TRAFFIC PLANNING CONSULTANTS LTD

PROPOSED PLAN CHANGE
AUCKLAND UNITARY PLAN

50 PUKEKOHE EAST ROAD & 47 GOLDING ROAD, PUKEKOHE

INTEGRATED TRANSPORT ASSESSMENT

Prepared By:
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TABLE OF CONTENTS

1.0 INTRODUCTION

This report provides an Integrated Transport Assessment for a proposal to rezone 27 hectares of land located between Pukekohe East Road and Golding Road in Pukekohe from Future Urban Zone to Residential - Mixed Housing Urban Zone. The site is located immediately south of Pukekohe East Road and east of Golding Road on the eastern urban fringe of Pukekohe, as shown in *Figure 1*. The area is currently rural in use and is bounded by predominantly rural land to the north, east, south and west.

The proposal intends to provide a zone that will enable the establishment of up to approximately 580 residential dwellings. The proposal is consistent with the Pukekohe-Paerata Structure Plan and the Supporting Growth Strategy for the South Auckland sub region.

The assessment will consider the proposed changes to the future road environment identified in the south Auckland region and within Pukekohe. It will also refer to the Pukekohe-Paerata Structure Plan and its accompanying Integrated Transport Assessment (ITA).

The key transportation consideration for this proposal is the accessibility of the plan change area to the various modes of transport, and the ability of the surrounding road network to support the proposed development safely and efficiently.

Figure 1: General Site Location
Source: Auckland Council GeoMaps

2.0 EXISTING TRANSPORT ENVIRONMENT

2.1 Road Network

As the site abuts an arterial road (Pukekohe East Road) along its northern boundary, the main access opportunities for the site at present are from Pukekohe East Road and Golding Road adjacent to the site's northern and western boundaries respectively. In the wider context, the site also connects to the Pukekohe Town Centre and State Highway 1 via Pukekohe East Road.

2.1.1 Pukekohe East Road / East Street

Pukekohe East Road is classified as an arterial route under the AUP and forms part of an east-west link between the centre of Pukekohe and State Highway 1 Southern Motorway, at the Mill Road interchange. Pukekohe East Road skirts the northern boundary of the subject site and includes a roundabout junction with Golding Road, which forms the western boundary to the site. To the west, Pukekohe East Road becomes East Street.

Pukekohe East Road is subject to a 70 km/hr posted speed limit which transitions to 50km/hr when it becomes East Street around the intersection of Willowgrange Place, situated some 350 metres from the north-western corner of the subject site, and continues towards Pukekohe. The change in speed limit north-west of the site reflects a transition from rural to urban environment.

Pukekohe East Road has a sealed width of 10 to 11 metres in the vicinity of the site, providing two to three lanes within the vicinity of the site. From its roundabout junction with Golding Road, it provides one traffic lane in each direction for some 300 metres east before providing a right turn lane to Ansemli Ridge Road. One traffic lane with a painted central median continues for some 75 metres east, before three traffic lanes are provided with two eastbound and one westbound. Traffic lanes in each direction are separated by double yellow 'no overtaking' lines. The most recent traffic counts on Pukekohe East Road in the vicinity of the subject site were carried out by Auckland Transport in March 2018 near Valley Royal Way. Details of these traffic counts are summarised in Table 1.

Table 1: Traffic Counts on Pukekohe East Road March 2018

Direction	Weekday	Saturday	Sunday	Weekday		
				AM Peak	Midday Peak	PM Peak
Both	16,362	13,242	11,812	1,352	1,232	1,499

2.1.2 Golding Road

Golding Road is classified as a local road under the AUP and follows a north-south axis between Pukekohe East Road/East Street, in the north-western corner of the subject site, and Logan Road, around 2.35 kilometres to the south. Near the subject site, it currently provides access to a small number of rural residential properties.

Golding Road has a sealed width of around 7.0 metres in the vicinity of the subject site, providing one traffic lane in either direction. To the south of its intersection with East Street / Pukekohe East Road, a 70km/hr speed limit transitions to 100 km/hr, which reflects the rural environment along its length.

The most recent traffic counts on Golding Road in the vicinity of the subject site, between Royal Doulton Drive and Logan Road, were carried out by Auckland Transport in February 2019. Details of the traffic counts are summarised in Table 2.

Table 2: Traffic Counts on Golding Road in February 2019

Direction	Weekday	Saturday	Sunday	Weekday		
				AM Peak	Midday Peak	PM Peak
Both	1,556	1,093	886	197	115	180

2.1.3 Intersection Turning Counts

Traffic Planning Consultants Ltd have also conducted a survey at the Pukekohe East Road/East Street/Golding Road/Belgium Street roundabout on Tuesday 29 and Thursday 30 June 2021 to determine the existing traffic flows during peak times near the site. The surveyed traffic flows for the AM and PM peak periods are shown at *Figure 2*. The turning count flows are generally consistent with those tube counts recorded by Auckland Transport in March 2019.

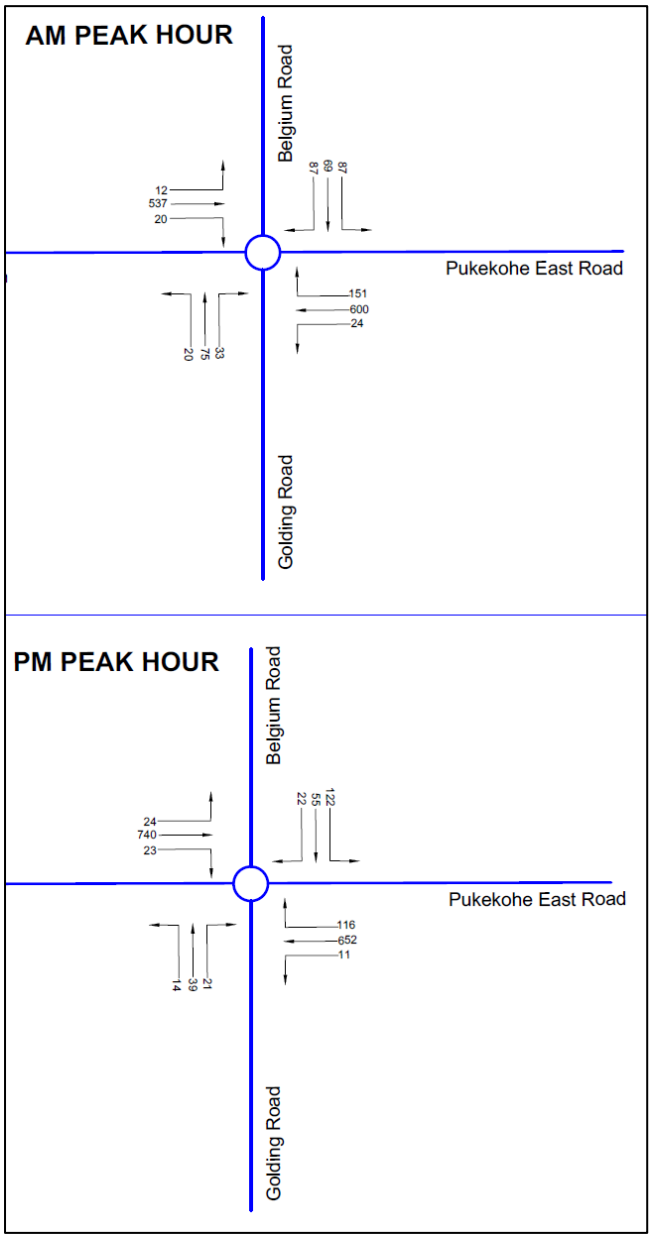


Figure 2: AM & PM Peak Hour Turning Movements – East Street

2.2 Existing Pedestrian Accessibility

In terms of footpath provisions near the site on the existing road network, a footpath is only provided on the north side of Pukekohe East Road opposite the site from the roundabout at Golding Road. While there are no dedicated pedestrian facilities or provisions along other roads in the immediate vicinity of the site.

Figure 3 and Figure 4 show the respective 400-metre and one-kilometre walking distances from the site. From these figures it is shown the site lies within a convenient walking distance of residential, business and education activities on the eastern side of Pukekohe.

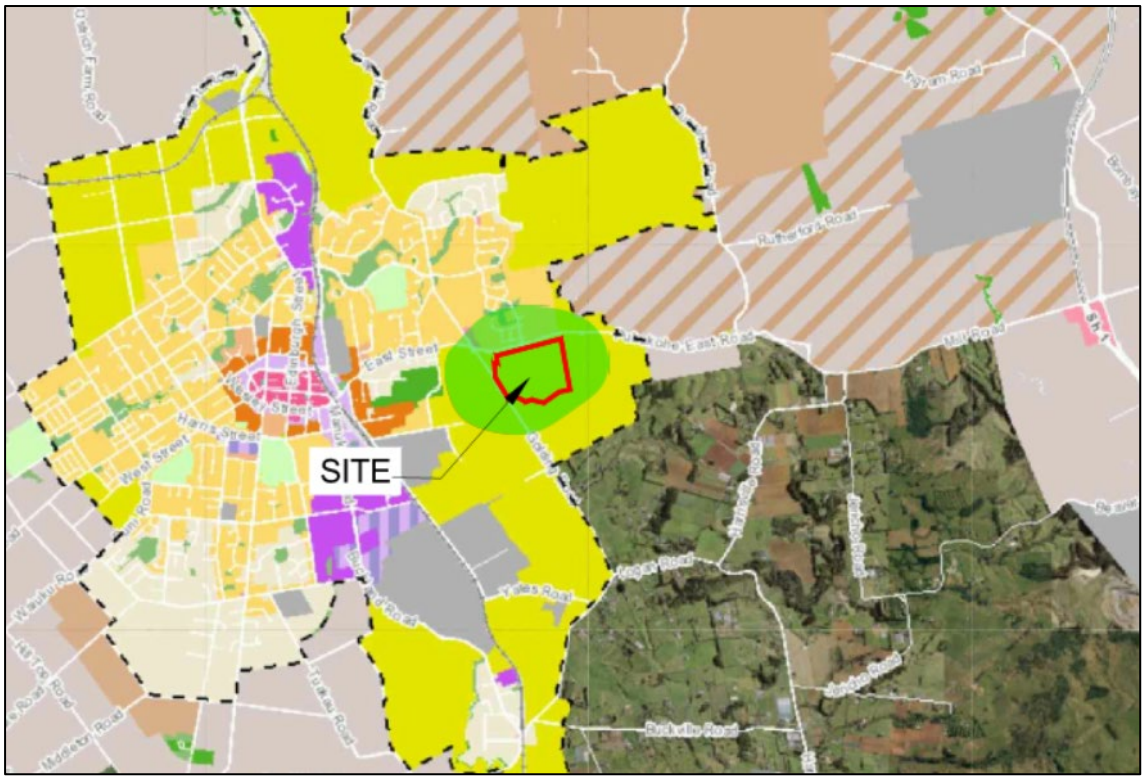


Figure 3: 400 metre Walking Contour from the Site

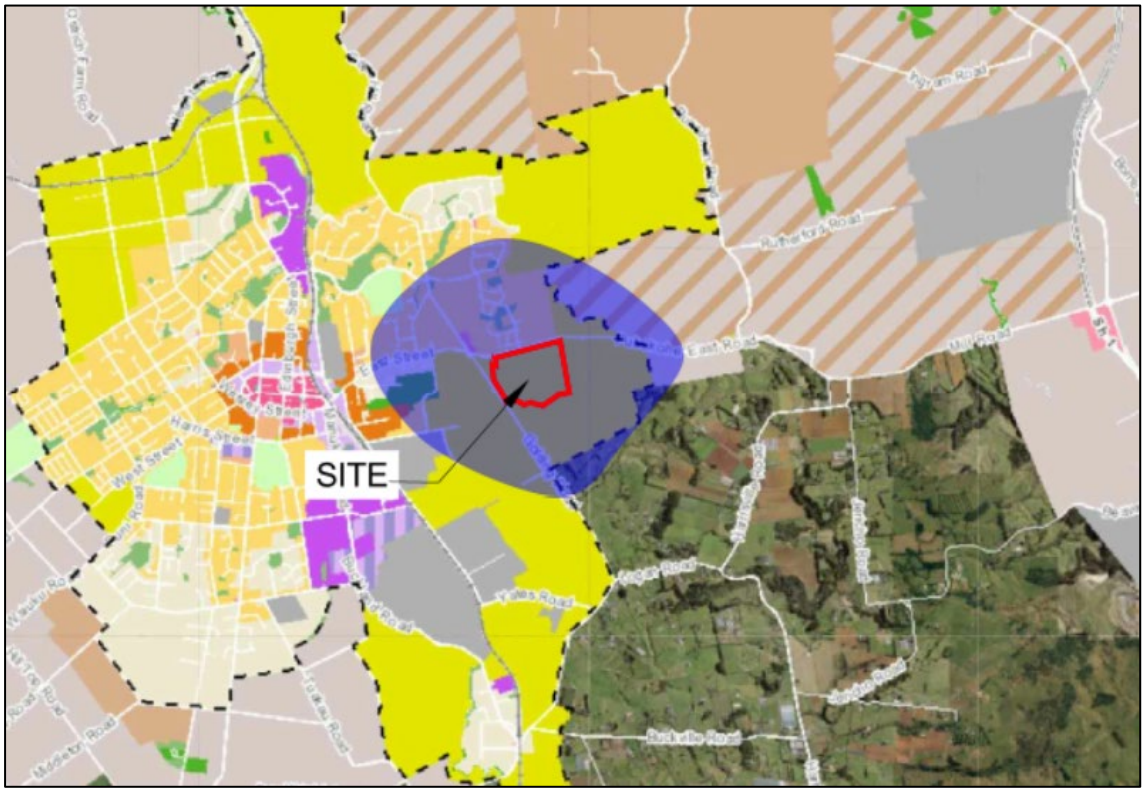


Figure 4: 1km Walking Contour from the Site

2.3 Existing Cyclist Accessibility

Parts of Pukekohe East Road and East Street between the subject site and the centre of Pukekohe have painted shoulders to cater for cyclists. While there are no dedicated cycle facilities or provisions along other roads in the immediate vicinity of the site, the current light levels of traffic along Ngahere Road and Birch Road make these routes safe and attractive for cycling for those who choose to travel by this mode.

Figure 5 shows the three-kilometre cycling contour from the site, which encompasses the centre of Pukekohe and key retail, commercial and industrial areas to the southeast.

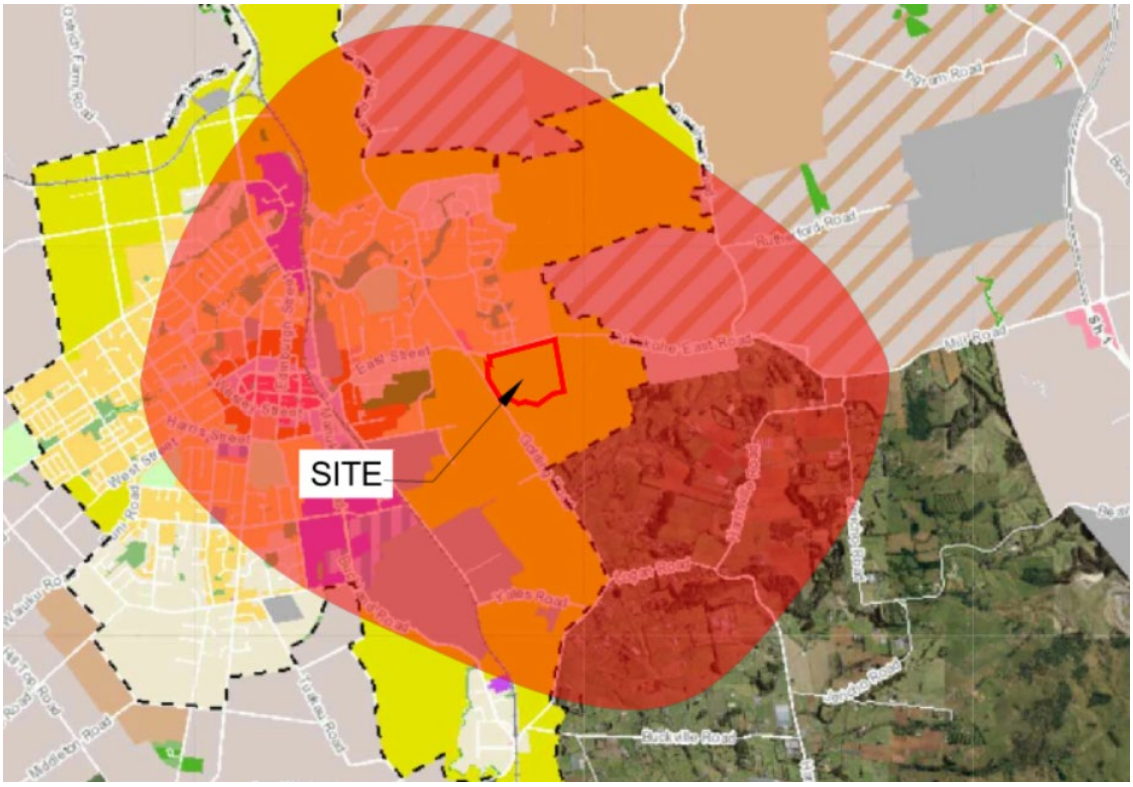


Figure 5: 3km Cycling Contour from the Site
Source: New Zealand Transport Agency/Auckland Transport

2.4 Existing Public Transport Accessibility

The eastern side of Pukekohe, to the east of the North Island Main Trunk Rail line, is currently served by the Bus Route 391, which provides an orbital route connecting the town centre and Railway Station with the north-eastern part of the town. The nearest bus stop to the subject site is located around 800 metres to the west of the site on East Street, but it is understood a bus stop will be provided closer to the site for any future development.

