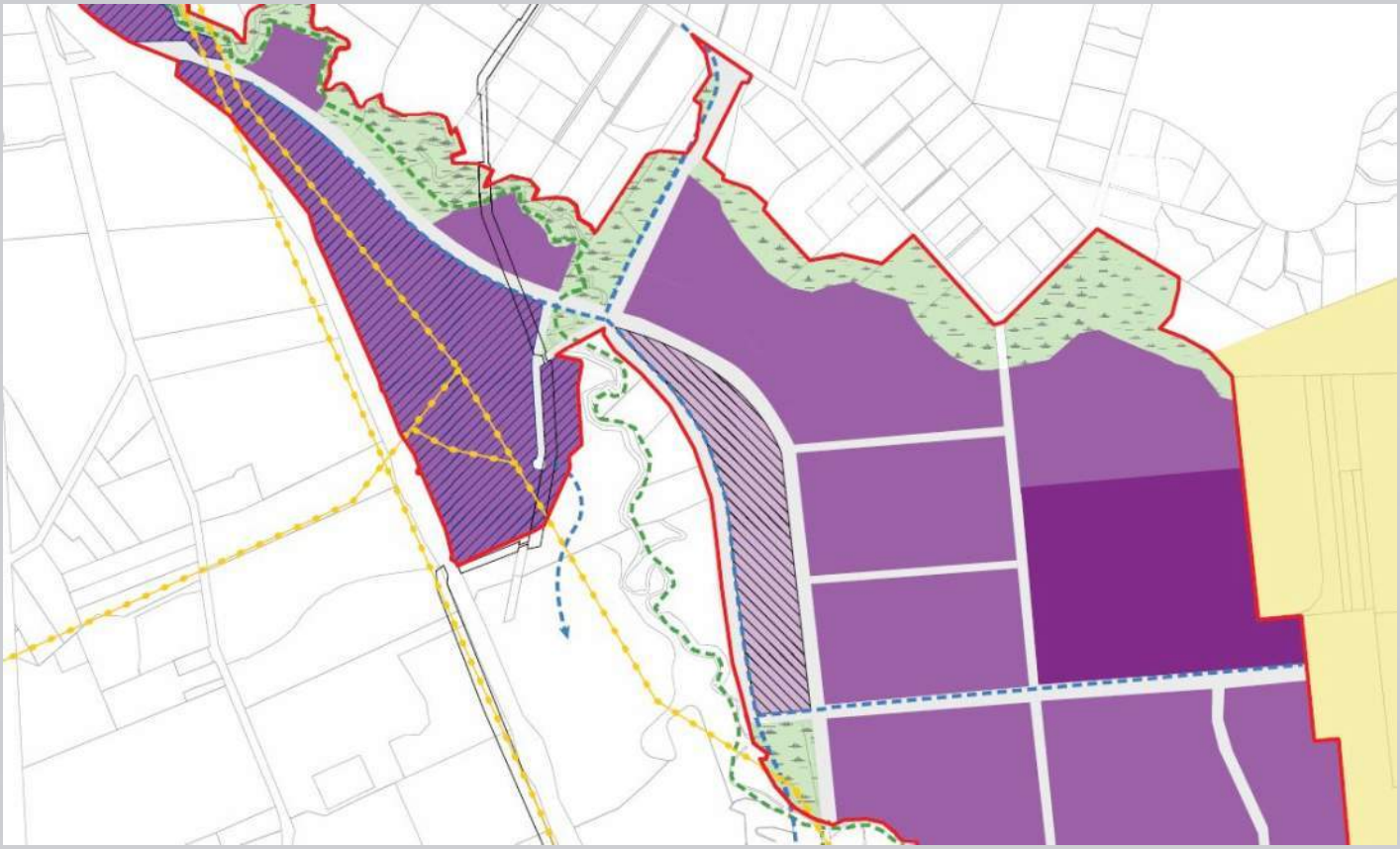
Drury South Industrial Precinct - Plan Variation - Transport Assessment

Prepared for Drury South Limited
Prepared by Beca Limited

12 November 2019



make everyday better.

Creative people together transforming our world

Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
1.0	**Joe Phillips**	Draft for Client	27/09/2019
2.0	**Joe Phillips**	Final for Lodgement	12/11/2019

Document Acceptance

Action	Name	Signed	Date
Prepared by	**Joe Phillips**		11/11/2019
Reviewed by	**Dan Jackson**		11/11/2019
Approved by	**Joe Phillips**		12/11/2019
on behalf of	Beca Limited		

Executive Summary

The Drury South Industrial Precinct (the Precinct) currently provides for around 216 hectares of Land Extensive Industrial Activities, which are expected to be delivered over the next 15 to 20 years. Drury South Limited (DSL) is seeking to lodge a private Plan Change to the Auckland Unitary Plan (Operative in Part) (AUP(OP)) to make a number of amendments to the Precinct provisions, including re-zoning Sub-Precinct C to Mixed Use and around 20 hectares of Heavy Industry to Light Industry.

The transport reporting for the original Plan Change, approved under the legacy Franklin and Papakura District Plans, considered the Precinct in the rural context of the surrounding land use at that time. However, the current surrounding land use context includes significant planned urbanisation to the north. The Council has released the Drury-Opaheke Structure Plan 2019, which does not include this Precinct, setting out the transformation of the Future Urban Zone at Drury-Opaheke into a highly desirable urban place. The transport networks to support the Structure Plan are now being investigated by the Supporting Growth Alliance (SGA) and this includes the route protection for the future Mill Road Corridor. The Precinct does not rely on the delivery of the Mill Road Corridor, as the Precinct transport effects are addressed by the identified Transport Network Development Requirements (TNDR). However, the implementation of the Corridor will influence the development in the Northern part of the Precinct.

Assessment of the traffic generation effects of the proposed zoning changes has been undertaken. This has identified that the external effects in terms of the transport projects required are unlikely to be discernibly different, to the traffic generated by the original Plan Change, when the change in vehicle trips is distributed across the external network. As such, the external transport effects can still be appropriately considered as part of future subdivision consents, as development in the Precinct is progressed.

Moreover, it is considered that, with the Drury-Opaheke Structure Plan and these proposals, there are now planned to be greater number and range of employment options in the Drury area. This change in the distribution of Precinct traffic (with more residential) and the wider work force opportunities (greater commercial and retail within the wider Drury area) may also balance the wider effects.

Overall, it is considered that the predicted traffic effects of the proposed changes on the internal Precinct network and to external connections, particularly the northern connections, are not dissimilar to those previously anticipated. It is considered that the internal road network, including the signalised intersections providing access for the Mixed Use Sub-precinct, can satisfactorily accommodate the predicted traffic demands and allow for the future transport network planning being progressed by the SGA.

Further refinement of the intersection layouts and road cross sections can be appropriately addressed through later subdivision consents and EPA applications, when the wider context and connections will be better understood. However, the modelling herein provides confidence that an appropriate internal transport network can be achieved regardless of the wider connections and networks.

The Precinct also enables the future implementation of public transport, via bus services, should these be provided by Auckland Transport. In particular, the more intensive activities within the Mixed Use Sub-precinct will be located within a reasonable walking distance of bus stops on the Spine Road, which is designed to accommodate bus services and stops. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services. It is expected the more detailed planning and design for bus services will be undertaken by Auckland Transport at the appropriate time.

The proposed changes to the Precinct can be satisfactorily accommodated by the already planned and proposed internal transport network provisions for pedestrians and cyclists, as well as the previously identified TNDR for external walking and cycling connections. This can be further addressed through the future subdivision and EPA applications as the development occurs, as required by the Precinct provisions.

It is considered that the proposed changes to the Precinct provisions are consistent with the assessments undertaken within this Transport Assessment Report (TAR), particularly with regard to the quantum of retail and commercial activities enabled within the Mixed Use Sub-precinct. Other changes to the provisions appropriately provide for flexibility in the development of the transport network, particularly the design of the Avenue Road, given the adjacent future urbanisation to the north and the developing transport network for those future urban areas, including the future Mill Road Corridor. The provisions continue to provide for the TNDR upgrades to be assessed, as well as any vehicle access off the Spine Road.

It is therefore considered that the proposed changes to the AUP (OP) provisions for the Precinct will provide appropriately in relation to transport matters for the proposed re-zoning and will continue to enable the transport effects of the Precinct development to be satisfactorily addressed, as further subdivision within the Precinct occurs.

It is also considered that the proposed changes to the Precinct will provide an improved transport and land use integration outcome, in combination with the now planned employment and residential development in the adjacent Drury-Opaheke Structure Plan area and the adjacent Drury South Residential Precinct.

It is therefore considered that there is no reason, from a transport perspective, as to why the Plan Change to the Drury South Industrial Precinct cannot be approved.

1 Introduction

1.1 Background

The Precinct currently provides for around 216 hectares of Land Extensive Industrial Activities, which are expected to be delivered over the next 15 to 20 years. **Figure 1-1** shows the overall extent of the Drury South area (red line), also covering the Residential Precinct located in the southern and western parts of the Drury South area.

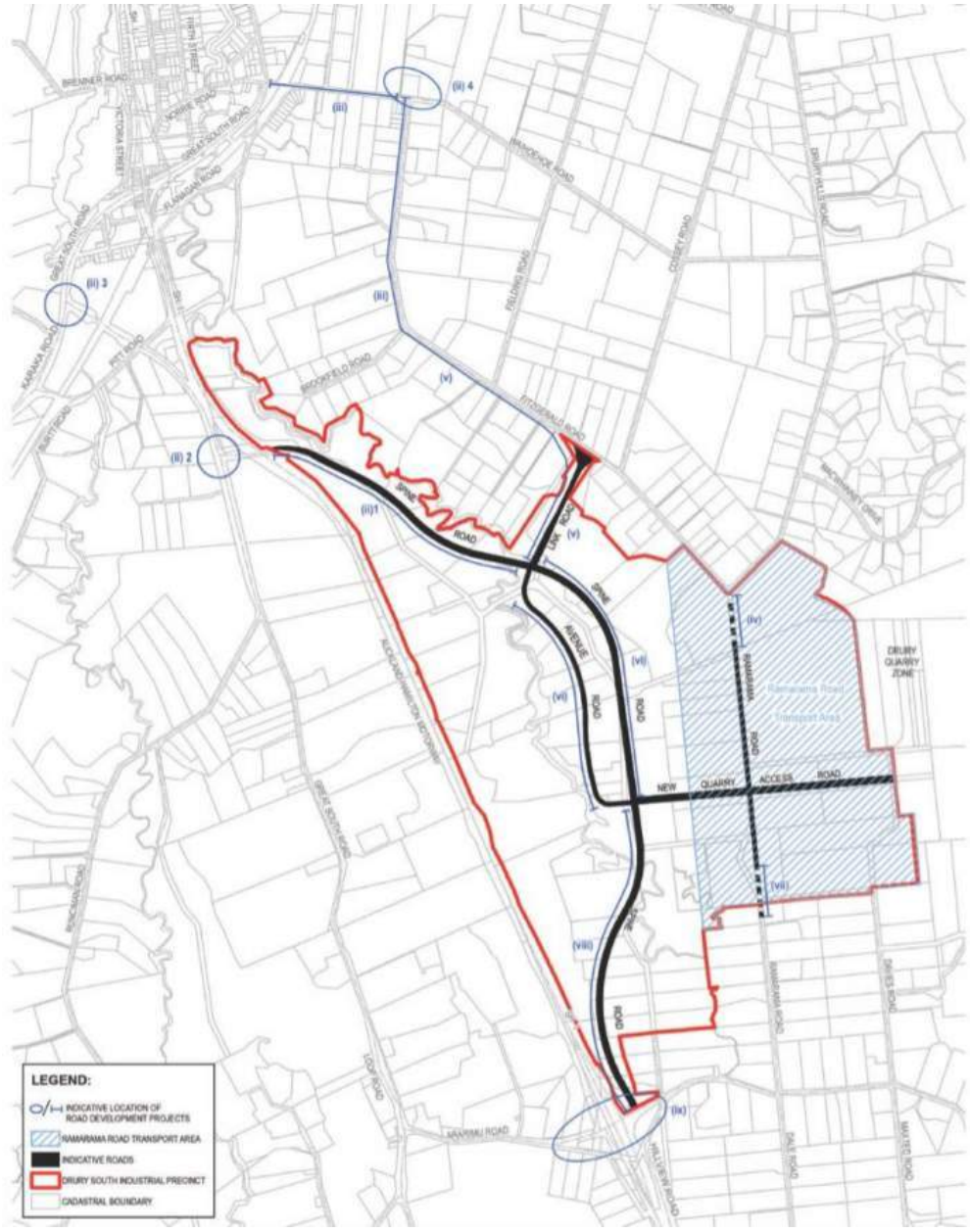


Figure 1-1: Drury South Precincts[1]

[1] AUP (OP) I410.10.2 Drury South Industrial: Precinct Plan 2

Under the AUP (OP), the development within the Drury South Industrial Precinct (the Precinct) is subject to assessment criteria for subdivision, or development preceding subdivision, which consider the identified Transport Network Development Requirements (TNDR). The TNDR, shown on **Figure 1-1**, enable that the transport effects of development of the Precinct to be appropriately addressed, as it occurs.

In terms of the Industrial Precinct, the identified TNDR and assessment criteria are based on the following previous comprehensive and detailed transport reporting. These reports are not appended, but can be made available, if required.

- Drury South Business Project – Integrated Transport Assessment, Beca Infrastructure Ltd (December 2010)
- DSBP Infrastructure Assessment Report, Beca Infrastructure Ltd (November 2011)
- Drury South Business Park (Private Plan Change) – Response to Auckland Transport letter, Beca Infrastructure Ltd, 5 April 2012
- Drury South Business Park (Private Plan Change) – Response to Auckland Council letter, Beca Infrastructure Ltd, 12 May 2012
- Quarry Road Special Housing Area (SHA) – Transport Assessment, Beca Ltd (June 2016)
- Quarry Road SHA – Addendum to Transport Assessment (July 2016).

In addition to the above, as part of the initial subdivision consents for the Precinct, further transport assessments have been undertaken and external transport upgrades have already been provided or will be constructed prior to that subdivision becoming operational. This is discussed further in **Section 2.2**. A key outcome of the above work and the change in context for the development of the Precinct is that development (including the residential development) is now occurring from south to north, not north to south.

Auckland Transport (AT) has completed its Regional Land Transport Plan (2018-28) (RLTP 2018), which identifies committed funding to deliver the Mill Road Corridor (Phase 1), including a new interchange at Drury South. It is understood from discussion with the NZ Transport Agency (the Transport Agency) that the identified funding only covers construction of the northern section of the Mill Road Corridor, although AT is currently undertaking a review to determine whether the funding for Mill Road should be reprioritised. It is understood from the Transport Agency, the southern section between Drury South and State Highway 1 (SH1) is not yet identified for funding in the first decade (to 2028), although a decision on this is likely in 2020. The route protection is subject to further investigation by the Supporting Growth Alliance (SGA) as discussed further in **Section 2.3**. The Precinct does not rely on the delivery of the Mill Road Corridor, as the Precinct transport effects are addressed by the identified TNDR.

Auckland Council (the Council) has now also released the Drury-Opaheke Structure Plan 2019, which sets out the transformation of the Future Urban Zone at Drury-Opaheke into a highly desirable urban place where people can live, work and play. The Structure Plan shows how this can be achieved, considering constraints and opportunities, and indicating the arrangement of centres, housing, business areas, parks and infrastructure. It also shows how the area connects to adjacent urban areas (such as the Drury South Precincts) and wider infrastructure networks. The Precinct does not form part of the Structure Plan area. This is discussed further in **Section 2.5**.

1.2 Development Proposals

Drury South Limited (DSL) is seeking a private Plan Change to the AUP (OP) to make a number of amendments to the Precinct provisions. The key proposed changes from a transport perspective are summarised in **Figure 1-2** below and then further discussed in **Section 3.1**.

- Commercial Services Precinct (Sub-Precinct C) – Rezoned from Light Industry to Mixed Use
- Heavy Industry – The illustrated portion (approx. 20 hectares) of this precinct rezoned to Light Industry.

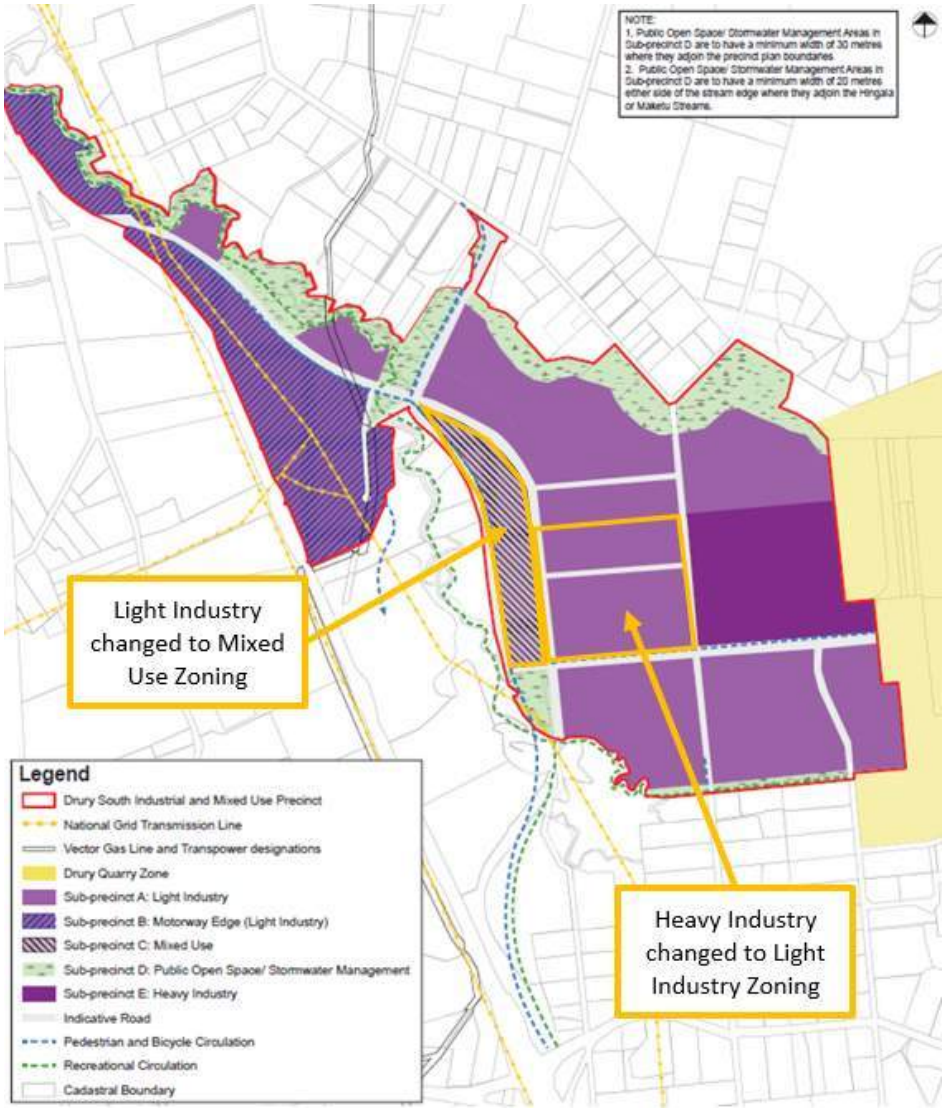


Figure 1-2: Proposed Change to the Industrial Precinct

1.3 Report Structure and Purpose

This Transport Assessment Report (TAR) has been prepared to support the proposed changes to the Precinct. The extent of the traffic modelling included in the TAR has been subject to discussion and agreement with the Council, and its transport peer reviewer (Flow Transportation Specialist (Flow)) prior to the lodgement of the application. The report is structured, as follows:

- **Section 2** summarises the previous transport assessments that have been undertaken in relation to the Industrial Precinct, as well as ongoing work by the SGA and Council, relating to the future land use and transport infrastructure in the Drury area;
- **Section 3** describes the proposed changes to the Precinct, including the proposed changes to land use activities and the supporting internal transport network changes;
- **Section 4** assesses the transport effects of the proposed changes to the Precinct in relation to both the internal and surrounding external transport network;
- **Section 5** discusses relevant transport matters relating to the changes to the I410 Precinct provisions identified in the AUP (OP); and
- **Section 6** provides the summary and conclusion.

2 Transport and Land Use Context

2.1 Precinct Transport Network Planning

As shown in **Figure 1-1**, the current alignment of the Avenue Road in the Precinct, on the western side Spine Road, connects at its northern and southern ends to intersections with the Link Road and New Quarry Access Road respectively. As discussed in **Sections 2.4** and **2.5**, the work being undertaken by the Council and the SGA currently indicate that the future Mill Road Corridor will potentially run through the northern intersection with the Link Road. As such, the northern Avenue Road intersection would need to move further south to facilitate a future Mill Road Corridor / Spine Road intersection.

In 2017, transport assessments were undertaken in liaison with the Auckland Transport team preparing the Housing Infrastructure Fund (HIF) business case application. This related to the alignment and form of the Spine Road and its relationship with the future Mill Road Corridor. The HIF application team advised at that time, for the purpose of the HIF work, that planning for the Drury South development should be premised on the Mill Road Corridor and a new State Highway 1 (SH1) Interchange.

The assessment was based on a 2046 future year scenario with full development of the Drury South Precincts and the Preferred Transport Network from the Transport for Future Urban Growth (TFUG) project, which is now being further investigated by the SGA. This included completion of the Mill Road Corridor extension to SH1 and a new Drury South Interchange (with connecting ramps to SH1), as instructed by the HIF application team. It also relied on the 2046 network and associated wider area growth assumptions, including a future expressway from SH1 through to Pukekohe.

Based on the assessment at that time, it was confirmed that the lane requirements for the Spine Road would be as shown in **Figure 2-1** below with localised turning lane requirements at the signalised intersections:

- For the northern section of the Spine Road, north of the Mill Road Corridor, one lane in each direction (two lanes) was appropriate.
- To the south of the Mill Road Corridor, it was identified that the following lane arrangements would be necessary along the Spine Road through to Ararimu Road:
  - Two lanes each way (four lanes) along the Spine Road from the Mill Road Corridor to the just south of the New Quarry Access Road intersection on the southern edge of the Industrial Precinct.
  - One lane each way (two lanes) from the southern edge of the Industrial Precinct through the Residential Precinct to Ararimu Road.

