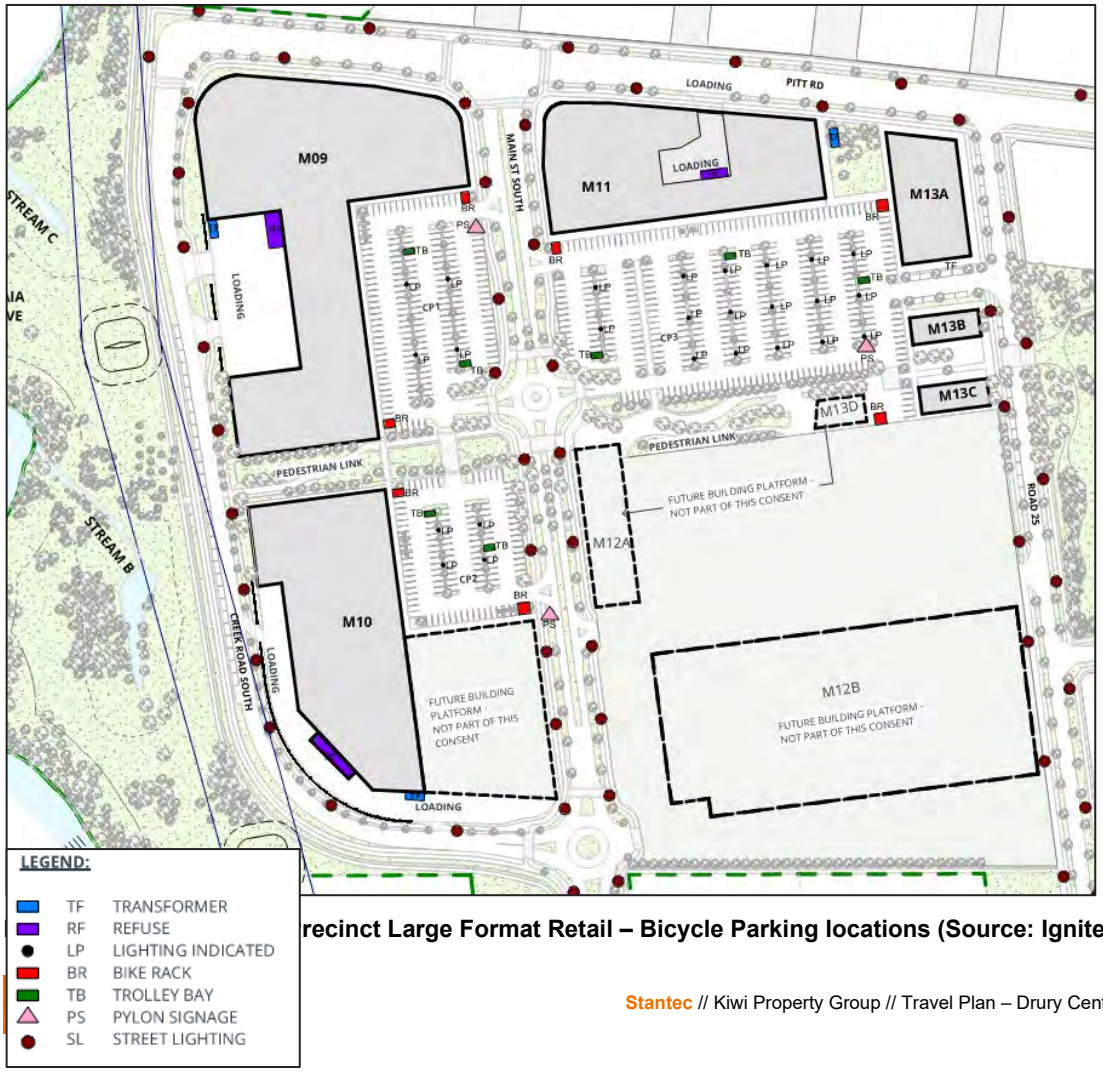
The first phase of the retail development will comprise of five buildings with a Gross Floor Area (**GFA**) of 24,000 sqm. Access will be provided via a new east west road (Pitt Road) to the north of the retail development via Fitzgerald Road.

Access from the south will be via Brookfield Road. The proposed Drury Centre Precinct retail development and residential superlot development is shown in **Figure 3-4**.



Figure 3-2: Drury Centre Precinct Stage 1 development (Source: Ignite)

The development will be served by 718 car parking spaces and 102 bicycle parking spaces which will be provided via bicycle racks. The bicycle racks will be located throughout the retail development, as shown in red in Figure 3-3. A centrally located secure bicycle parking facility will be provided for staff alongside the proposed end-of-trip facilities. A location for the end-of-trip facilities and secure bicycle parking will be confirmed at a later stage of development.



recinct Large Format Retail – Bicycle Parking locations (Source: Ignite)

Walking and cycling infrastructure has been provided within the site connecting the various individual buildings that form the Drury Centre Precinct. The pedestrian and cycle connections through the site are shown in Figure 3-2**.**



Figure 3-4: Pedestrian and Cycle Connections (Source: Ignite)

The proposed Drury Centre Precinct is proposed to comprise the facilities provided in Figure 3-1.

Table 3-1: Summary of the proposed features and facilities of the Drury Centre Precinct

Feature/Facility	Drury Centre Precinct
Type of stores	Mainly retail in nature compromising of large form retail and food and beverage stores
Number of stores	TBC
Operating hours	TBC
Estimated number of employees	TBC
Vehicle Access	Main vehicle access via Main Street South with access also being provide via Brookfield Road.
Pedestrian access	All roads fronting the proposed development provide pedestrian access points.
Car Parking	The development will be served by 718 parking spaces.

As previously noted, this Travel Plan will be updated as the design of the Precinct progresses, and more details of the types of retail facilities are known.

4 Transport Services and Infrastructure

The development is in Drury to the south of Auckland. The site is bounded by Fitzgerald Road to the east, Brookfield Road to the south and SH1 to the west. The site is currently rural in nature with no transportation facilities provided within the site which forms part of a larger land area within Drury, which has been recently rezoned to urban zones. The development of this land and the wider Drury region will be supported by public transport services, walking and cycling facilities and parking.

The following subsections discuss the existing/proposed transport services and infrastructure, whilst a summary of these facilities is depicted on drawings provided in **Appendix A.**

4.1 Walking

Waka Kotahi's Workplace Travel Plan Guideline outlines that walking is best suited to people living within a 2 km – 2.5 km walk distance of the site. This equates to around half an hour of walking time depending on the walking speeds.

Based on local practice, 800 m is considered to be a realistic distance that people may consider walking instead of using other modes of transport. This distance equates to approximately 7 minutes – 17 minutes dependant on the walking speed.

With this in mind, an analysis of the proposed transport network has been undertaken for an area covering an 800 m catchment surrounding Drury Centre Precinct. This catchment covers the following key roads:

- Pitt Road between Creek Road South and Fitzgerald Road;
- Creek Road South between Pitt Road and Main Street South;
- Main Street South between Brookfield Road and Pitt Road;
- Brookfield Road between Main Street South and Fitzgerald Road;
- Fitzgerald Road between Pitt Road and Brookfield Road;
- Road 25 between Pitt Road and Brookfield Road;
- Road 10 between Road 25 and Road 22;
- Road 22 between Pitt Road and Road 21;
- Road 9 between Road 23 and Fitzgerald;
- Road 21 between Pitt Road and Road 25; and

As the Drury Centre Precinct Development and the surrounding area are yet to be developed, several roads are currently identified by a distinctive number and will be provided with a formal road name as the project commences. The layout and configuration of the roads surrounding the site are shown in Appendix A. It is important to note that the area surrounding the site is yet to be developed and will provide further transport links to the site.

As shown in Figure 4-1, the centre of the development is located approximately 1km from the Drury Central rail station that is currently being constructed, with the majority of the Stage 1 buildings being located approximately 800m from the rail platform within what is considered to be the walkable catchment.

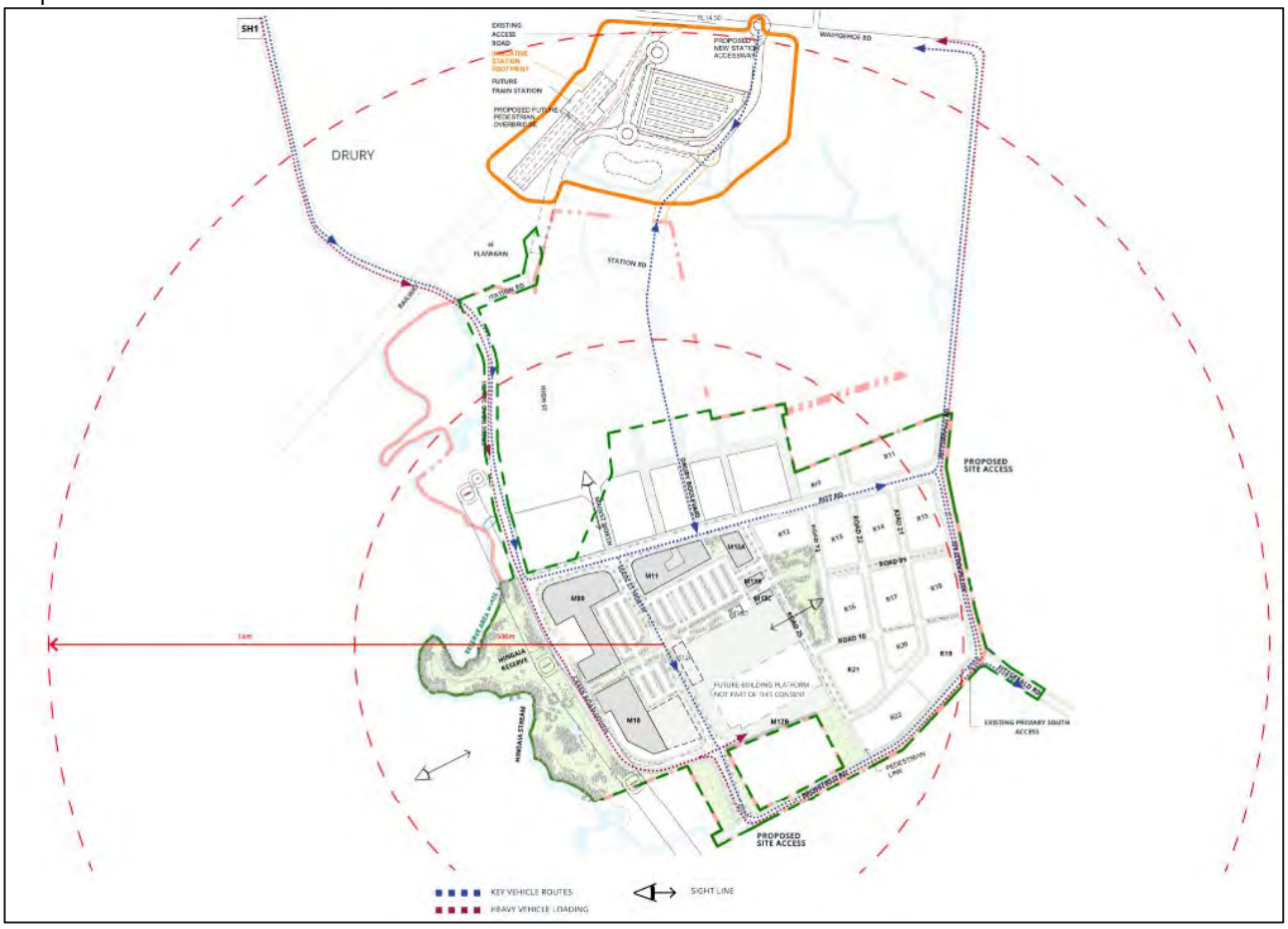


Figure 4-1: Drury Centre Precinct Masterplan showing proximity to Drury Central rail station

Footpaths will be provided on both of the roads at all roads located within the 800 m walking area surrounding the site.