The subject site is also located within approximately 1.8 kilometres of Pukekohe railway station. At present, rail services operating from Pukekohe railway station are limited to diesel shuttle services between Pukekohe and Papakura, which operate at a frequency of three trains per hour during peak periods and hourly at other times. From Papakura, interchange opportunities are available with Southern Line services providing an onward connection to Britomart and the wider Auckland network. Kiwi Rail's website[1] advises that:

- Electrification is now being extended beyond Papakura to Pukekohe and that the major works is currently underway.
- This means people travelling from Pukekohe will no longer need to switch trains at Papakura and will enjoy faster, quieter and cleaner journeys in modern electric trains.
- Introducing electric trains to Pukekohe will mean more services and longer trains. KiwiRail is working closely with Auckland Transport to build a modern public transport interchange and support Auckland Transport's redevelopment plans around Pukekohe Station. Works will include:

[1] https://www.kiwirail.co.nz/what-we-do/projects/amp/papakura-to-pukekohe-electrification/

- A new platform layout to accommodate longer trains. Initially platforms will serve six-car trains with an option to extend them to nine-car trains in the future;
- Removing the existing station building and building modern passenger facilities to complement the bus interchange;
- Installing new overhead power masts and changing the track layout for trains to pass easily and safely through the station area; and
- Building new electric train stabling.

The exiting public transport provision therefore provides linkage within Pukekohe itself and an onward link to Auckland City Centre, as well as nearby areas as shown in **Figure 6**.

Overall, the site is well located to benefit from existing rail service provisions, and as discussed below, it would also be expected to support future rail and bus provisions enabled by new and improved roading connections adjoining the location of the subject site.

Figure 6: Pukekohe Existing Public Transport Routes
Source: New Zealand Transport Agency/Auckland Transport

2.5 Road Safety History

Information from the New Zealand Transport Agency's "Crash Analysis System" for the latest available five-year period, January 2016 to December 2020, indicates that 18 crashes have been reported along Pukekohe East Road and Golding Road in the vicinity of the site. Of these 18 crashes, 13 resulted in no personal injuries while the remaining 5 resulted in injuries. The following is a summary of those crashes reported.

EAST STREET
16 crashes occurred along East Street in the vicinity of the site, at the following locations: • 1 x non-injury crash occurred at the intersection with Valley Road: vehicle lost control whilst turning left • 2 x non-injury crashes occurred at the intersection with Ngahere Road, relating to left-turn manoeuvres • 2 x non-injury crashes occurred at the intersection with Willowgrange Place, which included one rear-end shunt in heavy traffic and one failure to give way upon entering East Street The remaining 11 crashes occurred at or on the approaches to the roundabout intersection of East Street / Golding Road / Pukekohe East Road / Belgium Road and related to assorted traffic manoeuvres, with 5 resulting in personal injury, while the remaining 13 resulted in no personal injury. The crash types noted to be occurring at this location are considered typical for this type of intersection.
GOLDING ROAD
Two non-injury crashes occurred, both of which involved vehicles losing control and leaving the roadway to the left.

Based on analysis of the above crash records, there is no trend that would suggest that a change in land use from urban to residential would have a detrimental impact on the safety or functionality of the surrounding road environment.

3.0 FUTURE TRANSPORT ENVIRONMENT

3.1 The Pukekohe-Paerata Structure Plan and FULSS

In August 2019, Auckland Council adopted the Structure Plan for the future urban zone surrounding Pukekohe-Paerata. The structure plan area is anticipated to provide around 12,500 new dwellings and cater for around 5,000 potential additional jobs over a 30-year period, to enable Pukekohe to fulfil a strategic objective of the Auckland Unitary Plan, to function as a 'satellite town' to Auckland.

The Unitary Plan defines a 'satellite town' as a rural town which has the potential to function semi-independently from the main urban area, as well as servicing its surrounding rural community, with appropriate provisions for employment and services to support residential provisions. A satellite town also requires good transport connections to Auckland through state highways and, in the case of Pukekohe, by rail.

The proposed plan change aligns well with the strategic aim to enhance Pukekohe's role as a satellite town, with the subject site having good proximity to the railway station, town centre and Business – Light Industry zoned land within the south-eastern area of the town. Proposed new and improved roading connections would also serve to enhance the site's connectivity to the state highway network in the future.

Stage 1 of the Structure Plan Growth will be the Paerata Future Urban zoned land to the north of Pukekohe, which is scheduled to be developed during the period 2018 to 2022 with some areas currently underway. Stage Two will be the Pukekohe Future Urban zoned land, which is scheduled to be developed during to 2023 to 2027 period. The Structure Plan confirms that staging may be subject to change due to funding timing and provision of key infrastructure.

The Structure Plan was supported by an Integrated Transport Assessment (ITA), covering both the Pukekohe-Paerata and Drury-Opāheke Structure Plan areas. The purpose of the ITA was to identify the proposed arterial and collector road network at a high level, along with the public transport network and active mode network to support the future growth in line with the two Structure Plans.

The ITA also identified the anticipated trip generation and mode share for the various zoning and land uses set out in the structure plan. It also provided high level traffic modelling outputs, and recommended intersection treatments and road cross sections for key roads.

The Council's Future Urban Land Supply Strategy (FULSS) also indicates that the site is to be developed during the second half of Decade One, between 2023 and 2027. ***Figure 7*** below illustrates the proposed zoning and under the Pukekohe-Paerata Structure Plan. For the proposal site it is anticipated that the site would be zoned Mixed Housing Urban.

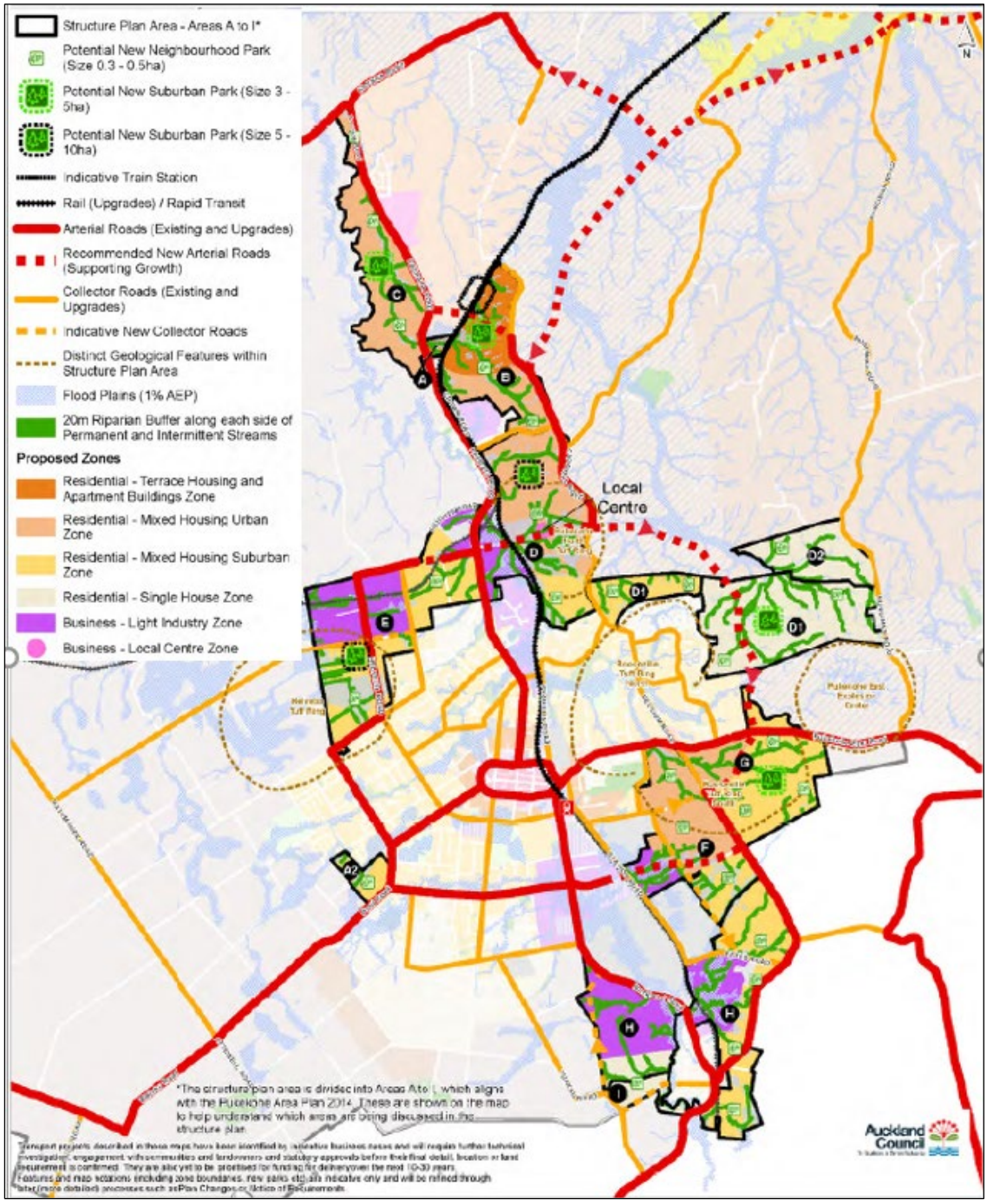


Figure 7 – Pukekohe-Paerata Structure Plan 2019
Source: Auckland Council

3.2 Future Transport Context

Through the Supporting Growth Alliance (SGA), New Zealand Transport Agency (NZTA) and Auckland Transport have proposed several upgrades and proposals to the road environment in the South Auckland region to facilitate to expansion of Pukekohe and the surrounding areas. These improvements are also recognised as key elements of the Pukekohe-Paerata Structure Plan, however timing and funding for the construction of key transport projects remains uncertain.

The following projects are anticipated to be progressed through SGA, to address the transport network issues in the South Auckland region:

- Pukekohe Expressway, which will provide an alternative route to the existing State Highway 22, for access between State Highway 1 and Pukekohe, connecting with the north-eastern section of the proposed new Pukekohe Ring Road.

- Pukekohe Ring Road, which will provide a new orbital route for the town, to travel around the town centre. While the exact form and function of the route is subject to further development, it is expected to be a limited access urban arterial road, which will intersect with Golding Road to the southwest of the subject site.

- Upgrade of Pukekohe East Road / Mill Road, which forms an existing east-west arterial road connection between the subject site and the Bombay Interchange on the State Highway 1 Southern Motorway. While the focus for the Pukekohe East Road section of this route would be on safety improvements, the upgrade of the Mill Road section is expected to include four-laning as well as safety improvements.

- Golding Road Urbanisation, which would serve to enhance the existing north-south connectivity adjacent to the subject site, while enabling future urban access to the subject site along its western frontage, by upgrading Golding Road to an urban collector.

- Four-tracking and Electrification of the North Island Main Trunk (NIMT) to Pukekohe, which would enable the extension of the existing services operated by electric trains, which currently terminate at Papakura, thus providing through services between Pukekohe and central Auckland. These would be expected to replace the current diesel shuttle services between Pukekohe and Papakura and improve travel times by avoiding the need to change trains. Given that the electrification of the NIMT to Pukekohe is consented, funded and works has commenced, the benefits of electrification can to an extent be considered as 'existing' because those works should be complete before houses are anticipated to be constructed.

Whilst the subject site is expected to operate efficiently regarding the surrounding road environment, and the rezoning from a Future Urban Zone to a residential zone is not expected to impact upon that, the planned upgrades will assist with future developments in the local area including the subject site. Several conceptual networks have been evaluated and the following preferred and indicative projects have been identified. ***Figure 8*** illustrates the location of these projects in relation to the site.

The site's improved connectively to other modes such as public transport, walking, and cycling will provide a choice of travel modes and a higher level of accessibility to the wider network.

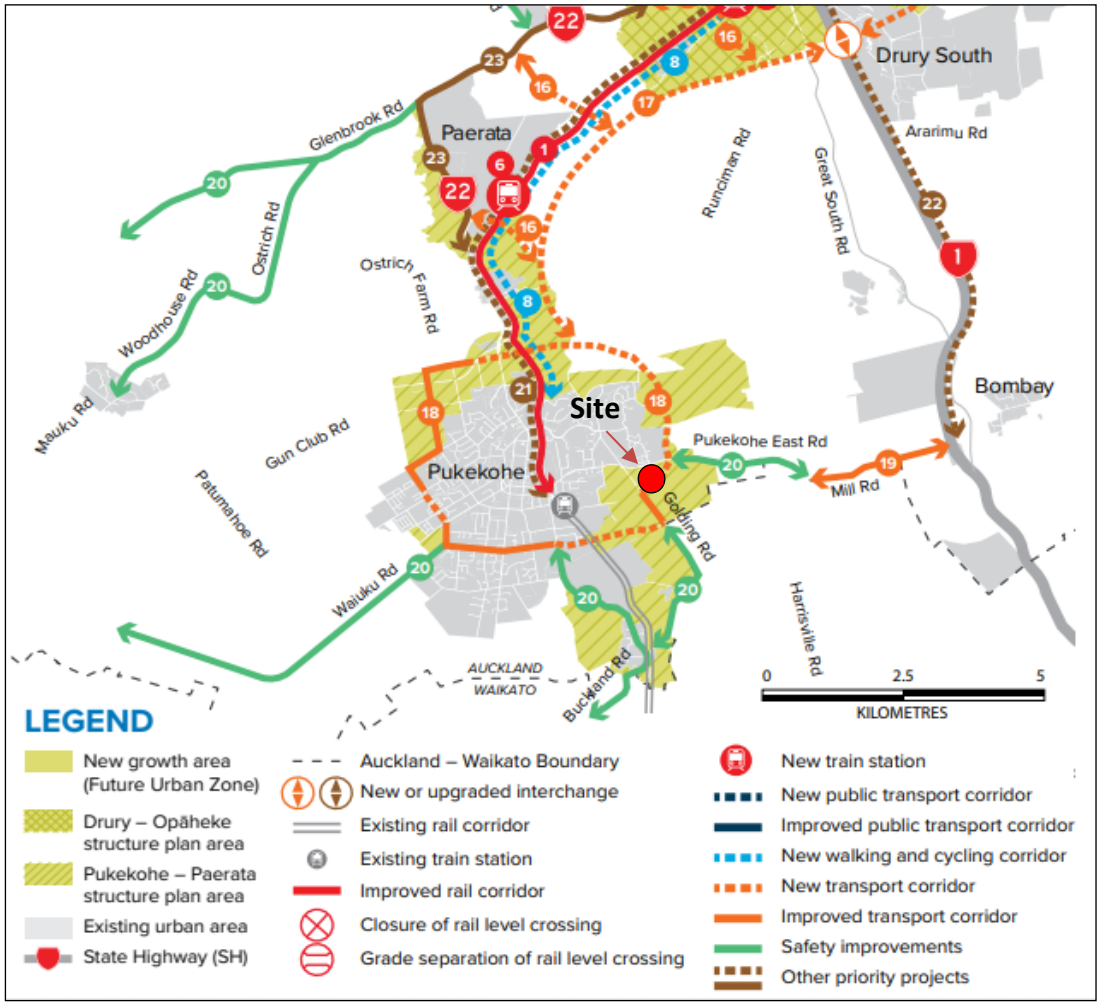


Figure 8: South Auckland Indicative Strategic Transport Network
Source: New Zealand Transport Agency/Auckland Transport

3.3 Future Traffic Flows

The Pukekohe-Paerata Structure Plan ITA also sets out future predictions for daily traffic volumes under numerous scenarios depending on which strategic infrastructure is in place. The key design years they have focused on are 2028 and 2048. Under all scenarios, the East Street – Pukekohe East Street corridor is expected to accommodate up to 10,000 vehicles movements per day in the vicinity of the site.

Given that the current volumes measured by Auckland Transport in 2018 are currently sitting at about 16,000 vehicles per day on Pukekohe East Road, this indicates that volumes will drop in the future as public transport and active mode infrastructure is established regardless of the increase in household and employment numbers.

Any assessment of effects of traffic flow on Pukekohe East Road relating to the proposed plan change can therefore be based existing volumes and will ensure a robust assessment is undertaken.

3.4 Future Public Transport Accessibility

Extension of the current rail electrification from Papakura to Pukekohe is currently planned and funded to be completed by 2024, which will reduce rail travel times by eliminating the need for interchange between diesel and electric train services at Papakura. This will contribute towards reducing car travel, particularly to and from the north during peak times.

The planned enhancements to the collector and arterial road network in and around Pukekohe will provide opportunity to expand the public transport network to support the planned population growth in the area. Details of future bus services are currently not available, but they are expected to increase as demand (new households) are established.

At a high level the Structure Plan ITA has confirmed that the road network is generally consistent with/generally provides for the coverage sought in AT's conceptual bus network. Multiple options for services between Drury, Pukekohe and Paerata (with connections to train stations to expand the reach of rail where there are no stations are available) are proposed, to maintain the current general structure of bus services in Pukekohe while providing for expansion of the network.

As shown in ***Figure 9***, both Pukekohe Road East/East Street and Golding Street roads are anticipated to have future Connector and Local bus services. These will further enhance the options for travel for households within the plan change area and assist in managing effects on the road network.