Given the anticipated alignment of the Mill Road Corridor and the lane requirements approaching the intersection from the south, it was agreed that the northern intersection of the Avenue Road could not connect at the Mill Road Corridor / Spine road intersection. As such, with the Mill Road Corridor, it was identified that the Avenue Road would be realigned to tie-in to the Spine Road further south, potentially via a signalised intersection with the identified east-west road in the Precinct.

It is also noted that, it has been demonstrated in the previous transport reporting for the Precinct (refer **Section 1.1**) that only two lanes (one lane in each direction) are required on the southern section of the Spine Road (south of the Precinct) both without and with the future Mill Road Corridor. However, that section of the Spine Road has now been designed and constructed with sufficient road reserve to provide for any future four-laning should Auckland Transport identify that this is necessary.

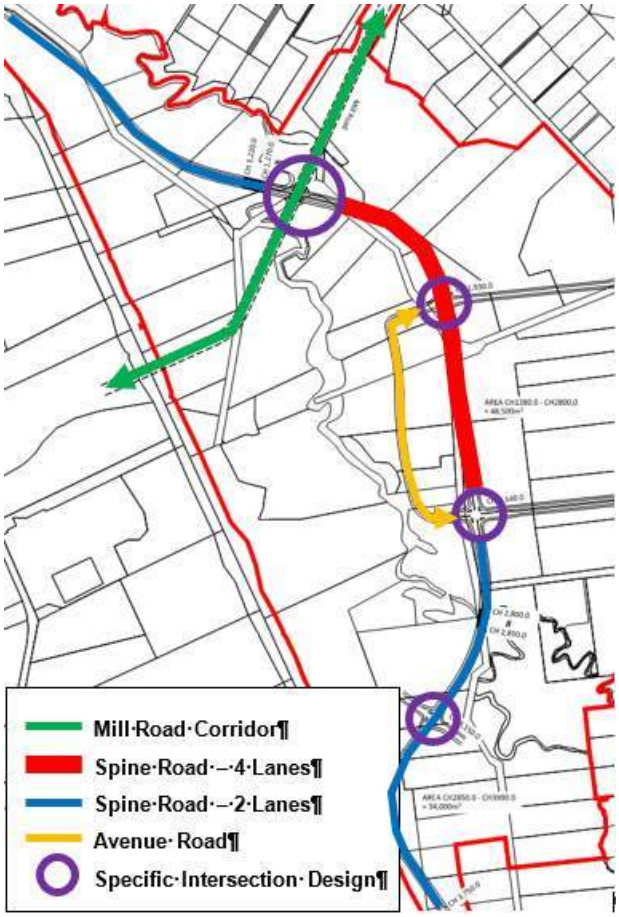


Figure 2-1: Indicative Spine Road / Mill Road Corridor Configuration (HIF Application Assessment)

2.2 Subdivision Transport Network

2.2.1 Internal Transport Network

The internal transport network for the approved subdivision of approximately 65 hectares within the Precinct and associated Engineering Plan Approval (EPA) is illustrated on **Figure 2-2** below. The key aspects of the current network are as follows:

- Spine Road (Road 1) from the Ramarama Interchange to the Precinct.
- Road 1A connecting to Intersection 1, with no current connection to Quarry Road.
- Road 2E and Road 2W providing access for the Drury Quarry, so quarry traffic no longer uses Quarry Rd.
- When Road 2W connects Spine Road to Roads 4/6, Road 6 is not connected to Ramarama Road South.
- Road 4 connecting to Ramarama Road North and its intersection with Quarry and Fitzgerald Roads.
- Intersections 1 and 2 providing western 'stubs' for connection to the future Avenue Road.

Figure 2-3 below shows the links within the approved subdivision network where dedicated cycle facilities or shared paths are provided, including dedicated crossing facilities for pedestrians and cyclists at signalised intersections. This includes the following:

- Road 1 / Road 1A – A dedicated bi-directional cycle facility (Spine Road west side) and separate footpath.
- Roads 2E, 2W, 4, 5 and 6 – Shared paths for pedestrians and cyclists.
- Northern connection of Road 4 with the external shared path to the Waihoehoe Road / Flanagan Road intersection discussed below.

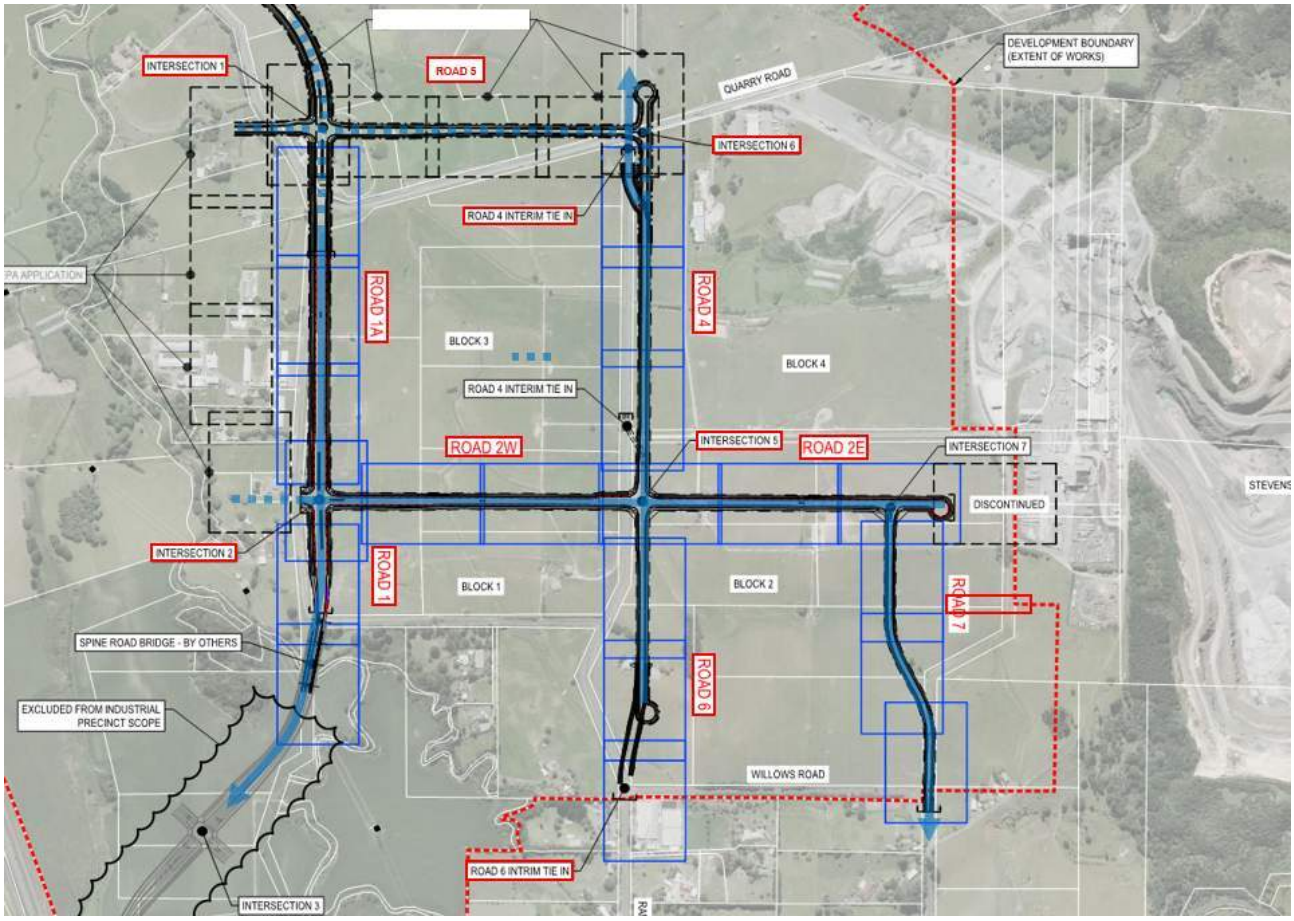


Figure 2-2: Current Subdivision Transport Network

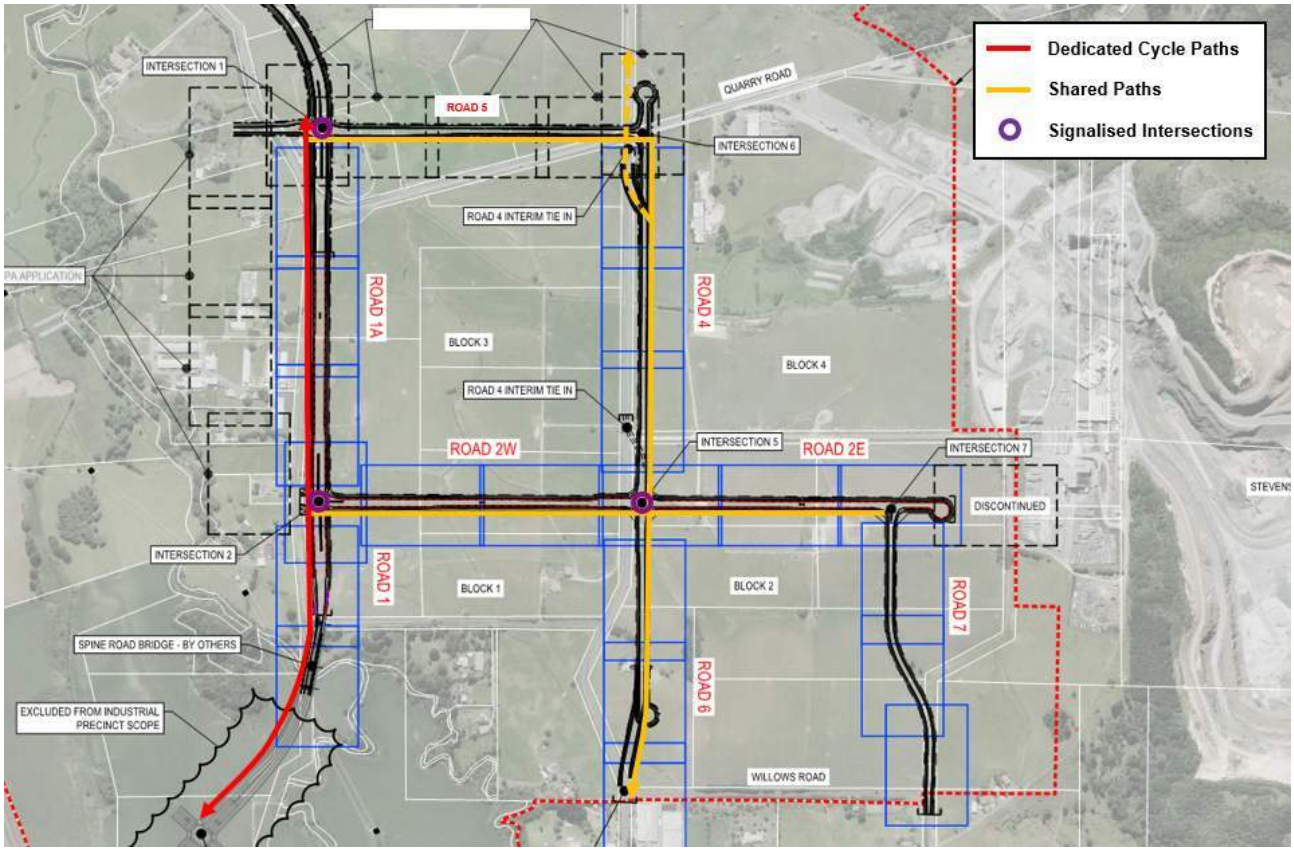


Figure 2-3: Current Subdivision Transport Network – Cycle Provision

2.2.2 External Transport Network Upgrades

In addition to the above, as part of the approved subdivision consents for the Precinct, transport assessments have identified the following external transport upgrades that have already been provided or will be constructed prior to the approved subdivision lots becoming operational. This is consistent with the upgrades to be considered through the TNDR for the Precinct.

- **Spine Road** – New roundabout connection on the eastern side of the Ramarama Interchange
- **Ramarama Road (Southern end)** – Closed to vehicles, at an appropriate time in accordance with the agreed road stopping, but remaining open for pedestrian and cycle access
- **Ramarama Interchange (West)** – Minor safety improvements to the western ramp intersections
- **Quarry Road / Great South Road** – Minor safety improvements at this intersection
- **State Highway 22 (SH22) / Great South Road** – Minor safety improvements at this intersection with conditions to undertake a further safety and operational performance review, as development occurs
- **Fitzgerald Road / Waihoehoe Road** – Minor safety improvements at this intersection
- **Shared Path** – Construction of a shared path (for pedestrians and cyclists) between the approved subdivided land and the Waihoehoe Road / Flanagan Road intersection, which will be constructed to an adequate construction standard consistent with a temporary rural bridle path.

2.3 Avenue Road Function

The current layout of the transport infrastructure within the Precinct (refer to **Figure 1-1**) is slightly different from that of the original Plan Change approved under the legacy Franklin and Papakura District Plans, prior to that being carried over into the AUP (OP). The original layout is illustrated on **Figure 2-4**.

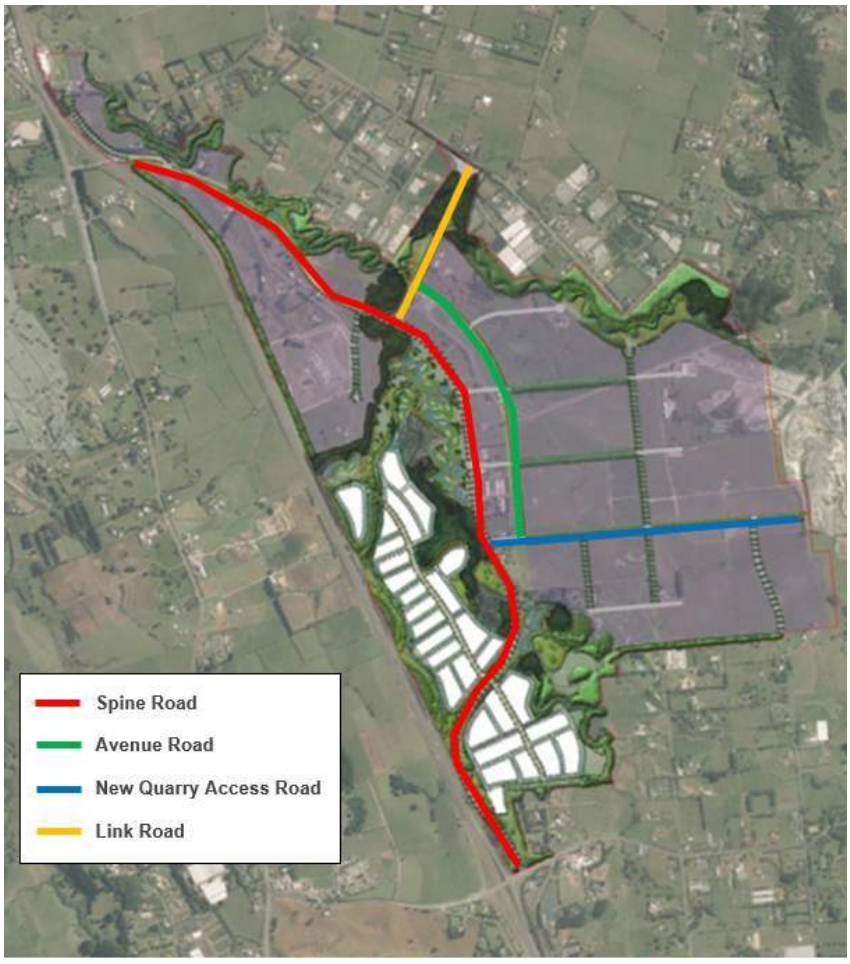


Figure 2-4: Previous Industrial Precinct Layout

The key differences between the current AUP (OP) Precinct and the original layout of the transport infrastructure approved under the legacy District Plans are, as follows:

- The Spine Road was previously further to the west adjacent to the open space and wetlands, but has now been moved east broadly along the previous alignment of the Avenue Road
- The Avenue Road, which previously ran to the east of the Spine Road and connected with the Link Road at its northern end, has been moved to the west of the Spine Road.

The purpose of the Avenue Road in the original layout, which is still recognised in the various provisions of the Precinct in the AUP (OP) was to provide northern connection off the Link Road to both the industrial and commercial services activities, as well as the opportunity of access to the Commercial Services sub-precinct as an alternative to the Spine Road. As such, the Avenue Road provided a through traffic and access function, as it served a wider Precinct catchment. However, with the current Precinct Plan, the Avenue Road simply provides an access function.

2.4 Supporting Growth Alliance

Auckland Transport, the New Zealand Transport Agency and Auckland Council have been collaborating to develop the transport network plan needed to support future urban areas in the north, northwest and south Auckland. The plan was formerly known as the TFUG programme, but is now known as the SGA.

The SGA is investigating protecting land for longer term 'new' routes to provide certainty to communities and developers on these routes. The SGA has released its Indicative Strategic Transport Network for the South Auckland (July 2019), which is illustrated on **Figure 2-5**.

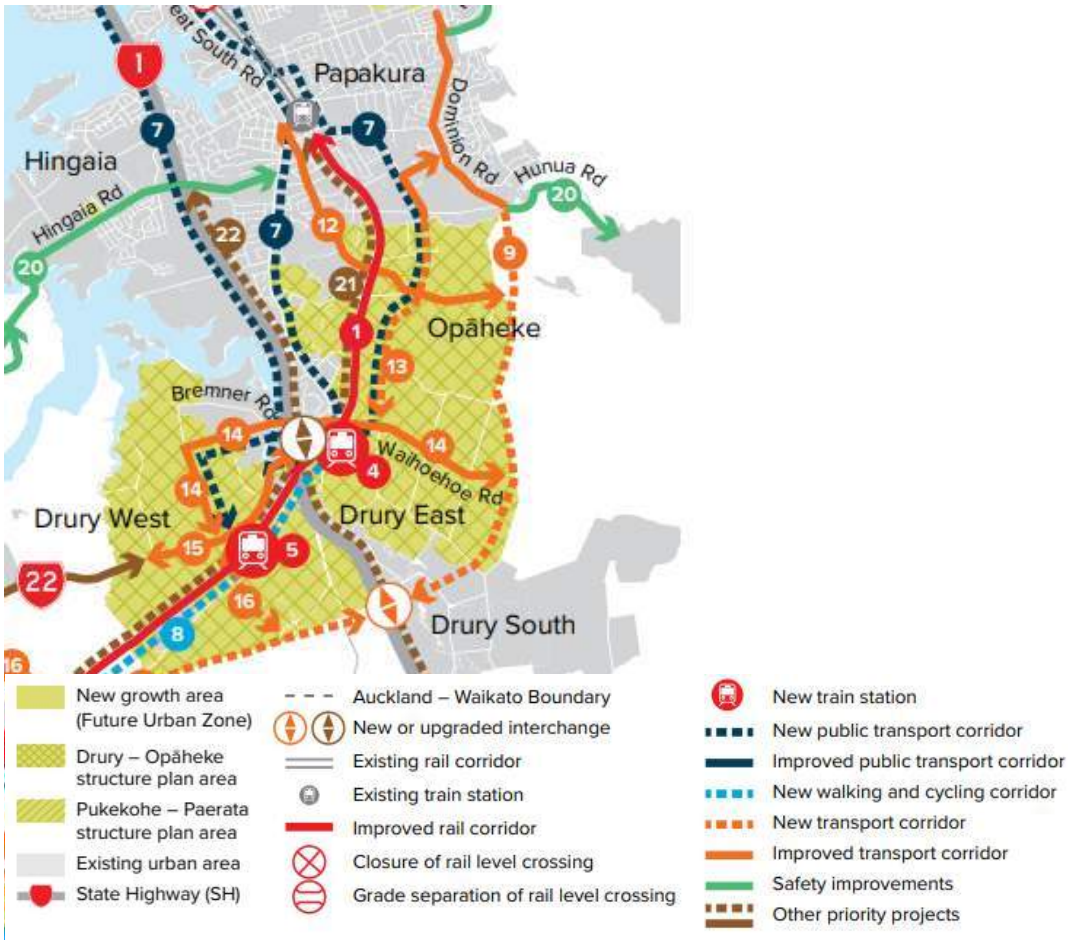


Figure 2-5: SGA Indicative Strategic Transport Network – South Auckland

This includes the Mill Road Corridor (Project 9) from Papakura to Drury South, including a new interchange with SH1. Separately, the New Zealand Transport Agency is also progressing the SH1 Papakura to Bombay Project, which is investigating upgrades to SH1.

It is noted that the transport assessment for the Plan Change approved under the legacy District Plans, (refer to **Section 1.1**) did not rely on the future Mill Road Corridor or include it within the transport infrastructure (TNDR) necessary to support the Precinct. As such, the Precinct does not rely on the delivery of the future Mill Road Corridor.

The future Mill Road Corridor has been identified (including through the recent SGA investigations), as necessary to support the wider surrounding growth in the Drury / Opaheke area, which is now being signalled through the Council's Structure Plan (refer below). The Corridor therefore helps enable growth in this area, which also complements the already planned development (and proposed mix of development) in this Precinct. Depending on its timing, the Corridor has the potential provide a transport network that would provide an alternative network to address the transport effects of the Precinct, meaning some of the TNDR projects to the north of the Precinct would not be necessary.

2.5 Drury-Opaheke Structure Plan

The Auckland Future Urban Land Supply Strategy (FULSS) was completed by Auckland Council in July 2017. The FULSS 2017 identifies a programme to sequence future urban land over 30 years and assists with the ongoing supply of greenfield land for development. It was updated to reflect changes to the AUP(OP), new demand for development and further technical work undertaken by the Council to gain a greater understanding of the requirements for development (e.g. SGA).

In relation to Drury South and the surrounding greenfield development areas (Opaheke, Drury West and Hingaia), the FULSS 2017 has identified the following timing for land being 'development ready', as illustrated on **Figure 2-6**.