In terms of pedestrian connectivity, signalised pedestrian crossings, pedestrian links and zebra crossings are provided within this area. This comprises of the following:

- Signalised pedestrian crossing at:
    - Pitt Road/Main Street South intersection;
    - Main Street South/Brookfield Road intersection;
    - Fitzgerald Road/Brookfield Road intersection; and
    - Fitzgerald Road/Pitt Road intersection.
- Zebra crossing at:
    - All driveways providing access to the Drury Centre Precinct Development on Main Street South;
    - Main Street South/Creek Road South roundabout;
    - Main Street South/Road 8 roundabout;
    - Across Creek Road South
    - Across Road 25
- Pedestrian links:
    - Connecting the site to the Drury Rail Station;
    - Between Creek Road and Main Street South;
    - Between Main Street South and Road 25;
    - Between Brookfield Road and Road 25; and
    - Between Road 10 and Fitzgerald Road.

Staff who choose to walk to/from the Drury Centre Precinct Development will be able to do so safely by utilising the aforementioned footpaths, signalised pedestrian crossings, zebra crossings and pedestrian links. The development is considered highly accessible on foot.

4.2 Cycling

Based on average cycle speeds (15 km/h), 5 km (20 minutes) is considered to be a realistic distance that people will consider cycling instead of using other modes of transport.

Given the current rural nature of the site there are no cycling facilities available in the immediate vicinity of the site which will adequately serve staff travelling to/from the Drury Centre Precinct Development. Several cycle lanes/paths will be developed as part the proposed rural road upgrades in the application prior to the opening of the Drury Centre Precinct which will allow staff cycle to/from work. Upon the development of the area surrounding the site, the cycling network will connect with the wider Drury area that is also being developed as part of separate Fast Track applications in Drury East. The southern pathway connecting Papakura with Karaka will be extended to connect with the Drury interchange by 2025 and several cycling facilities are expected to be provided by the development. These include:

- shared pathway connecting the development with the Drury Rail Station;
- cyclist crossing facilities at the following locations:
    - Main Street South/Pitt Road intersection;
    - Brookfield Road/Main Street South intersection;
    - Fitzgerald Road/Pitt Road intersection;
    - Road 8/Main Street South roundabout;
    - Creek Road South/Main Street South roundabout;
    - Fitzgerald Road/Brookfield intersection; and
    - Across the driveways providing access to the Drury Centre Precinct Development
- Exclusive cycle lanes, separated from the traffic lanes, will be provided on all major roads surrounding the site including:
    - Main Street South;
    - Creek Road South;
    - Pitt Road;
    - Fitzgerald Road; and
    - Brookfield Road.

The proposed cycling facilities are provided in in Appendix A.

4.3 Public Transport

4.3.1 Bus Services

In accordance with Auckland Transport Code of Practice (ATCOP), bus stops are to be located within a 400 m walking distance (i.e. 5 minutes walking time), whilst in main centres (CBD, Manukau Town Centre etc.), a bus stop spacing of 150 m is recommended.

Currently, only one bus stop associated with the 376 bus service is located within 400m of the site. This is a loop-around service which runs along Great South Road connecting with the Papakura Station, which provides train and bus services connecting with the wider Auckland region.

As part of the Drury Centre Precinct wider development, bus routes will be provided to service the (future) residential and commercial land uses, connecting to the Drury Central rail station and the wider network. At this stage of development, these bus routes have not been confirmed by Auckland Transport, however it is noted that Waihoehoe Road, Fitzgerald Road, Pitt Road and Main Road have all been designed to accommodate buses. Therefore, as the wider development continues, it is envisaged that the Drury Centre Precinct will be well serviced by buses.

4.3.2 Train Services

Currently, the closest train station to the site is the Papakura train station, which is located 5km north of the Drury interchange. This station serves the southern lane which connects Papakura with Britomart. During peak periods, train services operate at a frequency of one every ten minutes, while during off-peak periods these services operate every 20 minutes.

It is important to note that the new Drury Central Rail Station is expected to open adjacent to the site prior to the opening of the development in the first quarter of 2026. This train station will serve the southern line connecting the site with Britomart and the wider Auckland region. A temporary shared pathway is to be constructed which will provide a safe and efficient connection to/from the site and the train station for pedestrians and cyclists.

Upon the completion of the Drury Central Rail Station, the Drury Centre Precinct development will be well placed in terms of accessibility to the Public Transport network with rail services located within a walking distance of the development. Hence, public transport is expected to be a strong alternative transport mode for the Drury Centre Precinct employees, and will be encouraged by management.

The Auckland Transport **(AT**) HOP card provides a reusable pre-pay system that can be used to pay for all AT operated buses, trains and ferries.

4.4 Parking

718 parking facilities will be provided to serve the Drury Centre Precinct development. Secure bicycle parking facilities for staff will be provided at a central location which will be no more than 300-400m from any point of the development.

5 Baseline Data

As the development is still in the consenting phase, the employee travel patterns and modal split are currently unknown. Hence, an initial staff travel survey will be undertaken within the first 3 - 6 months of the development opening to collect information such as travel modes, travel patterns, and working patterns of the employees upon the completion of the development. The Travel Plan will then be updated to provide analysis of the data collected.

The staff travel survey is discussed below.

6 Staff Travel Survey

A staff travel survey is considered an important tool that forms the foundation of this Travel Plan, as it provides numerical data on employees travel patterns, modal choices and reasons for current travel choices. This data can be used to form the baseline data against which the success of the Travel Plan can be measured against.

An example of a workplace travel survey prepared based on the AT travel survey template is attached as **Appendix B**.

As the Drury Centre Precinct development will open in stages and the area surrounding the development will undergo staged development and urbanisation, it is recommended that staff travel surveys are undertaken during the following time periods:

- Within 3-6 months of the Phase 1 opening of the Drury Centre Precinct; and
- Every year following the opening of the Drury Centre Precinct.

To maintain support for the Travel Plan and encourage behavioural change, the survey results will be distributed among employees of the Drury Centre Precinct and discussed with AT.

It is also noted that as AT provides assistance with staff travel surveys, the baseline and yearly staff travel surveys can be facilitated by AT.

7 Action Plan Targets

Action plan targets will be prepared once data has been collected through the travel surveys following the opening of Drury Centre Precinct. Objectives will be established once the baseline travel survey is undertaken.

Once the baseline travel survey has been undertaken, objectives and targets for the modal share associated with office, retail and commercial activities will be established. The baseline travel survey will provide an insight into the existing travel patterns which will assist in establishing the modal share targets for the development. The objectives and targets of the proposed mode share associated with the Drury Centre will reflect a more active model.

8 Travel Plan Management

8.1 Travel Plan Coordinator

Drury Centre Precinct's Operations Manager (tbc) will be appointed as the Travel Plan Coordinator (**TPC**) for the shopping centre. Auckland Transport will allocate a Travel Demand Planner (TDP), who will advise the TPC on the implementation and monitoring of the Travel Plan. The TPC will be notified to the TDP as being the responsible person. The TPC's role will include:

- overall responsibility for the Travel Plan;
- to assist with the development/management of the Travel Plan;
- to develop employee co-operation;
- to liaise with the CTA and Auckland Transport;
- to promote the Travel Plan to colleagues;
- to update and set targets in the Travel Plan Action Plan;
- to promote nationally recognized travel planning theme days e.g. Bike2Work, Bike Challenge, The Auckland Walk Challenge and National Walk2Work Day
- to make travel information readily available; and
- to ensure that all existing and new employees are made aware of alternative travel opportunities. Where appropriate TPC coordinator to liaise with the TDP to obtain any relevant resources from AT (e.g. brochures, maps etc.)

8.2 Ongoing Monitoring of the Travel Plan

In order to achieve the action plan targets and encourage sustainable modal choices in the long term, on-going monitoring of the Travel Plan is essential.

A staff travel survey will be undertaken 3 - 6 months after the implementation of DTCTP, thereafter on a yearly basis. The result of these surveys will be used to inform the subsequent monitoring reports required to be submitted to the CTA.

In addition, this Travel Plan will be continuously updated to reflect any changes in the surrounding road network, walking and cycle facilities, public transport services as well any changes within the site.

9 Actions and Measures

9.1 Measures to Encourage Walking

Employees of the Drury Centre Precinct will be encouraged to walk to work through the following measures:

- A plan of safe pedestrian routes will be made available to all employees of the Drury Centre Precinct, and included within the induction packs provided to all new employees.
- A similar plan to the above which outlines safe pedestrian walking routes will be displayed in a prominent location within the Drury Centre Precinct to assist customers. An initial Plan is included in Appendix A. As the area surrounding the site is developed the plan will be updated accordingly.

- The TPC will seek to organise walking challenges to encourage employees to walk to work. This is to be linked in with Auckland Transport's 'The Auckland Walk Challenge' and 'National Walk2Work Day'. The TPC will also undertake discussions with employees to ascertain ideas to further promote walking to/from the Drury Centre Precinct.
- In the event of an emergency, employees who walk to work will be provided with a ride home.

9.2 Measures to Encourage Cycling

Employees of the Drury Centre Precinct will be encouraged to cycle to work through the following measures:

- Cycle parking will be provided on-site to encourage employees, visitors and customers to cycle to/from the Drury Centre Precinct. Secure cycle parking for employees will be located in a central location and will be easily accessible from all ends of the development.
- A plan showing the location of the secure cycle parking / changing facilities will be made available to all employees of the Drury Centre Precinct. This will be included in the information pack provided to all new stores. An initial plan is included in Appendix A.
- The TPC will seek to organise cycling challenges to encourage employees to cycle to work. This is to be linked in with national initiatives such as Bike Wise.
- In an event of an emergency, employees who cycle to work will be provided with necessary arrangements to travel to a secure and safe place.

9.3 Measures to Encourage Use of Public Transport

Employees of Drury Centre Precinct will be encouraged to use public transport to travel to work through the following measures:

- Plans of public transport routes and timetables will be made available and displayed in prominent locations within the Drury Centre Precinct and will be referenced in the induction packs provided to all new stores.
- Drury Centre Precinct staff at the Guest Service Desk will be trained to assist retailers and customers with public transport timetables and journey planning via the Auckland Transport website.
- As the area surrounding the Drury Centre Precinct is currently being developed, information regarding public transport services will be updated on a regular basis to reflect any changes/additions to the public transport services.
- Drury Centre Precinct will offer to assist AT hold orientation events to promote public transport among new Drury Centre Precinct staff.
- In the event of an emergency, employees who use public transport will be provided with a ride home.