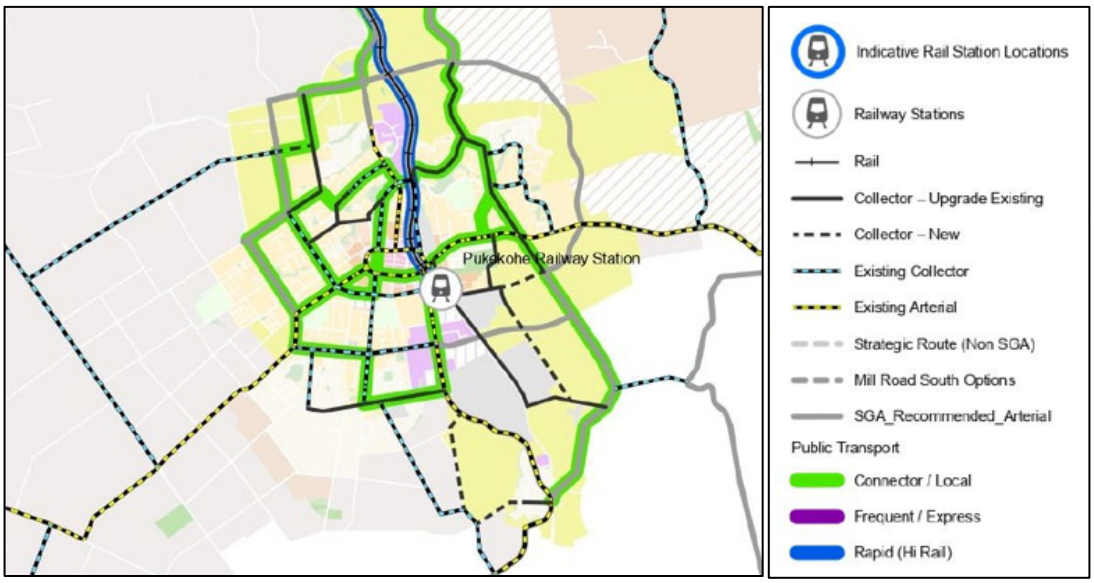


Figure 9: Pukekohe Indicative Future Public Transport Network
Source: New Zealand Transport Agency/Auckland Transport

3.5 Future Pedestrian and Cyclist Accessibility

The plan change anticipates that developments in the area will provide walking and cycling routes on both sides of Golding Road and Pukekohe East Road/East Street, which will provide direct links for future residents. These will be provided in the form of separated footpaths and cycle paths.

The Pukekohe-Paerata Greenways Plan adopted by Auckland Council in 2018 identified multiple greenway connections in and around the Pukekohe-Paerata Structure Plan area. The majority of these utilise existing roads and are largely consistent with the existing network. Both on and off-road trails identified in the vicinity of the site are shown in ***Figure 10*** below. They include greenway connections along Birch Road, Ngahere Road and through the subject site following the existing waterways.

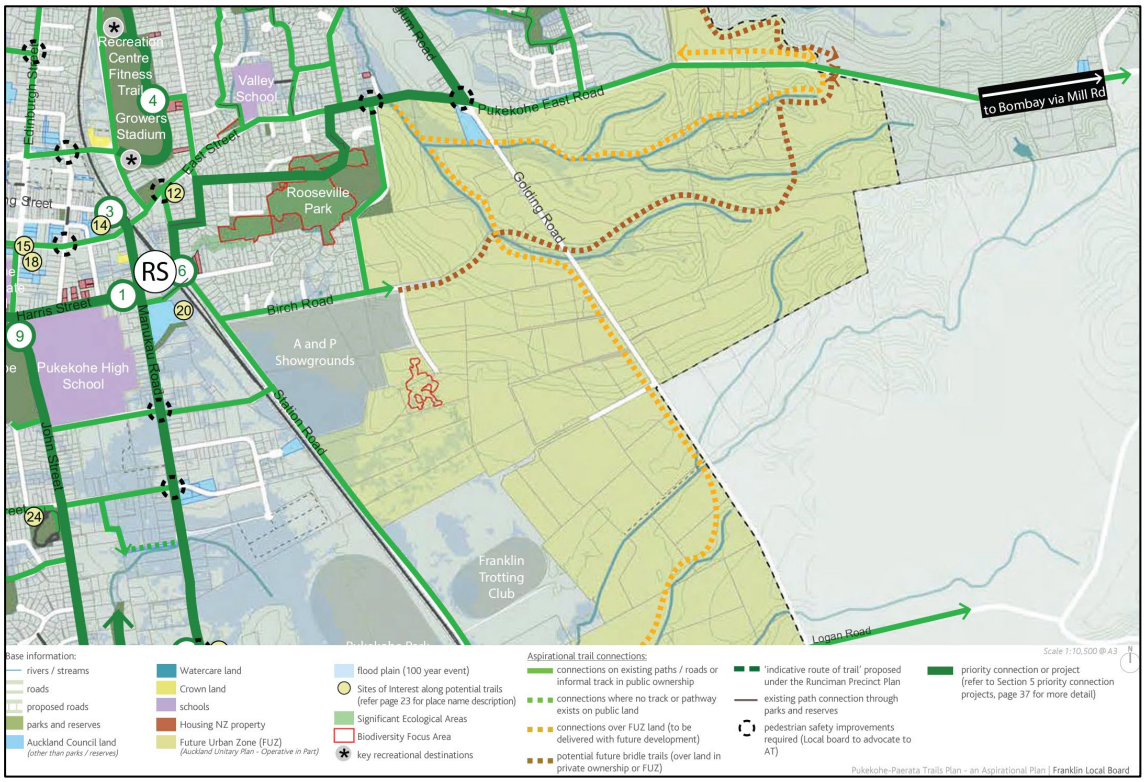


Figure 10: Pukekohe-Paerata Paths Plan
Source: Auckland Council

3.6 Indicative Cross Sections for Future Urban Roads

As noted earlier, Golding Road is to be upgraded to an urban collector road along the site frontage and Pukekohe East Road/East Street is shown as an urban arterial road in the Pukekohe-Paerata Structure Plan.

The urban collector roads will provide efficient access between new and existing residential frontages and the adjoining arterial road network, which will provide onward access to key locations, such as Pukekohe town centre, the railway station, and employment and retail opportunities to the southeast of the town centre, as well as to the state highway network.

These upgraded routes will cater for walking and cycling movements on both sides of the road, as well as potential future public transport usage. It is expected that they will be subject to a 50 kph speed limit, to support a safe speed environment. A typical cross section for a two-lane urban collector road is indicated in ***Figure 11*** and the expected cross section of Pukekohe East Road/East Street as an urban arterial road in ***Figure 12***.

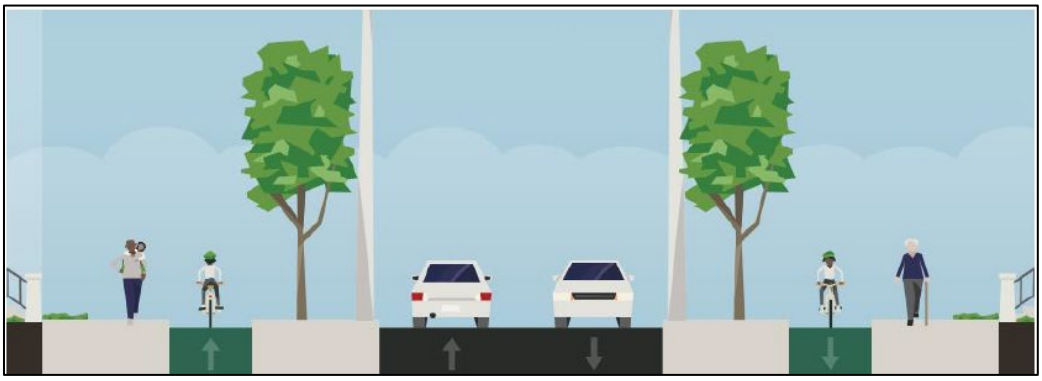


Figure 11: Urban Collector (21m) – Indicative Cross Section
Source: New Zealand Transport Agency/Auckland Transport

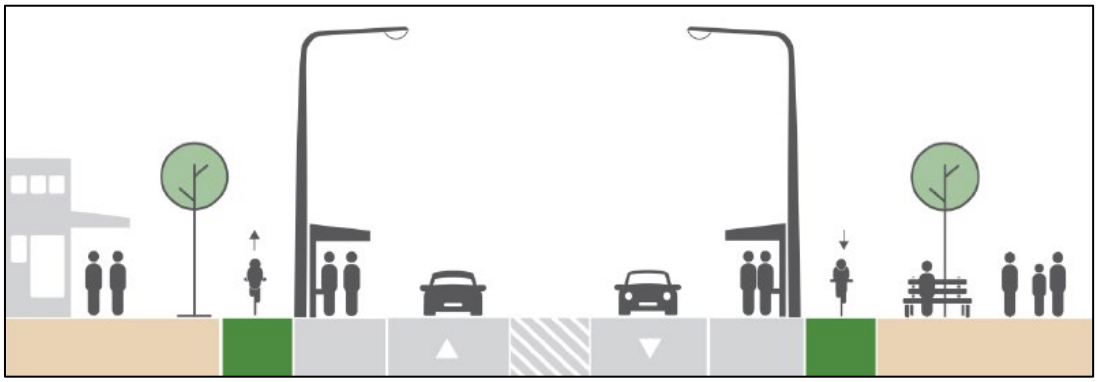


Figure 12: Urban Arterial (25m) – Indicative Cross Section
Source: New Zealand Transport Agency/Auckland Transport

4.0 THE PROPOSAL

4.1 General Description

The plan change seeks to rezone land from Future Urban Zone to a Mixed Housing Urban Zone, to enable the establishment of up to 580 residential dwellings.

The key transport outcomes of the proposal are:

- Support towards the upgrading of the Pukekohe East Road corridor to an urban arterial road along the frontage of the site;
- Providing quality connected residential neighbourhoods to support the growth of Pukekohe;
- Creating a network of walkways through the plan change area with a series of roads and active mode routes; and
- Identifying key intersections on the site boundaries to provide access to adjacent land for development.

An indicative masterplan of the potential site layout is shown in ***Figure 13***. This concept is an example of the type of development the plan change will enable. It is not necessarily the final detailed form of development, which will be determined at the time of any subdivision consent but represents the likely development for the site considering the natural features of the site and suitable of access.

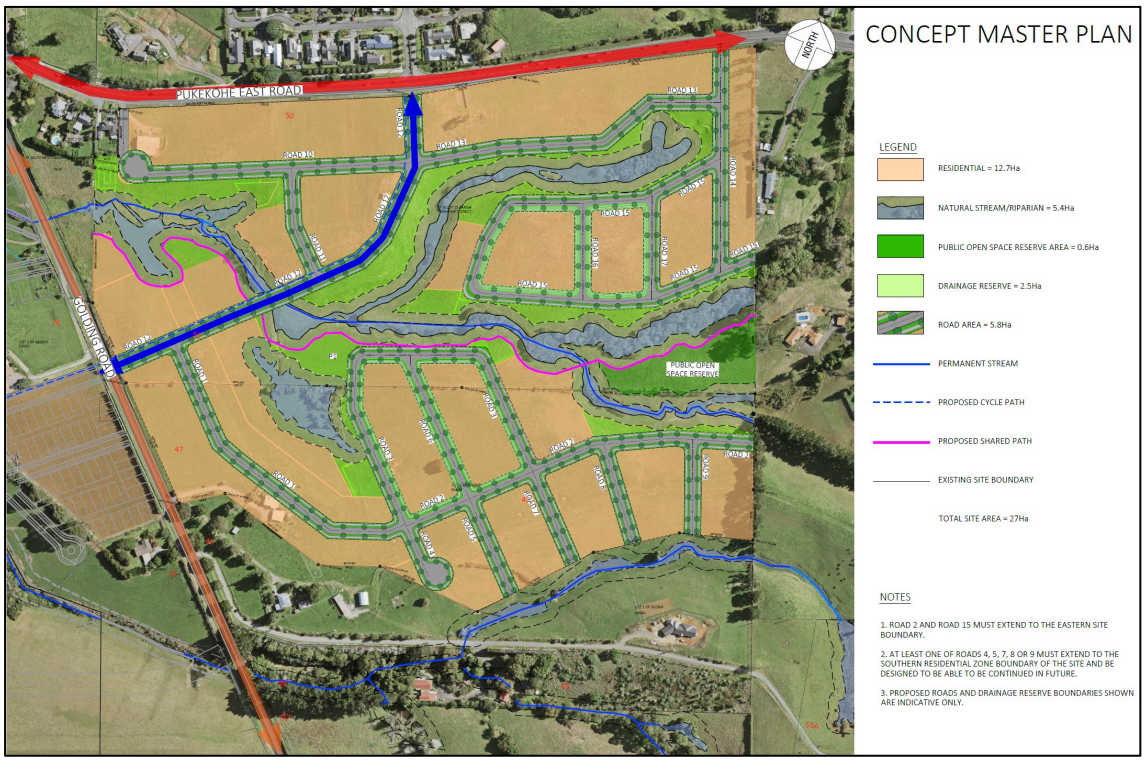


Figure 13: Proposed Concept Plan Layout
Source: Civix

4.2 Accessibility Design Principles

Best-practice residential area design aims to produce liveable residential neighbourhoods that contribute to safety, good health, efficiency, and sustainability while having good levels of amenity.

Street patterns that allow good access through and around the area and to local services by walking and cycling are beneficial, and guidelines generally talk about connectivity and permeability as being desirable attributes. Legibility is another desirable attribute and the creation of self-explanatory roads.

It is desirable for residents to be within easy walking distance of public transport services and local service centres to assist in reducing demand for private vehicle travel. Pedestrian walkability catchments are generally based on good access being provided within 400 metres or about 5-minutes' walk, with lesser access being provided within 800 metres or a 10-minute walk. Although with the increase in micro-mobility, there will be opportunities for greater distances to be covered.

In terms of intersection design, crossroads on streets where traffic volumes are higher have been shown to have poorer crash records. In general, where traffic volumes are higher than 1,000 vehicles per day consideration should be given to controlling conflict at cross-roads. Roundabouts can be effective at controlling conflict and moderating speeds, although busy roundabouts can be difficult for pedestrians and cyclists to negotiate. Many guidelines refer to the desirability of avoiding crossroads by shifting roads to produce a series of "T" intersections instead.

Any land development will need to provide high quality walking and cycling infrastructure to minimise the need to use private vehicles and for trips within the site. By providing a high standard of pedestrian and cycle facilities, pedestrians and cyclists of all ages can move safely within the area with minimal risk. This will be an important function of any future development of the site.

New facilities outside of the site boundaries are also needed to provide improved safety and connectivity to key destinations. Some of this infrastructure will rely upon other landowners to develop and with the future upgrade of nearby roads, dedicated and safe facilities will be provided. As a minimum, the upgrade of roads alongside the site frontage to including walking and cycling movement will connect any future development to the wider network.

The proposed zoning will not preclude making the most of opportunities to promote walking and cycling.

4.3 Proposed Precinct Plan

The proposed Precinct Plan is illustrated in *Figure 14* and sets out the key transport initiatives to support the integration of the site into the surrounding transport network.

As the site abuts an arterial road at its northern edge and a collector road on its western edge, these are the only opportunities to provide access between the site and the wider road network. The precinct plan recognises that the frontages for each of these roads will need to be upgraded consistent with the Structure Plan to enable the accessibility for all modes.

As indicated, the Precinct Plan provides for a collector type road connection through the site between Pukekohe East Road and Golding Road. The proposed alignment would connect with Pukekohe East Road opposite Anselmi Ridge Road and integrate with another collector road that is proposed within Plan Change 76 (PC76) on the west side of Golding Road. The creation of this collector type corridor would enable a direct active mode link through the subject site, PC76 and to Birch Road and the Pukekohe Train Station.

As this road would create two crossroad type junctions, it is expected that they would need to be controlled by traffic signals. Further assessment of these two intersections is provide later in this report.

Within the site a network of local roads that will provide access to most lots will be developed. These roads are anticipated to carry no more than 500 vehicle movements per day in line with local road functions.

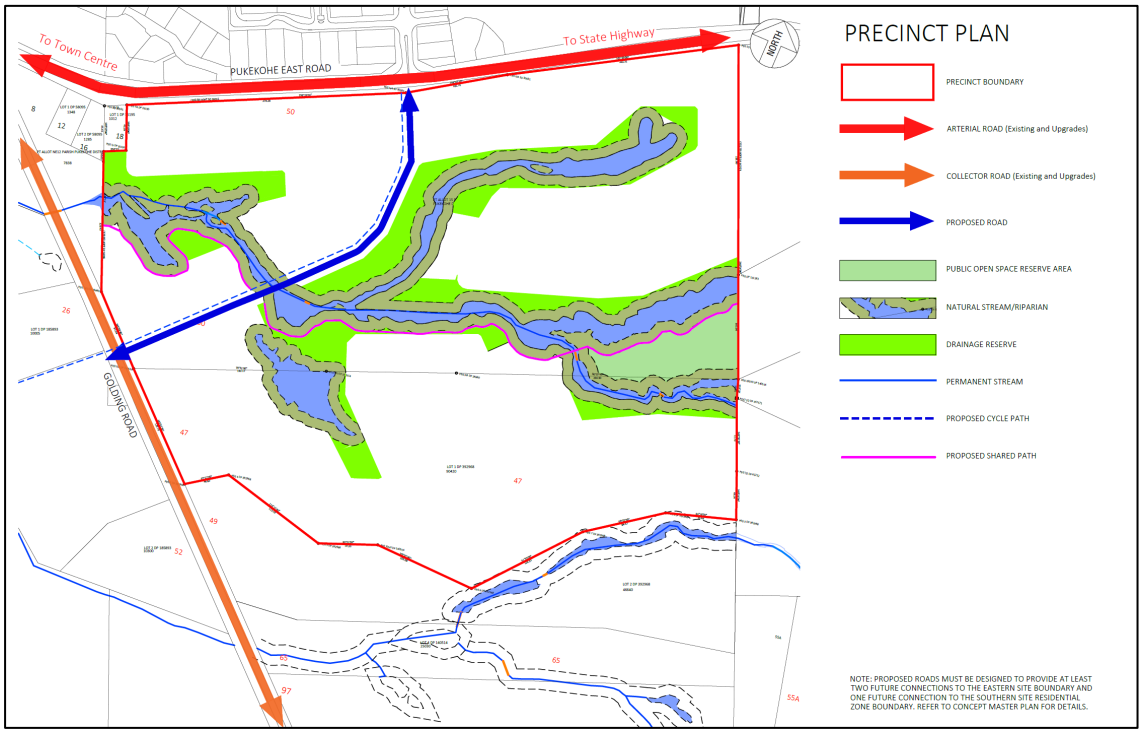


Figure 14: Proposed Precinct Plan
Source: Civix

4.4 Mode Trip Generation

The Structure Plan ITA provides an indication of the anticipated number of daily household trips for the Pukekohe East area to be around 8.9 trips per household with 11% of these trips being active mode trips.