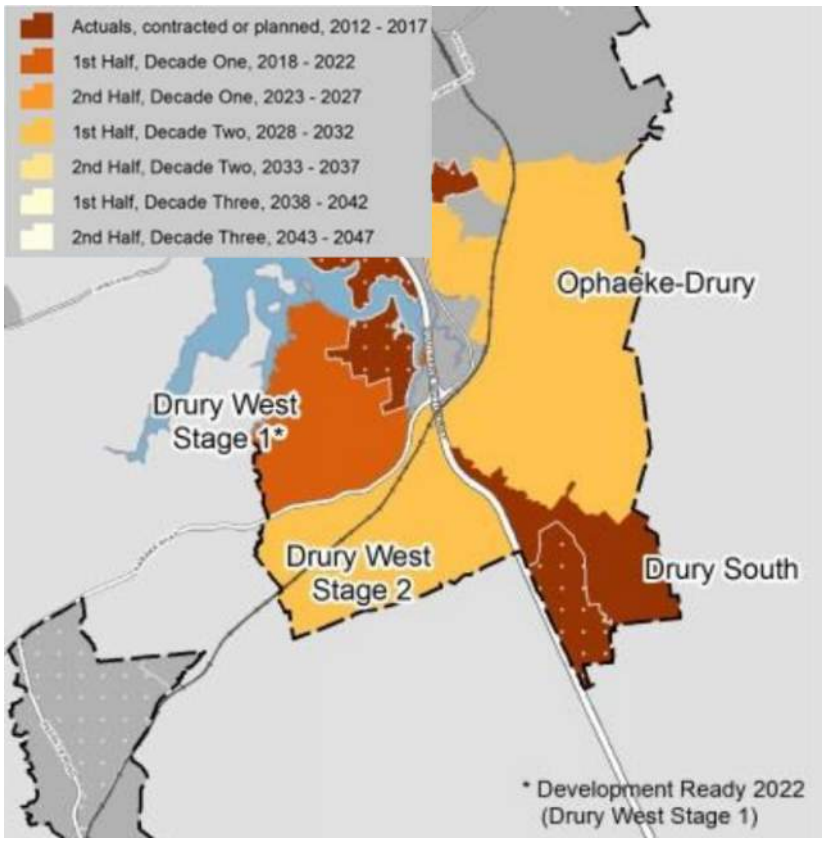


Figure 2-6: FULLS 2017 – Anticipated 'Development Ready' Land

Whilst the FULSS 2017 determines sequencing and timing for when future urban areas will be ready for development to commence this requires necessary underpinning zoning and bulk infrastructure to be in place. The AUP(OP) requires that before any future urban zone is zoned as being ready for urban development, a structure plan will be completed.

The Council has now released the Drury-Opaheke Structure Plan 2019, which sets out the transformation of the Future Urban Zone at Drury-Opaheke into a highly desirable urban place where people can live, work and play. The Structure Plan shows how this can be achieved, considering constraints and opportunities, and indicating the arrangement of centres, housing, business areas, parks and infrastructure.

As shown in **Figure 2-7**, the Structure Plan shows how the area connects to adjacent urban areas (such as the Drury South Precincts) and wider infrastructure networks, which is based on an Integrated Transport Assessment, prepared by the SGA, as part of the preparation of the Structure Plan.

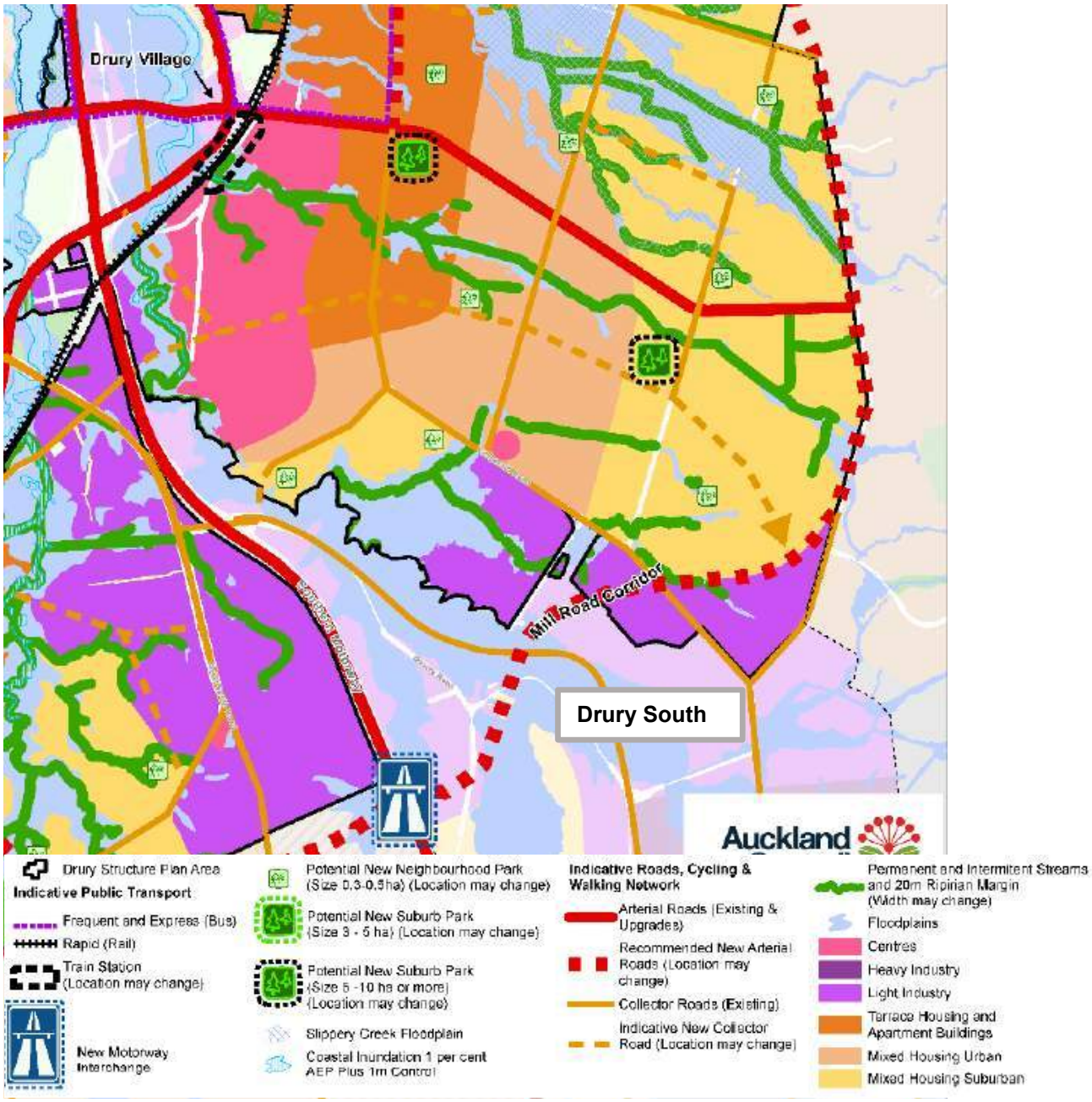


Figure 2-7: Drury-Opaheke Structure Plan 2019 – Indicative Transport Network

In relation to the Precinct, it is noted that both the Council's Structure Plan and the SGA programme will influence how transport network connections are established from the northern boundary of the Precinct to the wider area, such as Drury. The implementation of the Mill Road Corridor project (shown as the red dashed line on **Figure 2-7**) will influence the development in the northern part of the Industrial Precinct, but the Precinct is not reliant on the delivery of the Mill Road Corridor, as the transport effects will be addressed by the identified TNDR in the Precinct provisions.

A key aspect of the Structure Plan is that it now anticipates adjacent industrial development on the northern boundary of the Precinct and then residential development. Previously, at the time of the original Drury South Plan Change, this was identified to be rural land. The identified employment and residential development in these adjacent areas will complement the mix of development within this Precinct, the adjacent Drury South Residential Precinct, particularly the development proposed and considered in this TAR.

3 Development Proposals

3.1 Overview of Proposed Changes

Drury South Limited (DSL) is seeking a private Plan Change to the AUP (OP) to make a number of amendments to the underlying zoning and the Precinct provisions. The key proposed changes are summarised in **Figure 3-1**. Further details are provided in the Section 32 Evaluation for the proposed changes prepared by Barker & Associates (B&A).

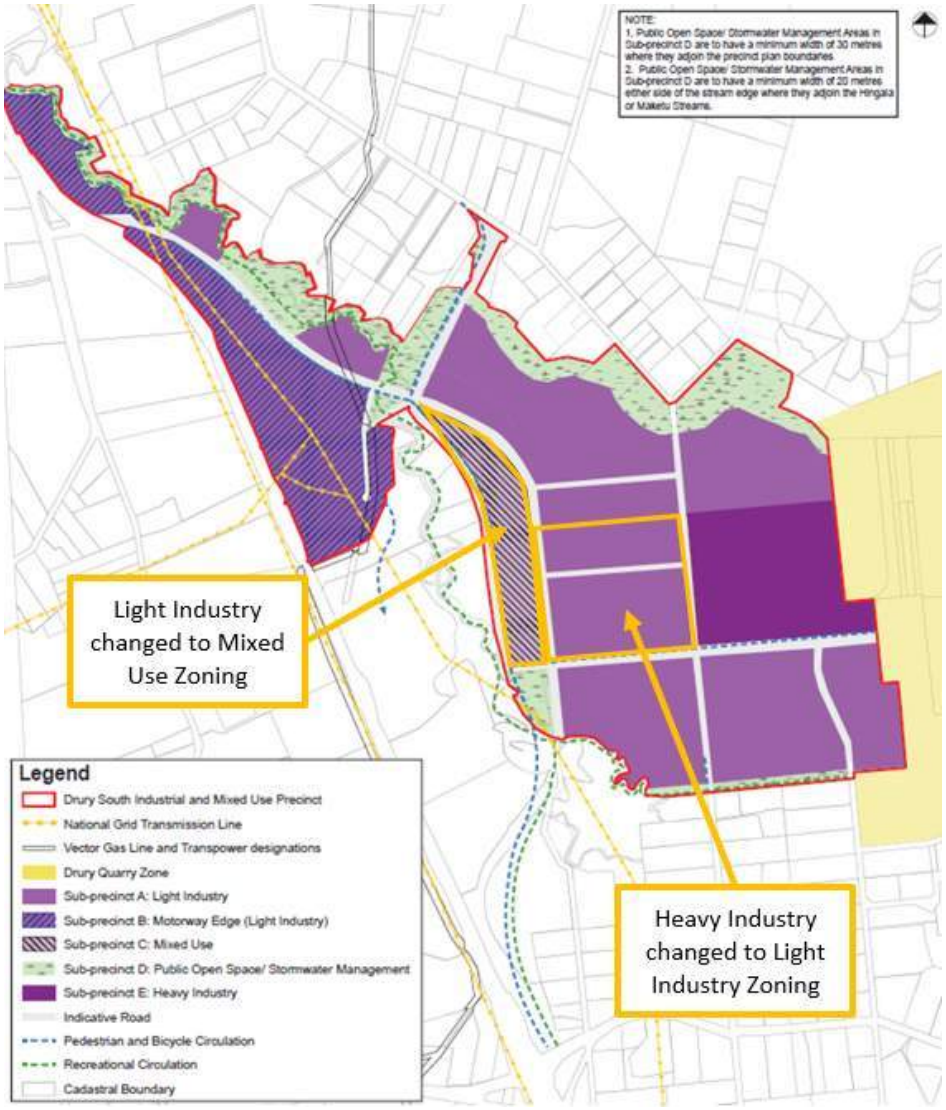


Figure 3-1: Proposed Change to the Industrial Precinct

3.1.1 Commercial Services Precinct (Sub-Precinct C)

DSL is seeking to amend the zoning of the Commercial Services precinct from Light Industry to Mixed Use. The rules currently applying to this area provide for offices, commercial services and a limited range of supporting retail activities. The purpose of these rules is to provide for employment generating activities associated with the industrial area.

Since these rules were put in place, the nature of the surrounding area has changed. The land to the west has been rezoned for residential (Drury South Residential Precinct) and the land to the north will be developed

for urban uses in the next ten years, as indicated in the Drury-Opaheke Structure Plan. A Mixed Use zone that provides for a broader range of activities, including residential and supporting services has been identified to better meet the needs of the residential and employment population in Drury South and the wider Drury area.

3.1.2 Industrial zoning

Reflecting the change of zoning in the Commercial Services precinct, DSL propose to rezone the block of land bounded by Spine Road, New Quarry Road and Quarry Road from Heavy Industry to Light Industry. This would provide an appropriate separation distance between the proposed Mixed Use zone and the Heavy Industry zone east of Quarry Road.

3.2 Predicted Trip Generation

In order to consider the extent of the traffic assessment, and traffic modelling, to be included in this TAR, a memorandum on trip generation was prepared by Beca, dated 22 March 2019.

This memorandum was provided to the Council's transport peer reviewer, Flow, and feedback was provided, which Beca then responded to in a further memorandum dated 15 August 2019. Further feedback was received from Flow on 18 September 2019. Copies of the Beca memoranda and the associated Flow feedback are included in **Appendix A**. This has been addressed in following sections.

A summary of the trip generation assessments is provided below.

3.2.1 Commercial Services Precinct (Sub-Precinct C)

The Plan Change proposes to apply the Mixed Use zone to Sub-Precinct C, with a range of modifications to ensure that commercial activities predominantly serve a local function.

This includes specific provisions for retail and office activities, which are typically the higher traffic generating activities in the Mixed Use zone, and also recognise its location further away from the anticipated future Rapid Transit Network (RTN) and areas of significant residential density. Although it is expected that the future public transport network will be extended to connect Drury South, as the future urban areas to the north and west are developed that complement improved viability of services. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services.

The development enabled in the zone sits above what would realistically be developed and provides some flexibility. Above certain Gross Floor Area (GFA) limits, discretionary activity resource consent would be required, which would enable effects on the transport network to be considered. This is discussed further in the Section 32 Evaluation prepared by B&A.

A range of activity mixes were considered in the Beca memoranda, given it is difficult to predict with certainty the specific mix of activities. **Table 3-1** below illustrates the mix of activities that was predicted to result in the highest traffic generation for the sub-precinct area. This is consistent with the proposed provisions described in the B&A Section 32 Evaluation.

The assumptions in **Table 3-1** are considered by B&A to be very conservatively high, being at the upper end of what is likely to be feasible to construct and with more of a retail and office focus. Also retail and office activities would typically generate more traffic than residential activities, particularly in the weekday evening peak. As such, should development within Sub-Precinct C be more residentially focused, traffic generation is likely to be lower than what is predicted.

Table 3-1: Proposed Zoning Considered (Mix 5) – Sub-Precinct C

Activity	Mix 5
Retail –Supermarket	4,500
Retail – Supporting retail / F&B	4,400
Trade supplier activity e.g. Bunnings, landscape suppliers	5,500
Supporting commercial services (e.g. medical, services etc)	3,300
Small scale offices	11,600
Residential – Apartments	12,300
Residential – Retirement villages	22,000
Total GFA	**63,600**
GFA / Site Area Ratio	*64%*

Table 3-2: Sub-Precinct C – Traffic Generation Comparison – Total Vehicle Movements

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Precinct Provisions – Commercial Services	1,388	1,391
Proposed Provisions – Mixed Use (Mix 5)	822	1,534
Predicted Change from Current	*-566*	*+143*

Table 3-1 shows the potential activities that may be established with Sub-Precinct C under the proposed precinct rules, without further transport assessment for discretionary activities. Trip generation rates have then been re-applied, and the resulting predicted traffic generation is summarised in **Table 3-2,** where a comparison is provided with the currently assessed traffic generation for Sub-Precinct C, based on the current Commercial Services zoning.

During the weekday morning peak hour, it is predicted that the traffic generation would be substantially lower under the proposed precinct provisions for Mixed Use zoning. In the weekday evening peak hour, whilst there is potentially an increase in traffic generation of up to around 10%, compared to the previous traffic generation for this sub-precinct, it is a much smaller proportion of the total Precinct traffic generation.

However, it is noted that while predicted weekday evening peak hour demands are similar, there will be a change in distribution. That is, with the ratio of employment activities across the Precinct reducing outbound trips will reduce during the evening peak, as in this period residential activities would have more inbound trips. As mentioned below, this has been assessed in relation to the Precinct's internal intersections (specifically along the Spine Road). Outside the Precinct, there may also be some changing effects with the change in ratio of employment and residential activities, although it is considered this can be appropriately addressed in considering the external TNDR. Moreover, it is considered that, with the Drury-Opaheke Structure Plan and these proposals, there are now planned to be greater number and range of employment options in the Drury area. In this regard, the change in the distribution of Precinct traffic (with more residential) and the wider work force opportunities (greater commercial and retail within the wider Drury area) may also balance the wider effects.

Given B&A and Market Economics have advised that these are conservatively high assumptions for the potential build-out, it is therefore considered that distributed across the wider external network, the effects would not be notably discernible from the current precinct provisions with the planned precinct transport infrastructure improvements. It is considered the changes will simply impact the more detailed layout / design of the Precinct's TNDR. Whilst the need for, general form / purpose and timing of the TNDR are appropriately addressed during the Plan Change, the more detailed layout of the TNDR is more appropriately addressed through later subdivision consents or Engineering Plan Approval that consider such detail.

3.2.2 Industrial zoning

The proposed changes include rezoning approximately 20 hectares of land from Heavy Industry to Light Industry activities. DSL has advised that it expects the subject land to be utilised for distribution / logistics type activities. It is not anticipated that the expected activities would have a notable retail component. As such, based on relevant sites in the NZ Trips and Parking Database (NZTPDB), trip rates of 0.61 and 0.55 movements per 100m^2 during the weekday morning and evening peak hours respectively. This is consistent with the peak hour trip rate of 0.5 movements per 100m^2 identified in the Flow memorandum of 10 April 2019 for warehousing.

As such, the NZTPDB warehousing traffic generation rates have been applied to a range of potential GFA to site area ratios (i.e. 20 to 40%) to determine the potential traffic generation. **Table 3-3** compares the traffic generation used for the previous Plan Change (within the current traffic models) with that predicted for warehousing / distribution activities.

Table 3-3: Industrial Zoning – Traffic Generation Summary – Total Vehicle Movements

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Traffic Models	300	314
Typical Warehousing / Distribution Activities (Based on GFA trip rates – 20 to 40% ratio)	240 to 492	213 to 437
Predicted Change (to Current Traffic Models)	***-60 to +192***	***-111 to +123***
Typical Light Industrial Activities (Based on Site Area trip rates)	365	381
Predicted Change (to Current Traffic Models)	***+65***	***+67***
Sensitivity Tests		
Typical Warehousing / Distribution Activities (Based on GFA trip rates – 45% ratio)	553	492
Predicted Change (to Current Traffic Models)	**+253**	**+178**
Typical Light Industrial Activities (Based on GFA trip rates – 30% ratio)	600	600
Predicted Change (to Current Traffic Models)	***+300***	***+286***

Additionally, the table provides consideration of a broad range of industrial storage, commercial and industrial park sites with a similar range of site areas, around 20 hectares, as well as sensitivity tests on a higher GFA to site area ratio of 45% and typical light industrial trip rates suggested by Flow of 1.0 movements per 100m^2 (with the NZTPDB indicating that a 30% GFA to site area ratio is appropriate in that situation).

The predicted additional vehicle movements should also be considered in the context of the overall Precinct, which is predicted to generate in the order of 3,800 and 3,900 total vehicle movements in the morning and evening peak hours respectively, once fully developed. In this context, the predicted additional vehicle movements represent increases of up to around 5% and 3% during the morning and evening peak hours respectively, based on the 40% GFA to site area ratio. With the sensitivity tests, the increase in predicted additional vehicle movements, compared with the overall Precinct, is around 5 to 8%.

3.2.3 Trip Generation Summary

In summary, based on the trip generation assessment, it is considered that:

- Sub-Precinct C Traffic Generation – The external traffic generation enabled by the proposed Sub-Precinct C provisions (Mixed Use zoning) would only be slightly more in the weekday evening peak and notably less than the morning peak and a very low percentage change compared to the overall Precinct traffic generation.
- Industrial Zoning Traffic Generation - The external traffic generation enabled by the proposed Light Industrial zoning (anticipated as warehousing / distribution activities), with the higher range of GFA to site area ratio considered, would represent a relatively low percentage change in the overall Precinct traffic generation.

As such, it is considered that the external effects in terms of the transport projects required are unlikely to be discernibly different from the traffic currently anticipated under the existing Precinct provisions when these trips are distributed across the external network. Therefore, no further assessment of external traffic effects is provided in this TAR.

It is considered unlikely that traffic modelling of the external transport network would identify the need for any additional TNDR projects than those previously identified within the assessment criteria for the Precinct. The form and design of upgrades will be appropriately considered as part of future subdivision consents, as development in the Precinct is progressed. This can appropriately address any change in the balance of inbound and outbound traffic flows, which is now likely to be more, given the change in the mix of activities in Sub-Precinct C. As such, the current TNDR identified in the current Precinct provisions satisfactorily provide for addressing any external transport effects.

Moreover, the Precinct does not rely on the future Mill Road Corridor or include it within the transport infrastructure necessary to support the Precinct. It is also currently anticipated that development of light industrial land in the north west of Precinct (north of the future Mill Road Corridor) is unlikely to occur until the Corridor is in place. It is therefore considered that the anticipated completion of the Mill Road Corridor (connecting with SH1), likely prior to the full development of the Precinct, provides an outcome that enables the surrounding urban growth and can be integrated with the current Precinct and proposed changes to provide an alternative to the TNDR in addressing the Precinct's transport effects.

However, within this TAR, it is still necessary to consider the effects of the traffic generation on the internal intersections, particularly along Road 1. This is addressed in **Section 4.4**. This has been based on the proposed changes to the Mixed Use sub-precinct (**Table 3-2**) and the traffic generation in **Table 3-3**, using the typical warehousing / distribution GFA trip rates with a 40% ratio. It is noted that this does not provide any specific discount on trip rates to account for public transport services.

3.3 Proposed Transport Network

It is proposed that transport infrastructure within the Precinct remains broadly the same as illustrated on Precinct Plans 1 and 2 in the AUP (OP). In particular, the same TNDR remain and it is considered that these will continue to satisfactorily address the potential external traffic effects of the Precinct (even with the changes proposed through the Plan Change).