9.4 Measures to Reduce Car Travel

Employees of Drury Centre Precinct will be encouraged to reduce single occupancy car trips to work through the following measures:

- The Drury Centre Precinct will promote a car sharing scheme for employees who travel from similar areas and this will be referred to within the induction packs provided to all new stores. The method used will be dependent on the decision of each store but an example used elsewhere involved advising employees of the scheme and suitable arrangements and then matching those that travel from similar areas.
- Information relating to the Smart Travel mobile app recommended by AT will be provided to the stores of the Drury Centre Precinct to allow carpooling with others who work at other stores within the Drury Centre Precinct and/or nearby workplaces in Drury. TPC will liaise with AT to obtain the up-to-date carpool/mode share tools.
- In the event of an emergency, employees who carpool to work will be provided with a ride home.
- The operation of the car park will be monitored through the Travel Plan. The TPC will encourage employees who live locally (within 10 to 20 km of the shopping centre dependant on the facilities available) to travel by sustainable modes of transport.

9.5 Marketing and Awareness

In order to achieve long-term behavioural changes in employees, marketing of the Travel Plan is proposed through the following measures:

- Information to stores will include details on the benefits of sustainable travel. The benefits include the opportunity for a healthier lifestyle, to help the environment and promote sustainable travel by Drury Centre Precinct employees.

- All new stores will be provided with an information pack on sustainable travel and a copy of the Travel Plan. The information pack will include plans of walking routes, cycle parking, bus stop locations and public transport service information.
- Drury Centre Precinct will liaise with other organisations locally to share experiences and consider joint initiatives. This will include, where appropriate, allowing sustainable travel and transport organisations, to liaise with the office TPC with regards to promoting sustainable travel events and promotions at the shopping centre for the benefit of Drury Centre Precinct employees and customers.
- In addition, the TPC will encourage office participation in nationally recognised sustainable travel events (e.g. Walk2Work Day, Bike Wise, The Auckland Walk Challenge etc.).

10 Action Plan for Visitors

Although this Travel Plan is primarily prepared to encourage employees of Drury Centre Precinct to choose sustainable modes of travel, the following initiatives can be used to encourage customers/visitors to the shopping centre to use sustainable travel modes:

- Displaying travel information on the website and digital information boards within Drury Centre Precinct prior to the opening of the store.
- The provision of bicycle parking spaces for visitors that are provided in visible locations that are easy to see and access.

11 Management Support

This Travel Plan represents a commitment to encourage sustainable trave at Drury Centre Precinct. The TPC of Drury Centre Precinct will be responsible for the implementation of this Travel Plan on site, and will receive full support from the management team for the promotion of the Travel Plan.

Signed: …… Date : ……
TBC – Drury Centre Precinct Office Manager

Signed: …… Date : ……
TBC – Drury Centre Precinct TPC

Office Details:
TBC Tel: TBC

Note: In the event that the Travel Plan Co-ordinator at Drury Centre Precinct should change, AT are to be provided, within one month, the new contact details of the colleague responsible for the Travel Plan.

Appendices

Appendix A Site Plan



Walking Map – Drury Town Centre



Cycling Map – Drury Town Centre Development

Appendix B Example Staff Travel Survey

Westfield Newmarket - Staff Travel Survey

'Green' travel is really in the news at the moment, therefore we are wishing to identify ways that we can help reduce the number of staff car journeys, to try and see if we can do our bit to help the environment.

Therefore, we would be grateful if you could fill in this questionnaire and return it to …….. by ……/……. /…….

Thanks,
Travel Plan Coordinator

Date: ……

---

1) How do you normally travel to and from work at the moment (tick appropriate box)?

Drive alone to work	
Share a car with another colleague / family member / friend	
Dropped off / picked up by car	
By bus	
By train	
Cycle	
Motorcycle	
Walk	
Taxi	
Other (please state)	

2) If you drive a car, where do you park?

In the colleague car park	
In the customer car park	
Other (please specify)	

3) Where does your journey start? (post code)

4) If by public transport, which service do you use? (e.g. Bus 30)

5) How many kilometres do you travel to and from work?

6) Do you make any journeys throughout the course of work?

If Yes, please answer the following:

If no, proceed to question 6)

Yes	
No	

Mode of transport	
Distance travelled on average per month	
Does your journey on business influence your normal mode of travel to work?	

7) Why do you use your chosen mode of transport?

Cost	
Time (restrictions/ benefits)	
Ease of use	
No alternative available	
Other (please specify)	

THE FOLLOWING QUESTIONS APPLY ONLY <u>IF YOU DRIVE ALONE TO WORK AT THE MOMENT:</u>

8) To try and help Westfield Newmarket comply with a planning agreement, would you be willing to:

Share a car into work with another colleague?	
Use public transport?	
Walk?	
Cycle?	
Other	

9) What would encourage you to travel in a more 'Green' way? Choose 3 from the following in order of preference.

Cycling

A) Discount on bike and accessories	
B) Bicycle Users Group	
C) Covered secure cycle parking	
D) Entry into 6 monthly prize draw	
E) Lift home in an emergency	
F) Limited availability of car permits	
G) Other, please state	

Public Transport

A) Discounted ticket purchase	
B) Entry into 6 monthly prize draw	
C) Lift home in an emergency	
D) Car permits limited	
E) Other, please state	

Walk

A) Entry into 6 monthly prize draw	
B) Lift home in an emergency	
C) Car permits limited	
D) Other, please state	

Car Sharing

A) Preferential parking for car sharers	
B) Improved information on the availability of car sharers	
C) Entry into 6 monthly prize draw	
D) Car permits limited	
E) Other, please state	

✂----------

Staff Travel Questionnaire

I would like to be included in the **Prize Draw.**

Name:……..

Department: ……

Please detach and place in the Travel Plan Prize Draw Box

Collating Survey Feedback

In order to make useful information out of the replies you have gathered in, we have included this collation form. This should help present colleague replies in an 'easy to read' format for the second Colleague Circle meeting about green travel plans.

Date of Survey: ..... Number of staff in the store: .....

Number of staff who have replied to questionnaire: .....

1) How many staff in the store come to work in the following ways?

Drive alone to work	
Share a car with another colleague / family member / friend	
Dropped off / picked up by car	
By bus	
By train	
Cycle	
Motorcycle	
Walk	
Taxi	
Other (please state)	

2) Where do staff who drive to work park?

In the staff car park	
In the customer car park	
Other (please specify)	

3) Most common origins of journeys?

4) Most common public transport services used?

5) Average kilometres travelled to work:

6) Number of staff making journeys during work:

Number of staff	
Distance travelled	
Influence of business travel on mode used	

7) Reason for use of chosen mode

8) How many staff in the store, who drive alone to work at the moment, would be willing to:

Share a car into work with another colleague?	
Use public transport?	
Walk?	
Cycle?	
Other (please specify)	

9) What are the main things staff have said would encourage them to use 'Greener' ways of travelling?

(Use these to prompt solutions in the Colleague Circle meeting) Reason for use of chosen mode

Cycling	
Public Transport	
Walking	
Car Sharing	

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Attachment 2: Updated Modelling Assessment – Great South Road / Waihoehoe Road intersection

Planning | Surveying | Engineering | Environmental

Drury Land Company Limited
Fulton Hogan Land Development Limited
Kiwi Property Holdings No.2 Limited
A23121, A23016
Auckland

Ref: A24129,

21 November 2024

Subject: **Drury Plan Change – Great South Road/Waihoehoe Road – Updated Modelling Assessment**

Issued via: andrew@oystercapital.co.nz
david.maclean@fultonhogan.com
david.schwartfeger@kp.co.nz

Dear Andrew, David and David,

Background

Plan Change 48 (PC48), Plan Change 49 (PC49) and Plan Change 50 (PC50) rezoned land in the Drury Centre, Drury East, and Waihoehoe Precincts respectively. The proposed plan changes were notified in August 2020 and became operative on 16 December 2022 to successfully rezone 328ha of land from Future Urban Zone (FUZ) to a mix of Residential, Business, and Open Space zonings.

As part of these three plan changes, a '*Threshold for Subdivision and Development'* table was prepared outlining the specific transport upgrades required to support the different stages of the proposed development within the subject sites. These tables are labelled Table I450.6.2.1, Table I451.6.2.1, and Table I452.6.2.1, and are identical across PC48, PC49 and PC50 respectively.

Row (a) of these tables outlined that in order to achieve up to a maximum of 710 dwellings, an interim upgrade is required to the Waihoehoe Road corridor between and including the existing Great South Road (GSR) roundabout and the Fitzgerald Road give-way intersection. An overview of Waihoehoe Road and the relevant connecting roads is provided as **Figure 1** below:



Figure 1: Aerial Photograph of Waihoehoe Road and key connecting Roads

To develop the precincts beyond those 710 dwellings, further upgrades are required to the State Highway 1 network, the Drury Central train station, the Ultimate upgrade of Waihoehoe Road beyond the interim upgrade described above (Row (d) of the tables), and provision of the Mill Road southern and northern connections. The Activity Table in each of these Plan Changes also stated that any subdivision or development which does not comply with the '*Threshold for Subdivision and Development*' table shall be classified as a Non-Complying activity.

Therefore, in order to construct and occupy the first 710 dwellings across the three precincts, it is required to provide the Interim Waihoehoe Road corridor upgrade between and including GSR and Fitzgerald Road intersections, as per row (a) of the table.

In late 2022, three resource consent applications (being the first stage of development within each new Precinct) were submitted as referred projects under the Covid 19 Recovery (Fast track Consenting) Act 2020 and were subsequently granted. These applications were for the Waihoehoe Precinct by Oyster Capital / Drury Land Company (council reference BUN60414900) providing for up to 357 dwellings, Drury East Stage 1 by Fulton Hogan Land Development (council reference BUN60414907) providing for 248 vacant lots / dwellings and Drury Centre Stage 1 by Kiwi Property Holdings No.2 Limited (council reference BUN60414877).

Each of the three Fast Track consents included conditions with respect to the need for the Interim (in row (a) Waihoehoe upgrades in the event that the construction of the Ultimate Waihoehoe Road upgrade (in row (d)) were imminent. These were included as Conditions 4, 69 and 88 within the Drury East, Waihoehoe and Drury Centre consent conditions respectively. The precinct specific conditions read:

- Condition 69 of the Waihoehoe Precinct Fast Track Consent reads:

  "In the event that the interim upgrade(s) to the Waihoehoe/Great South Road intersection or the Waihoehoe Road corridor are not required because the construction of the full upgrade of Waihoehoe Road has commenced, then the consent holder may, with the agreement of Auckland Council and Auckland Transport, occupy the dwellings approved in this consent prior to the full upgrade of Waihoehoe Road being constructed and operational".

- Condition 88 of the Drury Centre Precinct Fast Track Consent reads:

  "In the event that the upgrade(s) specified in (a) and/or (b)[1] above are not required because the construction of the full upgrade of Waihoehoe Road, then the consent holder may, with the agreement of the Council and Auckland Transport, occupy the retail activities and buildings approved in this consent prior to the full upgrade of Waihoehoe Road being constructed and operational."

- Condition 4 (under Transport Upgrades) of the Drury East Precinct reads:

  "In the event that the upgrade(s) specified in (a), (b) and/or (c)[2] above are not required because the construction of the full upgrade of Waihoehoe Road has commenced, then the consent holder may, with the written agreement of the Council and Auckland Transport, apply for the release of section 224(c) RMA certificates for lots approved in this consent prior to the full upgrade of Waihoehoe Road being constructed and operational."