The ITA also indicates that for a fully developed 2048 network a high public transport share approaching 50% is expected for longer-distance trips north, with a 16% share for trips to nearby areas such as Papakura and only 5% for local trips within the southern area itself. The overall average across all trips is 20%.

The predicted uptake in public transport (PT) trips has several factors that will vary based on the trip purpose and destination of the movement. The influence of the available road network and reliability of public transport will limit this uptake. The ITA indicated that for a constrained 2028 network, the PT share is much lower, being some 24% to the north, 5% nearby and 2% local.

Therefore, for the purposes of this ITA, the following with regards to the anticipated mode share has been assumed as a baseline for assessment. This is expected to be the middle ground scenario and any reduction in private car travel because of the improved active mode and public transport provisions will have a positive effect on the surrounding road network.

- 11% active modes;
- 15% public transport; and
- 74% private car.

The Structure Plan ITA also sets out predicted peak hour vehicle trip generation rates for each area. For Pukekohe East, the ITA predicts an AM peak hour trip generation of 0.54 vehicles per hour (vph) per household and an almost identical PM peak rates of 0.55 vph per household.

Based on a development potential of 580 dwellings the following number of trips can be expected for each mode. The peak hour rates for active modes are estimates as they were not provided within the ITA.

Number of Trips	Active	Public Transport	Private Car
Daily	568	774	6,000
Peak Hour	85	116	319

4.5 Vehicle Trip Distribution

As is typical with most residential activities, flow to and from the site is tidal with most vehicle movements in the AM peak leaving the site and then returning in the PM peak, thus reducing the potential of any two-way conflicts when vehicles are entering or leaving the site. For this assessment, it is assumed that 80% vehicles exiting the site and 20% vehicles entering the site in the AM peak hours and vice versa in the PM peak.

As the proposal site has no employment or school zoning proposed, it is anticipated that all the associated vehicle trips would be external to the site. The predicted origins and destination of the vehicle trips generated by the proposal have been based on the existing directional flows on East Street. The following distribution is therefore anticipated for each peak period.

Direction	AM Peak	PM Peak
To East	39%	48%
To West	51%	42%
To North	5%	5%
To South	5%	5%

For the purposes of this assessment, it has been assumed that 70% of site related vehicle trips will use East Street. Golding Road also provides a link to and from the north and south from the site and is assumed to accommodate about 30% of vehicle trips.

The assignment of turning movements at each of the following key intersections on East Street and Golding Street are shown in ***Attachment 1*** for each the AM and PM peak periods.

- East Street / Golding Street / Belgium Road - Roundabout
- East Street / New Collector Road / Anselmi Ridge Road – Traffic Signals
- Golding Road / New Collector Road – Traffic Signals

5.0 ASSESSMENT OF TRANSPORT EFFECTS

5.1 Walking and Cycling Trips

Although the predicted walking and cycling numbers are expected to be relatively low, any redevelopment on the subject site will need to manage pedestrian and cycling amenity and safety. As the surrounding area develops with other activities such as employment and schools, it is anticipated that the volume of pedestrians and cyclists will increase.

To cater for these new trips and to ensure a safe environment for active modes, any development of the subject site will need to include the following:

- Creation of footpaths along both sides of the new street alignments that meet Auckland Transports standards;
- Connection of new footpaths with the existing public footpath network immediately outside the site, with new and upgraded pedestrian infrastructure along the frontages on Pukekohe East Road and Golding Road;
- Consistency with the Pukekohe-Paerata Paths Plan 2018;
- Pedestrian crossing facilities incorporated into the intersection layouts;
- Regular and safe crossing opportunities on the adjacent arterial roads where pedestrian desire lines are evident;
- Separated, protected, or off-street cycle facilities on collector roads; and
- Provision of a low-speed local street network that allows cyclists and vehicles to share the same carriageway on an equal basis.

The implementation of such measures will ensure that pedestrian and cycling activity in the area will not be adversely affected and will promote an increase in active travel.

5.2 Public Transport Trips

Public transport provision in Pukekohe will be significantly enhanced to help accommodate the anticipated demands associated with growth in Pukekohe and other key areas.

The exact nature, timing, and routes of future bus services through the Pukekohe area will be finalised and decided upon by Auckland Transport. When this occurs, accessibility will be significantly improved and in return will reduce the number of private car travels. Future bus services planned for Pukekohe East Road/East Street and Golding Road will ensure all households within the plan change area will be within suitable walking distance of a bus stop and service.

As set out above, the extension of the current rail electrification from Papakura to Pukekohe is currently planned and funded to be completed by 2024, which will reduce rail travel times and is expected to increase the number of people using the train and also contribute to a reduction in private car travel.

The key outcome of the rezoning will therefore be to ensure that high quality walking connections are provided to nearby bus stops to promote a greater use of public transport and reduce private car travel.

5.3 Traffic Generation Effect (Intersection Performance)

The ability for roads to accommodate two-way flow and the performance of the intersections are both key considerations when assessing traffic generation effects. The three intersections where most vehicle demand is expected to occur are as follows:

- East Street / Golding Street / Belgium Road - Roundabout
- Pukekohe East Road / New Collector Road / Anselmi Ridge Road – Traffic Signals
- Golding Road / New Collector Road – Traffic Signals

To assess the likely effects of the generated traffic from the development of the site, a SIDRA-9 traffic model has been run for these intersections during both commuter peaks and the SIDRA outputs for the modelled intersections are included in ***Attachment 2***. The key assumptions used in the models are as follows:

- The baseline flows for each intersection are the existing flows on each road as set out in Figure 2 above, together with the anticipated trip generation flows from the PC76 area on the west side of Golding Road.
- Trip generation rates and distribution are consistent withPC76 and as set out in Section 3 above.
- Anselmi Ridge Road will cater for up to 200 lots and follow a similar distribution as set out on Section 3 above.
- Allowances have been made for through traffic using the collector road through the site in order to access areas outside of the site such as the PC76 area.

5.3.1 East Street / Golding Road / Belgium Road Roundabout

The SIDRA results for the East Street/Golding Road/Belgium Road roundabout in the AM and PM peak hours are summarised in **Figure 15** and **Figure 16**, which includes the proposed traffic flows.

In the weekday AM peak hour, the roundabout will generally operate within its capacity, with a maximum degree of saturation of 0.928 and average delay of 60 seconds occurring on the Golding Road approach. The overall level of service (LOS) for the intersection will be B, with the worst LOS on the southern approach on Golding Road where there is a LOS E.

Level of service and average delays provide a robust measure of an intersection's performance and resilience to accommodate added traffic demand and when it may need upgrading. Once an intersection reaches a LOS D, it is considered close to reaching its capacity and unreasonable delays can be expected. As the overall LOS is measured as B during the busiest time of the day, the intersection will operate well within its capacity even with the add development traffic and for the most part will operate at a higher level in the off-peak times.

In the weekday PM peak hour, the roundabout will also continue to operate within its capacity, with a maximum degree of saturation of 0.871 and average delay of 12.2 seconds. The overall level of service (LOS) for the intersection will be B, with the worst LOS on the northern approach on Belgium Road where there is a LOS C.

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: Golding Road														
1	L2	129	1.0	136	1.0	0.928	59.2	LOS E	18.4	129.7	1.00	1.75	2.69	33.0
2	T1	149	1.0	157	1.0	0.928	59.2	LOS E	18.4	129.7	1.00	1.75	2.69	28.4
3	R2	102	1.0	107	1.0	0.928	62.8	LOS E	18.4	129.7	1.00	1.75	2.69	25.1
Approach		380	1.0	400	1.0	0.928	60.2	LOS E	18.4	129.7	1.00	1.75	2.69	29.6
East: Pukekohe East Road														
4	L2	38	1.0	40	1.0	0.818	7.7	LOS A	13.3	95.2	0.82	0.76	0.95	43.3
5	T1	698	3.0	735	3.0	0.818	8.5	LOS A	13.3	95.2	0.82	0.76	0.95	46.9
6	R2	160	2.0	168	2.0	0.818	12.0	LOS B	13.3	95.2	0.82	0.76	0.95	45.5
Approach		896	2.7	943	2.7	0.818	9.1	LOS A	13.3	95.2	0.82	0.76	0.95	46.6
North: Belgium Road														
7	L2	89	1.0	94	1.0	0.478	11.5	LOS B	4.0	28.2	0.95	1.02	1.08	43.1
8	T1	74	2.0	78	2.0	0.478	11.6	LOS B	4.0	28.2	0.95	1.02	1.08	43.4
9	R2	88	1.0	93	1.0	0.478	15.1	LOS B	4.0	28.2	0.95	1.02	1.08	46.1
Approach		251	1.3	264	1.3	0.478	12.8	LOS B	4.0	28.2	0.95	1.02	1.08	44.6
West: East Street														
10	L2	12	2.0	13	2.0	0.785	13.0	LOS B	11.6	84.2	0.98	1.09	1.37	45.5
11	T1	597	4.0	628	4.0	0.785	13.1	LOS B	11.6	84.2	0.98	1.09	1.37	45.4
12	R2	48	1.0	51	1.0	0.785	16.6	LOS B	11.6	84.2	0.98	1.09	1.37	45.1
Approach		657	3.7	692	3.7	0.785	13.4	LOS B	11.6	84.2	0.98	1.09	1.37	45.4
All Vehicles		2184	2.6	2299	2.6	0.928	19.7	LOS B	18.4	129.7	0.91	1.06	1.39	42.7

Figure 15: SIDRA Results – East Street/Golding Road/Belgium Road Roundabout – AM Peak Hour

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: Golding Road														
1	L2	37	1.0	39	1.0	0.265	10.9	LOS B	1.8	12.6	0.82	0.85	0.82	45.1
2	T1	45	1.0	47	1.0	0.265	11.0	LOS B	1.8	12.6	0.82	0.85	0.82	43.7
3	R2	38	1.0	40	1.0	0.265	14.5	LOS B	1.8	12.6	0.82	0.85	0.82	42.0
Approach		120	1.0	126	1.0	0.265	12.1	LOS B	1.8	12.6	0.82	0.85	0.82	43.9
East: Pukekohe East Road														
4	L2	96	1.0	101	1.0	0.825	8.1	LOS A	14.1	101.4	0.82	0.77	0.96	43.2
5	T1	718	4.0	756	4.0	0.825	8.9	LOS A	14.1	101.4	0.82	0.77	0.96	46.8
6	R2	118	1.0	124	1.0	0.825	12.3	LOS B	14.1	101.4	0.82	0.77	0.96	45.4
Approach		932	3.3	981	3.3	0.825	9.2	LOS A	14.1	101.4	0.82	0.77	0.96	46.5
North: Belgium Road														
7	L2	131	1.0	138	1.0	0.695	28.6	LOS C	7.5	52.7	1.00	1.22	1.52	37.0
8	T1	77	1.0	81	1.0	0.695	28.7	LOS C	7.5	52.7	1.00	1.22	1.52	36.7
9	R2	24	1.0	25	1.0	0.695	32.2	LOS C	7.5	52.7	1.00	1.22	1.52	41.7
Approach		232	1.0	244	1.0	0.695	29.0	LOS C	7.5	52.7	1.00	1.22	1.52	37.6
West: East Street														
10	L2	24	1.0	25	1.0	0.871	10.4	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
11	T1	827	4.0	871	4.0	0.871	10.6	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
12	R2	113	1.0	119	1.0	0.871	14.1	LOS B	18.4	132.6	1.00	0.85	1.21	46.0
Approach		964	3.6	1015	3.6	0.871	11.0	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
All Vehicles		2248	3.1	2366	3.1	0.871	12.2	LOS B	18.4	132.6	0.92	0.86	1.12	45.4

Figure 16: SIDRA Results – East Street/Golding Road/Belgium Road Roundabout – PM Peak Hour

5.3.2 Pukekohe East Road / Anselmi Ridge Road / New Road – Traffic Signals

The SIDRA results for the Pukekohe East Road/Anselmi Ridge Road/New Road intersection in the AM and PM peak hours are summarised in **Figure 17** and **Figure 18**, which include the anticipated future traffic flows from the plan change area.

The layout of the signalised intersection has adopted two-lane approaches on Pukekohe East Road and a split side road phasing. Details of both the layout and the pashing adopted are included in *Attachment 2*.

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: Road 1														
1	L2	84	1.0	88	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	33.3
2	T1	1	1.0	1	1.0	0.648	29.5	LOS C	7.5	53.2	0.97	0.84	1.02	37.0
3	R2	130	1.0	137	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	42.1
Approach		215	1.0	226	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	40.0
East: Pukekohe Road East														
4	L2	33	1.0	35	1.0	*0.572	27.9	LOS C	9.9	70.7	0.89	0.79	0.89	44.1
5	T1	763	3.0	803	3.0	*0.822	27.2	LOS C	17.8	127.8	0.95	0.92	1.06	43.5
6	R2	8	2.0	8	2.0	0.054	37.9	LOS D	0.3	2.0	0.94	0.66	0.94	42.1
Approach		804	2.9	846	2.9	0.822	27.3	LOS C	17.8	127.8	0.95	0.91	1.05	43.5
North: Anselmi Ridge Road														
7	L2	34	1.0	36	1.0	*0.474	24.3	LOS C	2.0	13.9	0.98	0.77	0.98	44.7
8	T1	4	1.0	4	1.0	*0.474	19.5	LOS B	2.0	13.9	0.98	0.77	0.98	40.1
9	R2	48	1.0	51	1.0	0.474	24.2	LOS C	2.0	13.9	0.98	0.77	0.98	39.6
Approach		86	1.0	91	1.0	0.474	24.0	LOS C	2.0	13.9	0.98	0.77	0.98	42.5
West: Pukekohe Road East														
10	L2	12	2.0	13	2.0	0.558	25.8	LOS C	9.6	69.4	0.87	0.75	0.87	40.4
11	T1	755	4.0	795	4.0	0.803	25.5	LOS C	16.6	120.3	0.93	0.88	1.03	43.8
12	R2	21	1.0	22	1.0	0.140	38.5	LOS D	0.7	5.3	0.96	0.70	0.96	31.8
Approach		788	3.9	829	3.9	0.803	25.8	LOS C	16.6	120.3	0.93	0.87	1.02	43.6
All Vehicles		1893	3.0	1993	3.0	0.822	27.3	LOS C	17.8	127.8	0.95	0.88	1.03	43.2

Figure 17: SIDRA Results – Pukekohe East Road/Anselmi Ridge Road/New Road – AM Peak Hour

In the weekday AM peak hour, the intersection will operate well within its capacity, with a maximum degree of saturation of 0.822. The worst performing movement is for the right-turn movement from Pukekohe East Road into both side roads having a LOS of D and an average delay of 38-39 seconds. This level of delay is considered minimal given it would be occurring during peak times.

In the Weekday PM peak hour, the intersection will also operate within its capacity, with a maximum degree of saturation of 0.832 and an overall LOS of C. A similar LOS is anticipated for all movements except for the right-turn movement from Pukekohe East Road, which has a LOS of E and average delay 63-66 seconds. As with the AM peak, it is not expected that this level of congestion and delay will occur for any long period of time.

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: Road 1														
1	L2	18	1.0	19	1.0	0.142	38.9	LOS D	2.8	19.4	0.81	0.72	0.81	32.0
2	T1	4	1.0	4	1.0	0.142	34.1	LOS C	2.8	19.4	0.81	0.72	0.81	35.8
3	R2	41	1.0	43	1.0	0.142	38.8	LOS D	2.8	19.4	0.81	0.72	0.81	41.3
Approach		63	1.0	66	1.0	0.142	38.6	LOS D	2.8	19.4	0.81	0.72	0.81	39.5
East: Pukekohe Road East														
4	L2	162	1.0	171	1.0	*0.579	28.5	LOS C	18.1	130.2	0.81	0.78	0.81	43.7
5	T1	903	4.0	951	4.0	*0.832	30.7	LOS C	32.4	234.5	0.89	0.86	0.94	42.7
6	R2	42	1.0	44	1.0	0.440	62.9	LOS E	2.5	17.4	1.00	0.74	1.00	38.3
Approach		1107	3.4	1165	3.4	0.832	31.6	LOS C	32.4	234.5	0.89	0.84	0.93	42.6
North: Anselmi Ridge Road														
7	L2	11	1.0	12	1.0	0.177	34.6	LOS C	0.8	5.4	0.97	0.70	0.97	42.8
8	T1	1	1.0	1	1.0	*0.177	29.9	LOS C	0.8	5.4	0.97	0.70	0.97	36.9
9	R2	10	1.0	11	1.0	0.177	34.6	LOS C	0.8	5.4	0.97	0.70	0.97	36.4
Approach		22	1.0	23	1.0	0.177	34.4	LOS C	0.8	5.4	0.97	0.70	0.97	40.6
West: Pukekohe Road East														
10	L2	41	1.0	43	1.0	0.516	28.7	LOS C	16.3	117.6	0.78	0.70	0.78	39.3
11	T1	883	4.0	929	4.0	0.742	26.1	LOS C	23.8	172.6	0.83	0.74	0.83	43.7
12	R2	72	1.0	76	1.0	*0.754	66.3	LOS E	4.4	31.4	1.00	0.87	1.25	25.4
Approach		996	3.7	1048	3.7	0.754	29.1	LOS C	23.8	172.6	0.84	0.75	0.86	42.7
All Vehicles		2188	3.4	2303	3.4	0.832	30.7	LOS C	32.4	234.5	0.86	0.80	0.89	42.5

Figure 18: SIDRA Results – East Street/Anselmi Ridge Road/New Road – PM Peak Hour

5.3.3 Golding Road / New Road – Traffic Signals

The SIDRA results for the Golding Road/New Road intersection in the AM and PM peak hours are summarised in **Figure 19** and **Figure 20**, which include the anticipated future traffic flows from the plan change area.