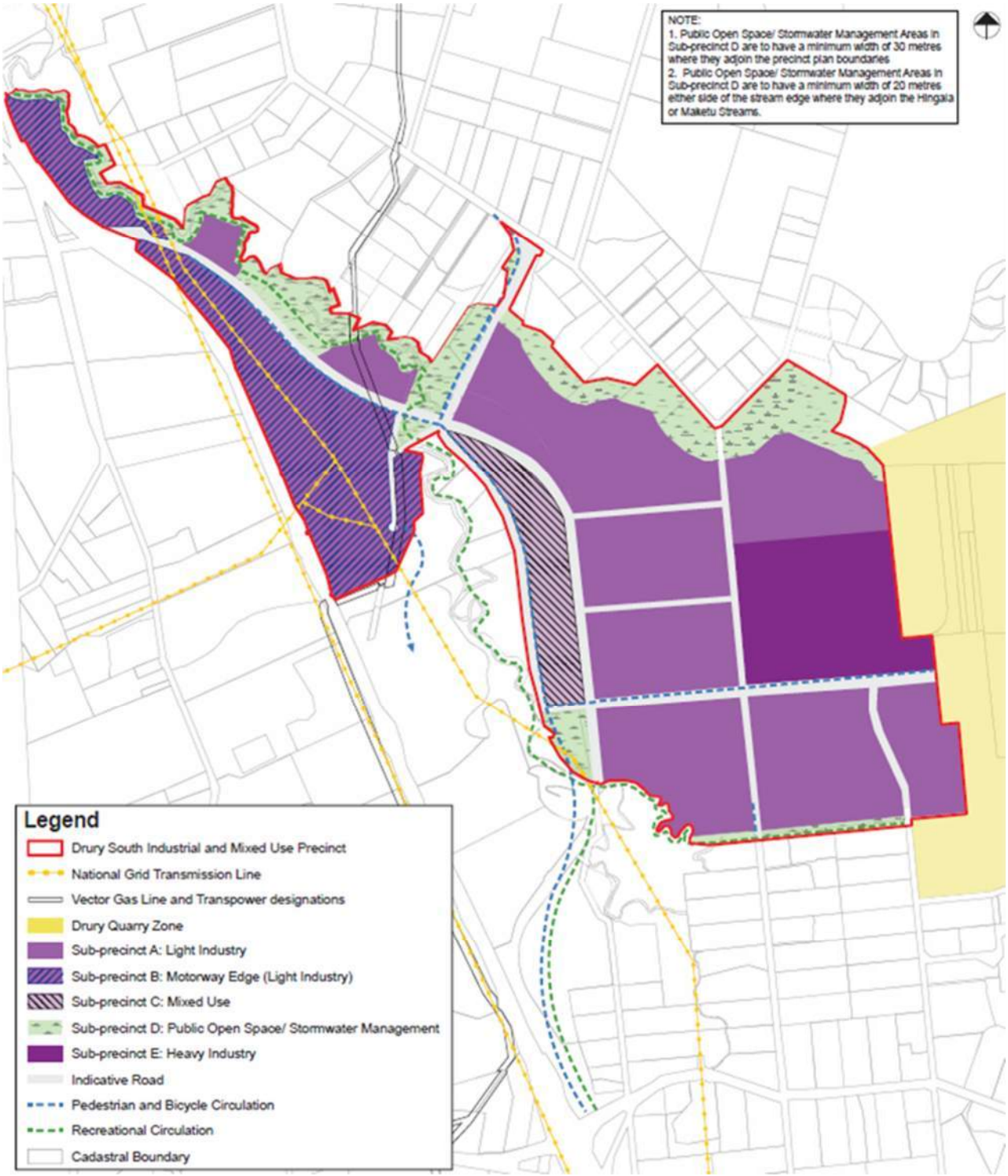


Figure 3-2: Revised Precinct Plan 1

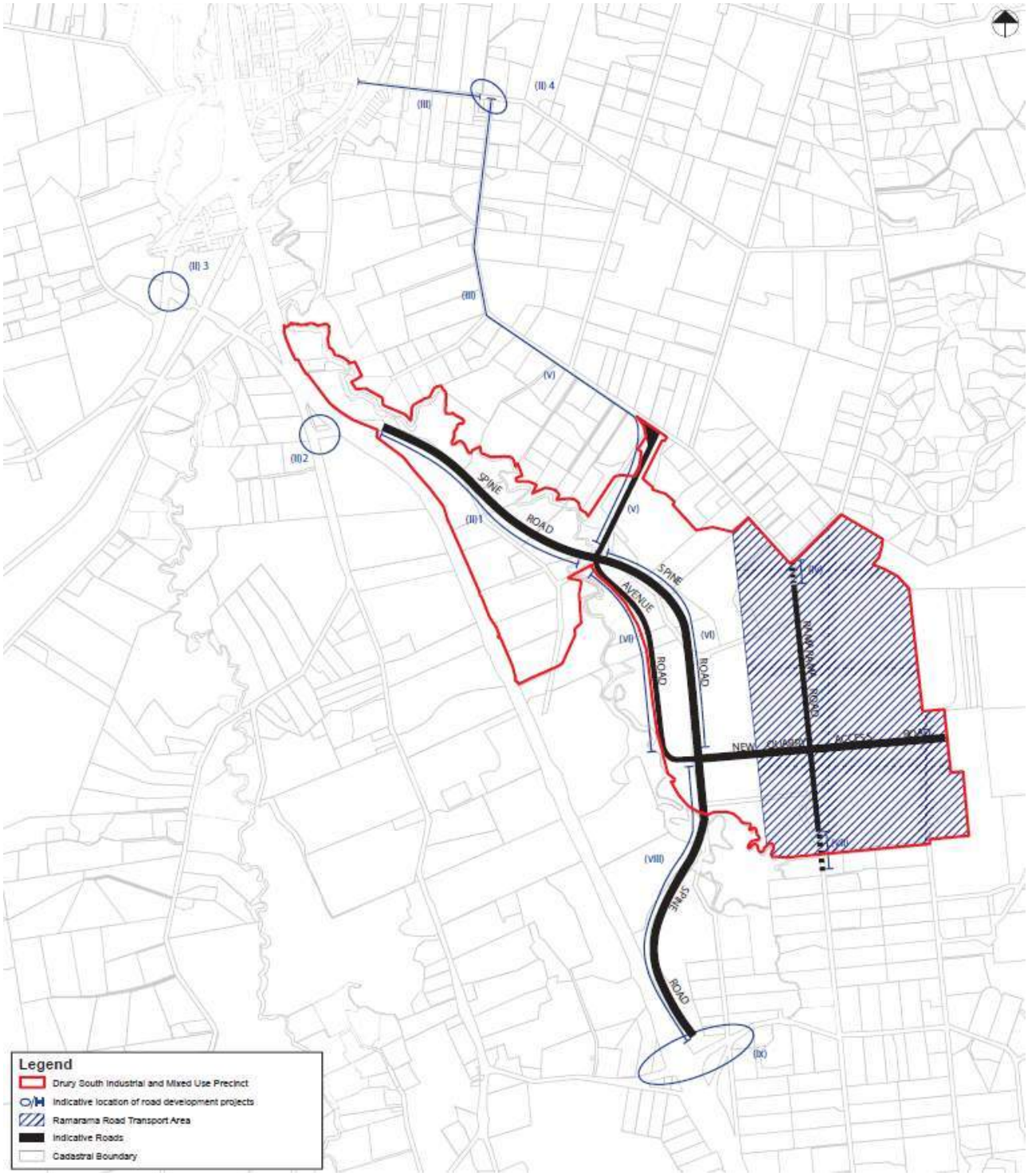


Figure 3-3: Revised Precinct Plan 2

Figure 3-2 and **Figure 3-3** above illustrate the revised Precinct Plans 1 and 2 that are also included in the revised Precinct provisions in the B&A Section 32 Evaluation. The key changes to the Precinct Plans 1 and 2 are:

- Modification to the area of the proposed Mixed Use Sub-precinct to align with the developable area now planned with associated realignment of the Avenue Road, at its northern end.
- Removal of the following roads, as agreed as part of the approved subdivision for initial 65 hectares of development in the Precinct; a north-south local road extension of Davis Road / Road 7, and an east-west local road connecting that north-south road with Road 4.

It is also noted that the previously identified walking and cycling circulation and recreational circulation, as shown on Precinct Plan 1, as well as the external connections (through the TNDR) remain unchanged. Notwithstanding this, as described and illustrated in **Section 2.2**, the cycling facilities provided within the Precinct as part of the approved subdivisions and EPA to date, have exceeded the provisions identified on the Precinct Plan 1. This includes:

- Spine Road – A dedicated bi-directional cycle path and separate footpath, rather than a shared path
- Roads 4, 6 and 5 – Shared paths provided, rather than footpaths only.

It is also noted that all roads within the Precinct, as they are designed to accommodate heavy vehicles associated with the industrial activities, the roads have sufficient width to accommodate bus services, should these be provided by Auckland Transport. As noted previously, it is expected that the future public transport network will be extended to connect Drury South, as the future urban areas to the north and west are developed that complement improved viability of services. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services.

3.4 Parking Provision

It is proposed that the Precinct will generally retain the parking provisions for the Drury South Industrial Precinct (I410) as identified the AUP(OP). However, for Sub-Precinct C with the rezoning to Mixed Use, it is proposed that the parking provisions will revert the standard provisions for the Mixed Use zone, as set out in Table E27.6.2.3 of the Transportation Chapter of the AUP(OP).

Further discussion of the proposed parking provisions is provided in **Section 5.2**.

4 Assessment of Transport Effects

4.1 Assessment Approach and Methodology

The transport modelling for the previous transport assessment reporting on the Precincts was based on earlier land use assumptions for the Auckland Region and the Drury Precincts. For the recent subdivision consents, the Auckland Regional Model has been updated to reflect the land use assumptions associated with the AUP(OP), as well as the outcomes of the Auckland FULSS, which was adopted by the Council in July 2017. This utilised the I-11 land use scenario.

For the subdivision consents, Beca liaised with Flow, who operate the 'Project Area' (S3M SATURN) model on behalf of the Auckland Forecasting Centre (AFC), to obtain appropriate model runs. The same models have been used to assess the proposed Plan Variation considered in this TAR.

The modelling has included consideration of 2026 'Without Mill Road Corridor' and 2026 'With Mill Road Corridor' scenarios with the full development of the Industrial (and Residential) Precincts subdivision. The traffic generation for Sub-precinct C and the re-zoned Industrial land has been adjusted to reflect the predicted traffic generation discussed in **Section 3.2**. The wider area transport network assumptions for the 2026 modelling are outlined in **Appendix B**, with Precinct assumptions are discussed in **Section 4.3**.

In order to assess the intersections within the Precinct, Beca has extracted traffic demands from the S3M SATURN model and undertaken localised intersection modelling (using SIDRA Intersection Software models) for the relevant internal intersections. It is the localised intersection modelling that has been used to confirm satisfactory operational performance can be achieved.

As discussed below, given the assessment focusses on the internal transport network operation, it is considered that that the use of the previous I-11 land use scenario and associated S3M SATURN models is still appropriate for the purposes of considering the changes to the Precinct zoning.

4.2 Wider Transport Effects

As discussed in **Section 3.2**, it is considered that the external effects in terms of the transport projects with the proposed changes to the Precinct required are unlikely to be discernibly different, when these trips are distributed across the external network (even considering the change in the balance of traffic flows), with the identified Precinct TNDR in place.

Noting also that the area to north is now planned to be urbanised, as identified in the Council's Drury-Opaheke Structure Plan, and the SGA is investigating the infrastructure required (and its timing) to support that wider development in the Drury-Opaheke area, which it is planned to include the Mill Road Corridor.

As such, no assessment of external traffic effects is provided in this TAR, as the effects will continue to be satisfactorily addressed by the existing TNDR provisions for the Precinct.

4.3 Precinct Transport Network Assumptions

In relation to the proposed changes to the Precinct, the traffic assessment has focussed on the operational performance of Intersections 1 and 2, illustrated in **Figure 4-1** below, which would provide access to the Spine Road from both the Mixed Use Sub-precinct (via the Avenue Road) and the new light industrial-zoned area (via Roads 2W and 5).

Both intersections will be signal controlled and provide pedestrian and cycle crossing facilities. The design of the Intersection 2 has been part of the previously approved subdivision and EPA (for the initial 65 hectares of industrial land), albeit with only a 'stub' connection to provide for the Avenue Road in the future.

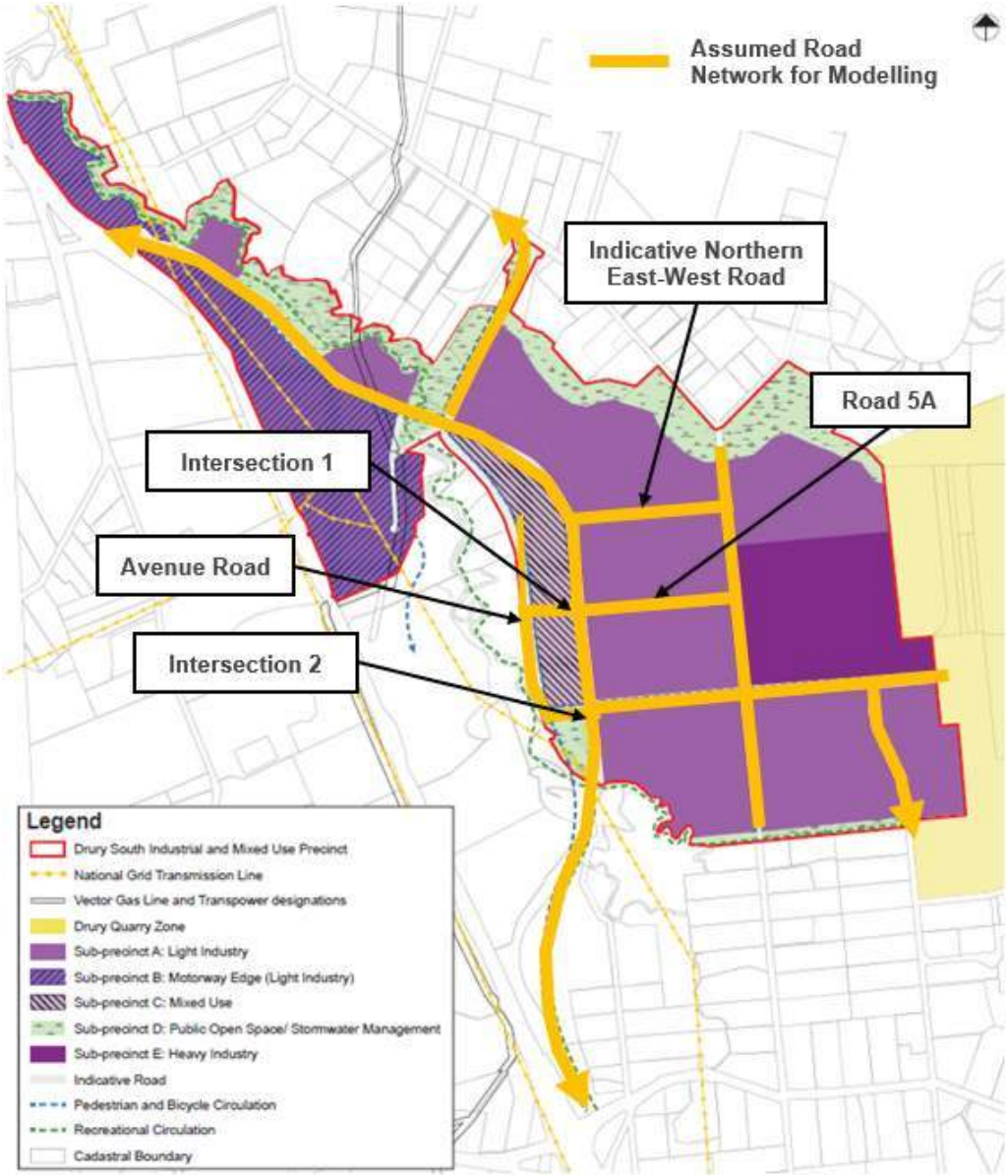


Figure 4-1: Transport Network Modelling Assumptions (Without Future Mill Road Corridor)

As shown in **Figure 4-1**, the following assumptions have been made in undertaking the traffic modelling for the scenario without the future Mill Road Corridor:

- ***Road 5A*** – Subdivision and EPA consents are expected to be lodged with Council proposing the relocation of Road 5 further to the south, along the northern edge of the area proposed to be re-zoned for Light Industrial activities. With the Northern East-West Local Road, discussed below, this layout would be consistent with the original Plan Change and is assumed for traffic modelling purposes
- ***Northern East-West Local Road*** – The relocation of Road 5 (as Road 5A further to the south) allows an east-west local road to be provided further to the north between the Spine Road and Road 4. In combination with the New Quarry Access Road (Road 2E/2W), this network layout provides more alternatives, than identified in the currently approved subdivision (**Figure 2-2**), to distribute traffic from the industrial areas to the Spine Road. It also enables additional connectivity and permeability for pedestrians and cyclists
- ***Avenue Road*** – As identified in **Section 3.3**, in addition to the signalised intersection connection with the New Quarry Access Road (Intersection 2), it is assumed that the Avenue Road would connect with the western end of Road 5A and the Spine Road (Intersection 1).

As such, only two main (signalised intersection) connections have been assumed for the Mixed Use sub-precinct as part of the traffic modelling. Direct connection to the Link Road has not been considered on the basis of the uncertainty provided by the future Mill Road Corridor. This is on the basis that, when the Mixed Use sub-precinct is developed, that direct connection would be unlikely to be established without it later becoming redundant / unfeasible with the Mill Road Corridor in place.

It is considered that provision of a signalised intersection connection with the Link Road would simply reduce traffic impacts on Intersection 1, compared with those assessed in this reporting. The particular operational effects at a Spine Road / Avenue Road / Link Road signalised intersection, if progressed, could be satisfactorily addressed through the relevant subdivision and EPA applications at that time, as part of confirming the necessary TNDR to support that subdivision development.

Figure 4-2 shows the assumed road network with the future Mill Road Corridor. The connections assumed within the Precinct largely remain the same as assumed for the modelling without the Mill Road Corridor, other than the Mill Road Corridor replaces the Link Road, between the Spine Road and Fitzgerald Road. The modelling has also assumed a secondary access in the form of a left-in / left-out intersection on the Spine Road for the northern part of the Mixed-Use sub-precinct.

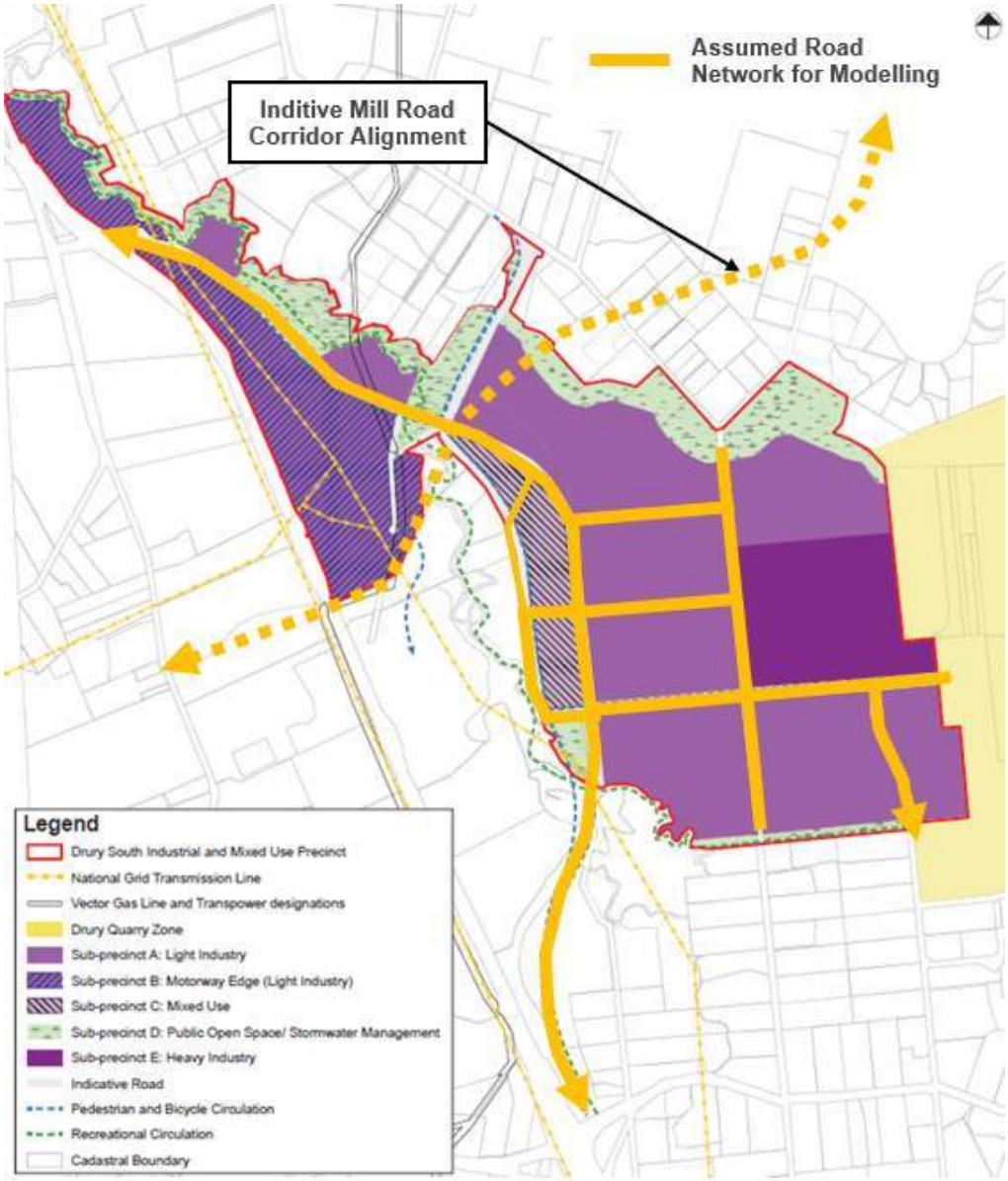


Figure 4-2: Transport Network Modelling Assumptions (With Indicative Future Mill Road Corridor)

4.4 Predicted Traffic Effects

4.4.1 Predicted Precinct Network Effects

Table 4-1 summarises the predicted daily traffic volumes and associated percentage heavy vehicles (HCVs) on the transport network within the Precinct for both the 2026 Without and With Mill Road Corridor scenarios.