In addition, it is noted that resource consent has been applied for Drury East Stage 2 by Fulton Hogan Land Development (council reference BUN60419515), which proposes 102 dwellings within the Drury East Precinct. This resource consent is currently being processed by Auckland Council. However, it is intended that this memorandum also applies to the Drury East Stage 2 application. Based on the above, the total number of dwellings anticipated under the approved and currently lodged applications is 707.

Recently, there has been confirmation from Auckland Transport (AT) and New Zealand Transport Agency (NZTA) that several elements of the Ultimate Waihoehoe Road upgrade have been allocated funding through the Government's Roads of Regional Significance package and will therefore soon be constructed. A collaborative design process between Auckland Transport and the three Drury East precinct landowners is well underway, and it is understood that construction of these upgrades is currently envisaged to begin towards the end of 2025 / start of 2026. It is noted that the first households within the Drury East precincts are likely to be completed in a similar timeframe.

Accordingly, the interim Waihoehoe Road upgrades as required in row (a) of the respective Thresholds for Subdivision and Development tables are no longer deemed appropriate due to the timing of the

[1] where (a) and (b) are the Interim signals at GSR / Waihoehoe and the mid-block Waihoehoe upgrades between GSR and Fitzgerald Road respectively.
[2] where (c) is the interim signals at Waihoehoe / Fitzgerald.

delivery of the Ultimate upgrade. Instead, temporary facilities are proposed until the completion of the Ultimate Waihoehoe Road upgrade is completed. **Table 1** below summarises the proposed changes:

Intersection	Existing Layout	Anticipated layout under Fast Track consents, as per row (a) of the Trigger Table	Proposed temporary layout
Waihoehoe / GSR	Roundabout	Interim Signals	Unchanged roundabout
Waihoehoe / Kath Henry	Give Way	N/A – not in trigger table	Single-lane roundabout
Waihoehoe / Fitzgerald	Give Way	Interim Signals	Single-lane roundabout

Table 1: Existing, Anticipated and Now Proposed Intersection Layouts

Once these temporary facilities are constructed, it is expected that the existing background traffic plus any residential traffic generated from the Drury East precincts that have been completed can be readily accommodated. The following section sets out the methodology and results of a study to establish a practical limit on the number of completed residential dwellings within the Drury East precincts that can be accommodated by the temporary Waihoehoe Road upgrades.

Non-Complying Consent Application – Traffic Modelling

Although the aforementioned conditions enable households within the Drury East precincts to become occupied once the Ultimate Waihoehoe Road upgrade scheme commences construction, with a similar timeframe there is a realistic risk that any programme slippage for the scheme construction will prevent completed houses from becoming occupied or release of s224(C) RMA certificates.

To address that risk, a non-complying consent application (for each of the Drury East Precincts) is sought due to the non-compliance with row (a) of the respective Thresholds for Subdivision and Development tables, as the Interim upgrades described will no longer be carried out. To support the application, further traffic modelling was carried out.

Traffic Modelling Methodology

The traffic modelling primarily focussed upon the existing GSR / Waihoehoe Road roundabout, as this was established as the critical intersection within the Drury East network. However, a check was also undertaken at the Waihoehoe Road / Fitzgerald Road intersection.

To assist with the calibration of the traffic modelling, updated traffic count data was collected at the GSR / Waihoehoe Road roundabout on Wednesday 18 September 2024. The data collected included vehicle movement counts and a recording of queue lengths on all four arms.

The data collected from the traffic count was set up as the baseline scenario in the Signalised Intersection Design and Research Aid (SIDRA) program to represent existing traffic volumes at the Waihoehoe/GSR intersection. The base modelling results were calibrated to align with the observed traffic count (queue length) results by altering the environmental factor. An environmental factor of 1.1 provided the best calibration between the observed and modelled queue lengths, hence was adopted in the SIDRA model for this study.

The video footage also showed that during peak periods, the eastern (Waihoehoe Road) approach can have a double lane queue length (storage length) of approximately 30m. This is likely due to the 5.5m wide lane width on the eastern approach which allows two cars to stack adjacently on approach to the intersection. However, to ensure a conservative assessment, a storage length of 15m was adopted in the updated SIDRA model. Additional development traffic flows were sourced from the Simulation and Assignment of Traffic to Urban Road Networks (SATURN) model used in each of the Plan Change processes, which in turn was originally supplied by Supporting Growth Alliance (SGA). The SATURN model was based upon outputs from the Regional Land Use Model (MSM). As such, the residential trip rates used in the Plan Change modelling were adopted without modification.

Based on the assumptions described above, the updated SIDRA model for the Waihoehoe/GSR roundabout was then iteratively tested by increasing the number of dwellings (and therefore traffic) within the Drury East precincts until the network capacity criteria (NCC) thresholds were reached. The NCC thresholds were agreed with Authorities (NZTA, AT, SGA and Auckland Council) prior to the Plan Change modelling process and ensure that average queues at any intersection do not extend to an adjacent intersection.

The Waihoehoe Road / Kath Henry Lane intersection, which as discussed above will become a temporary roundabout to accommodate the Drury Central Rail Station access to the south, is located approximately 240m east of the Waihoehoe Rd/GSR intersection. Respective closest intersections to the south, west and north were measured as 430m, 350m and 190m respectively.

Traffic Modelling Results

The updated SIDRA model based on the assumptions outlined above showed that the existing Waihoehoe Rd/GSR roundabout can facilitate a maximum Drury East residential yield of at least 800 dwellings before hitting the thresholds of the NCC. The key outputs from the iterative testing are summarised in Table 2 below:

Peak Hour	Drury East residential Yield (hh)	95th Percentile Queues (m)				Average Queues (m)
		GSR N	Norrie Rd (W)	GSR S	Waihoehoe (E)	Waihoehoe (E)
AM	800	34	13	73	40	-
	1,000	35	15	113	57	-
	1,200	36	18	241	107	-
PM	800	82	10	66	165	66
	1,000	88	11	70	416	167
	1,200	93	11	72	714	287

Table 2: Traffic modelling Results Summary (green = pass; red = fail)

As can be seen in Table 2, at 800 households, all 95th percentile queues lie within the queue thresholds. Notably, the Waihoehoe Road 95th percentile queue at 165m does not reach the 240m queue length that would reach the adjacent Kath Henry Lane / Rail Station temporary roundabout. At 1,000 households, the 95th percentile queue at Waihoehoe Road of 416m would exceed the 240m threshold. However, the average queue of 167m, upon which the NCC is based, still does not reach the threshold.

At 1,200 households, even the average queue at Waihoehoe Road of 287m exceeds the 240m threshold. None of the 95th percentile queue lengths on any other roundabout approach arm are exceeded in any of the shown scenarios. The full SIDRA results for the AM and PM peaks for the proposed 800-household limit are provided as **Attachment 1** to this letter.

The fact that the NCC threshold, which references average queue lengths, is not exceeded demonstrates that the 800 dwelling limit proposed is conservative. However, on balance it was decided that a better-than-required operation was desirable for all parties.

Additional traffic modelling was undertaken to understand the Waihoehoe Road / GSR intersection performance for a scenario where Large Format Retail (LFR) is introduced to Drury Centre Precinct in conjunction with the proposed dwellings. The testing was only carried out for the PM peak as previous modelling results indicated the intersection is significantly more congested during the PM, and also, retail trips are minimal in the AM peak. A summary of the modelled results is provided in Table 3 below:

Scenario	95% Q on the eastern Waihoehoe Road arm (m)
800hh + 5,000sqm LFR	432
600hh + 5,000sqm LFR	175
600hh + 10,000sqm LFR	400
400hh + 10,000sqm LFR	165
400hh + 15,000sqm LFR	366

Table 3: Traffic Modelling Results Summary with LFR Land Use Included (green = pass; red = fail)

As can be seen in Table 3, the two feasible options which lie within the maximum queue length threshold of 240m are the 600hh + 5,000sqm LFR option and the 400hh + 10,000sqm LFR option. Based on these scenarios, through extrapolation, it is also likely that 500hh and 7,500sqm LFR will also be within the maximum queue length threshold. An appropriate mix between residential and retail development area can therefore be specified based on the thresholds established above within modelling.

Checks were undertaken at the Waihoehoe Road / Fitzgerald Road and Waihoehoe Road / Kath Henry Lane / Rail Station access intersections, both proposed to become a temporary roundabout prior to the Ultimate Waihoehoe Road upgrade being constructed. The 800 dwelling threshold was tested at the proposed roundabouts utilising traffic counts previously undertaken in October 2023, and assigning development traffic logically based on likely development construction timescales. The full SIDRA results are provided in **Attachment 1** of this letter. In summary, both temporary roundabouts were found to operate at Level of Service (LOS) A in the AM and PM peak periods, with minimal queueing on all arms.

Conclusion

Based on the traffic modelling described above, it is evident that the existing Waihoehoe Road / GSR roundabout can accommodate the additional traffic volume generated from up to 800 dwellings within the Drury East precinct. This is a conservative limit based on the desire to retain a reasonably

good intersection performance. Further, the yield limit of 800 dwellings is highly unlikely to be reached within the construction timescale of the Ultimate Waihoehoe Road upgrade.

Additionally, the number of dwellings can be reduced to introduce a LFR Centre within the development. Up to 600 dwellings can be provided in conjunction with 5,000sqm of retail GFA or 400 dwellings with 10,000sqm. The exact combination of residential and retail areas can be specified at a later stage, however, both scenarios maintain a reasonably good intersection performance similar to that of the 800 dwelling scenario.

As such, despite not providing the upgrade elements listed in row (a) of the Thresholds for Subdivision and Development tables, the resulting Non-Complying consents will have no significant adverse impacts on the efficient operation of the existing (or temporary) Waihoehoe Road corridor. As such, it is concluded that there are no traffic engineering or transport planning reasons to preclude approval of the Non-Complying consents.

We trust this meets your requirements. Please do not hesitate to contact us if you have any questions or require any additional information.