In the weekday AM peak hour, the intersection will operate well within its capacity, with a maximum degree of saturation of 0.689 and an overall LOS of C. The worst performing movement is for the approach from the New Road within the site having a LOS of C and an average delay of 29 seconds. This level of delay is considered minimal given it would be occurring during peak times.

In the Weekday PM peak hour, the intersection will also operate within its capacity, with a maximum degree of saturation of 0.613 and the same overall LOS of C. The same LOS will remain for all movements with similar delays to the AM peak. As with the AM peak, it is not expected that this level of congestion and delay will occur for any long period of time.

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: Golding Road														
1	L2	5	1.0	5	1.0	0.616	27.5	LOS C	4.7	33.2	0.98	0.83	1.05	38.8
2	T1	172	1.0	181	1.0	*0.616	23.0	LOS C	4.7	33.2	0.98	0.83	1.05	37.9
3	R2	4	1.0	4	1.0	0.616	27.5	LOS C	4.7	33.2	0.98	0.83	1.05	38.5
Approach		181	1.0	191	1.0	0.616	23.2	LOS C	4.7	33.2	0.98	0.83	1.05	38.0
East: Road 1 (New)														
4	L2	17	1.0	18	1.0	0.335	28.1	LOS C	1.8	12.8	0.95	0.75	0.95	37.4
5	T1	12	1.0	13	1.0	*0.335	23.5	LOS C	1.8	12.8	0.95	0.75	0.95	36.4
6	R2	42	1.0	44	1.0	0.335	28.1	LOS C	1.8	12.8	0.95	0.75	0.95	34.3
Approach		71	1.0	75	1.0	0.335	27.3	LOS C	1.8	12.8	0.95	0.75	0.95	35.5
North: Golding Road														
7	L2	11	1.0	12	1.0	0.616	29.5	LOS C	3.6	25.7	0.99	0.83	1.10	35.1
8	T1	109	2.0	115	2.0	*0.616	25.0	LOS C	3.6	25.7	0.99	0.83	1.10	36.9
9	R2	14	1.0	15	1.0	0.616	29.5	LOS C	3.6	25.7	0.99	0.83	1.10	34.8
Approach		134	1.8	141	1.8	0.616	25.8	LOS C	3.6	25.7	0.99	0.83	1.10	36.6
West: Road 1 (Consented)														
10	L2	82	1.0	86	1.0	0.689	30.4	LOS C	4.1	28.8	1.00	0.88	1.20	33.9
11	T1	46	1.0	48	1.0	*0.689	25.8	LOS C	4.1	28.8	1.00	0.88	1.20	35.8
12	R2	19	1.0	20	1.0	0.689	30.4	LOS C	4.1	28.8	1.00	0.88	1.20	36.6
Approach		147	1.0	155	1.0	0.689	29.0	LOS C	4.1	28.8	1.00	0.88	1.20	34.9
All Vehicles		533	1.2	561	1.2	0.689	26.0	LOS C	4.7	33.2	0.99	0.83	1.09	36.4

Figure 19: SIDRA Results – Golding Road/New Road Traffic Signals – AM Peak Hour

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: Golding Road														
1	L2	20	1.0	21	1.0	0.493	28.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.9
2	T1	70	1.0	74	1.0	*0.493	24.1	LOS C	2.8	19.7	0.98	0.76	0.98	37.0
3	R2	17	1.0	18	1.0	0.493	28.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.7
Approach		107	1.0	113	1.0	0.493	25.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.3
East: Road 1 (New)														
4	L2	4	1.0	4	1.0	0.320	28.0	LOS C	1.8	12.5	0.95	0.73	0.95	38.4
5	T1	57	1.0	60	1.0	*0.320	23.4	LOS C	1.8	12.5	0.95	0.73	0.95	37.5
6	R2	9	1.0	9	1.0	0.320	28.0	LOS C	1.8	12.5	0.95	0.73	0.95	35.5
Approach		70	1.0	74	1.0	0.320	24.2	LOS C	1.8	12.5	0.95	0.73	0.95	37.3
North: Golding Road														
7	L2	36	1.0	38	1.0	0.613	27.5	LOS C	4.6	32.3	0.98	0.83	1.05	35.4
8	T1	88	1.0	93	1.0	*0.613	23.0	LOS C	4.6	32.3	0.98	0.83	1.05	37.1
9	R2	52	1.0	55	1.0	0.613	27.5	LOS C	4.6	32.3	0.98	0.83	1.05	35.1
Approach		176	1.0	185	1.0	0.613	25.3	LOS C	4.6	32.3	0.98	0.83	1.05	36.2
West: Road 1 (Consented)														
10	L2	14	1.0	15	1.0	0.154	27.3	LOS C	0.8	5.7	0.93	0.70	0.93	35.3
11	T1	14	1.0	15	1.0	*0.154	22.7	LOS C	0.8	5.7	0.93	0.70	0.93	37.1
12	R2	5	1.0	5	1.0	0.154	27.3	LOS C	0.8	5.7	0.93	0.70	0.93	37.8
Approach		33	1.0	35	1.0	0.154	25.3	LOS C	0.8	5.7	0.93	0.70	0.93	36.5
All Vehicles		386	1.0	406	1.0	0.613	25.2	LOS C	4.6	32.3	0.97	0.78	1.00	36.7

Figure 20: SIDRA Results – Golding Road/New Road Traffic Signals – PM Peak Hour

5.3.4 Conclusion of Traffic Generation Effects

Overall, it is anticipated that the likely vehicle trip generation from development of the plan change area can be accommodated within the existing and future network with minimal effect.

Therefore, the proposed plan change can be accommodated on the road network without compromising its function or capacity and without any major upgrades being required (minor upgrades are expected to be identified and required as part of the resource consent process as noted in section 8).

5.4 Road Safety

Development of the subject site, completion of any new roads and the creation of the new intersections should have no detrimental impact on general road safety. The following key points are noted about the proposal:

- The adoption of the road design principles above will promote the safe use of the new roads and intersections;
- The introduction of pedestrian facilities and safe provision for cycling will promote greater awareness and a safer environment; and
- The proposal will adopt the Council's underlying development controls for access and parking provisions.

It is thus expected that traffic safety matters will be addressed during future development, both by the road changes that can be expected under the Auckland Transport Roads and Streets Framework, and by the AUP controls relating to development on arterial roads. This will apply regardless of the proposed Plan Change. In view of the above, any road safety effects of the proposal are expected to be negligible.

5.5 Future Roads – Pukekohe Paerata Structure Plan

Figure 21 below illustrates the proposed roads identified near the site in the Pukekohe – Paerata Structure Plan. It includes the extension of Birch Road towards the east to connect with Golding Road (shown as a yellow dashed line) and the Pukekohe Ring Road alignment (shown as a red dashed line), both near the southern boundary of the site.

Although both road alignments are yet to be confirmed, the extension of Birch Road has the potential to be located adjacent to the south-western corner of the plan change area (as set out in the structure plan mapping). The proposed collector road through the site and PC76 may well replace the extension of Birch Road as the key east-west collector through this part of the Pukekohe.

This will be dependent on the alignment of the Pukekohe Ring Road and future assessments by the Supporting Growth Alliance. Nevertheless, the proposed plan change does not preclude the extension of Birch Road, or the Ring Road alignment as currently indicated.

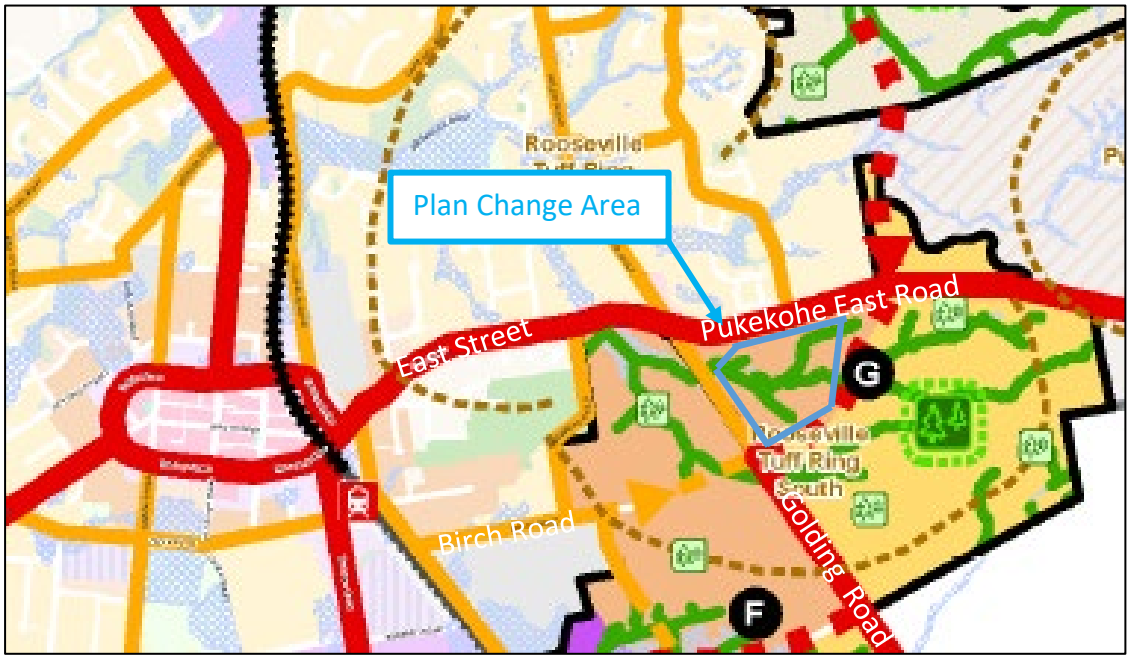


Figure 21: Pukekohe - Paerata Structure Plan – Future Road Network

At the time of writing, the Supporting Growth Alliance had undertaken business case analysis of the Ring Road alignment, but only as it pertains to the alignment to the north of Pukekohe Road East. No completed assessment has been undertaken of the alignment between Pukekohe Road East and Golding Road (as labelled "G" in Figure 21 above).

The feasibility of this alignment has been considered at a high level by the Applicant's consultant team along with other options as part of the masterplan development. The conclusion of this assessment was that it would be preferable for the Ring Road to follow the more southern alignment.

The following points are noted if adopting a more southern alignment of both Birch Road and the Ring Road:

- Only one stream crossing would be required, however located closer to the head of the stream so the stream crossing will not need to span significantly like the Structure Plan alignments stream crossing.
- There is a greater opportunity to minimise earthworks required as the route follows the ridgeline for much of the alignment.
- A more acceptable/ flatter road grades is achievable.
- Although a greater distance of road to construct, it is very likely that overall construction costs would be similar or less than the Structure Plan alignment due to the stream crossing and earthworks to establish the alignment.

6.0 AUCKLAND UNITARY PLAN CONSIDERATIONS

While the Section 32 documentation within the application considers the proposed Plan Change against all relevant policies and objectives of the AUP, we have focused our assessment on the objectives and policies most relevant to transport, especially those in Sections B3 (Infrastructure, transport and energy) and E27 (Transport).

6.1 B3 (Infrastructure, Transport and Energy)

The relevant Auckland-wide transport objectives and policies in the AUP are set out below and comments are provided as to how the proposal aligns with each:

The key issue for this plan change is B3.1(2) integrating the provision of infrastructure with urban growth. As explained in more detail below in section 6.2, the site is well served with transport infrastructure and integrates well with local road, pedestrian and cycle connections and is within an accessible catchment of the train station and future bus routes.

The transport aspects of the plan change are consistent with the objectives and policies of Section B3.3 Transport, in that:

- There is good supporting infrastructure for people and the goods they need;
- A suitably high density of zoning has been chosen which is appropriate for the convenient links to public transport;
- The proposed transport linkages do not create amenity or safety issues of concern and a range of transport choices are enabled; and
- No major off-site transport upgrades are required as part of this plan change, though small, localised upgrades may be appropriate as part of the design and assessment at a resource consent stage.

6.2 Section E27 – Transport Objectives and Policies

The relevant Auckland-wide transport objectives and policies in the AUP are set out below and comments are provided as to how the proposal aligns with each:

E27.2 Objectives

(1) 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.

As demonstrated in this report, the subject area is well served by roading, bus, and cycling infrastructure in the future, and thus the proposal is integrated with all modes of transport and enables the benefits of the integrated transport network at this location to be further utilised.

On this basis the motor vehicle traffic effects of the proposal are expected to be negligible. The impacts of the proposal on the public transport, walking and cycling network is also expected to be minimal.

(2) An integrated transport network including public transport, walking, cycling, private vehicles and freight, is provided for.

As demonstrated in this report, the subject area is well served by (and will further support) an integrated transport network of roading, bus, walking and cycling infrastructure.

E27.3 Policies

(1) Require subdivision, use and development which:

(a) generate trips resulting in potentially more than minor adverse effects on the safe, efficient and effective operation of the transport network;

to manage adverse effects on and integrate with the transport network by measures such as travel planning, providing alternatives to private vehicle trips, staging development or undertaking improvements to the local transport network.

The proposal could be expected to generate about 320 vehicle movements in peak hours. This increase in vehicle movements, which would be shared between intersections surrounding the site, is minimal in the context of the flows already catered for in peak periods, and the operation of any intersections are expected to have an acceptable level of service with the appropriate upgrade.

Furthermore, under the Mixed Housing Urban zone, resource consent is required for any land use or subdivision that accommodates more than 100 lots, or if there is a change in land use greater than three dwellings. Assessment of any effects on the road network, including the effects of the location and design of any intersections on the safe and efficient operation of the adjacent transport network, will be required.

Thus, the AUP requires the effects on the efficient operation of the transport network to be considered for any redevelopment on the subject site. It is thus expected that the effects of motor vehicle traffic generated by any future development on the road network will be assessed and addressed at the resource consent stage by the AUP controls relating to development.

On this basis the effects of the proposal on the efficient and effective operation of the road transport network are expected to be negligible. As discussed above, the impacts of the proposal on the efficient and effective operation of the public transport and cycling network is also expected to be negligible, and the impact on the pedestrian network is expected to be minimal.

There are no changes to the controls or standards that relate to the effects of development on the safe, efficient and effective operation of the transport network, and the proposed development would only apply as redevelopment occurs.

6.3 Section E27 – Transport Standards

Section E27.6 Standards sets out the transport related standards for development. These standards are considered suitable to be applied to activities and any future development of the site.

Compliance with these standards would be assessed as part of any future resource consent application.

6.4 Section E27 – Assessment Criteria

These assessment criteria will need to be considered at the time of a future resource consent application. Notwithstanding that, this report demonstrates that access to the site can be provided safely and efficiently from the wider road network.

6.5 Section E38 – Transport Standards

Section E38 Standards sets out the subdivision related standards for development. These standards are considered suitable to be applied to activities and any future development of the site.

Compliance with these standards would be assessed as part of any future resource consent application.

6.6 Section E38 – Assessment Criteria

These assessment criteria will need to be considered at the time of a future resource consent application and are also considered appropriate for future development of the site.

7.0 INTEGRATION WITH FUTURE TRANSPORT NETWORK

The following section considers the various regional plans and considers that the proposal is consistent with what has been anticipated. The following is noted in this regard:

7.1 Auckland Plan 2050

The Auckland Plan 2050 is the Council's long-term spatial plan to ensure Auckland grows in a way that will meet the opportunities and challenges of the future. It was originally released in 2012 and was subsequently updated in 2018. The Auckland Plan 2050 describes Auckland in general terms, outlines the major challenges that we face, and sets the direction for tackling these challenges.

The subject site is identified as a location where new dwellings can be provided in a future urban zone and can be supported by new transport infrastructure.

- The site's improved connectively to other modes such as public transport, walking, and cycling are identified and will provide choice of travel mode and a higher level of accessibility for the subject site;

- Short term strategies for managing network demands and improving safety, such as introducing smart technologies or improving efficiency of intersections, will continue to be implemented while new roading infrastructure is developed in the medium to long term; and

- A new road network will also be investigated in the wider Pukekohe area when the area begins to develop, providing more local road options for travel.

7.2 Auckland Regional Land Transport Plan 2021-2031

The Auckland Regional Land Transport Plan 2021-2031 sets out the land transport objectives, policies, and measures for the Auckland region over the next 10 years. It includes the land transport activities of Auckland Transport, Auckland Council, Waka Kotahi NZ Transport Agency, KiwiRail, and other agencies.