Table 4-1: Predicted Daily Traffic Volumes / % HCVs

Road	2026 Without Mill Road Corridor		2026 With Mill Road Corridor	
	Vehicles	% HCV	Vehicles	% HCV
Spine Road (Road 1) – South of Intersection 2	9,100	5%	6,300	3%
Spine Road (Road 1A) – North of Intersection 2	3,500	9%	4,000	9%
Spine Road (Road 1B) – North of Intersection 1	16,200	22%	20,200	20%
New Quarry Access Road (Road 2W) – East of Intersection 2	4,900	11%	3,700	11%
Avenue Road (Road 3) – West of Intersection 1	4,600	13%	5,500	12%
Avenue Road (Road 3) – West of Intersection 2	3,300	4%	2,500	5%
Road 4 – North End	4,300	32%	5,900	29%
Road 4 – South End	4,100	28%	5,000	29%
Road 5A – East of Intersection 1	3,400	28%	4,800	26%
Northern East-West Road – East of Spine Road	6,800	24%	7,600	23%
Link Road (Mill Road Corridor) – North of Spine Road	9,000	18%	14,000	12%
Spine Road / Quarry Rd crossing SH1	9,400	24%	4,400	10%

From **Table 4-1**, it can be seen that:

- Daily traffic volumes on the Spine Road are generally less than 10,000 vehicles per day and comfortably within the anticipated volumes for a collector road, particularly as the Spine Road is provided with four lanes (two lanes each way) on the sections identified above
- Daily traffic volumes on the Spine Road approaching the Link Road are predicted to be in the order of 16,000 vehicles. Around 9,000 vehicles per day then using the Link Road to Fitzgerald Road to travel north, whilst a similar number of vehicles use cross SH1 on Quarry Road to Great South Road. By comparison, modelling undertaken for the Residential Precinct,[2] previously predicted that traffic volumes on these northern connections (in 2026 without the Mill Road Corridor) would be of a similar order, such that similar effects eventuate on these northern connections:
  - Link Road – 880 to 960 weekday peak hour vehicles, equating to around 9,000 daily vehicles
  - Quarry Road – 1,020 to 1,080 weekday peak hour vehicles, equating to around 10,000 daily vehicles.

[2] Quarry Road SHA - Transport Assessment (June 2016, Beca Ltd), Table 5-3

- With the future Mill Road Corridor connection, routes to the north become more attractive with traffic volumes on the Spine Road predicted to increase from around 16,000 to 20,000 daily vehicles. Similar outcomes would have occurred with the current Precinct development and the identified provision of four lanes along the Spine Road, with localised widening approaching the Mill Road Corridor (as discussed in **Section 2.1**) would satisfactorily manage these predicted traffic volumes. Moreover, it is considered that the planning for the Mill Road Corridor, through the investigations being undertaken by the SGA will further address the appropriate design for the Spine road connection with the Mill Road Corridor.
- The Avenue Road (Road 3) is predicted to have around 3,000 to 6,000 daily vehicles, which it is considered can still be consistent with its function to primarily provide access to the Mixed Use Sub-precinct. With the Mill Road Corridor, there is predicted to be more demand for people to enter and exit the Avenue Road and its northern connection with Intersection 1. This is further addressed in the detailed intersection modelling below.
- Daily traffic volumes on the other roads within the Precinct (less than 8,000 daily vehicles) are consistent with the function of these roads. It can again be seen that there is predicted to be more demand on the roads providing access to the northern connections with the Mill Road Corridor in place. As such, it is considered that the provision of the northern east-west road supports the ability of the Precinct to manage the predicted future traffic demands, placing less reliance on Road 5A, particularly with the Mill Road Corridor in place.

Overall, it is considered that the predicted effects of the proposed changes on the Precinct network and to external connections, particularly the northern connections, are not dissimilar to those previously anticipated under the current Precinct provisions.

4.4.2 Northern East-West Road

With regard to the northern east-west connection, it is considered that there is adequate spacing to accommodate this connection on the Spine Road between Road 5A and the Link Road / future Mill Road Corridor. With Road 5A in place, it is currently anticipated that the northern east-west road would connect to the Spine Road around 300 to 350m further north. It is considered that this separation should be satisfactory to achieve appropriate performance from these intersections, without adversely affecting each other, i.e. avoiding potential queues extending back between intersections / to adjacent intersections.

It is considered this would still achieve a reasonable separation between the northern east-west road and the Link Road / future Mill Road Corridor of around 500m to provide for the localised widening at the future Spine Road / Mill Road Corridor intersection. The provision of the northern east-west road and Road 5A is consistent with the current Precinct Plan 1 in the AUP (OP) providing improved permeability of the transport network, more east-west connectivity (compared with the currently approved subdivision consent), both for pedestrians and cyclists as well as in distributing vehicle traffic across several roads.

It is considered that further assessment of the design of the northern east-west connection can appropriately be addressed through the future subdivision consents for the Precinct. This is considered appropriate on the basis that this will depend on the timing of the future Precinct development and the associated timing of the future Mill Road Corridor. However, it is considered that the assessments provided in this report show that a satisfactory network outcome for the Precinct, consistent with the current Precinct provisions, and the adjacent future network is achievable.

4.4.3 Future Northern Connections

The proposals do not include any changes to the northern connections planned for through the TNDR provisions for the Precinct. More specifically, it is still proposed that (subject to future assessments as part of subdivision consents) the northern end of Ramarama Road (the future Road 4) would be closed at the appropriate time with the new Link Road and upgrade to Fitzgerald Road being implemented.

It is noted that the implementation of those upgrades, as part of the Plan Changes approved under the legacy Franklin and Papakura District Plans, was in the context that the area to the north of the Precinct would remain rural. However, as subsequently identified through the AUP (OP) and the more recent Drury-Opaheke Structure Plan, these areas are now identified to be urbanised. In this context, maintaining a local road connection between Road 4 and Fitzgerald Road would be appropriate. This would provide opportunity for local connection between the planned residential and employment opportunities within the Drury-Opaheke Structure Plan area and the Precinct, particularly for active modes and public transport. This would potentially avoid 'local' trips having to utilise the future Mill Road Corridor, which would have a more strategic function.

A sensitivity test has therefore been undertaken to consider the potential change in traffic patterns that could occur should the northern end of Road 4 remain connected to Fitzgerald Road, with the future Mill Road Corridor in place. This is summarised in **Table 3-1**.

Table 4-2: Predicted Daily Traffic Volumes – 2026 Without and With Fitzgerald Road Connection

Road	2026 With Mill Road Corridor – Without Fitzgerald Road Connection	2026 With Mill Road Corridor – With Fitzgerald Road Connection
Spine Road (Road 1B) – North of Intersection 1	20,200	15,300
Mill Road Corridor – North of Spine Road	14,000	8,100
Road 4 – North End	5,900	7,800
Road 5A – East of Intersection 1	4,800	3,100
Northern East-West Road – East of Spine Road	7,600	6,000
Spine Road / Quarry Rd crossing SH1	4,400	4,400
Fitzgerald Road – North of Precinct	n/a	7,800

As can be seen from **Table 4-2**:

- The inclusion of the connection to Fitzgerald Road is predicted to notably reduce daily vehicles using the northern part of the Spine Road approaching the Mill Road Corridor, as well as on the Mill Road Corridor to the north of the Spine Road. The predicted reduction of around 5,000 to 6,000 vehicles per day, potentially assisting the operational performance of northern intersections on the Spine Road within the Precinct as well as the future Spine Road / Mill Road Corridor intersection.
- Similarly, daily vehicles are predicted to reduce on Road 5A and the northern east-west road with the eastern parts of the Precinct having an alternative to use the link to Fitzgerald Road rather than having to use the Spine Road.
- There is no predicted change in effects on the Quarry Road / Spine road connection across SH1.
- The predicted traffic demands on Fitzgerald Road with the link to Road 4 in place are just under 8,000 vehicles per day, which would be satisfactory on what would likely be a local / collector road connecting the Precinct with residential and employments areas to the north.

It is considered that the future of a connection between Road 4 and Fitzgerald Road can be appropriately considered through the future subdivision consents for development within the Precinct. This will also be influenced by the timing of the future development to the north of the Precinct and the future transport network for those areas that is being investigated by the SGA.

4.4.4 Detailed Intersection Modelling

Traffic demands have been extracted from the SATURN traffic models to enable more detailed intersection modelling (using SIDRA Intersection Software) for the proposed signalised intersection connections with the Spine Road.

The modelling has considered scenarios both without and with the future Mill Road Corridor in place, based on a 2026 future year with full development of the Precinct, including the proposed changes. For the reasons discussed in **Section 3.3**, for the Without Mill Road Corridor scenario, a connection from the Mixed Use Sub-precinct to the Link Road / Spine Road signalised intersection has not been considered.

However, in the detailed intersection modelling, it has been assumed there would be a left-in / left-out only connection on the Spine Road for the northern part of the Mixed Use sub-precinct. As such, the traffic demands on the left turn from the Avenue Road to Spine Road at Intersection 1 have been reduced accordingly in relation to the northbound movements from the northern part of the sub-precinct.

a. Avenue Road / Spine Road / Road 5A Signalised Intersection (Intersection 1)

The detailed intersection modelling for Intersection 1, a signalised intersection connecting the Avenue Road, Spine Road and Road 5A (refer to **Figure 4-3**) is summarised in **Table 4-3** and **Table 4-4** below, Without and With Mill Road Corridor respectively. Further details are provided in **Appendix C**.

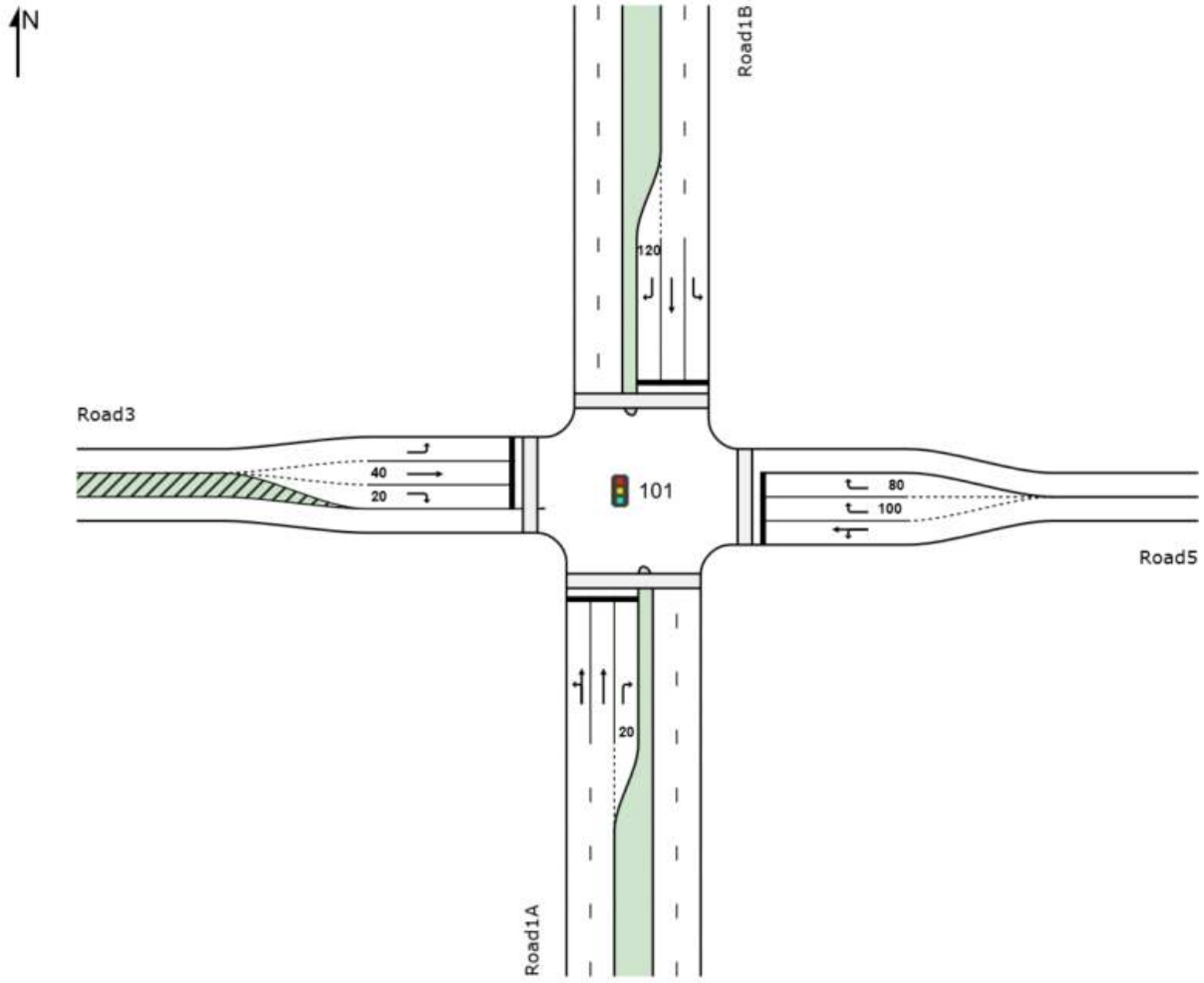


Figure 4-3: Intersection 1 Modelled Layout

Table 4-3: Intersection 1 Modelling Summary – 2026 Without Mill Road Corridor

Approach	AM Peak Hour		PM Peak Hour	
	LOS	Queue (m)	LOS	Queue (m)
With Pedestrian Crossing Phases				
Road 1A – Spine Road South	D	38	E	28
Road 5A	C	6	E	87
Road 1B – Spine Road North	D	95	C	146
Road 3 – Avenue Road	D	72	B	82
Overall	**D**	**-**	**D**	**-**
Without Pedestrian Crossing Phases				
Road 1A – Spine Road South	C	23	D	19
Road 5A	C	5	D	60
Road 1B – Spine Road North	C	56	C	89
Road 3 – Avenue Road	B	45	B	55
Overall	**C**	**-**	**C**	**-**

Level of Service (LoS) – based on average vehicle delay

Queue – 95th percentile queue – in metres (m)

Table 4-4: Intersection 1 Modelling Summary – 2026 With Mill Road Corridor

Approach	AM Peak Hour		PM Peak Hour	
	LOS	Queue (m)	LOS	Queue (m)
With Pedestrian Crossing Phases				
Road 1A – Spine Road South	D	54	E	48
Road 5A	D	13	E	136
Road 1B – Spine Road North	D	128	D	192
Road 3 – Avenue Road	C	46	B	62
Overall	**D**	**-**	**D**	**-**
Without Pedestrian Crossing Phases				
Road 1A – Spine Road South	C	31	D	34
Road 5A	C	8	D	90
Road 1B – Spine Road North	C	68	C	135
Road 3 – Avenue Road	B	26	B	50
Overall	**C**	**-**	**C**	**-**

The modelling has been undertaken for two scenarios, with all pedestrian/cycle crossings being 'called' every signal cycle and without any pedestrian/cycle crossings being 'called'. It is expected that pedestrian/cycle volumes will be such that the probability of crossing on every approach being called every cycle is low. The two scenarios represent the range of outcomes that could be expected.

The 2026 modelling with all pedestrian/cycle crossings being 'called' predicts that the intersection will overall perform with a LoS of D in both weekday peak periods, without and with the Mill Road Corridor, albeit a LoS of E is experienced on some right turn movements. The signalised intersection is predicted to perform with a Degree of Saturation (DoS) of 0.85 or better, within its theoretical capacity. The predicted queues are generally accommodated within the approach lanes and would not affect adjacent intersections, generally clearing each signal phase for that approach / movement. The exception being some of the right turns on the Road 5 and 1B approaches, which do not quite clear each cycle.

By comparison, with no crossings being 'called', both without and with the Mill Road Corridor, the intersection is predicted to overall perform with a LoS of C and a DoS of 0.81 or better in both peak periods. All turning movements experience a LoS of D or better and queues are notably reduced.

As such, it is considered that Intersection 1 will perform satisfactorily with the proposed changes to the Precinct, both without and with the future Mill Road Corridor in place. Further refinement of the intersection layout is appropriately addressed through later subdivision consents and EPA applications, which is the appropriate stage to address that level of design. However, the modelling herein confirms that an appropriate outcome can be achieved.

As identified previously, the modelling of this intersection does not assume any signalised intersection connection between the Avenue Road and the Spine Road / Link Road signalised intersection, given the potential for the future Mill Road Corridor in that location. The modelling results presented also do not account for a potential future 'local' connection between Road 4 and Fitzgerald Road, which whilst not part of the Precinct proposals, is predicted to reduce traffic demands through this intersection and potentially has wider access and connectivity benefits for the wider Drury / Opaheke area.

b. Avenue Road / Spine Road / Quarry Access Road Signalised Intersection (Intersection 2)

The detailed intersection modelling for Intersection 2, a signalised intersection connecting the Avenue Road, Spine Road and Quarry Access Road (Road 2W) (refer to **Figure 4-4**) is summarised in **Table 4-5** and **Table 4-6** below, Without and With Mill Road Corridor respectively. Further details are provided in **Appendix D**.

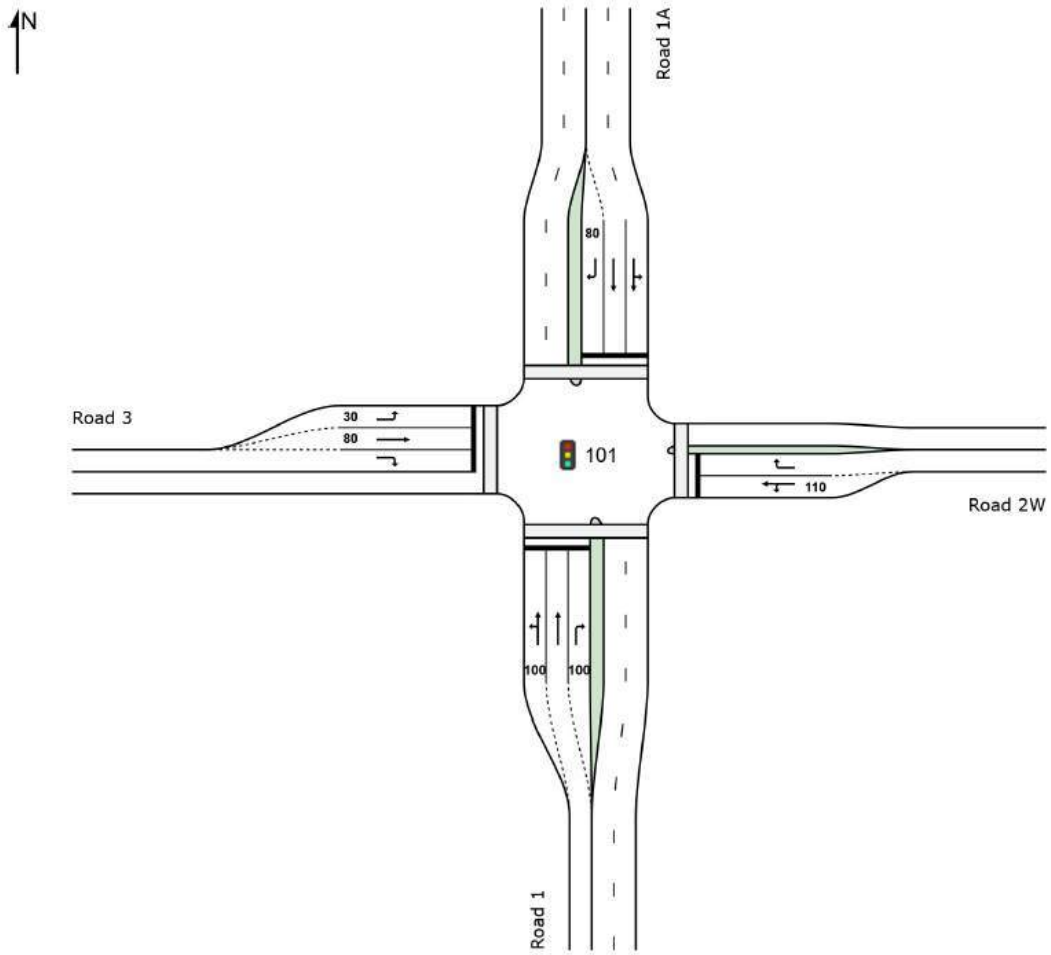


Figure 4-4: Intersection 2 Modelled Layout

Table 4-5: Intersection 2 Modelling Summary – 2026 Without Mill Road Corridor

Approach	AM Peak Hour		PM Peak Hour	
	LOS	Queue (m)	LOS	Queue (m)
With Pedestrian Crossing Phases				
Road 1 – Spine Road South	D	164	E	140
Road 2W – Quarry Access Road	D	26	D	145
Road 1A – Spine Road North	D	62	C	28
Road 3 – Avenue Road	E	37	D	124
Overall	**D**	**-**	**D**	**-**
Without Pedestrian Crossing Phases				
Road 1 – Spine Road South	C	111	E	140
Road 2W – Quarry Access Road	D	27	D	145
Road 1A – Spine Road North	C	48	C	28
Road 3 – Avenue Road	D	28	D	124
Overall	**D**	**-**	**D**	**-**

Table 4-6: Intersection 2 Modelling Summary – 2026 With Mill Road Corridor

Approach	AM Peak Hour		PM Peak Hour	
	LOS	Queue (m)	LOS	Queue (m)
With Pedestrian Crossing Phases				
Road 1 – Spine Road South	D	113	C	35
Road 2W – Quarry Access Road	D	17	D	57
Road 1A – Spine Road North	C	19	D	74
Road 3 – Avenue Road	D	19	D	63
Overall	**D**	**-**	**D**	**-**
Without Pedestrian Crossing Phases				
Road 1 – Spine Road South	C	76	C	34
Road 2W – Quarry Access Road	D	12	C	48
Road 1A – Spine Road North	C	17	C	47
Road 3 – Avenue Road	D	13	C	42
Overall	**C**	**-**	**C**	**-**

As previously outlined, the modelling has been undertaken for two scenarios, with all pedestrian/cycle crossings being 'called' every signal cycle and without any pedestrian/cycle crossings being 'called'.

The 2026 modelling with all pedestrian/cycle crossings being 'called' predicts that the intersection will overall perform with a LoS of D in both weekday peak periods, without and with the Mill Road Corridor, albeit a LoS of E is experienced on some turning movements in the Without Mill Road Corridor scenario. The signalised intersection is generally predicted to perform with a DoS of 0.86 or better, within its theoretical capacity. However, without the Mill Road Corridor in the evening peak hour, a DoS of 0.93 is predicted. The predicted queues are generally accommodated within the approach lanes and would not affect adjacent intersections, generally clearing each signal phase for that approach / movement. The exception being some of the turning movements on the Road 1, 3 and 2W approaches, which do quite fully clear, albeit not affecting adjacent intersections. With the Mill Road Corridor, these queuing effects are notably reduced.