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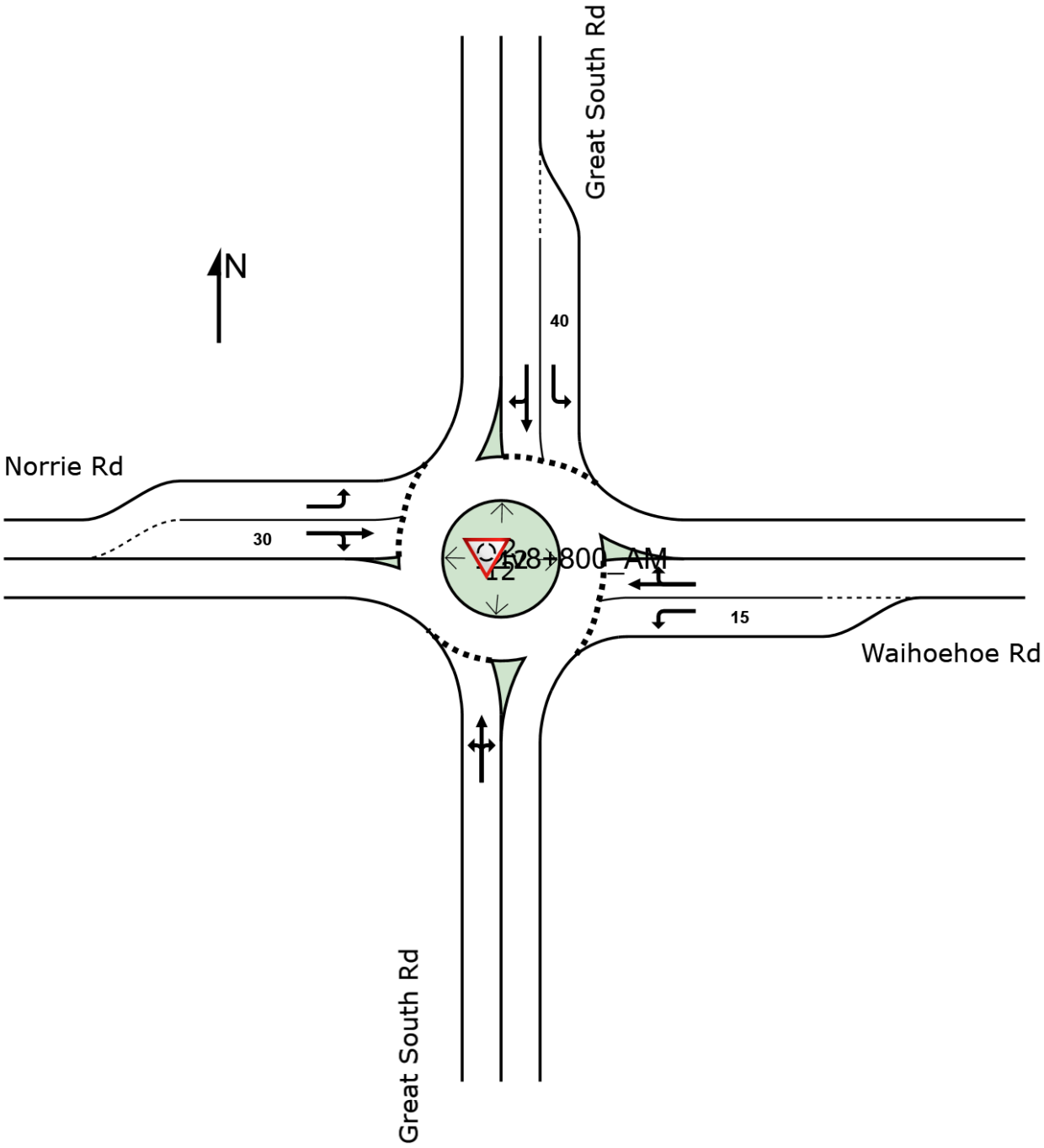
CKL

SITE LAYOUT

Site: v8+800_AM [GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM (Site Folder: 3061 - GSR / Waihoehoe)]

GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: v8+800_AM [GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM (Site Folder: 3061 - GSR / Waihoehoe)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	3	0.0	3	0.0	0.753	10.9	LOS B	3.9	29.4	0.87	0.97	1.18	41.3
2	T1	All MCs	578	10.7	578	10.7	0.753	11.1	LOS B	3.9	29.4	0.87	0.97	1.18	42.5
3	R2	All MCs	161	7.8	161	7.8	0.753	14.5	LOS B	3.9	29.4	0.87	0.97	1.18	40.0
Approach			742	10.1	742	10.1	0.753	11.8	LOS B	3.9	29.4	0.87	0.97	1.18	42.0
East: Waihoehoe Rd															
4	L2	All MCs	172	12.9	172	12.9	0.359	11.1	LOS B	0.8	6.6	0.78	0.78	0.80	40.4
5	T1	All MCs	54	3.9	54	3.9	0.588	10.7	LOS B	2.2	16.0	0.89	0.86	1.09	37.9
6	R2	All MCs	377	3.4	377	3.4	0.588	14.2	LOS B	2.2	16.0	0.89	0.86	1.09	39.0
Approach			602	6.1	602	6.1	0.588	13.0	LOS B	2.2	16.0	0.86	0.84	1.01	39.3
North: Great South Rd															
7	L2	All MCs	127	9.1	127	9.1	0.206	6.9	LOS A	0.5	3.5	0.53	0.60	0.53	43.0
8	T1	All MCs	446	15.6	446	15.6	0.524	5.3	LOS A	1.7	13.7	0.62	0.55	0.62	45.1
9	R2	All MCs	97	10.9	97	10.9	0.524	8.8	LOS A	1.7	13.7	0.62	0.55	0.62	43.7
Approach			671	13.7	671	13.7	0.524	6.1	LOS A	1.7	13.7	0.61	0.56	0.61	44.6
West: Norrie Rd															
10	L2	All MCs	97	20.7	97	20.7	0.169	13.6	LOS B	0.6	5.1	1.00	0.77	1.00	39.9
11	T1	All MCs	22	33.3	22	33.3	0.077	12.9	LOS B	0.3	2.4	0.99	0.76	0.99	37.3
12	R2	All MCs	16	60.0	16	60.0	0.077	17.7	LOS B	0.3	2.4	0.99	0.76	0.99	39.1
Approach			135	27.3	135	27.3	0.169	13.9	LOS B	0.6	5.1	1.00	0.77	1.00	39.5
All Vehicles			2149	11.2	2149	11.2	0.753	10.5	LOS B	3.9	29.4	0.79	0.80	0.94	42.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: v8+800_AM [GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM (Site Folder: 3061 - GSR / Waihoehoe)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds AM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	3	0.0	3	0.0	0.753	10.9	LOS B	9.6	73.1	0.87	0.97	1.18	41.3
2	T1	All MCs	578	10.7	578	10.7	0.753	11.1	LOS B	9.6	73.1	0.87	0.97	1.18	42.5
3	R2	All MCs	161	7.8	161	7.8	0.753	14.5	LOS B	9.6	73.1	0.87	0.97	1.18	40.0
Approach			742	10.1	742	10.1	0.753	11.8	LOS B	9.6	73.1	0.87	0.97	1.18	42.0
East: Waihoehoe Rd															
4	L2	All MCs	172	12.9	172	12.9	0.359	11.1	LOS B	2.1	16.3	0.78	0.78	0.80	40.4
5	T1	All MCs	54	3.9	54	3.9	0.588	10.7	LOS B	5.5	39.7	0.89	0.86	1.09	37.9
6	R2	All MCs	377	3.4	377	3.4	0.588	14.2	LOS B	5.5	39.7	0.89	0.86	1.09	39.0
Approach			602	6.1	602	6.1	0.588	13.0	LOS B	5.5	39.7	0.86	0.84	1.01	39.3
North: Great South Rd															
7	L2	All MCs	127	9.1	127	9.1	0.206	6.9	LOS A	1.2	8.7	0.53	0.60	0.53	43.0
8	T1	All MCs	446	15.6	446	15.6	0.524	5.3	LOS A	4.3	34.1	0.62	0.55	0.62	45.1
9	R2	All MCs	97	10.9	97	10.9	0.524	8.8	LOS A	4.3	34.1	0.62	0.55	0.62	43.7
Approach			671	13.7	671	13.7	0.524	6.1	LOS A	4.3	34.1	0.61	0.56	0.61	44.6
West: Norrie Rd															
10	L2	All MCs	97	20.7	97	20.7	0.169	13.6	LOS B	1.5	12.6	1.00	0.77	1.00	39.9
11	T1	All MCs	22	33.3	22	33.3	0.077	12.9	LOS B	0.6	6.0	0.99	0.76	0.99	37.3
12	R2	All MCs	16	60.0	16	60.0	0.077	17.7	LOS B	0.6	6.0	0.99	0.76	0.99	39.1
Approach			135	27.3	135	27.3	0.169	13.9	LOS B	1.5	12.6	1.00	0.77	1.00	39.5
All Vehicles			2149	11.2	2149	11.2	0.753	10.5	LOS B	9.6	73.1	0.79	0.80	0.94	42.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: v8+800_PM [GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds PM (Site Folder: 3061 - GSR / Waihoehoe)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	1	0.0	1	0.0	0.727	10.1	LOS B	3.5	26.7	0.86	0.94	1.11	41.7
2	T1	All MCs	518	9.8	518	9.8	0.727	10.2	LOS B	3.5	26.7	0.86	0.94	1.11	42.8
3	R2	All MCs	197	9.6	197	9.6	0.727	13.7	LOS B	3.5	26.7	0.86	0.94	1.11	40.4
Approach			716	9.7	716	9.7	0.727	11.1	LOS B	3.5	26.7	0.86	0.94	1.11	42.2
East: Waihoehoe Rd															
4	L2	All MCs	222	10.0	222	10.0	0.623	23.1	LOS C	2.1	16.1	0.98	1.03	1.35	35.1
5	T1	All MCs	60	3.5	60	3.5	0.995	67.7	LOS E	9.2	66.4	1.00	2.05	3.37	20.0
6	R2	All MCs	364	2.9	364	2.9	0.995	71.2	LOS F	9.2	66.4	1.00	2.05	3.37	22.2
Approach			646	5.4	646	5.4	0.995	54.4	LOS E	9.2	66.4	0.99	1.70	2.68	25.1
North: Great South Rd															
7	L2	All MCs	141	4.5	141	4.5	0.241	7.6	LOS A	0.5	3.9	0.58	0.64	0.58	42.6
8	T1	All MCs	716	5.1	716	5.1	0.772	8.9	LOS A	4.5	33.1	0.90	0.75	1.06	43.8
9	R2	All MCs	98	2.2	98	2.2	0.772	12.3	LOS B	4.5	33.1	0.90	0.75	1.06	42.4
Approach			955	4.7	955	4.7	0.772	9.0	LOS A	4.5	33.1	0.85	0.73	0.99	43.5
West: Norrie Rd															
10	L2	All MCs	104	5.1	104	5.1	0.152	11.9	LOS B	0.6	4.2	1.00	0.74	1.00	40.9
11	T1	All MCs	36	2.9	36	2.9	0.089	10.8	LOS B	0.3	2.4	1.00	0.73	1.00	38.8
12	R2	All MCs	25	8.3	25	8.3	0.089	14.5	LOS B	0.3	2.4	1.00	0.73	1.00	40.7
Approach			165	5.1	165	5.1	0.152	12.1	LOS B	0.6	4.2	1.00	0.73	1.00	40.5
All Vehicles			2482	6.4	2482	6.4	0.995	21.6	LOS C	9.2	66.4	0.90	1.04	1.46	37.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: v8+800_PM [GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds PM (Site Folder: 3061 - GSR / Waihoehoe)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