The Plan sets out the direction for the region's transport systems. It identifies what is needed to achieve an affordable, integrated, safe, responsive, and sustainable land transport system that can cope with population growth and the changing economic environment. The provision of intensified residential housing in Pukekohe will promote walking and cycling to nearby activities, thus removing some vehicles making short trips from the network.

7.3 Auckland Regional Public Transport Plan 2018

The Auckland Regional Public Transport Plan 2018 seeks to deliver an improved public transport network in Auckland by increasing public transport frequency along key transport corridors. Future public transport services are anticipated, and the site is considered well located to support further growth in public transport use.

8.0 CONCLUSIONS

The following conclusions can be made in respect of the proposal to rezone the subject site to Mixed Housing Urban:

- The potential residential development for the site is feasible in terms of the transportation perspective and has been anticipated in the future planning for the Pukekohe-Paerata Structure Plan;

- The estimated traffic generation of the proposal is likely to be about 6,000 traffic movements per day with peak hour traffic generation of about 320 traffic movements per hour based on 580 residential dwellings within the subject site;

- The estimated traffic generated by the proposal can be accommodated on the surrounding network with upgrades to local intersections and maintaining acceptable levels of safety and performance;

- Developers may be required to vest some additional land and upgrade road frontages and supporting infrastructure to enable Pukekohe East Road and Golding Road to be upgraded to accommodate active modes and connect to the existing public network. These can be addressed through the relevant resource consent applications in accordance with the AUP rules for the respective zones proposed by the proposed plan change;

- The site will have a suitable level of accessibility to public transportation, walking, and cycling and the effects of private car travel from the development area will likely be reduced; and

- Any development enabled by the proposed plan change is consistent with and encourages key regional and district transport policies.

Prepared by

Todd Langwell
Director

Attachment 1

TRIP DISTRIBUTION

Rat Run 40%

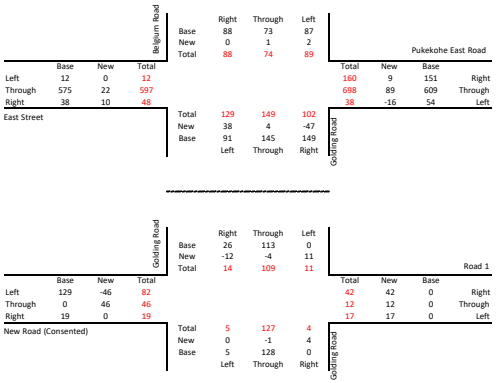
Lots from Anselmi Ridge Road 200 Lots
Trips from Lots from Anselmi Ridge Road 108 Vehicle Movement per Hour

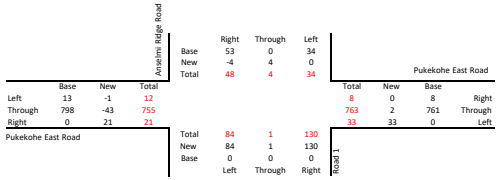
21981 - 50 Pukekohe East Road and 47 Golding Road
Trip Generation and Trip Distribution - AM Peak Hour (Summary)

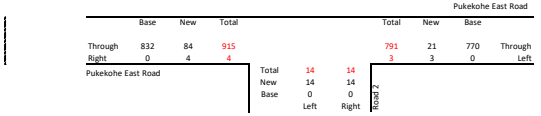
Trip Generaion
Lots 580 Lots
Trip Generation Rate 0.54 Vehicle Movement per Hour per Lot
Trip Generation **313** Vehicle Movement per Hour

Trip Distribution

East	39%	Entry	20%	Road 1 N	60%
West	51%	Exit	80%	Road 1 S	30%
North	5%			Road 2	10%
South	5%				







Rat Run 40%

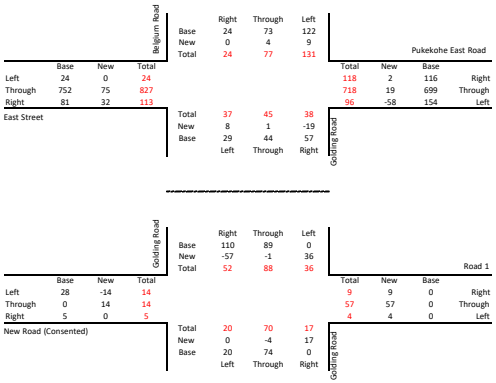
Lots from Anselmi Ridge Road 200 Lots
Trips from Lots from Anselmi Ridge Road 110 Vehicle Movement per Hour

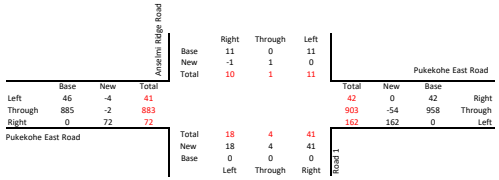
21981 - 50 Pukekohe East Road and 47 Golding Road
Trip Generation and Trip Distribution - PM Peak Hour (Summary)

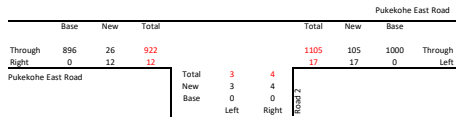
Trip Generaion
Lots 580 Lots
Trip Generation Rate 0.55 Vehicle Movement per Hour per Lot
Trip Generation **319** Vehicle Movement per Hour

Trip Distribution

East	48%	Entry	80%	Road 1 N	60%
West	42%	Exit	20%	Road 1 S	30%
North	5%			Road 2	10%
South	5%				







Attachment 2

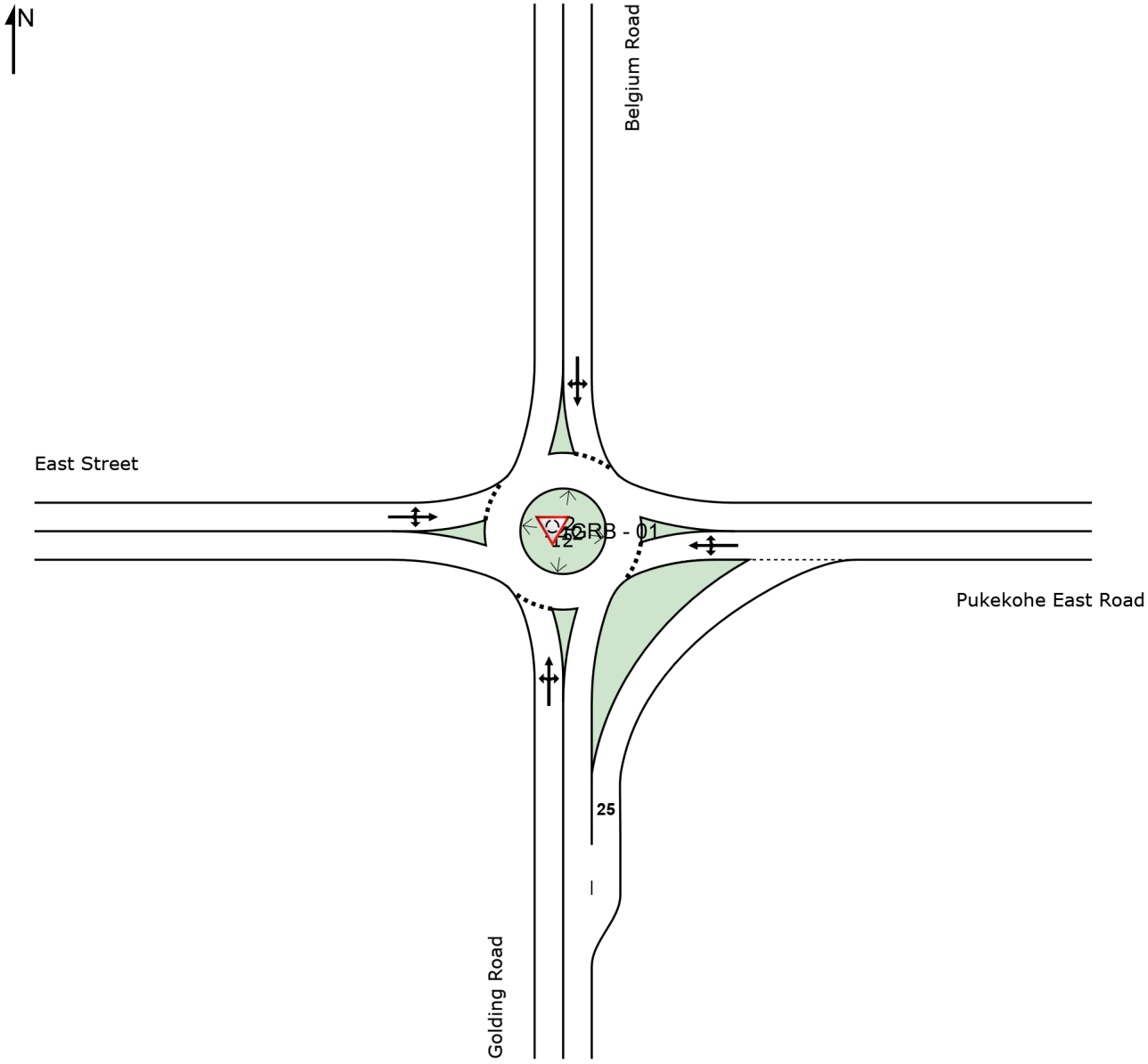
SIDRA MODELLING RESULTS

SITE LAYOUT

Site: GRB - 01 [Golding Road Rbout - AM Peak - Development (Site Folder: Golding Roundabout)]

Roundabout of Golding Road / Pukekohe East Road / East Street / Belgium Road
AM Peak: Existing + Consented + Development
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: GRB - 01 [Golding Road Rbout - AM Peak - Development (Site Folder: Golding Roundabout)]

Roundabout of Golding Road / Pukekohe East Road / East Street / Belgium Road
AM Peak: Existing + Consented + Development
Site Category: (None)
Roundabout

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: Golding Road														
1	L2	129	1.0	136	1.0	0.928	59.2	LOS E	18.4	129.7	1.00	1.75	2.69	33.0
2	T1	149	1.0	157	1.0	0.928	59.2	LOS E	18.4	129.7	1.00	1.75	2.69	28.4
3	R2	102	1.0	107	1.0	0.928	62.8	LOS E	18.4	129.7	1.00	1.75	2.69	25.1
Approach		380	1.0	400	1.0	0.928	60.2	LOS E	18.4	129.7	1.00	1.75	2.69	29.6
East: Pukekohe East Road														
4	L2	38	1.0	40	1.0	0.818	7.7	LOS A	13.3	95.2	0.82	0.76	0.95	43.3
5	T1	698	3.0	735	3.0	0.818	8.5	LOS A	13.3	95.2	0.82	0.76	0.95	46.9
6	R2	160	2.0	168	2.0	0.818	12.0	LOS B	13.3	95.2	0.82	0.76	0.95	45.5
Approach		896	2.7	943	2.7	0.818	9.1	LOS A	13.3	95.2	0.82	0.76	0.95	46.6
North: Belgium Road														
7	L2	89	1.0	94	1.0	0.478	11.5	LOS B	4.0	28.2	0.95	1.02	1.08	43.1
8	T1	74	2.0	78	2.0	0.478	11.6	LOS B	4.0	28.2	0.95	1.02	1.08	43.4
9	R2	88	1.0	93	1.0	0.478	15.1	LOS B	4.0	28.2	0.95	1.02	1.08	46.1
Approach		251	1.3	264	1.3	0.478	12.8	LOS B	4.0	28.2	0.95	1.02	1.08	44.6
West: East Street														
10	L2	12	2.0	13	2.0	0.785	13.0	LOS B	11.6	84.2	0.98	1.09	1.37	45.5
11	T1	597	4.0	628	4.0	0.785	13.1	LOS B	11.6	84.2	0.98	1.09	1.37	45.4
12	R2	48	1.0	51	1.0	0.785	16.6	LOS B	11.6	84.2	0.98	1.09	1.37	45.1
Approach		657	3.7	692	3.7	0.785	13.4	LOS B	11.6	84.2	0.98	1.09	1.37	45.4
All Vehicles		2184	2.6	2299	2.6	0.928	19.7	LOS B	18.4	129.7	0.91	1.06	1.39	42.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
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.

MOVEMENT SUMMARY

Site: GRB - 01 [Golding Road Rbout - PM Peak - Development (Site Folder: Golding Roundabout)]

Roundabout of Golding Road / Pukekohe East Road / East Street / Belgium Road
PM Peak: Existing + Consented + Development
Site Category: (None)
Roundabout

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: Golding Road														
1	L2	37	1.0	39	1.0	0.265	10.9	LOS B	1.8	12.6	0.82	0.85	0.82	45.1
2	T1	45	1.0	47	1.0	0.265	11.0	LOS B	1.8	12.6	0.82	0.85	0.82	43.7
3	R2	38	1.0	40	1.0	0.265	14.5	LOS B	1.8	12.6	0.82	0.85	0.82	42.0
Approach		120	1.0	126	1.0	0.265	12.1	LOS B	1.8	12.6	0.82	0.85	0.82	43.9
East: Pukekohe East Road														
4	L2	96	1.0	101	1.0	0.825	8.1	LOS A	14.1	101.4	0.82	0.77	0.96	43.2
5	T1	718	4.0	756	4.0	0.825	8.9	LOS A	14.1	101.4	0.82	0.77	0.96	46.8
6	R2	118	1.0	124	1.0	0.825	12.3	LOS B	14.1	101.4	0.82	0.77	0.96	45.4
Approach		932	3.3	981	3.3	0.825	9.2	LOS A	14.1	101.4	0.82	0.77	0.96	46.5
North: Belgium Road														
7	L2	131	1.0	138	1.0	0.695	28.6	LOS C	7.5	52.7	1.00	1.22	1.52	37.0
8	T1	77	1.0	81	1.0	0.695	28.7	LOS C	7.5	52.7	1.00	1.22	1.52	36.7
9	R2	24	1.0	25	1.0	0.695	32.2	LOS C	7.5	52.7	1.00	1.22	1.52	41.7
Approach		232	1.0	244	1.0	0.695	29.0	LOS C	7.5	52.7	1.00	1.22	1.52	37.6
West: East Street														
10	L2	24	1.0	25	1.0	0.871	10.4	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
11	T1	827	4.0	871	4.0	0.871	10.6	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
12	R2	113	1.0	119	1.0	0.871	14.1	LOS B	18.4	132.6	1.00	0.85	1.21	46.0
Approach		964	3.6	1015	3.6	0.871	11.0	LOS B	18.4	132.6	1.00	0.85	1.21	46.2
All Vehicles		2248	3.1	2366	3.1	0.871	12.2	LOS B	18.4	132.6	0.92	0.86	1.12	45.4

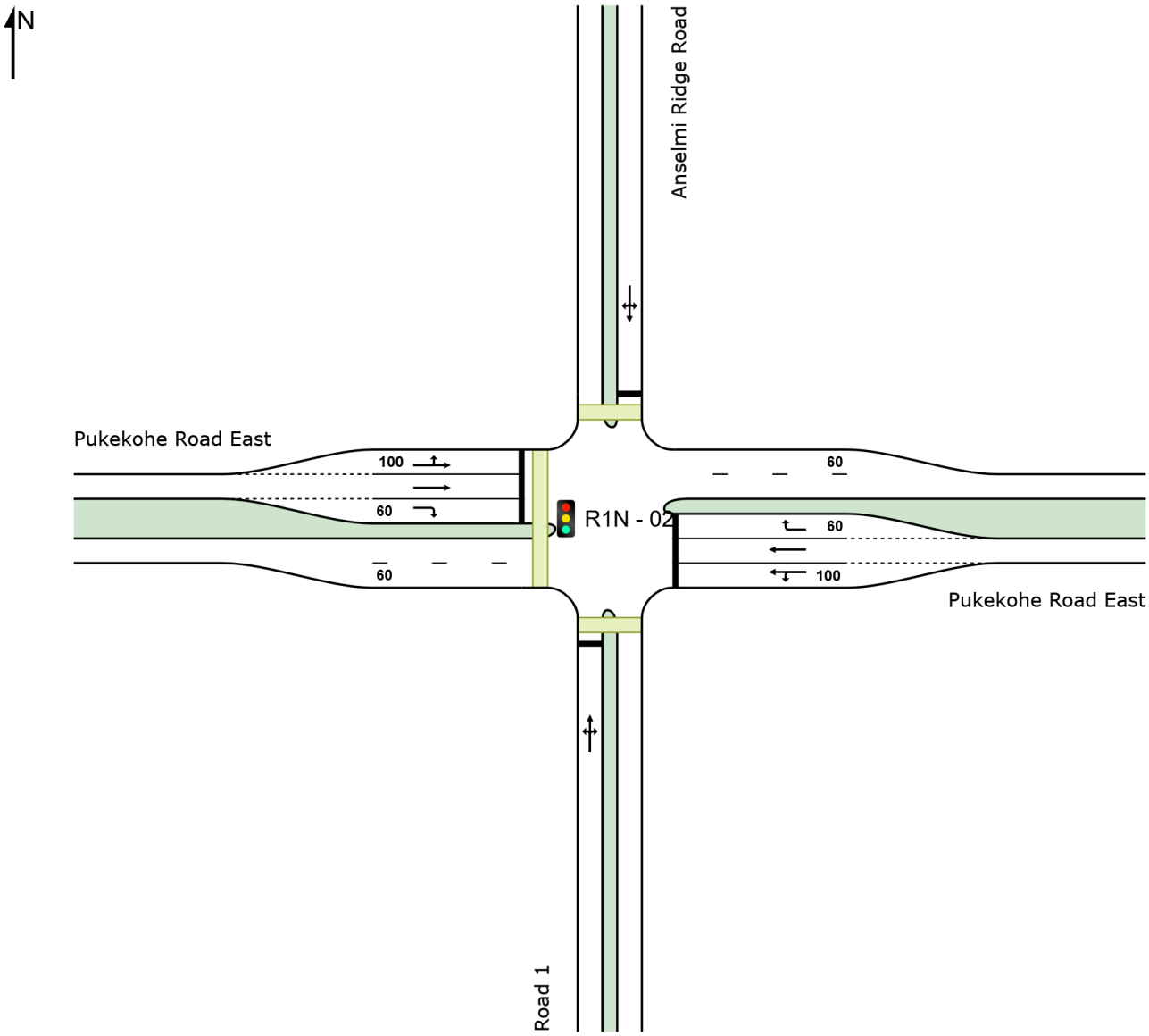
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
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: R1N - 02 [Road 1 N - Signalised - AM Peak - More Lanes (Site Folder: Pukekohe Road East / Road 1 / Anselmi Ridge Road - Signalised)]