By comparison, with no crossings being 'called', both without and with the Mill Road Corridor, the intersection is predicted to overall perform with a LoS of C / D or better in both peak periods. It is noted that in the without Mill Road Corridor scenario, the DoS during the weekday evening peak hour is predicted to be 0.93, although this is just in relation to the right turn movement on Road 1, all other approaches performing with a DoS of 0.9 or better. With the Mill Road Corridor scenario, the intersection performs satisfactorily in both peak periods with a DoS of 0.88 or better, no turning movements predicted to experience a LoS of E and notably reduced queues on all approaches.

As such, whilst there are potentially some minor adverse traffic effects in relation to the operational performance of Intersection 2 without the future Mill Road Corridor, this is limited to certain movements in the PM peak hour only and would be localised to this intersection. As such, it is overall considered that Intersection 2 can perform satisfactorily with the proposed changes to the Precinct. Further refinement of the intersection layout is appropriately addressed through later subdivision consents and EPA applications, which is the appropriate stage to address that level of design, when development in the Mixed Use sub-precinct occurs. However, the modelling herein confirms that an appropriate outcome can be achieved.

4.4.5 Traffic Effects Summary

Overall, it is considered that the predicted traffic effects of the proposed changes on the Precinct network and to external connections, particularly the northern connections, are not dissimilar to those previously anticipated under the current Precinct provisions. It is considered that the internal road network can satisfactorily accommodate the predicted traffic demands and the external transport effects are satisfactorily addressed by the current TNDR provisions for the Precinct, without relying on delivery of adjacent or wider future transport network changes being investigated by the SGA. Nevertheless, the proposed internal network layout does also not preclude those adjacent or wider future transport network changes.

Whilst the proposals do not include any changes to the northern connections planned for through the TNDR provisions there is an opportunity to enhance northern connections by having a future 'local' connection between Road 4 and the Fitzgerald Road. It is considered the connection is potentially beneficial for integration with the now planned urbanisation to the north of the Precinct, as well as supporting improved access within the Precinct for all modes. This provision of the connection can be appropriately considered through the future subdivision consents for development within the Precinct. This will also be influenced by the timing of the future development to the north of the Precinct and the future transport network for those areas that is being investigated by the SGA.

Overall, it is considered that Intersections 1 and 2 that provide access to the Mixed Use Sub-precinct and the re-zoned Industrial activities will perform satisfactorily with the proposed changes to the Precinct. Further refinement of the intersection layout is considered to be appropriately addressed through later subdivision consents and EPA applications, which is the appropriate stage to address that level of design. However, the modelling herein confirms that an appropriate outcome can be achieved.

4.5 Public Transport Effects

As discussed in **Section 3.3**, all roads within the Precinct, are designed such that they can accommodate bus services, should these be provided by Auckland Transport. It is expected that the future public transport network will be extended to connect to the Precinct, as the future urban areas to the north and west are developed that complement improved viability of services. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services.

The activities in the Mixed Use Sub-precinct will be located adjacent to the Spine Road, the design for which (already part of an approved EPA application), enables provision for bus services and bus stops. The whole Mixed Use Sub-precinct will be no more than around 200m walk from the western side of the Spine Road with the ability for connection along this frontage to Sub-precinct C not only at the identified intersections.

As such, the more intensive activities within the Mixed Use Sub-precinct will be located within a reasonable walking distance of bus stops, should Auckland Transport provide bus services. Whilst not shown on the SGA's Indicative Network for South Auckland, it is understood this is due to the Spine Road being identified as a Collector Road, not an Arterial Road corridor. However, bus services are still anticipated on Collector Roads to provide local / connector services, as part of the overall public transport network planning.

Given there could be convenient access to bus services along the Spine Road, should services be provided, it is not considered that the Avenue Road would require bus services, particularly as its current function within the Precinct is related to access to the Mixed Use Sub-Precinct, not a through movement function.

4.6 Walking and Cycling Effects

As discussed in **Sections 2.2** and **3.3**, current provision for walking and cycling facilities within the Precinct, enabled through the approved subdivision consents, exceeds that identified on the current Precinct Plan 1. For example, in terms of servicing the proposed Mixed Use Sub-precinct, there is both a dedicated bi-directional cycle path on west side of Spine Road, complemented by recreational shared path to west of the Sub-precinct / Avenue Road. By comparison, on the current Precinct Plan 1, only a pedestrian/cycle facility along the western edge of the Avenue Road is identified.

The current Precinct Plan 1 illustrates connection between the pedestrian and cycle facilities along the New Quarry Access Road (Road 2) and facilities along the western side of the Mixed Use Sub-precinct. However, as cycle facilities were not indicated on Road 5 (between Road 4 and the Spine Road), no similar connection is shown on Precinct Plan 1, where the Avenue Road is planned to connect at the signalised intersection with Road 5. It is considered that this will also be an important connection to the Sub-precinct.

With provision of cycle facilities along both the eastern (Spine Road) and western edge of the Sub-precinct (understood to be through the adjacent public open space), it is considered that dedicated cycle facilities along the Avenue Road are not necessary. As the Avenue Road is not a through route and simply provides access to the Sub-precinct, it is considered that any cyclists using the Avenue Road can be satisfactorily be accommodated on road in what is anticipated to be a lower speed environment. **Section 5.2.3** further discusses the proposed provisions relating to the design outcomes for the Avenue Road.

On the basis of the above, in combination with the TNDR provisions already applying to the Precinct's connectivity with the wider cycling network, it is considered that the approved, planned and proposed walking and cycling facilities within the Precinct will satisfactorily provide for pedestrians and cyclists.

4.7 Transport Effects Summary

Overall, it is considered that the predicted traffic effects of the proposed changes on the Precinct network and to external connections, particularly the northern connections, are not dissimilar to those previously anticipated under the current Precinct provisions. It is considered that the internal road network can satisfactorily accommodate the predicted traffic demands and the external transport effects are satisfactorily addressed by the current TNDR provisions for the Precinct. Nevertheless, the proposed internal network layout does also not preclude those adjacent or wider future transport network changes being progressed by the SGA.

Overall, it is considered that the assessed internal intersections that will provide access to the Mixed Use Sub-precinct and the re-zoned Industrial activities will perform satisfactorily with the proposed changes to the Precinct. Further refinement of the intersection layout is appropriately addressed through later subdivision consents and EPA applications, which is the appropriate stage to address that level of design, including when development in the Mixed Use sub-precinct occurs. However, the modelling herein confirms that an appropriate outcome can be achieved.

The Precinct also enables the future implementation of public transport, via bus services, should these be provided by Auckland Transport. In particular, the more intensive activities within the Mixed Use Sub-precinct will be located within a reasonable walk distance of bus stops on the Spine Road, which ss designed to accommodate services and bus stops. It is expected that the future public transport network will be extended to connect to the Precinct, as the future urban areas to the north and west are developed that complement improved viability of services. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services. It is expected the more detailed planning and design for bus services will be undertaken by Auckland Transport at the appropriate time.

The proposed changes to the Precinct can be satisfactorily accommodated by the already planned and proposed internal transport network provisions for pedestrians and cyclists, as well as the previously identified TNDR for external walking and cycling connections. This can be further addressed through the future subdivision and EPA applications.

5 Auckland Unitary Plan Matters

The following sections address the proposed changes to the relevant transport provisions of the Precinct, which are included in the B&A Section 32 Evaluation accompanying the Plan Variation.

5.1 Objectives and Policies

5.1.1 Precinct description and objectives

These aspects of the Precinct provisions have been amended to reflect the changes proposed, which generally does not affect transport matters. However, the amendment to the Project description for Sub-precinct C (now proposed for Mixed Use zoning) identifies that there are specific Standards applying to this Sub-precinct, which will limit the amount of certain retail and commercial activities that can occur without Discretionary activity status applying.

The current Precinct objective I410.2(7) is considered to satisfactorily address the potential transport effects, in combination with the subsequent provisions, by providing for safe and efficient movement, as well as managing the effects on the safe and efficient operation of the surrounding network. The latter continuing to be appropriately addressed through the provisions for the TNDR.

5.1.2 Policies

Within the Precinct policies, minor adjustments have been made to Policies I410.3.(11) and (14) that still provide for the same outcomes, but simply provide consistency with similar policies in the Drury South Residential Precinct.

New policies have also been provided specifically in relation to the change Mixed Use zoning within Sub-precinct C:

- Policy I410.3.(27) incorporates previous Policy I410.3.(10) (which is removed). This identifies that the proposed mix of residential and employment activities will be well located to benefits from future public transport routes (along the Spine Road), whilst also providing integration between the remainder of the Industrial Precinct (to the east) and the Residential Precinct (to the west). As noted previously, the change in balance in activities in the Precinct, complementing now planned surrounding future residential and employment opportunities to the north (in the Drury-Opaheke Structure Plan area) is considered to improve the viability of Auckland Transport providing bus services for the Precinct. With these services most likely along the Spine Road adjacent, and within 200m walk of Mixed Use Sub-Precinct.
- Policies I410.3.(28) and (29) set out how the range of retail and commercial activities in Sub-Precinct C provided for in the proposed provisions will not to compromise other surrounding centres, encourage retail activities to serve local convenience needs of the Residential Precinct to be close to that precinct and enable appropriate staging and commercial activities that support the surrounding land uses in the Precinct.

5.2 Activities, Standards and Assessment Criteria

5.2.1 Activity Table and Notification

A more detailed description in relation to the activities proposed within the Mixed Use Sub-precinct is provided in the B&A Section 32 Evaluation. It is considered that the changes proposed are consistent with the assessment of the traffic and transport effects considered in this TAR.

No changes are proposed in relation to Activity table 1, which still requires any subdivision, or development that precedes subdivision (providing it complies with Standard I410.6.3) to be assessed as a Restricted Discretionary activity. As such consideration of the TNDR provisions in I410.8.1.2.(f), is still required. No changes are also proposed to the Restricted Discretionary activity status in relation to vehicle access to any site with frontage to the Spine Road.

In relation to notification, from a transport perspective, it is considered appropriate that the limited notification of Auckland Transport and the NZ Transport Agency for Restricted Discretionary activities is retained.

5.2.2 Standards

As discussed above, the changes within Standard I410.6.1, relating to transport matters, are associated with the GFA of retail and commercial (office) activities within the proposed Mixed Sub-precinct. This limits both the total amount of these activities and some specific activities (particularly a supermarket) without Discretionary activity status applying. As stated previously, the proposed provisions are considered to be consistent with the traffic generation and assessment in this TAR.

Under Standard I410.6.2., the only transport-related change to the provisions relates to the parking provisions for commercial services in Sub-precinct C, which under Standard I410.6.2.(1) is a minimum parking rate of 1 space per 40m^2 GFA. This is now removed.

With the change to Mixed Use zoning, it is considered appropriate that the parking standards revert to those of the Auckland-wide standards. For the Mixed Use zoning of Sub-precinct C, this would be a maximum parking rate of 1 per 30m^2 GFA, which is greater than the minimum currently identified. The same maximum rate would apply for the underlying employment zoning of the Precinct under the Auckland-wide standards. The change to the parking standards also reflects the change in the overall balance and mix of complementary activities both within the Precinct, as well as the change in context since the Precinct was initially approved under the legacy Franklin and Papakura District Plans. The current context including the Residential Precinct to the south west of this Precinct, as well as the planned future residential and employment development to the north in the Drury-Opaheke Structure Plan area, likely to include other new Metropolitan / Town Centres.

The changes to Standard I410.6.3. reflect a practical need to have some flexibility in the road design, which is consistent with approach that has occurred through subdivision consents to date and the Residential Precinct. This will also enable flexibility in the design / location of the Avenue Road, particularly should this need to be adjusted to reflect the alignment of the future Mill Road Corridor. This would also allow the northern connections for the Precinct, such as the need for the Link Road (and Fitzgerald Road upgrade) or a connection between Road 4 and Fitzgerald Road to be considered in the context of the future Mill Road Corridor and the other planned transport network changes associated with the now planned urbanisation to the north of the Precinct, at the time of future subdivision applications.

5.2.3 Assessment Matters and Criteria

As there are no longer any Controlled activities within the proposed Mixed Use Sub-precinct (Sub-precinct C), the assessment matters and criteria, including transport-related matters in I410.7.1.(2) and I410.7.2.(2) are no longer required, so are instead transferred to I410.8.1(3) and I410.8.2(3). In transferring the assessment criteria, these have been amended as below. The amendment to part (f)(i) reflects that Sub-precinct C is not adjacent to the New Quarry Access Road, so this reference is not required.

With regard to the Restricted Discretionary activity matters in I410.8.1, no changes are proposed to the matters of discretion relating to the TNDR (part (1)(f)) and effects of vehicle access off the Spine Road (part (2)). Such that these matters still require consideration for restricted discretionary activities.

However, consistent with the associated Policies and Standards (discussed above), specific matters of discretion and associated assessment criteria are now included in relation to supermarkets, office and other retail activities (between 1,000 and 4,500m^2 GFA). These address effects in relation to the amenity of the surrounding area, pedestrian safety of access/servicing arrangements, as well as the activities consistency with serving a local catchment and effects on other surrounding Metropolitan / Town Centres. This is, in addition, to the Restricted Discretionary matters that need to be considered in relation to the subdivision of land, such as the TNDR requirements, which still apply.

Whilst the assessment criteria relating to the TNDR in I410.8.2(1)(f) remain, some changes are proposed to part (vi), which relates to the provision of the Avenue Road. The assessment criteria have been amended to reflect the current function of the Avenue Road (refer to **Section 2.3**), which now simply provides for access to the Mixed Use Sub-precinct, and not a through traffic function. The changes also reflect the flexibility to alter the Avenue Road alignment to enable the future Mill Road Corridor, as well as high amenity outcomes for the Avenue Road, given the Mixed Use zoning.

5.3 Precinct Plans

The revised Precinct Plans 1 and 2, discussed in **Section 3.3**, were shown in **Figure 3-2** and **Figure 3-3** respectively and are also included in the B&A Section 32 Evaluation. The key changes to the Precinct Plans 1 and 2 are:

- Modification to the area of the proposed Mixed Use Sub-precinct to align with the developable area now planned with associated realignment of the Avenue Road, at its northern end.
- Removal of the following roads, as agreed as part of the approved subdivision for initial 65 hectares of development in the Precinct; a north-south local road extension of Davis Road / Road 7, and an east-west local road connecting that north-south road with Road 4.

In addition to those changes, as discussed in **Section 4.6**, to provide for pedestrian/cycle connectivity between the Precinct and the Mixed Use Sub-precinct, it is recommended that Precinct Plan 1 illustrate 'Pedestrian and Cycle Circulation' between the Spine Road and 'Pedestrian and Cycle Circulation' shown on the western edge of the Mixed Use Sub-precinct.

In relation to the transport network within the Precinct, as discussed in **Section 5.2.2**, Standard I410.6.3 has been changed to allow some flexibility, which is consistent with approach that has occurred through subdivision consents to date, and in the context of the future Mill Road Corridor and the other planned transport network changes associated with the now planned urbanisation to the north of the Precinct, at the time of future subdivision applications.

6 Summary and Conclusion

6.1 Assessment Summary

Assessment of the traffic generation effects of the proposed zoning changes has been undertaken. This has identified that the external effects in terms of the transport projects required are unlikely to be discernibly different to the current Precinct provisions, when the change in vehicle trips is distributed across the external network.

Whilst with the change in the balance of employment and residential activities in the Precinct would change the associated inbound / outbound distribution of vehicles, it is considered this would simply impact the form and design of TNDR upgrades. Whilst the need for, general form / purpose and timing of the TNDR are appropriately addressed during the Plan Change, the more detailed layout of the TNDR is more appropriately addressed through later subdivision consents or Engineering Plan Approval that consider such detail. As such, the current TNDR identified in the current Precinct provisions satisfactorily address any external transport effects and no further assessment of external traffic effects assessment is required.

Moreover, it is considered that, with the Drury-Opaheke Structure Plan and these proposals, there are now planned to be greater number and range of employment options in the Drury area. This change in the distribution of Precinct traffic (with more residential) and the wider work force opportunities (greater commercial and retail within the wider Drury area) may also balance the wider effects.

It is considered that the predicted traffic effects of the proposed changes on the internal Precinct network and to external connections, particularly the northern connections, are not dissimilar to those previously anticipated for the original Plan Change. It is considered that the internal road network can satisfactorily accommodate the predicted traffic demands and does not preclude the future transport network planning being progressed by the SGA.

The internal intersections providing access to the Mixed Use Sub-precinct and the re-zoned Industrial activities have been assessed to perform satisfactorily with the proposed changes to the Precinct. Further refinement of the intersection layout is considered to be appropriately addressed through later subdivision consents and EPA applications, which is the appropriate stage to address that level of design. However, the modelling herein confirms that an appropriate outcome can be achieved.

The Precinct enables the future implementation of public transport, via bus services, should these be provided by Auckland Transport. In particular, the more intensive activities within the Mixed Use Sub-precinct will be located within a reasonable walk distance of bus stops on the Spine Road, which is designed to accommodate bus services and stops. The broader range and mix of activities now proposed in the Precinct will also support the potential viability of services. It is expected the more detailed planning and design for bus services will be undertaken by Auckland Transport at the appropriate time.

The proposed changes to the Precinct can be satisfactorily accommodated by the already planned and proposed internal transport network provisions for pedestrians and cyclists, as well as the previously identified TNDR for external walking and cycling connections. This can be further addressed through the future subdivision and EPA applications, as the development occurs, as required by the Precinct provisions.

It is considered that the proposed changes to the Precinct provisions are consistent with the assessments undertaken within this TAR, particularly with regard to the quantum of retail and commercial activities enabled within the Mixed Use Sub-precinct. Other changes to the provisions appropriately provide for flexibility in the development of the transport network, particularly the design of the Avenue Road, given the adjacent future urbanisation to the north and the developing transport network for those future urban areas, including the Mill Road Corridor. The provisions continue to provide for the TNDR upgrades to be assessed, and delivered at the appropriate time, as well as any vehicle access off the Spine Road.

6.2 Conclusion

It is therefore considered that the proposed changes to the AUP (OP) provisions for the Precinct will provide appropriately in relation to transport matters for the proposed re-zoning and will continue to enable the transport effects of the Precinct development to be satisfactorily addressed, as further subdivision within the Precinct occurs.

It is also considered that the proposed changes to the Precinct will provide an improved transport and land use integration outcome, in combination with the now planned employment and residential development in the adjacent Drury-Opaheke Structure Plan area and the adjacent Drury South Residential Precinct.

It is therefore considered that there is no reason, from a transport perspective, as to why the Plan Variation for the proposed changes to the Drury South Industrial Precinct cannot be approved.

A

Appendix A – Traffic Generation Assessment Memoranda

flow
TRANSPORTATION SPECIALISTS

technical note

PROJECT	**ACXX360 – DRURY SOUTH PLAN CHANGE**
SUBJECT	**TRANSPORT REVIEW FEEDBACK**
TO	**CRAIG CAIRNCROSS (AUCKLAND COUNCIL)**
FROM	TERRY CHURCH (FLOW)
REVIEWED BY	MAT COLLINS (FLOW)
DATE	18 SEPTEMBER 2019

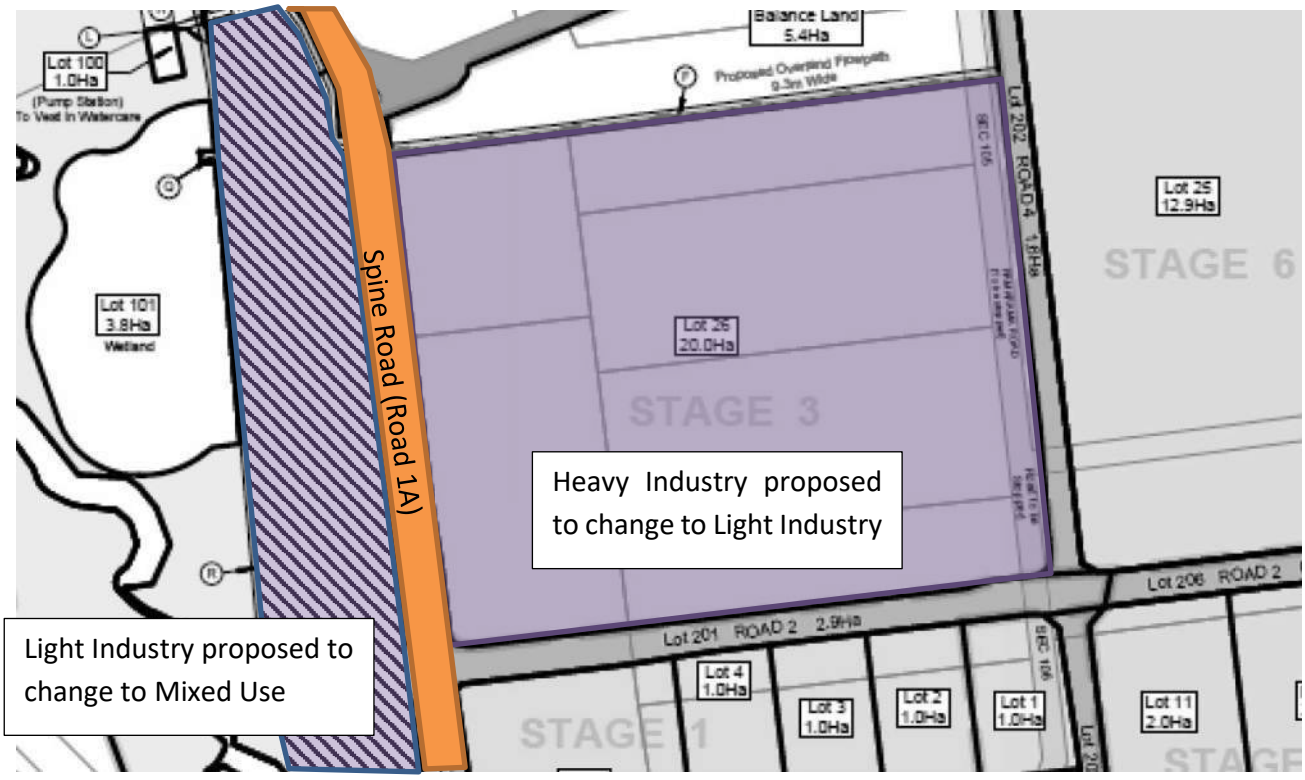
1 INTRODUCTION

Auckland Council has asked Flow Transportation Specialists (Flow) to review transportation matters associated with the proposed Private Plan Change to land within the Drury South Industrial Precinct. The two plan change areas are identified as

- Land located to the west of Spine Road (Sub-Precinct C), changing from Light Industry to Mixed Use (approximately 10 hectares)
- Land located to the east of Spine Road, changing from Heavy Industry to Light Industry (approximately 20 hectares).