GSR / Waihoehoe - Roundabout - 800 AdditionalHouseholds PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	1	0.0	1	0.0	0.727	10.1	LOS B	8.8	66.4	0.86	0.94	1.11	41.7
2	T1	All MCs	518	9.8	518	9.8	0.727	10.2	LOS B	8.8	66.4	0.86	0.94	1.11	42.8
3	R2	All MCs	197	9.6	197	9.6	0.727	13.7	LOS B	8.8	66.4	0.86	0.94	1.11	40.4
Approach			716	9.7	716	9.7	0.727	11.1	LOS B	8.8	66.4	0.86	0.94	1.11	42.2
East: Waihoehoe Rd															
4	L2	All MCs	222	10.0	222	10.0	0.623	23.1	LOS C	5.3	40.1	0.98	1.03	1.35	35.1
5	T1	All MCs	60	3.5	60	3.5	0.995	67.7	LOS E	23.0	164.9	1.00	2.05	3.37	20.0
6	R2	All MCs	364	2.9	364	2.9	0.995	71.2	LOS F	23.0	164.9	1.00	2.05	3.37	22.2
Approach			646	5.4	646	5.4	0.995	54.4	LOS E	23.0	164.9	0.99	1.70	2.68	25.1
North: Great South Rd															
7	L2	All MCs	141	4.5	141	4.5	0.241	7.6	LOS A	1.3	9.8	0.58	0.64	0.58	42.6
8	T1	All MCs	716	5.1	716	5.1	0.772	8.9	LOS A	11.3	82.3	0.90	0.75	1.06	43.8
9	R2	All MCs	98	2.2	98	2.2	0.772	12.3	LOS B	11.3	82.3	0.90	0.75	1.06	42.4
Approach			955	4.7	955	4.7	0.772	9.0	LOS A	11.3	82.3	0.85	0.73	0.99	43.5
West: Norrie Rd															
10	L2	All MCs	104	5.1	104	5.1	0.152	11.9	LOS B	1.4	10.5	1.00	0.74	1.00	40.9
11	T1	All MCs	36	2.9	36	2.9	0.089	10.8	LOS B	0.8	6.1	1.00	0.73	1.00	38.8
12	R2	All MCs	25	8.3	25	8.3	0.089	14.5	LOS B	0.8	6.1	1.00	0.73	1.00	40.7
Approach			165	5.1	165	5.1	0.152	12.1	LOS B	1.4	10.5	1.00	0.73	1.00	40.5
All Vehicles			2482	6.4	2482	6.4	0.995	21.6	LOS C	23.0	164.9	0.90	1.04	1.46	37.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: v8+600_PM [GSR / Waihoehoe - Roundabout - 600hh +5000LFR PM (Site Folder: PR Testing GSR/Waihoehoe RAB - 0HH)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

GSR / Waihoehoe - Roundabout - 600 AdditionalHouseholds PM
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	1	0.0	1	0.0	0.750	10.4	LOS B	9.6	72.2	0.87	0.96	1.15	41.4
2	T1	All MCs	518	9.8	518	9.8	0.750	10.5	LOS B	9.6	72.2	0.87	0.96	1.15	42.6
3	R2	All MCs	232	8.2	232	8.2	0.750	14.0	LOS B	9.6	72.2	0.87	0.96	1.15	40.1
Approach			751	9.3	751	9.3	0.750	11.6	LOS B	9.6	72.2	0.87	0.96	1.15	41.9
East: Waihoehoe Rd															
4	L2	All MCs	238	9.3	238	9.3	0.661	24.4	LOS C	6.0	45.1	1.00	1.06	1.42	34.6
5	T1	All MCs	57	3.7	57	3.7	1.009	74.7	LOS F	24.3	174.5	1.00	2.12	3.54	18.9
6	R2	All MCs	358	2.9	358	2.9	1.009	78.1	LOS F	24.3	174.5	1.00	2.12	3.54	21.1
Approach			653	5.3	653	5.3	1.009	58.2	LOS E	24.3	174.5	1.00	1.73	2.77	24.3
North: Great South Rd															
7	L2	All MCs	162	3.9	162	3.9	0.291	8.2	LOS A	1.7	12.0	0.63	0.66	0.63	42.2
8	T1	All MCs	716	5.1	716	5.1	0.809	11.0	LOS B	13.3	96.7	0.97	0.86	1.24	42.7
9	R2	All MCs	98	2.2	98	2.2	0.809	14.4	LOS B	13.3	96.7	0.97	0.86	1.24	41.2
Approach			976	4.6	976	4.6	0.809	10.9	LOS B	13.3	96.7	0.91	0.82	1.14	42.5
West: Norrie Rd															
10	L2	All MCs	104	5.1	104	5.1	0.162	12.5	LOS B	1.5	11.3	1.00	0.76	1.00	40.6
11	T1	All MCs	41	2.6	41	2.6	0.103	11.4	LOS B	1.0	7.1	1.00	0.75	1.00	38.5
12	R2	All MCs	25	8.3	25	8.3	0.103	15.2	LOS B	1.0	7.1	1.00	0.75	1.00	40.4
Approach			171	4.9	171	4.9	0.162	12.7	LOS B	1.5	11.3	1.00	0.75	1.00	40.1
All Vehicles			2549	6.2	2549	6.2	1.009	23.3	LOS C	24.3	174.5	0.93	1.09	1.55	36.3

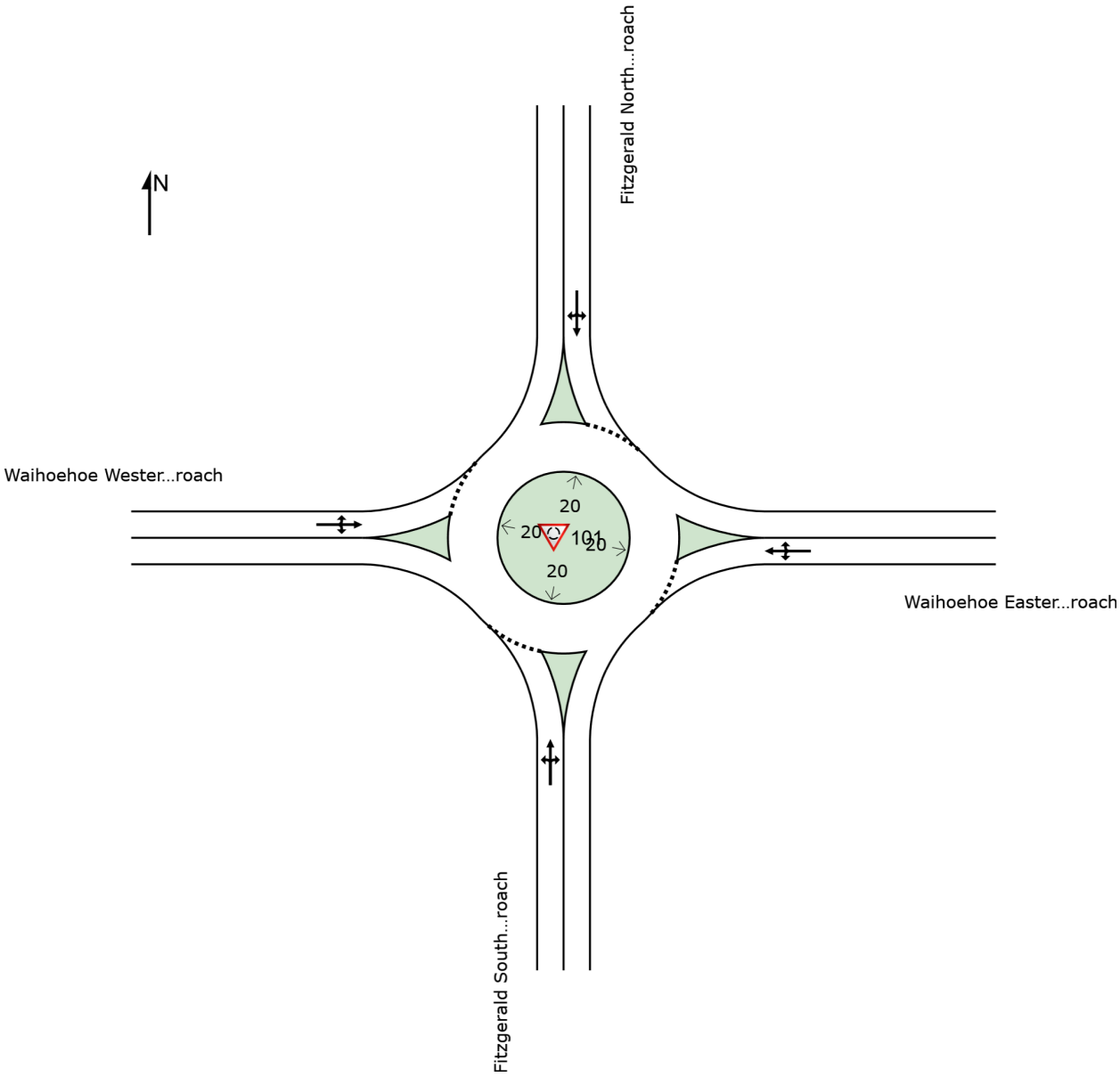
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

SITE LAYOUT

Site: 101 [Waihoehoe/Fitzgerald PM RAB (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [Waihoehoe/Fitzgerald AM RAB (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Fitzgerald Southern Approach															
1	L2	All MCs	178	5.0	178	5.0	0.395	5.7	LOS A	2.6	18.9	0.65	0.65	0.65	44.6
2	T1	All MCs	9	5.0	9	5.0	0.395	5.6	LOS A	2.6	18.9	0.65	0.65	0.65	44.8
3	R2	All MCs	187	5.0	187	5.0	0.395	10.2	LOS B	2.6	18.9	0.65	0.65	0.65	44.2
Approach			375	5.0	375	5.0	0.395	7.9	LOS A	2.6	18.9	0.65	0.65	0.65	44.4
East: Waihoehoe Eastern Approach															
4	L2	All MCs	137	5.0	137	5.0	0.344	4.4	LOS A	2.3	16.7	0.52	0.49	0.52	45.9
5	T1	All MCs	232	5.0	232	5.0	0.344	4.3	LOS A	2.3	16.7	0.52	0.49	0.52	46.1
6	R2	All MCs	8	5.0	8	5.0	0.344	8.8	LOS A	2.3	16.7	0.52	0.49	0.52	45.5
Approach			377	5.0	377	5.0	0.344	4.4	LOS A	2.3	16.7	0.52	0.49	0.52	46.0
North: Fitzgerald Northern Approach															
7	L2	All MCs	11	5.0	11	5.0	0.220	6.3	LOS A	1.3	9.6	0.66	0.70	0.66	43.5
8	T1	All MCs	12	5.0	12	5.0	0.220	6.2	LOS A	1.3	9.6	0.66	0.70	0.66	43.7
9	R2	All MCs	162	5.0	162	5.0	0.220	10.8	LOS B	1.3	9.6	0.66	0.70	0.66	43.2
Approach			184	5.0	184	5.0	0.220	10.2	LOS B	1.3	9.6	0.66	0.70	0.66	43.2
West: Waihoehoe Western Approach															
10	L2	All MCs	54	5.0	54	5.0	0.366	4.2	LOS A	2.6	18.8	0.51	0.49	0.51	45.6
11	T1	All MCs	301	5.0	301	5.0	0.366	4.1	LOS A	2.6	18.8	0.51	0.49	0.51	45.9
12	R2	All MCs	60	5.0	60	5.0	0.366	8.7	LOS A	2.6	18.8	0.51	0.49	0.51	45.2
Approach			415	5.0	415	5.0	0.366	4.8	LOS A	2.6	18.8	0.51	0.49	0.51	45.7
All Vehicles			1351	5.0	1351	5.0	0.395	6.3	LOS A	2.6	18.9	0.57	0.56	0.57	45.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Waihoehoe/Fitzgerald PM RAB (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Fitzgerald Southern Approach															
1	L2	All MCs	84	5.0	84	5.0	0.306	5.4	LOS A	1.9	13.9	0.61	0.64	0.61	44.4
2	T1	All MCs	11	5.0	11	5.0	0.306	5.3	LOS A	1.9	13.9	0.61	0.64	0.61	44.6
3	R2	All MCs	197	5.0	197	5.0	0.306	9.8	LOS A	1.9	13.9	0.61	0.64	0.61	44.0
Approach			292	5.0	292	5.0	0.306	8.4	LOS A	1.9	13.9	0.61	0.64	0.61	44.2
East: Waihoehoe Eastern Approach															
4	L2	All MCs	191	5.0	191	5.0	0.423	4.3	LOS A	3.0	21.6	0.49	0.47	0.49	46.0
5	T1	All MCs	296	5.0	296	5.0	0.423	4.2	LOS A	3.0	21.6	0.49	0.47	0.49	46.2
6	R2	All MCs	11	5.0	11	5.0	0.423	8.7	LOS A	3.0	21.6	0.49	0.47	0.49	45.6
Approach			497	5.0	497	5.0	0.423	4.3	LOS A	3.0	21.6	0.49	0.47	0.49	46.1
North: Fitzgerald Northern Approach															
7	L2	All MCs	8	5.0	8	5.0	0.113	5.8	LOS A	0.6	4.6	0.61	0.67	0.61	43.9
8	T1	All MCs	9	5.0	9	5.0	0.113	5.7	LOS A	0.6	4.6	0.61	0.67	0.61	44.1
9	R2	All MCs	80	5.0	80	5.0	0.113	10.2	LOS B	0.6	4.6	0.61	0.67	0.61	43.5
Approach			98	5.0	98	5.0	0.113	9.4	LOS A	0.6	4.6	0.61	0.67	0.61	43.6
West: Waihoehoe Western Approach															
10	L2	All MCs	136	5.0	136	5.0	0.400	4.4	LOS A	2.9	21.0	0.54	0.52	0.54	45.5
11	T1	All MCs	207	5.0	207	5.0	0.400	4.3	LOS A	2.9	21.0	0.54	0.52	0.54	45.7
12	R2	All MCs	106	5.0	106	5.0	0.400	8.8	LOS A	2.9	21.0	0.54	0.52	0.54	45.1
Approach			449	5.0	449	5.0	0.400	5.4	LOS A	2.9	21.0	0.54	0.52	0.54	45.5
All Vehicles			1336	5.0	1336	5.0	0.423	5.9	LOS A	3.0	21.6	0.54	0.54	0.54	45.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