Signalied Intersection of Pukekohe Road East / Road 1 / Anselmi Ridge Road
AM Peak: Existing + Consented + Development
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: R1N - 02 [Road 1 N - Signalised - AM Peak - More Lanes (Site Folder: Pukekohe Road East / Road 1 / Anselmi Ridge Road - Signalised)]

Signalied Intersection of Pukekohe Road East / Road 1 / Anselmi Ridge Road
AM Peak: Existing + Consented + Development
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] %	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: Road 1														
1	L2	84	1.0	88	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	33.3
2	T1	1	1.0	1	1.0	0.648	29.5	LOS C	7.5	53.2	0.97	0.84	1.02	37.0
3	R2	130	1.0	137	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	42.1
Approach		215	1.0	226	1.0	0.648	34.2	LOS C	7.5	53.2	0.97	0.84	1.02	40.0
East: Pukekohe Road East														
4	L2	33	1.0	35	1.0	*0.572	27.9	LOS C	9.9	70.7	0.89	0.79	0.89	44.1
5	T1	763	3.0	803	3.0	*0.822	27.2	LOS C	17.8	127.8	0.95	0.92	1.06	43.5
6	R2	8	2.0	8	2.0	0.054	37.9	LOS D	0.3	2.0	0.94	0.66	0.94	42.1
Approach		804	2.9	846	2.9	0.822	27.3	LOS C	17.8	127.8	0.95	0.91	1.05	43.5
North: Anselmi Ridge Road														
7	L2	34	1.0	36	1.0	*0.474	24.3	LOS C	2.0	13.9	0.98	0.77	0.98	44.7
8	T1	4	1.0	4	1.0	*0.474	19.5	LOS B	2.0	13.9	0.98	0.77	0.98	40.1
9	R2	48	1.0	51	1.0	0.474	24.2	LOS C	2.0	13.9	0.98	0.77	0.98	39.6
Approach		86	1.0	91	1.0	0.474	24.0	LOS C	2.0	13.9	0.98	0.77	0.98	42.5
West: Pukekohe Road East														
10	L2	12	2.0	13	2.0	0.558	25.8	LOS C	9.6	69.4	0.87	0.75	0.87	40.4
11	T1	755	4.0	795	4.0	0.803	25.5	LOS C	16.6	120.3	0.93	0.88	1.03	43.8
12	R2	21	1.0	22	1.0	0.140	38.5	LOS D	0.7	5.3	0.96	0.70	0.96	31.8
Approach		788	3.9	829	3.9	0.803	25.8	LOS C	16.6	120.3	0.93	0.87	1.02	43.6
All Vehicles		1893	3.0	1993	3.0	0.822	27.3	LOS C	17.8	127.8	0.95	0.88	1.03	43.2

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: Road 1												
P1	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	191.3	210.6	1.10
North: Anselmi Ridge Road												

P3	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	191.3	210.6	1.10
West: Pukekohe Road East												
P4	Full	50	53	29.3	LOS C	0.1	0.1	0.92	0.92	198.9	220.5	1.11
All Pedestrians		150	158	29.3	LOS C	0.1	0.1	0.92	0.92	193.9	213.9	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.

PHASING SUMMARY

Site: R1N - 02 [Road 1 N - Signalised - AM Peak - More Lanes (Site Folder: Pukekohe Road East / Road 1 / Anselmi Ridge Road - Signalised)]

Signalied Intersection of Pukekohe Road East / Road 1 / Anselmi Ridge Road
AM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

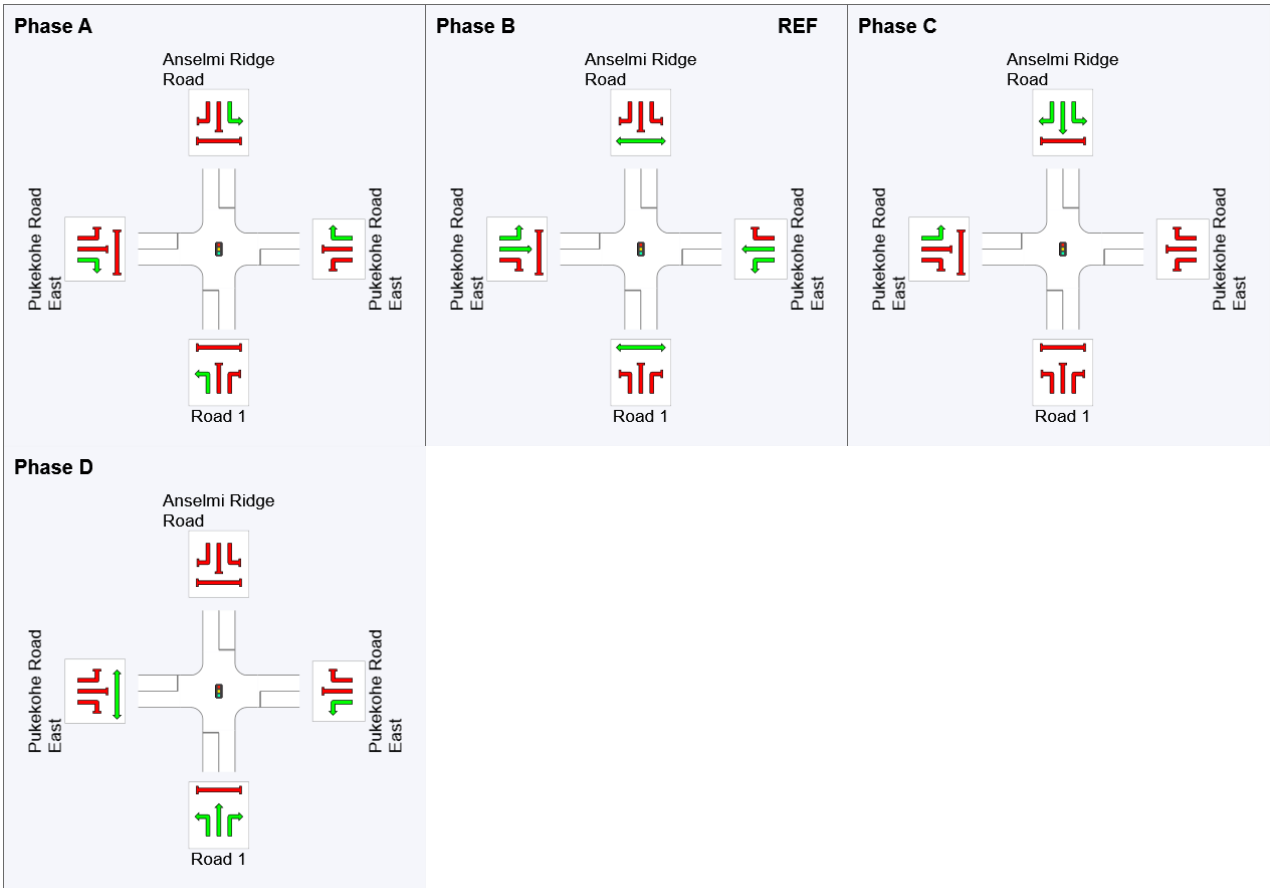
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Diamond + Split
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

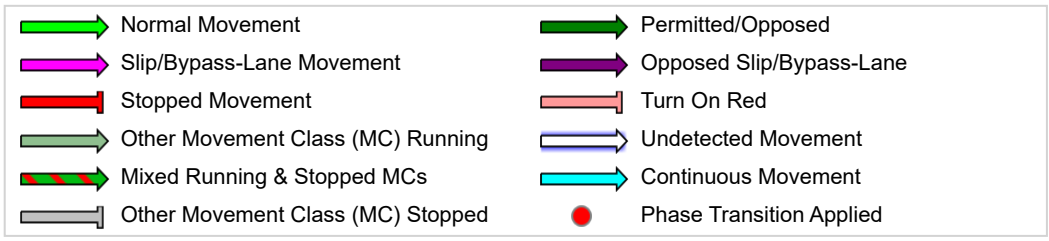
Phase	A	B	C	D
Phase Change Time (sec)	58	0	28	40
Green Time (sec)	6	22	6	12
Phase Time (sec)	12	28	12	18
Phase Split	17%	40%	17%	26%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: R1N - 02 [Road 1 N - Signalised - PM Peak - More Lanes (Site Folder: Pukekohe Road East / Road 1 / Anselmi Ridge Road - Signalised)]

Signalied Intersection of Pukekohe Road East / Road 1 / Anselmi Ridge Road
AM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

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: Road 1														
1	L2	18	1.0	19	1.0	0.142	38.9	LOS D	2.8	19.4	0.81	0.72	0.81	32.0
2	T1	4	1.0	4	1.0	0.142	34.1	LOS C	2.8	19.4	0.81	0.72	0.81	35.8
3	R2	41	1.0	43	1.0	0.142	38.8	LOS D	2.8	19.4	0.81	0.72	0.81	41.3
Approach		63	1.0	66	1.0	0.142	38.6	LOS D	2.8	19.4	0.81	0.72	0.81	39.5
East: Pukekohe Road East														
4	L2	162	1.0	171	1.0	*0.579	28.5	LOS C	18.1	130.2	0.81	0.78	0.81	43.7
5	T1	903	4.0	951	4.0	*0.832	30.7	LOS C	32.4	234.5	0.89	0.86	0.94	42.7
6	R2	42	1.0	44	1.0	0.440	62.9	LOS E	2.5	17.4	1.00	0.74	1.00	38.3
Approach		1107	3.4	1165	3.4	0.832	31.6	LOS C	32.4	234.5	0.89	0.84	0.93	42.6
North: Anselmi Ridge Road														
7	L2	11	1.0	12	1.0	0.177	34.6	LOS C	0.8	5.4	0.97	0.70	0.97	42.8
8	T1	1	1.0	1	1.0	*0.177	29.9	LOS C	0.8	5.4	0.97	0.70	0.97	36.9
9	R2	10	1.0	11	1.0	0.177	34.6	LOS C	0.8	5.4	0.97	0.70	0.97	36.4
Approach		22	1.0	23	1.0	0.177	34.4	LOS C	0.8	5.4	0.97	0.70	0.97	40.6
West: Pukekohe Road East														
10	L2	41	1.0	43	1.0	0.516	28.7	LOS C	16.3	117.6	0.78	0.70	0.78	39.3
11	T1	883	4.0	929	4.0	0.742	26.1	LOS C	23.8	172.6	0.83	0.74	0.83	43.7
12	R2	72	1.0	76	1.0	*0.754	66.3	LOS E	4.4	31.4	1.00	0.87	1.25	25.4
Approach		996	3.7	1048	3.7	0.754	29.1	LOS C	23.8	172.6	0.84	0.75	0.86	42.7
All Vehicles		2188	3.4	2303	3.4	0.832	30.7	LOS C	32.4	234.5	0.86	0.80	0.89	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.
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: Road 1												
P1	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	211.3	210.6	1.00
North: Anselmi Ridge Road												

P3	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	211.3	210.6	1.00
West: Pukekohe Road East												
P4	Full	50	53	49.3	LOS E	0.2	0.2	0.95	0.95	218.9	220.5	1.01
All Pedestrians		150	158	49.3	LOS E	0.2	0.2	0.95	0.95	213.8	213.9	1.00

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.

PHASING SUMMARY

Site: R1N - 02 [Road 1 N - Signalised - PM Peak - More Lanes (Site Folder: Pukekohe Road East / Road 1 / Anselmi Ridge Road - Signalised)]

Signalied Intersection of Pukekohe Road East / Road 1 / Anselmi Ridge Road
AM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Diamond + Split
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

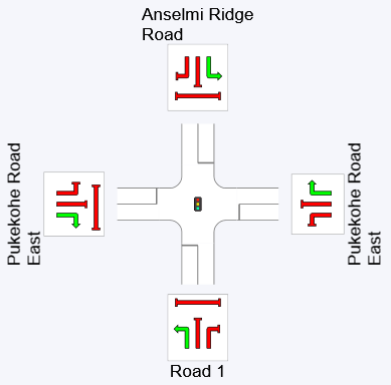
Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	98	0	53	65
Green Time (sec)	6	47	6	27
Phase Time (sec)	12	53	12	33
Phase Split	11%	48%	11%	30%

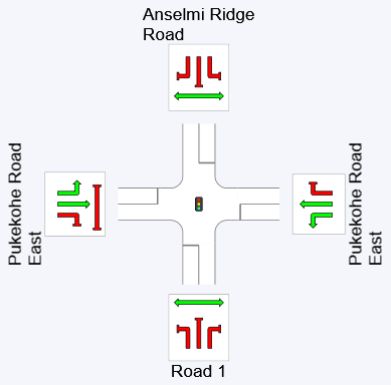
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence

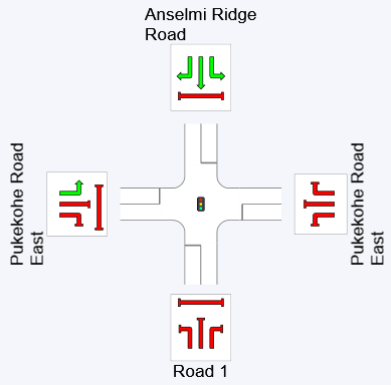
Phase A



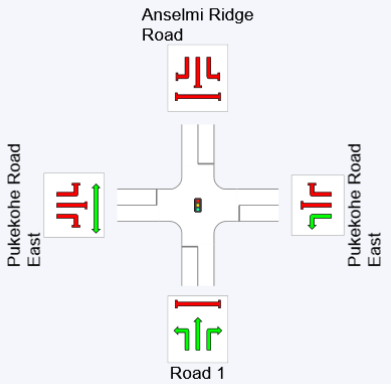
Phase B **REF**



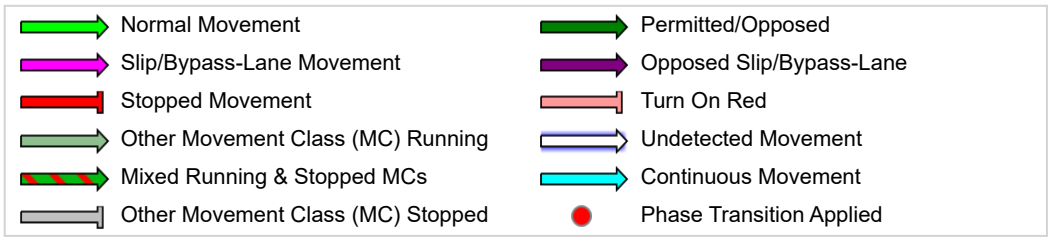
Phase C



Phase D



REF: Reference Phase
VAR: Variable Phase



Organisation: TRAFFIC PLANNING CONSULTANTS LTD | Licence: NETWORK / 1PC | Processed: Tuesday, 12 July 2022 2:19:54 am
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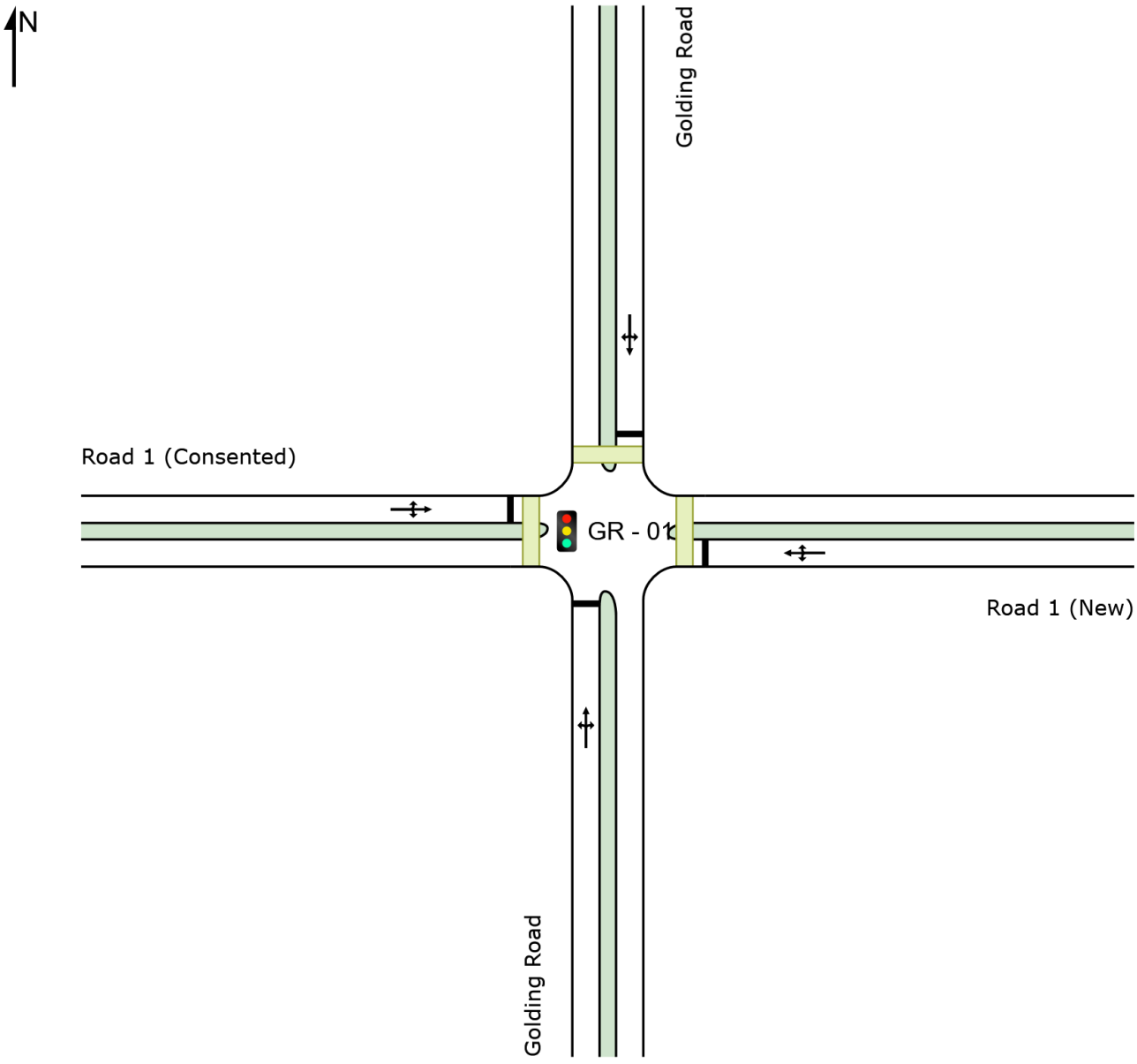
SITE LAYOUT