The land subject to the plan change is assumed to be that identified in Figure 1 below. This underlying figure has been taken from the Drury South Industrial Sub-division plans.

Figure 1: Proposed Plan Change Areas



Pre-application discussions between Drury South Limited (DSL) and Council in respect of the proposed Private Plan Change have occurred, with DSL's traffic experts providing initial assessments of the predicted traffic impacts associated with the proposal.

Flow has reviewed the Traffic Generation Memorandum prepared by Beca on behalf of DSL, dated 22 March 2019, with Flow's feedback on the memo outlined in Flow Technical Note TN1A190410, dated 10 April 2019.

DSL has responded to the feedback provided by Flow in a Memorandum prepared by Beca dated 15 August 2019. A meeting was also held at Auckland Council with DSL and their representatives on 11 September 2019 where the contents of the memorandum were discussed.

This technical note provides a written response to the latest memorandum, with each matter being addressed in turn, as set out in the Beca Memorandum, dated 15 August. We note that the feedback provided below is based on the information before us at the time of preparing this technical note. No precinct provisions have been provided that allows an understanding as to how transport matters and therefore effects will be assessed and controlled.

2 SUB-PRECINCT C TRAFFIC GENERATION

2.1 Development Potential

Flow Feedback (10 April) - *Flow was of the view that the scenarios considered in the previous Beca memorandum did not provide consideration of an ultimate buildout scenario that could be pursued by a different future landowner, under the Auckland Unitary Plan (AUP) Mixed Use zone rules.*

Flow Feedback on the Beca Response – We note the following having reviewed the Beca memorandum:

- The response indicates that the Mixed Use zone will be applied to Sub-Precinct C, with a range of modifications to ensure the commercial activities predominantly serve a local function.
    - We assume that the default activity status for land use activities on individual sites or tenancies will remain as set out in the Mixed Use Zone Activity Table H13.4.1.
    - We also anticipate that an activity table will be included in Sub-Precinct C that limits the level of retail and commercial floor space within the Precinct, and that any increase above the prescribed thresholds will be a Discretionary Activity.
    - *Recommended action: Flow will review the proposed controls once these are provided by the applicant.*
- The Beca response suggests that the controls sit above what would realistically be developed within the life of the Unitary Plan. We note that a Plan Change should consider impacts beyond the life of the Unitary Plan, such that the impacts of the network (for example – infrastructure timing) that may not be in place until say 2031 can be understood.
    - Market Economics suggests that the full build out of Sub-Precinct C is unlikely within the life of the AUP. We take this to be 10 years, and note that the life of the AUP should not

be the basis for determining/assessing the level of effect of the Plan Change, as the zoning will be in place for perpetuity.

- Barkers and Associates considers it to be unreasonable to assume that a full build out will occur for the purposes of assessing potential effects. We are of the view that the full effect should be assessed, and note that if this is not the case, that the proposed Sub-Precinct C activity table which is proposed to provide floor area thresholds be aligned with what is assessed and understood, in terms of network performance and reasonable infrastructure requirements.
- *Recommended action: The Transport Assessment to support the Private Plan Change should be consistent with the Precinct provisions, with activity thresholds beyond that assessed being a Discretionary Activity.*

- Table 2-2 summarises the predicted traffic generation of a development scenario (Mix 5) that is set out in Table 2-1. The current Precinct Provision totals are understood to be a full build scenario, being some 1,390 trips per hour. Based on the feedback provided above, the Mix 5 scenario is not representative of a full build out scenario, and generates some 1,550 trips during the evening peak hour. Several questions arise from this summary:
  - While the total trips for the scenario are similar (+143 per hour in the evening peak) for a scenario that is not full build, it is important that development thresholds are applied within the Precinct.
  - While predicted volume numbers are similar, there will be a change in distribution. That is, the weight provided to outbound trips will reduce during the evening peak for example due to increased retail and residential activities. The effects of internal intersections (namely those that intersection with Road 1) will need to be considered in due course.
  - Further afield however, there may be some implications given the increase in residential activities and a reduction in industrial activities (employment), with that impact potentially resulting in an increase in traffic demand heading north. In saying this however, greater employment options are assumed to exist in the wider Drury area, not only through the Plan Change but through neighbouring development proposals. As such, the change in distribution (residential) and work force opportunities (greater commercial and retail within Drury) may balance the wider effect. We recommend some discussion on this in the final report.
  - Assessing the wider transport improvements about the Drury Precinct relies on the activity status of the subject consent application to be Restricted Discretionary in order to trigger an assessment of the matters identified in I410.8.2(1)(f). The Beca note makes comment that development consistent with that outlined in Table 2-1 will not require further transport assessment. We take this to relate to a wider ITA and wider transport assessment only.
  - *Recommended action: The Transport Assessment to support the Private Plan Change should include a discussion about the potential change and impacts associated with trip distribution.*

- *Recommended action: Flow will review the proposed controls and activity status table once these are provided by the applicant, and comment on the application/risks associated with applying I410.8.2(1)(f) for future activities.*

2.2 Precinct Internal Effects

Flow Feedback (10 April) - *Flow noted agreement with the Beca assumptions on traffic generation reductions for ancillary activities and multi-purpose trips, as this related to the external traffic generation outside the Precinct. However, Flow noted that that there should be consideration to the internal trips, such that the effects on internal intersections providing access to Sub-Precinct C could be understood.*

Flow Feedback on the Beca Response – We agree that the transport assessment accompanying the Plan Change, particularly Sub Precinct C will include an assessment of the internal intersections, as also discussed above.

3 HEAVY INDUSTRY TO LIGHT INDUSTRY TRAFFIC GENERATION

3.1 Traffic Generation Rate

Flow Feedback (10 April) - *Flow has stated that it considers the weekday morning (AM) peak hour traffic generation rate in the Beca memorandum for the light industrial activities to be low, in comparison to sites where retailing is permitted from warehousing activities. Flow has instead identified that the traffic generation rates should be increased from 0.61 to 1.0 trips per 100m$_2$ GFA.*

Flow Feedback on the Beca Response – While the response suggests that DSL is currently considering distribution/logistic type activities, the zoning allows for development that generates higher rates on smaller sites. In considering the example provided however in relation to the trip rate of the Mainfreight distribution depot (0.25 to 0.28 per 100 m^2 GFA), the trip rate of 0.61 per 100 m^2 GFA proposed seems reasonable when averaged across the plan change area, where activities may have rates ranging between 0.25 and 1.0, with the overall average sitting somewhere about 0.6.

We note however that the previously suggest rate of 0.89 vehicle trips per 100m^2 GFA for the evening peak, which Flow had no concerns with in the April 2019 memo has been reduced to 0.55 vehicle trips per 100m^2 GFA in the latest memo. There does not seem to be an explanation for this change, other than to assume it relates to the current direction anticipated by DSL.

Recommended action: We request that the Transport Assessment supporting the Private Plan Change includes robust commentary on appropriate trip generation rates for Light Industry. We recommend that this include sensitivity testing to reflect the range of land use outcomes that are enabled by Light Industry zoning.

3.2 Site Area to GFA Ratio

Flow Feedback (10 April) - *Flow has stated it considers the site area to GFA ratio used in the Beca memorandum (20%) to below in its experience of other similar sites. Flow has instead identified a ratio of 40 to 50%, subject to further discussion on this matter.*

Flow Feedback on the Beca Response – The 20% ratio was based on an indicative employee per hectare ratio and floor area per employee ratio. Barkers and Associates provided examples of the Albany Business Park on Corinthian Drive which has a ratio of 31%.

Flow agrees that testing a range of GFA to site area ratio's may be a good way forward, albeit the range in our view should sit between 30% and 45%, rather than 20% and 40%. This can be addressed in the Transport Assessment.

As highlighted above, we also request that the predicted trips generated by the Plan Change confirm the trip rates being applied, noting the reduction in the evening peak trip rate between the April memo and August memo, which has not been addressed.

Recommended action: We request that the Transport Assessment supporting the Private Plan Change includes robust commentary on appropriate trip generation rates for Light Industry. We recommend that the Transport Assessment assess a range of land use/trip generation outcomes that are enabled by Light Industry zoning.

4 SUMMARY

Following our review of the Beca responses to queries raised by Flow, we have noted several matters that can be addressed in the Transport Assessment that supports the Private Plan Change. It is difficult to determine the transport implications of the Private Plan Change without viewing the proposed changes to the Precinct Provisions alongside the transport scenarios assessed.

While there appears to be no fundamental flaws in the assessment completed to date, we do request that the matters raised above are sufficiently addressed in the Transport Assessment. We reserve our position until the above has been sufficiently addressed.

We appreciate that the current discussions are pre-application discussions that have, to our knowledge, only involved Council. As such, discussions with Auckland Transport and potentially the NZ Transport Agency may result in differing positions which we advise would be good to understand sooner rather than later.

flow TRANSPORTATION SPECIALISTS LTD
Level 1, 11 Blake Street, Ponsonby | PO Box 47497, Ponsonby, Auckland 1144 | p 09 970 3820 | f 09 970 3890 | www.flownz.com

Memorandum

To:	Rachel Morgan, Barker & Associates	**Date:**	15 August 2019
From:	Joe Phillips	**Our Ref:**	3820130
Copy:	Sean Thompson / Stephen Hughes, DSL		
	Greg Akehurst, Market Economics		
Subject:	Drury South - Plan Change		

1 Introduction

This memorandum has been prepared by Beca Ltd (Beca) for Drury South Limited (DSL) to respond to technical note prepared by Flow Transportation Specialists (Flow) dated 10 April 2019.

The Flow technical note provided comments on the Beca memorandum dated 22 March 2019 that addressed the predicted changes in trip generation associated with the Plan Change proposals for the Drury South Industrial Precinct (the Precinct). The proposed land zoning changes for the Precinct are discussed in the Beca memorandum dated 22 March 2019.

The following sections address the Flow comments on:

- Sub-Precinct C traffic generation
- Heavy industry to light industry traffic generation.

2 Sub-Precinct C Traffic Generation

2.1 Development Potential

Flow was of the view that the scenarios considered in the previous Beca memorandum did not provide consideration of an ultimate buildout scenario that could be pursued by a different future landowner, under the Auckland Unitary Plan (AUP) Mixed Use zone rules.

The Plan Change proposes to apply the Mixed Use zone to Sub-Precinct C, with a range of modifications to ensure that commercial activities predominantly serve a local function. This will include specific provisions for retail and office activities, which are typically the higher traffic generating activities in the Mixed Use zone, and also recognise its location further away from the anticipated future Rapid Transit Network (RTN) and areas of significant residential density.

The proposed controls sit above what would realistically be developed within the life of the Unitary Plan, but provide some flexibility. Above certain Gross Floor Area (GFA) limits, discretionary activity resource consent would be required, which would enable effects on the transport network to be considered.

In determining the land use scenario to test, Beca has received the following advice from Barker & Associates (B&A) and Market Economics, in terms of what would be reasonably constructed within the life of the AUP:

- Market Economics considers that achieving full build-out of Sub-Precinct C up to what is proposed to be enabled through the Plan Change is highly unlikely within the life of the AUP
- B&A's considers that it is unreasonable to assume that a full build-out will occur for the purpose of assessing potential effects of the rezoning on the transport network.

To derive the land use assumptions set out in **Table 2-1**, Beca has been advised by B&A and Market Economics:

- Firstly, B&A reviewed information received from Warren and Mahoney on potential development schemes for the site.
- Secondly, B&A accounted for what was enabled by the proposed rules before a discretionary activity consent was triggered.
- Thirdly, B&A reviewed other similar developments in Auckland to determine the level of development achieved in those areas. This work showed that development in the Corinthian Drive Business Park area accommodates approximately 20,000m^2 GFA and has an average site coverage of 45%. This area was rezoned over 10 years ago.
- Fourthly, Market Economics considered the likely rate of development in Sub-Precinct C over the life of the AUP, with a focus on retail activities. This confirmed that the land use scenario in **Table 2-1** is conservative and likely to be at the very upper end of what is likely to be feasibly constructed to support development in the catchment.

As a Mixed Use zone, Sub-Precinct C could be developed in a number of ways that is challenging to accurately predict, hence the variation of mixes considered. The assumptions in **Table 2-1** are considered by B&A to be very conservatively high, being at the upper end of what is likely to be feasible to construct and with more of a retail and office focus. Also retail and office activities would typically generate more traffic than residential activities, particularly in the weekday evening peak. As such, should development within Sub-Precinct C be more residentially focused, traffic generation is likely to be lower than what is predicted.

Table 2-1 therefore shows the potential activities that may be established with Sub-Precinct C under the proposed precinct rules (an indicative Mix 5 scenario), without further transport assessment for discretionary activities. The previous trip generation rates have been re-applied to this scenario and the resulting predicted traffic generation is summarised in **Table 2-2**, further detail being included in **Appendix A**.

Table 2-1: Proposed Zoning Mix 5 Considered – Sub-Precinct C

Activity	Mix 5
Retail –Supermarket	4,500
Retail – Supporting retail / F&B	4,400
Trade supplier activity e.g. Bunnings, landscape suppliers	5,500
Supporting commercial services (e.g. medical, services etc)	3,300
Small scale offices	11,600
Residential – Apartments	12,300
Residential – Retirement villages	22,000
Total GFA	**63,600**
GFA / Site Area Ratio	*64%*

Table 2-2: Traffic Generation Comparison – Total Vehicle Movements – Mix 5

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Precinct Provisions	1,388	1,391
Mix 5	822	1,534
Predicted Change from Current	*-566*	*+143*

Based on this high-level assessment, and as per the previous assessment dated 22 March 2019, it is considered that the predicted traffic generation in the weekday peak hours enabled under the proposed precinct provisions (Mixed Use zoning) would be broadly similar or less than considered in the previous traffic modelling for Sub-Precinct C for the original plan change.

The relative change is due to more intensive traffic generating activities of the proposed Mixed Use zoning now being within a Sub-Precinct C area that is significantly reduced from that considered in the previous plan change for the Precinct (approx. 20 hectares). The Sub-Precinct C has now been confirmed at just under 10 hectares, not the 11 hectares stated in the 22 March 2019 assessment. Hence, the slight increase in the GFA / Site Area ratio in **Table 2-1**, when compared with those in the previous assessment.

During the weekday morning peak hour, it is predicted that the traffic generation would be substantially lower under the proposed precinct provisions for Mixed Use zoning. In the weekday evening peak hour, whilst there is potentially an increase in traffic generation of up to around 10%, compared to the previous traffic generation for this sub-precinct, it is a much smaller proportion of the total Precinct traffic generation.

Given B&A and Market Economics have advised that these are conservatively high assumptions for the potential build-out within the life of the Unitary Plan, it is therefore considered that distributed across the wider external network, the effects would not be notably discernible from the current precinct provisions with the planned precinct transport infrastructure improvements. It is considered the changes will simply impact the more detailed layout / design of those improvements that will in any event be considered through later subdivision consents.

2.2 Precinct Internal Effects

Flow noted agreement with the Beca assumptions on traffic generation reductions for ancillary activities and multi-purpose trips, as this related to the external traffic generation outside the Precinct. However, Flow noted that that there should be consideration to the internal trips, such that the effects on internal intersections providing access to Sub-Precinct C could be understood.

The purpose of the previous Beca memo was to establish whether traffic modelling of the road network external to the whole Precinct was necessary for the Plan Change. It would still be the intention that the Transport Assessment accompanying the Plan Change for the Precinct, and particularly Sub-Precinct C, would include traffic modelling of the internal intersections providing access off Road 1 to Sub-Precinct C.

As such, it is considered that the effects of internal trips can be satisfactorily considered in the Transport Assessment for the Plan Change.

3 Heavy Industry to Light Industry Traffic Generation

3.1 Traffic Generation Rate

Flow has stated that it considers the weekday morning (AM) peak hour traffic generation rate in the Beca memorandum for the light industrial activities to be low, in comparison to sites where retailing is permitted from warehousing activities. Flow has instead identified that the traffic generation rates should be increased from 0.61 to 1.0 trips per 100m^2 GFA.

Since the original Beca memorandum was prepared, DSL has indicated that it expects the subject land to be utilised for distribution / logistics type activities. It is not anticipated that this would have notable retail component and hence the vehicle trip rates provided in the previous assessment are still appropriate.

Indeed, probably the most appropriate site in the context of the range of sites previously considered from the New Zealand Trips and Parking Database (NZTPDB) is the Mainfreight freight depot in Christchurch, on a five hectare site (surveyed in August 2014). This site was recorded as having weekday morning and evening vehicle trip rates of 0.25 to 0.28 vehicles per 100m^2. This is well below the trip rates previously assessed and majority of sites considered with a similar site area to the development anticipated are also below a trip rate of 0.5 vehicles per 100m^2.

3.2 Site Area to GFA Ratio

Flow has stated it considers the site area to GFA ratio used in the Beca memorandum (20%) to be low in its experience of other similar sites. Flow has instead identified a ratio of 40 to 50%, subject to further discussion on this matter.

The previous assessment was derived from an indicative employee per hectare ratio and floor area per employee ratio for the expected light industrial activities, resulting in the 20% ratio identified. As noted above, DSL has since indicated that it expects the subject land to be utilised for warehousing / distribution type activities. In this regard, the Mainfreight freight depot in Christchurch has a GFA (15,073m^2) to site area (51,390m^2) ratio of this site is around 29%. Similarly, B&A has provided details relating to a similar warehousing site in the Albany Business Park on Corinthian Drive, which has a GFA (6,493m^2) to site area (21,214m^2) ratio of 31%.

As such, whilst the initial 20% assumption for GFA ratio may be on the lower side for the expected light industrial activities, it is considered that a range of up to 40% would be appropriate in terms of considering the potential traffic generation for the change in zoning.

3.3 Effects on Predicted Traffic Generation

Applying the predicted warehousing traffic generation rates to the identified range of GFA ratio (i.e. 20 to 40%), is predicted to result in around 240 to 492 and 213 to 437 two-way vehicle movements during the weekday morning and evening peak hours respectively. This does also not include any allowance for some of these movements being internalised within the Precinct.

Table 3-1 compares the traffic generation used for the original Plan Change (and within the current traffic models) with that typically predicted for warehousing / distribution activities. Additionally, considering a broad range of industrial storage, commercial and industrial park sites in the NZTPDB with a similar range of site areas, average trip rates per 100m^2 of site area, of 0.18 and 0.19 in the morning and evening peak hours respectively have been identified. These are also presented for the 20 hectares. Further detail is included in **Appendix B**.

Table 3-1: Traffic Generation Summary – Total Vehicle Movements

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Traffic Models	300	314
Typical Warehousing / Distribution Activities (Based on GFA trip rates)	240 to 492	213 to 437
Predicted Change (to Current Traffic Models)	***-60 to +192***	***-111 to +123***
Typical Light Industrial Activities (Based on Site Area trip rates)	365	381
Predicted Change (to Current Traffic Models)	***+65***	***+67***

For the warehousing / distribution sites identified, with a GFA to site area ratio of around 30% (similar to the sites identified above), the traffic generation would potentially be in the middle of this range of outcomes. As such, in the morning peak hour, there would potentially be around 366 vehicle movements, or around 66 additional movements. Whilst in the evening peak hour, there would be around 325 vehicle movements, or around 11 additional movements. Similar changes are predicted based on the site area trip rate calculations.

The predicted additional vehicle movements should also be considered in the context of the overall Precinct, which is predicted to generate in the order of 3,800 and 3,900 total vehicle movements in the morning and evening peak hours respectively, once fully developed. In this context, the predicted additional vehicle movements represent increases of up to around 5% and 3% during the morning and evening peak hours respectively, based on the higher 40% GFA to site area ratio.

Moreover, it is noted that the previous plan change for the Precinct did not rely on the Mill Road Corridor or include it within the transport infrastructure necessary to support the Precinct. It is considered that the anticipated completion of the Mill Road Corridor (connecting with SH1)[1], likely prior to the full development of the Precinct, will further assist in addressing the overall transport effects of the Precinct, including the effects of the proposed Plan Change.

DSL does not currently anticipate that the light industrial land to the north west of a future Mill Road Corridor alignment will be developed until that corridor is in place. The land to the north west was anticipated to be some 35 hectares, which would have resulted in around 470 vehicle movements during the morning and evening peak hours respectively.[2] That would be at least double the expected change in the vehicle movements associated with the proposed re-zoning of Sub-Precinct C. Moreover, based on more recent stormwater modelling, some of that area is not now to be developed, so the area reduces to around 21 hectares. Hence, the overall development within the Precinct and hence the associated traffic generation is reduced as a result, notwithstanding that this area will not be developed until later.

In summary, in the overall context of the Precinct, the predicted effect of this additional traffic generation, when spread across the surrounding road network, is not considered to require the revised external traffic modelling. It is considered that the planned Precinct transport improvements will satisfactorily address the additional impacts of the proposed re-zoning and later be supported by the future Mill Road Corridor.

4 Summary

In summary, based on the assessment within this memorandum, it is considered that:

- **Sub-Precinct C Traffic Generation** – The external traffic generation enabled by the proposed Sub-Precinct C provisions (Mixed Use zoning) would only be slightly more in the weekday evening peak and notably less than the morning peak and a very low percentage change compared to the overall Precinct traffic generation.
- **Light Industry Traffic Generation** - The external traffic generation enabled by the proposed Light Industrial zoning (anticipated as warehousing / distribution activities), with the higher range of GFA to site area ratio considered, would represent a low percentage change in the overall Precinct traffic generation.

[1] Detailed Business Case currently being considered by the Supporting Growth Alliance

[2] Based on the original Plan Change vehicle trip rates for the Motorway Edge Precinct

As such, it is considered that the external effects in terms of the transport projects required are unlikely to be discernibly different, when these trips are distributed across the external network, with the planned precinct transport improvements in place.

It is therefore considered unlikely that traffic modelling of the external transport network would identify the need for any additional transport projects than those previously identified within the assessment criteria for the Precinct. Further, the form and design of upgrades will still be appropriately considered as part of future subdivision consents, as development is progressed in the Precinct.