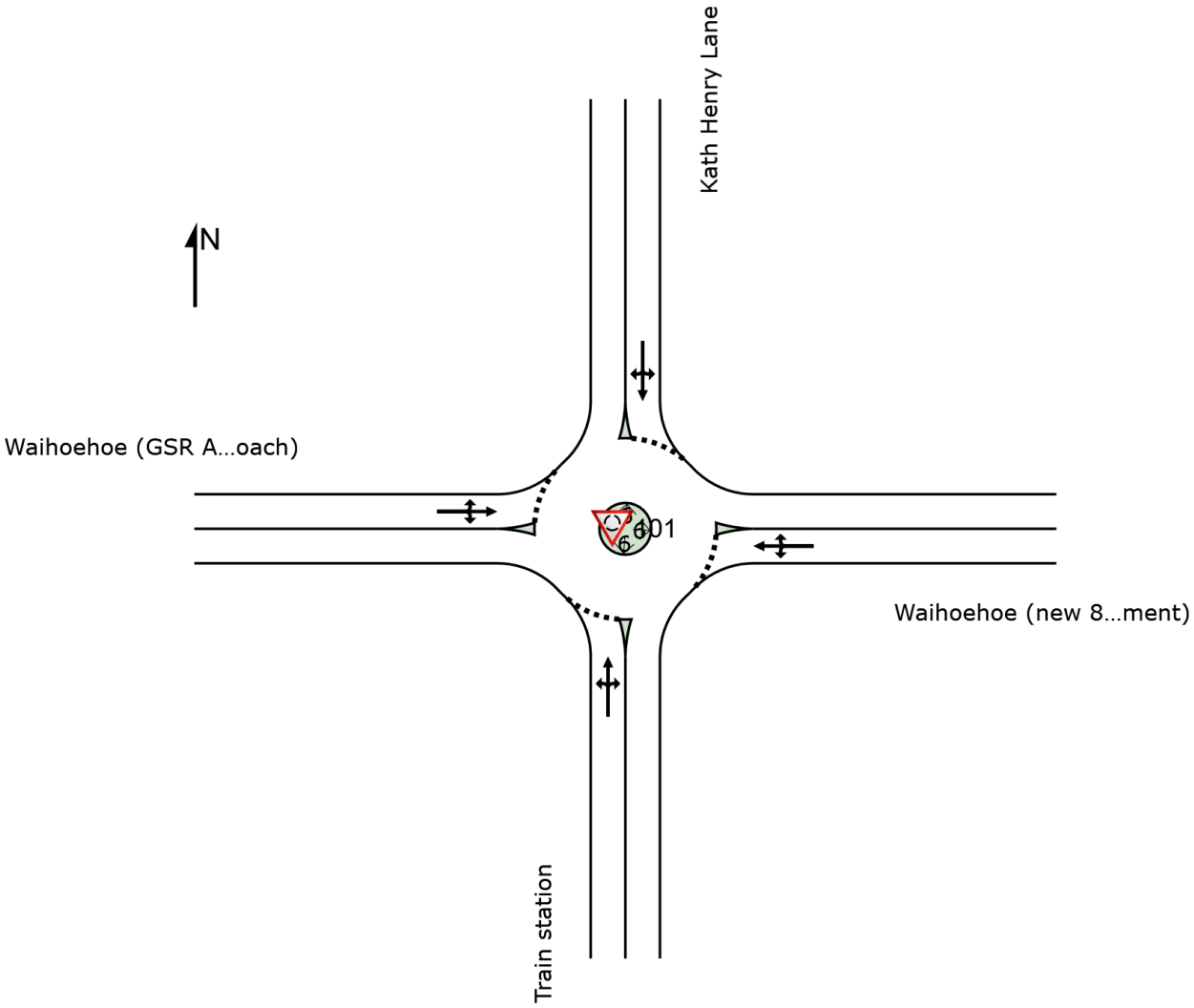
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SITE LAYOUT

Site: 101 [Kath Henry Ln Design (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Kath Henry Ln AM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Train station															
1	L2	All MCs	16	3.0	16	3.0	0.043	7.8	LOS A	0.2	1.6	0.60	0.68	0.60	43.5
2	T1	All MCs	1	3.0	1	3.0	0.043	7.4	LOS A	0.2	1.6	0.60	0.68	0.60	43.8
3	R2	All MCs	16	3.0	16	3.0	0.043	10.1	LOS B	0.2	1.6	0.60	0.68	0.60	43.3
Approach			33	3.0	33	3.0	0.043	8.9	LOS A	0.2	1.6	0.60	0.68	0.60	43.4
East: Waihoehoe (new 800hh development)															
4	L2	All MCs	11	3.0	11	3.0	0.394	4.4	LOS A	2.7	20.0	0.15	0.43	0.15	45.9
5	T1	All MCs	571	5.0	571	5.0	0.394	4.0	LOS A	2.7	20.0	0.15	0.43	0.15	46.2
6	R2	All MCs	1	5.0	1	5.0	0.394	6.8	LOS A	2.7	20.0	0.15	0.43	0.15	45.7
Approach			582	5.0	582	5.0	0.394	4.0	LOS A	2.7	20.0	0.15	0.43	0.15	46.2
North: Kath Henry Lane															
7	L2	All MCs	1	5.0	1	5.0	0.008	6.8	LOS A	0.0	0.3	0.52	0.59	0.52	44.0
8	T1	All MCs	2	3.0	2	3.0	0.008	6.3	LOS A	0.0	0.3	0.52	0.59	0.52	44.4
9	R2	All MCs	3	5.0	3	5.0	0.008	9.1	LOS A	0.0	0.3	0.52	0.59	0.52	43.9
Approach			6	4.3	6	4.3	0.008	7.8	LOS A	0.0	0.3	0.52	0.59	0.52	44.1
West: Waihoehoe (GSR Approach)															
10	L2	All MCs	1	5.0	1	5.0	0.293	4.4	LOS A	2.1	15.2	0.13	0.44	0.13	45.8
11	T1	All MCs	415	5.0	415	5.0	0.293	3.9	LOS A	2.1	15.2	0.13	0.44	0.13	46.2
12	R2	All MCs	19	0.0	19	0.0	0.293	6.7	LOS A	2.1	15.2	0.13	0.44	0.13	45.8
Approach			435	4.8	435	4.8	0.293	4.0	LOS A	2.1	15.2	0.13	0.44	0.13	46.2
All Vehicles			1056	4.8	1056	4.8	0.394	4.2	LOS A	2.7	20.0	0.16	0.44	0.16	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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MOVEMENT SUMMARY