Site: GR - 01 [Golding Road / Road 1 - Signalised - AM Peak (Site Folder: Golding Road / Road 1 - Signalised)]

Signalied Intersection of Golding Road / Road 1
AM Peak: Existing + Consented + Development
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: GR - 01 [Golding Road / Road 1 - Signalised - AM Peak (Site Folder: Golding Road / Road 1 - Signalised)]

Signalied Intersection of Golding Road / Road 1
AM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

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: Golding Road														
1	L2	5	1.0	5	1.0	0.616	27.5	LOS C	4.7	33.2	0.98	0.83	1.05	38.8
2	T1	172	1.0	181	1.0	* 0.616	23.0	LOS C	4.7	33.2	0.98	0.83	1.05	37.9
3	R2	4	1.0	4	1.0	0.616	27.5	LOS C	4.7	33.2	0.98	0.83	1.05	38.5
Approach		181	1.0	191	1.0	0.616	23.2	LOS C	4.7	33.2	0.98	0.83	1.05	38.0
East: Road 1 (New)														
4	L2	17	1.0	18	1.0	0.335	28.1	LOS C	1.8	12.8	0.95	0.75	0.95	37.4
5	T1	12	1.0	13	1.0	* 0.335	23.5	LOS C	1.8	12.8	0.95	0.75	0.95	36.4
6	R2	42	1.0	44	1.0	0.335	28.1	LOS C	1.8	12.8	0.95	0.75	0.95	34.3
Approach		71	1.0	75	1.0	0.335	27.3	LOS C	1.8	12.8	0.95	0.75	0.95	35.5
North: Golding Road														
7	L2	11	1.0	12	1.0	0.616	29.5	LOS C	3.6	25.7	0.99	0.83	1.10	35.1
8	T1	109	2.0	115	2.0	* 0.616	25.0	LOS C	3.6	25.7	0.99	0.83	1.10	36.9
9	R2	14	1.0	15	1.0	0.616	29.5	LOS C	3.6	25.7	0.99	0.83	1.10	34.8
Approach		134	1.8	141	1.8	0.616	25.8	LOS C	3.6	25.7	0.99	0.83	1.10	36.6
West: Road 1 (Consented)														
10	L2	82	1.0	86	1.0	0.689	30.4	LOS C	4.1	28.8	1.00	0.88	1.20	33.9
11	T1	46	1.0	48	1.0	* 0.689	25.8	LOS C	4.1	28.8	1.00	0.88	1.20	35.8
12	R2	19	1.0	20	1.0	0.689	30.4	LOS C	4.1	28.8	1.00	0.88	1.20	36.6
Approach		147	1.0	155	1.0	0.689	29.0	LOS C	4.1	28.8	1.00	0.88	1.20	34.9
All Vehicles		533	1.2	561	1.2	0.689	26.0	LOS C	4.7	33.2	0.99	0.83	1.09	36.4

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
East: Road 1 (New)												
P2	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16
North: Golding Road												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16

West: Road 1 (Consented)											
P4 Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16
All Pedestrians	150	158	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16

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.

PHASING SUMMARY

Site: GR - 01 [Golding Road / Road 1 - Signalised - AM Peak (Site Folder: Golding Road / Road 1 - Signalised)]

Signalied Intersection of Golding Road / Road 1
AM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

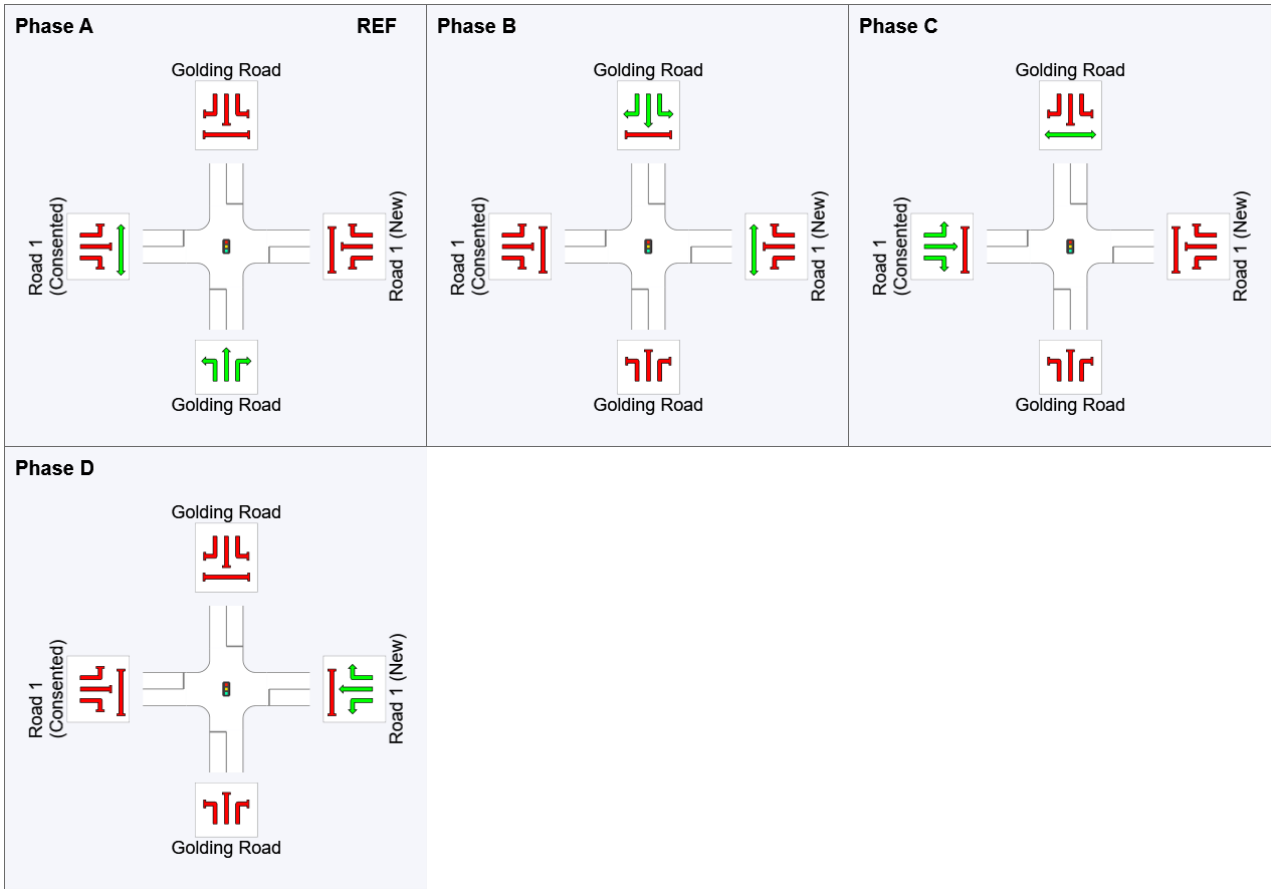
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

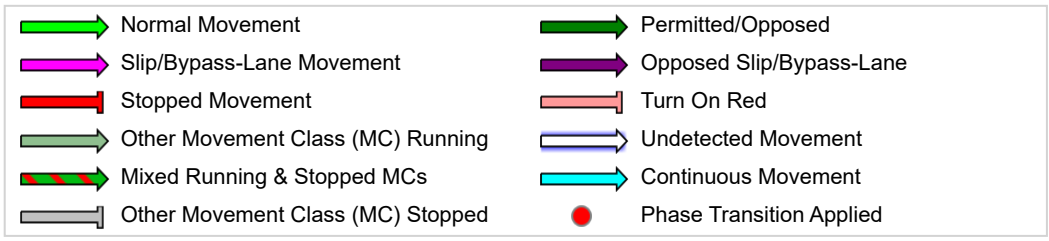
Phase	A	B	C	D
Phase Change Time (sec)	0	14	26	38
Green Time (sec)	8	6	6	6
Phase Time (sec)	14	12	12	12
Phase Split	28%	24%	24%	24%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: GR - 01 [Golding Road / Road 1 - Signalised - PM Peak (Site Folder: Golding Road / Road 1 - Signalised)]

Signalied Intersection of Golding Road / Road 1
PM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

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: Golding Road														
1	L2	20	1.0	21	1.0	0.493	28.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.9
2	T1	70	1.0	74	1.0	*0.493	24.1	LOS C	2.8	19.7	0.98	0.76	0.98	37.0
3	R2	17	1.0	18	1.0	0.493	28.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.7
Approach		107	1.0	113	1.0	0.493	25.6	LOS C	2.8	19.7	0.98	0.76	0.98	37.3
East: Road 1 (New)														
4	L2	4	1.0	4	1.0	0.320	28.0	LOS C	1.8	12.5	0.95	0.73	0.95	38.4
5	T1	57	1.0	60	1.0	*0.320	23.4	LOS C	1.8	12.5	0.95	0.73	0.95	37.5
6	R2	9	1.0	9	1.0	0.320	28.0	LOS C	1.8	12.5	0.95	0.73	0.95	35.5
Approach		70	1.0	74	1.0	0.320	24.2	LOS C	1.8	12.5	0.95	0.73	0.95	37.3
North: Golding Road														
7	L2	36	1.0	38	1.0	0.613	27.5	LOS C	4.6	32.3	0.98	0.83	1.05	35.4
8	T1	88	1.0	93	1.0	*0.613	23.0	LOS C	4.6	32.3	0.98	0.83	1.05	37.1
9	R2	52	1.0	55	1.0	0.613	27.5	LOS C	4.6	32.3	0.98	0.83	1.05	35.1
Approach		176	1.0	185	1.0	0.613	25.3	LOS C	4.6	32.3	0.98	0.83	1.05	36.2
West: Road 1 (Consented)														
10	L2	14	1.0	15	1.0	0.154	27.3	LOS C	0.8	5.7	0.93	0.70	0.93	35.3
11	T1	14	1.0	15	1.0	*0.154	22.7	LOS C	0.8	5.7	0.93	0.70	0.93	37.1
12	R2	5	1.0	5	1.0	0.154	27.3	LOS C	0.8	5.7	0.93	0.70	0.93	37.8
Approach		33	1.0	35	1.0	0.154	25.3	LOS C	0.8	5.7	0.93	0.70	0.93	36.5
All Vehicles		386	1.0	406	1.0	0.613	25.2	LOS C	4.6	32.3	0.97	0.78	1.00	36.7

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
East: Road 1 (New)												
P2	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16
North: Golding Road												
P3	Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16

West: Road 1 (Consented)											
P4 Full	50	53	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16
All Pedestrians	150	158	19.4	LOS B	0.1	0.1	0.88	0.88	181.4	210.6	1.16

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.

PHASING SUMMARY

Site: GR - 01 [Golding Road / Road 1 - Signalised - PM Peak (Site Folder: Golding Road / Road 1 - Signalised)]

Signalied Intersection of Golding Road / Road 1
PM Peak: Existing + Consented + Development
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

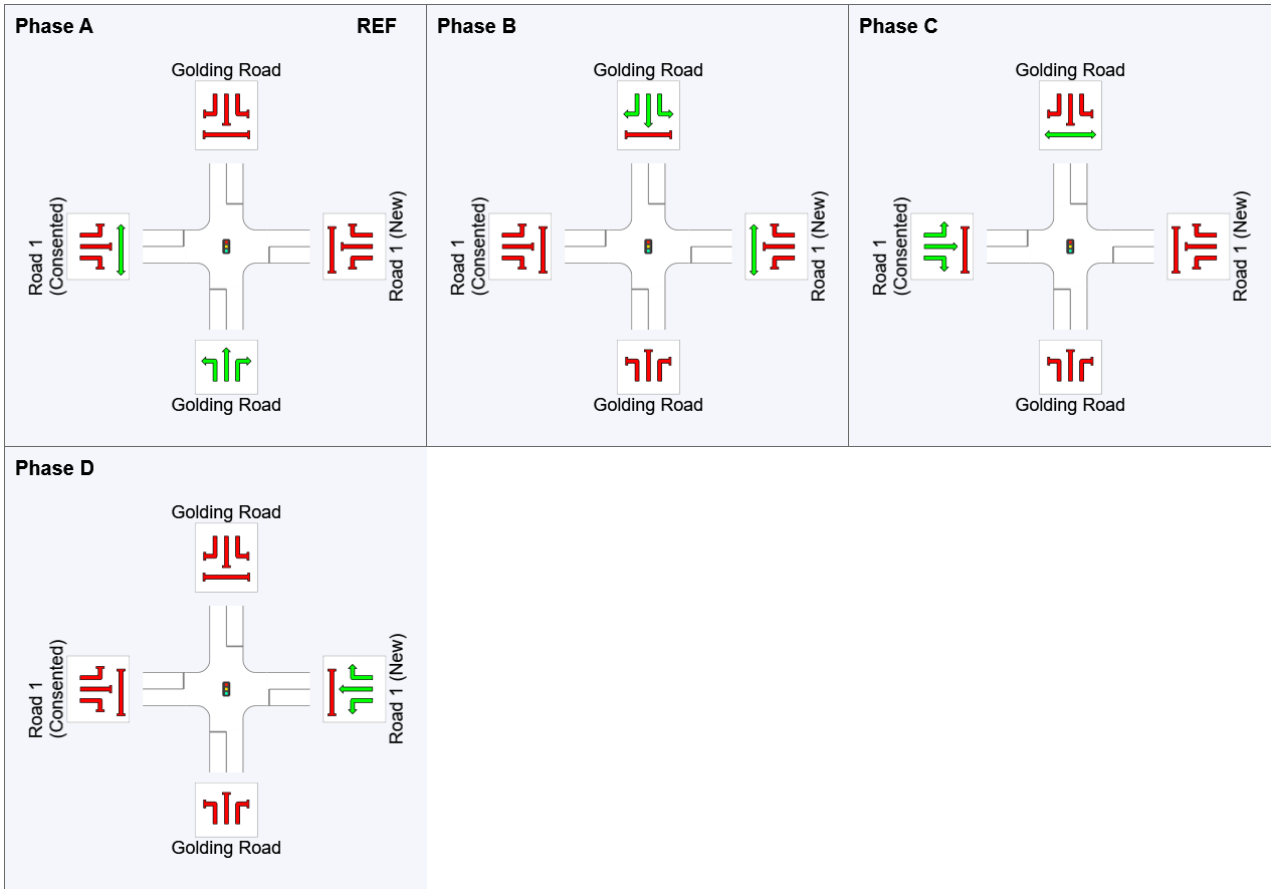
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Split Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

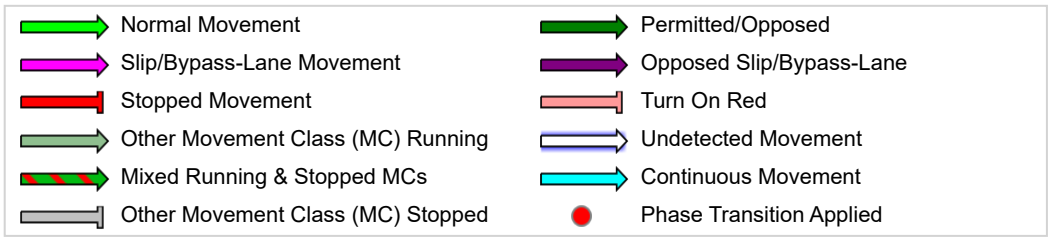
Phase	A	B	C	D
Phase Change Time (sec)	0	12	26	38
Green Time (sec)	6	8	6	6
Phase Time (sec)	12	14	12	12
Phase Split	24%	28%	24%	24%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



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Project: C:\Users\elemi\Documents\TPC Works\Traffic Planning Dropbox\A TPC Projects\2021 Projects\21981 - 50 Pukekohe East Road and 47 Golding Road\TPC Documents\Modelling\21981 - SIDRA Modelling.sip9