Site: 101 [Kath Henry Ln PM (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival 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	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Train station															
1	L2	All MCs	16	3.0	16	3.0	0.039	7.0	LOS A	0.2	1.4	0.54	0.65	0.54	43.9
2	T1	All MCs	1	3.0	1	3.0	0.039	6.5	LOS A	0.2	1.4	0.54	0.65	0.54	44.2
3	R2	All MCs	16	3.0	16	3.0	0.039	9.3	LOS A	0.2	1.4	0.54	0.65	0.54	43.8
Approach			33	3.0	33	3.0	0.039	8.1	LOS A	0.2	1.4	0.54	0.65	0.54	43.8
East: Waihoehoe (new 800hh development)															
4	L2	All MCs	11	3.0	11	3.0	0.323	4.4	LOS A	2.1	15.0	0.14	0.43	0.14	45.9
5	T1	All MCs	460	5.0	460	5.0	0.323	4.0	LOS A	2.1	15.0	0.14	0.43	0.14	46.2
6	R2	All MCs	1	5.0	1	5.0	0.323	6.8	LOS A	2.1	15.0	0.14	0.43	0.14	45.7
Approach			472	5.0	472	5.0	0.323	4.0	LOS A	2.1	15.0	0.14	0.43	0.14	46.2
North: Kath Henry Lane															
7	L2	All MCs	1	5.0	1	5.0	0.008	7.0	LOS A	0.0	0.3	0.54	0.59	0.54	43.9
8	T1	All MCs	2	3.0	2	3.0	0.008	6.5	LOS A	0.0	0.3	0.54	0.59	0.54	44.3
9	R2	All MCs	3	5.0	3	5.0	0.008	9.4	LOS A	0.0	0.3	0.54	0.59	0.54	43.8
Approach			6	4.3	6	4.3	0.008	8.0	LOS A	0.0	0.3	0.54	0.59	0.54	44.0
West: Waihoehoe (GSR Approach)															
10	L2	All MCs	1	5.0	1	5.0	0.315	4.4	LOS A	2.2	16.4	0.13	0.44	0.13	45.8
11	T1	All MCs	449	5.0	449	5.0	0.315	3.9	LOS A	2.2	16.4	0.13	0.44	0.13	46.2
12	R2	All MCs	19	0.0	19	0.0	0.315	6.7	LOS A	2.2	16.4	0.13	0.44	0.13	45.8
Approach			469	4.8	469	4.8	0.315	4.0	LOS A	2.2	16.4	0.13	0.44	0.13	46.2
All Vehicles			980	4.8	980	4.8	0.323	4.2	LOS A	2.2	16.4	0.15	0.44	0.15	46.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options 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 (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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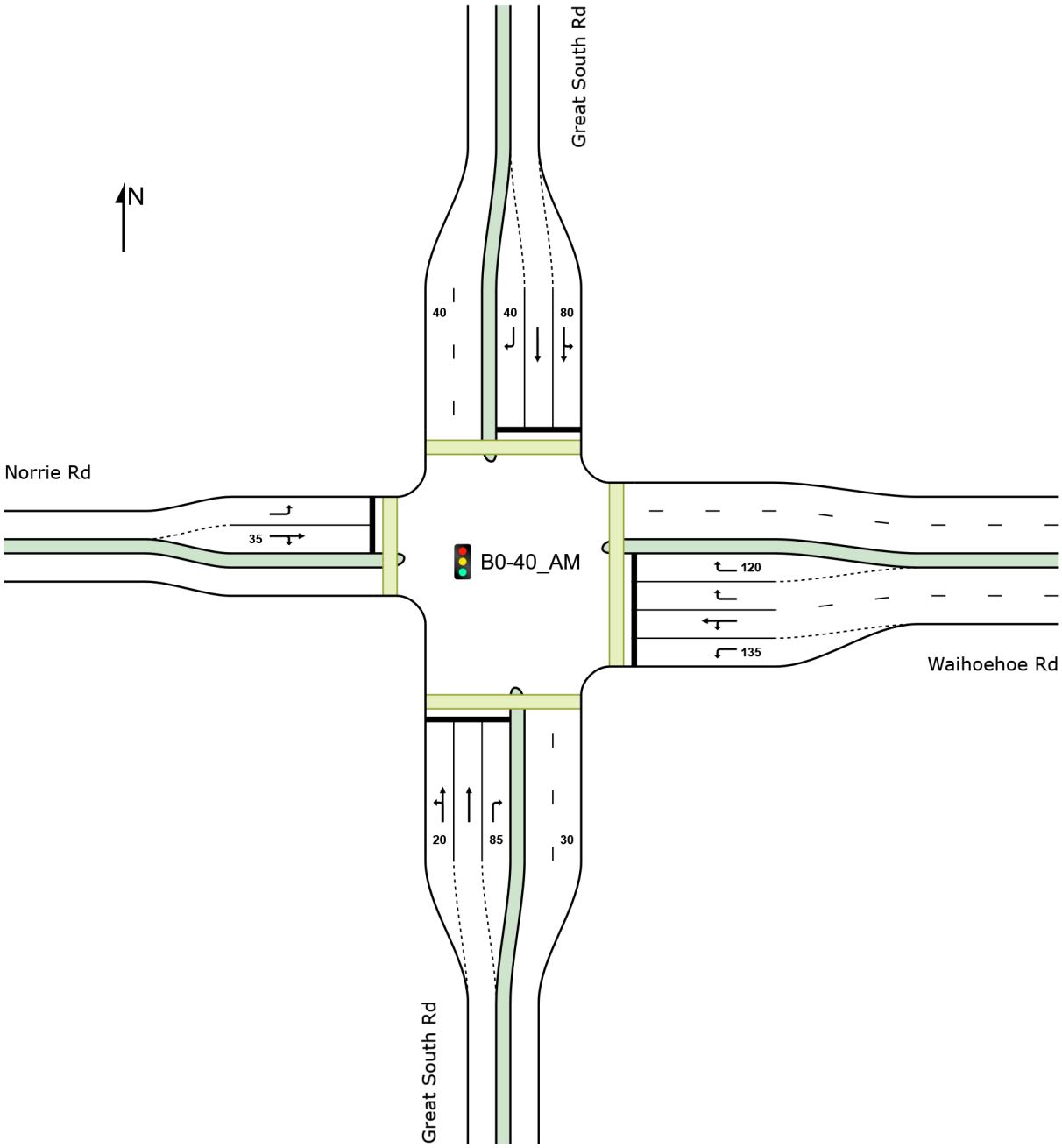
Attachment 3: SIDRA Outputs

SITE LAYOUT

Site: B0-40_AM [Signalized - PT Offset 10% - Background 0% - Drury (40%) (Site Folder: AM)]

Signalized - PT Offset 10% - Background 0% - Drury (40%)
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: B0-40_PM [Signalized - PT Offset 10% - Background 0% - Drury (40%) (Site Folder: PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Signalized - PT Offset 10% - Background 0% - Drury (40%)
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	23	9.1	23	9.1	0.150	38.2	LOS D	2.3	17.9	0.72	0.62	0.72	32.6
2	T1	All MCs	317	10.6	317	10.6	0.445	48.3	LOS D	6.6	50.6	0.79	0.67	0.79	35.3
3	R2	All MCs	124	11.0	124	11.0	0.759	67.1	LOS E	4.7	36.1	1.00	0.91	1.17	26.0
Approach			464	10.7	464	10.7	0.759	52.8	LOS D	6.6	50.6	0.84	0.73	0.89	32.1
East: Waihoehoe Rd															
4	L2	All MCs	300	6.7	300	6.7	* 1.284	175.9	LOS F	33.4	240.9	0.92	1.43	1.80	14.5
5	T1	All MCs	239	1.8	239	1.8	1.284	325.4	LOS F	33.4	240.9	1.00	2.12	2.81	7.8
6	R2	All MCs	408	4.9	408	4.9	0.950	74.0	LOS E	13.8	100.8	0.98	1.03	1.29	24.8
Approach			947	4.7	947	4.7	1.284	169.7	LOS F	33.4	240.9	0.97	1.43	1.84	14.5
North: Great South Rd															
7	L2	All MCs	467	5.4	467	5.4	0.522	61.6	LOS E	6.3	46.4	0.74	0.78	0.74	40.0
8	T1	All MCs	752	6.4	752	6.4	* 1.295	350.0	LOS F	66.6	491.7	1.00	2.40	2.81	9.4
9	R2	All MCs	196	6.5	196	6.5	1.195	282.5	LOS F	14.7	108.9	1.00	1.64	2.50	9.5
Approach			1415	6.1	1415	6.1	1.295	245.4	LOS F	66.6	491.7	0.91	1.76	2.08	12.7
West: Norrie Rd															
10	L2	All MCs	344	4.9	344	4.9	0.964	115.5	LOS F	11.8	86.3	1.00	1.25	1.45	23.1
11	T1	All MCs	278	1.9	278	1.9	* 1.261	326.0	LOS F	25.3	179.6	1.00	2.12	2.74	8.2
12	R2	All MCs	22	0.0	22	0.0	1.261	330.5	LOS F	25.3	179.6	1.00	2.12	2.74	8.2
Approach			644	3.4	644	3.4	1.261	213.7	LOS F	25.3	179.6	1.00	1.65	2.05	12.5
All Vehicles			3471	5.8	3471	5.8	1.295	193.1	LOS F	66.6	491.7	0.93	1.51	1.85	14.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
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.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	69.7	20.0	0.29
East: Waihoehoe Rd												

P2	Full	50	53	40.1	LOS E	0.1	0.1	0.82	0.82	55.5	20.0	0.36
North: Great South Rd												
P3	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	69.7	20.0	0.29
West: Norrie Rd												
P4	Full	50	53	32.3	LOS D	0.1	0.1	0.73	0.73	47.7	20.0	0.42
All Pedestrians		0	211	45.2	LOS E	0.2	0.2	0.86	0.86	60.6	20.0	0.33

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: B0-40_AM [Signalized - PT Offset 10% - Background 0% - Drury (40%) (Site Folder: AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Signalized - PT Offset 10% - Background 0% - Drury (40%)
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	Aver. Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Great South Rd															
1	L2	All MCs	21	0.0	21	0.0	0.323	57.3	LOS E	3.3	24.6	0.83	0.68	0.83	30.4
2	T1	All MCs	534	7.3	534	7.3	* 0.955	100.9	LOS F	20.0	149.1	0.97	1.12	1.28	26.3
3	R2	All MCs	168	10.6	168	10.6	0.706	66.4	LOS E	6.1	46.5	1.00	0.86	1.07	27.1
Approach			723	7.9	723	7.9	0.955	91.6	LOS F	20.0	149.1	0.97	1.05	1.22	26.6
East: Waihoehoe Rd															
4	L2	All MCs	78	8.1	78	8.1	0.480	37.8	LOS D	4.8	36.4	0.79	0.73	0.79	31.9
5	T1	All MCs	132	9.6	132	9.6	0.480	51.1	LOS D	4.8	36.4	0.95	0.78	0.95	27.1
6	R2	All MCs	392	5.9	392	5.9	* 0.963	78.1	LOS E	13.6	100.3	0.98	1.05	1.33	24.1
Approach			601	7.0	601	7.0	0.963	67.0	LOS E	13.6	100.3	0.95	0.95	1.18	25.5
North: Great South Rd															
7	L2	All MCs	337	3.8	337	3.8	0.440	18.7	LOS B	4.7	33.7	0.77	0.78	0.77	39.0
8	T1	All MCs	219	13.9	219	13.9	0.446	45.9	LOS D	6.4	50.1	0.86	0.74	0.86	33.3
9	R2	All MCs	199	7.4	199	7.4	* 0.957	95.8	LOS F	9.1	67.6	1.00	1.15	1.53	20.0
Approach			755	7.7	755	7.7	0.957	46.9	LOS D	9.1	67.6	0.86	0.87	1.00	30.8
West: Norrie Rd															
10	L2	All MCs	396	4.0	396	4.0	0.805	60.3	LOS E	9.5	68.8	0.99	1.04	1.08	31.7
11	T1	All MCs	213	2.0	213	2.0	* 0.941	90.7	LOS F	10.6	75.1	1.00	1.30	1.46	21.7
12	R2	All MCs	21	0.0	21	0.0	0.941	95.2	LOS F	10.6	75.1	1.00	1.30	1.46	21.5
Approach			629	3.2	629	3.2	0.941	71.7	LOS E	10.6	75.1	1.00	1.14	1.22	27.0
All Vehicles			2708	6.5	2708	6.5	0.963	69.1	LOS E	20.0	149.1	0.94	1.00	1.15	27.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
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* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Great South Rd												
P1	Full	50	53	54.3	LOS E	0.2	0.2	0.95	0.95	69.7	20.0	0.29
East: Waihoehoe Rd												

P2	Full	50	53	46.9	LOS E	0.2	0.2	0.89	0.89	62.3	20.0	0.32
North: Great South Rd												
P3	Full	50	53	52.4	LOS E	0.2	0.2	0.94	0.94	67.8	20.0	0.30
West: Norrie Rd												
P4	Full	50	53	38.5	LOS D	0.1	0.1	0.80	0.80	53.9	20.0	0.37
All Pedestrians		0	211	48.0	LOS E	0.2	0.2	0.89	0.89	63.4	20.0	0.32

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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