Moreover, the previous plan change (for the Precinct) did not rely on the future Mill Road Corridor or include it within the transport infrastructure necessary to support the Precinct. It is also currently anticipated that development of light industrial land to the north west of the future Mill Road Corridor is unlikely to occur until the corridor is in place. It is therefore considered that the anticipated completion of the Mill Road Corridor (connecting with SH1), likely prior to the full development of the Precinct, will further assist in satisfactorily addressing the overall transport effects of the Precinct, including the effects of the proposed Plan Change.

However, it will be necessary to consider the effects of the traffic generation on the internal intersections, particularly along Road 1, within the Transport Assessment for the proposed Plan Change.

Joe Phillips
Principal - Transportation
Direct Dial: +64-9-300 9190
Email: joseph.phillips@beca.com

Memorandum

Appendix A

High-Level Traffic Generation – Sub-Precinct C

Drury S - Plan Variation - Masterplanning

Original Plan Change Traffic Models

	In	Out	Total
AM Peak (1 Hour)	1,221	167	**1,388**
PM Peak (1 Hour)	237	1,155	**1,391**

Comparison to Proposed Precinct Provisions

	Mix 1		Base		Mix 2		Office		Mix 3		Resi		Mix 4		Extra GFA		Mix 5		PV Rules	
	AM		PM		AM		PM		AM		PM		AM		PM		AM		PM	
Proposed Mixed Use Zoning	746		1,336		769		1,359		725		1,315		793		1,466		822		1,534	
Previously Assessed Commercial Sub-Precinct	1,388		1,391		1,388		1,391		1,388		1,391		1,388		1,391		1,388		1,391	
Change	**-642**		**-55**		**-618**		**-32**		**-663**		**-77**		**-595**		**74**		**-566**		**143**	
% Change	-46%		-4%		-45%		-2%		-48%		-6%		-43%		5%		-41%		10%	

Drury S - Plan Variation - Masterplanning

Proposed Precinct Provisions **Mix 5**

Assume 15% discount for linked activities

				Trip Rates / hr		Re-adjusted for Discounting			
		Assume	Rooms / HHs etc	AM	PM	AM		PM	
Land use	**GFA**					**In**	**Out**	**In**	**Out**
Supermarket	4,500			5	15	96	96	287	287
Bulk Retail	5,500			5	5	117	117	117	117
Retail - Assume 75% external attraction only	4,400			3	13	50	50	215	215
Commercial services - Assume ancillary to other activities	3,300								
Office	11,600			1.6	1.6	126	32	32	126
Hotel	0	70m2 GFA / room	0	1	1	0	0	0	0
Residential	12,300	100m2 GFA / HH	123	0.8	0.8	25	59	59	25
Retirement	22,000	100m2 GFA / HH	220	0.3	0.3	28	28	28	28
Total	**63,600**					***441***	***380***	***736***	***798***
						822		**1,534**	

Memorandum

Appendix B

Predicted Traffic Generation – Light Industrial Area

Drury S - Plan Variation - Masterplanning

Light vs Heavy Comparison

Previous Drury South Industrial Trip Rates

Source: Drury Traffic Models

	Trip Rate / Hectare		Assumptions
	AM	PM	20 hectares
Heavy Industrial	15.0	15.7	
Light Industrial	15.0	15.7	
Predicted Trips	**300**	**314**	

Light Industrial Trip Rates

Source: NZ Trips and Parking Database 2018

	Trip Rates (per 100m2 GFA)		Proposed Development		Predicted Trips	Assumptions
AM	0.61	per 100m2	39,000	m2	**240**	30 employees per hectare
PM	0.55	per 100m2	39,000	m2	**213**	65 m2 per employee
	site development ratio =		**20%**	**GFA vs Site Area**		

	Trip Rates (per 100m2 GFA)		Proposed Development		Predicted Trips	Assumptions
AM	0.61	per 100m2	80,000	m2	**492**	
PM	0.55	per 100m2	80,000	m2	**437**	
	site development ratio =		**40%**	**GFA vs Site Area**		

technical note

PROJECT	**ACXX360 – DRURY SOUTH PLAN CHANGE**
SUBJECT	**TRAFFIC GENERATION MEMO REVIEW**
TO	**CRAIG CAIRNCROSS (AUCKLAND COUNCIL)**
FROM	TERRY CHURCH (FLOW)
REVIEWED BY	HARRY ORMISTON (FLOW)
DATE	10 APRIL 2019

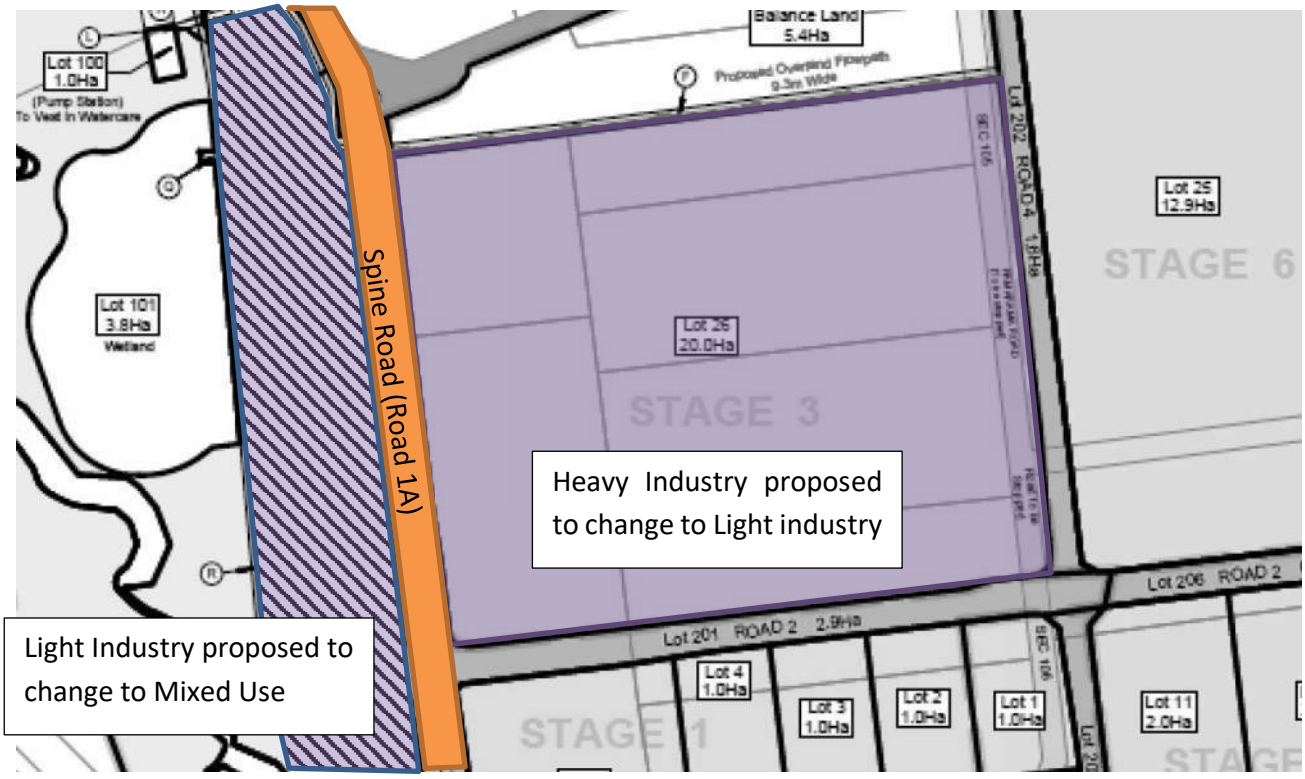
Flow Transportation Specialists (Flow) has been requested by Auckland Council to review transportation matters associated with the Proposed Plan Changes to land within the Drury South Industrial Precinct.

This technical note provides comment on the traffic generation rates assessed for the two plan change areas proposed. These are summarised as follows:

- Land located to the west of Spine Road (Sub-Precinct C), potentially changing from Light Industry to Mixed Use (11 hectares)
- Land located to the east of Spine Road, potentially changing from Heavy industry to Light Industry (20 hectares).

The land parcels that are assumed to be associated with the plan changes have not been provided to Flow yet. In noting that, the land subject to the plan changes are assumed to be those identified in Figure 1 below. This underlying figure has been taken from the Drury South Industrial Sub-division plans.

Figure 1: Proposed Plan Change Areas



Flow has reviewed the Traffic Generation Memorandum prepared by Beca, dated 22 March 2019. The following feedback is provided, where some additional information is requested prior to accepting the predicted trip generation calculations for the plan change areas.

1 SUB-PRECINCT C TRAFFIC GENERATION

Potential development scenarios have been assessed that would be enabled under the proposed Mixed Use Zone. We understand that the four development scenarios are those that could be pursued by the land owner. In noting this however, we are of the view that the scenarios presented do not provide an ultimate buildout scenario that could be pursued by a different land owner and in keeping with the Mixed Use zone rules.

While multiple activities can be established under the Mixed Use zone, it would be helpful to understand how the scenarios presented stack up against what could be established if development was built out to the maximum allowed, ie within the envelopes allowed.

The assessment of traffic generation assumes reductions associated with ancillary activities and multi-purpose trips within the wider Drury South Precinct. While we support this logic from the perspective of understanding effects about the wider external transport network (ie external to the Precinct), an indication on the traffic generation impacts internal to the Precinct, in particular the intersections of Road 1 with Road 2, and the northern connection that provides access to Sub-Precinct C should also be included.

It would be helpful for Table 2-2 to be expanded to include an additional column for each period. The existing columns provide predicted traffic generation that is external to the wider Precinct. The additional column should include traffic generation that is internal to the Precinct, in particular that which would be expected to access Sub-Precinct C through the internal intersections.

2 HEAVY INDUSTRY TO LIGHT INDUSTRY TRAFFIC GENERATION

Various data sources have been referenced by Beca to obtain a traffic generation rate for light industry, with trip rates of 0.61 and 0.89 trips per 100m^2 GFA. On the face of it, the morning peak rate appears low. The type of Industry being located within the Precinct will influence the overall average trip rate. Industry standards generally suggest an average trip rate of 1.0 trip per 100m^2 GFA for general light industry and 0.5 trips per 100m^2 GFA for warehousing. The trip rate of 0.61 trips per 100m^2 GFA in my view is weighted towards warehousing.

The RTA guide notes that where retailing is permitted from warehousing sites, traffic generation rates are higher. Referring to the Trips and Parking Database, we also note that the trip rate calculated will depend on the activities the trip rate has been calculated from.

It is our view that a vehicle trip rate of 1.0 trip per 100m^2 GFA is used for the AM peak, with the PM peak remaining at 0.9 trips per 100m^2 GFA.

An assumption of 20 % has been used to convert the 20 hectare site into GFA. Noting that the 20 hectare site already has a roading network surrounding it, the 20% value used appears low when compared with other light industry sites Flow has been involved in. A low percentage is typically used to account for the exclusion of road reserve, open space and so forth. While the 20 hectare site is relatively large, four road boundaries already exist.

We are of the view that a higher percentage should be applied when considering GFA for Light Industry. The percentages we are familiar with typically sit around 45% to 50% based on work Flow has been involved with for other sites. In noting this, we welcome further discussion on the percentage to use and ask that further information be provided from a planning/economist perspective to support the conversion factor.

3 SUMMARY

Prior to agreeing to the findings of the memorandum, we request that the matters above are further discussed.

Reference: P:\ACXX\360 Drury South Plan Change\Traffic Generation\TN1A190410_Traffic Generation Feedback.docx - Terry Church

Memorandum

To:	Rachel Morgan, Barker & Associates	**Date:**	22 March 2019
From:	Joe Phillips	**Our Ref:**	3820130
Copy:	Sean Thompson / Stephen Hughes, DSL		
Subject:	Drury South - Plan Variation - Traffic Generation Memo		

1 Introduction

This memorandum has been prepared by Beca Limited (Beca) for Drury South Limited (DSL) to outline the potential changes in traffic generation associated with the proposed changes to the land use zoning within the Drury South Industrial Precinct (the Precinct).

It is understood that the proposed land use zoning changes within the Precinct are as follows:

- Change the size and zoning of land to the west of the Spine Road, referred as Sub-Precinct C, from Commercial Services (Light Industry) to Mixed Use; and
- Change the zoning of approximately 20 hectares of land to the east of the Spine Road (Road 1A) from Heavy Industry to Light Industry.

The separate predicted changes in traffic generation for both areas are discussed in the following two sections, and then summarised in **Section 4**.

2 Sub-Precinct C Traffic Generation

To assess the potential changes in traffic generation effects with the proposed zoning changes for Sub-Precinct C, inputs have been provided by Barker & Associates (B&A) on the potential development scenarios for this area that would be enabled under the proposed Mixed Use zone provisions. The proposed zoning provisions for the 11 hectare sub-precinct consider a range of development scenarios, given no specific proposals currently exist.

This has then been compared with the predicted traffic generation of Sub-Precinct C (the Commercial Services (Light Industry) precinct) used in the traffic modelling for the Precinct, i.e. the traffic generation under the current precinct provisions, when it was located east of the Spine Road. At that time, the sub-precinct was around 20 hectares, but has reduced in size with its relocation west of the Spine Road, in order to accommodate surrounding stormwater management areas.

Table 2-1 below summarises the range of scenarios considered for a potential mix of land use activities that could be enabled under the zoning provisions of the proposed Mixed-Use zoning for this area (Sub-Precinct C). These indicative Gross Floor Areas (GFA) for each scenario have been derived by applying typical GFA / Site Area ratios for the identified land use activities to the overall site area and anticipated blend of activities.

The scenarios reflect a range of potential outcomes in terms of the land use mix, as well as potentially slightly greater GFA being achieved, as follows:

- **Mix 1 – Base Scenario** – most likely land use activity mix within 11 hectare site area
- **Mix 2 – Office Scenario** – Greater proportion of office activity with associated reduction in residential apartments
- **Mix 3 – Residential Scenario** – Greater proportion of residential activity with associated reduction in office activity
- **Mix 4 – Extra GFA Scenario** – An overall 10% increase in GFA, including increases in office, residential and supporting retail activities.

Table 2-1: Proposed Zoning Scenarios Considered – Sub-Precinct C

Activity	Mix 1 – Base	Mix 2 – Office	Mix 3 – Residential	Mix 4 – Extra GFA
Retail – Small scale supermarket	5,000	5,000	5,000	5,000
Retail – Supporting retail / F&B	2,200	2,200	2,200	3,300
Trade supplier activity e.g. Bunnings, landscape suppliers	5,500	5,500	5,500	5,500
Supporting commercial services (e.g. medical, services etc)	2,200	2,200	2,200	3,300
Small scale office	7,700	11,600	3,900	9,600
Residential – Apartments	13,200	8,800	17,600	11,000
Residential – Retirement villages	22,000	22,000	22,000	26,400
Total GFA	**57,800**	**57,300**	**58,400**	**64,100**
GFA / Site Area Ratio	*53%*	*52%*	*53%*	*58%*

For the purposes of the traffic generation assessment for the indicative land use activities within the proposed Mixed Use zoning, the following high-level assumptions have been made:

- Supporting commercial services activities would simply be ancillary, supporting the other activities in the Sub-Precinct, as well as the light and heavy industrial activities in the wider Precinct. As such, these activities would not result in additional traffic generation to / from the Precinct
- Around 25% of the traffic generation for retail activities (excluding Bulk Retail) would potentially be associated with the other activities within the overall Precinct. As such, only 75% of the traffic generation would be additional traffic to / from the Precinct
- For all proposed activities in the Mixed-Use zone (excluding the retail activities above), a high-level allowance of an overall 15% discount has been applied to account for trip linking associated with the activities in the Sub-Precinct and wider Precinct.
- No allowance has been provided for reduction in traffic generation rates to account for high quality public transport (bus) services being provided to and within the Precinct, given uncertainty around when and the quality of services that may be provided to and within the Precinct by Auckland Transport.

The traffic generation for the current precinct provisions relating to Sub-Precinct C is based on the agreed traffic generation used for the traffic modelling and associated ITA for the Precinct.

Table 2-2 summarises the predicted traffic generation enabled under the current and proposed precinct provisions, whilst further detail on the traffic generation calculations is included in **Appendix A**.

Table 2-2: Traffic Generation Comparison – Total Vehicle Movements

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Precinct Provisions	1,388	1,391
Proposed Precinct Provisions		
Mix 1 – Base	746	1,336
Predicted Change from Current	*-642*	*-55*
Mix 2 – Office	769	1,359
Predicted Change from Current	*-618*	*-32*
Mix 3 – Residential	725	1,315
Predicted Change from Current	*-663*	*-77*
Mix 4 – Extra GFA	793	1,466
Predicted Change from Current	*-595*	*+74*

Based on this high-level assessment, it is considered that the predicted traffic generation in the weekday evening peak hour enabled under the proposed precinct provisions (Mixed Use zoning) would be similar or less than considered in the previous traffic modelling for Sub-Precinct C. During the weekday morning peak hour, it is predicted that the traffic generation would be substantially lower under the proposed precinct provisions for Mixed Use zoning. Noting that this is due to the more intensive traffic generating activities of the proposed Mixed Use zoning now being within a Sub-Precinct C area that is significantly reduced from that considered in the previous plan change for the Precinct.

3 Light Industry Traffic Generation

The potential changes in traffic generation effects with the proposed re-zoning of the 20 hectares to the east of the Spine Road from heavy to light industrial has been assessed by comparing the agreed traffic generation used in the traffic modelling for the Precinct with predicted typical traffic generation for light industrial activities. Further details of the traffic generation calculations are provided in **Appendix B**.

For the Precinct, the same traffic generation rates were used for all light and heavy industrial zones within the S3M SATURN (Project) traffic model. These were traffic generation rates of 15 and 15.7 vehicle movements per hectare in the weekday morning and evening peak hours respectively. These are external trip rates, so exclude internalisation, and these rates continue to be used in the Drury South 'Project' traffic model.

Applying these 'Project' traffic model traffic generation rates to the 20 hectares to be re-zoned, equates to 300 and 314 two-way vehicle movements during the weekday morning and evening peak hours respectively. This is the external traffic generation that has been currently assessed for this area, when determining the necessary transport projects for the Precinct.

To determine the potential traffic generation associated with the proposed light industrial zoning of this area, average traffic generation rates have been obtained from a range of sites within the New Zealand Trips and Parking Database (NZTDB). This is a recognised industry-source of traffic generation for assessing developments. Sites have been selected that cover the following activities within the Industrial land use group and the average traffic generation identified:

- Industrial Park
- Commercial and Manufacturing / Commercial
- Storage
- Transport.

On this basis, the following weekday peak hour traffic generation rates have been identified:

- Morning Peak Hour – 0.61 per 100m^2 Gross Floor Area (GFA)
- Evening Peak Hour – 0.89 per 100m^2 GFA.

To convert the proposed development site area (20 hectares) to a GFA, the following assumptions have been applied; 30 employees per hectare and 65m^2 per employee for light industrial activities. Applying these assumptions results in a GFA of 39,000m^2, which compared with the 20 hectare site area, equates to a site development ratio of 20%. This is considered appropriate in relation to light industrial, which typically have large yards, manoeuvring and parking/ loading areas within the overall site area.

Applying the predicted light industrial traffic generation rates to the identified GFA, is predicted to result in 240 and 349 two-way vehicle movements during the weekday morning and evening peak hours respectively. Noting that this does not include any allowance for some of these movements being internalised within the Precinct.

Table 3-1 compares the traffic generation used for the original Plan Change (and within the current traffic models) with that typically predicted for light industrial activities.

Table 3-1: Traffic Generation Summary – Total Vehicle Movements

	Weekday Morning Peak Hour	Weekday Evening Peak Hour
Current Traffic Models	300	314
Typical Light Industrial Activities	240	349
Predicted Change	**-60**	**+35**

This indicates that the predicted traffic generation in the weekday morning peak hour under the proposed light industrial zoning would be less than previously assessed for the current heavy industrial zoning. During the weekday evening peak hour, it is predicted that the traffic generation would be slightly higher (35 two-way movements) under the proposed light industrial zoning. In the overall context of the Precinct, the predicted effect of this additional traffic generation, when spread across the surrounding road network, is considered to be negligible.

Notwithstanding this, it is reiterated that current modelled traffic generation rates exclude internalised vehicle movements. Assuming those internalised vehicle movements would be in the order of 10% of the total movements (i.e. around 30 movements), then the overall modelled traffic generation in the weekday evening peak hour would be very similar to typical light industrial land use activities.

4 Summary

In summary, based on the assessment within this note, it is considered that:

- **Sub-Precinct C Traffic Generation** – The traffic generation enabled by the proposed precinct provisions (Mixed Use zoning) would likely be similar or less than has previously been assessed within the traffic modelling for Sub-Precinct C, which has also been significantly reduced in terms of its overall area (from around 20 to 11 hectares)
- **Light Industry Traffic Generation** - The traffic generation enabled by the proposed Light Industrial zoning would likely be similar or less than has previously been assessed within the traffic modelling for this 20 hectare area.

On this basis, it is predicted that the proposed changes in land use zoning for Sub-Precinct C and the 20 hectares of industrial land (east of the Spine Road) will not increase the overall traffic generation that has been previously assessed for the Precinct.

As such, it is unlikely that traffic modelling of the external transport network would identify the need for any additional transport projects than those previously identified within the assessment criteria for the Precinct. Noting that the anticipated completion of the Mill Road Corridor (connecting with SH1) prior to the full development of the Precinct (that was not part of the Precinct infrastructure considered in the previous plan changes), will further assist in satisfactorily addressing the overall transport effects of the Precinct.

Appendix A

High-Level Traffic Generation – Sub-Precinct C

Drury S - Plan Variation - Masterplanning

Original Plan Change Traffic Models

	In	Out	Total
AM Peak (1 Hour)	1221	167	**1388**
PM Peak (1 Hour)	237	1155	**1391**

Comparison to Proposed Precinct Provisions

	Mix 1	Base	Mix 2	Office	Mix 3	Resi	Mix 4	Extra GFA
	AM	PM	AM	PM	AM	PM	AM	PM
Proposed Mixed Use Zoning	746	1,336	769	1,359	725	1,315	793	1,466
Previously Assessed Commercial Sub-Precinct	1,388	1,391	1,388	1,391	1,388	1,391	1,388	1,391
Change	**-642**	**-55**	**-618**	**-32**	**-663**	**-77**	**-595**	**74**
% Change	-46%	-4%	-45%	-2%	-48%	-6%	-43%	5%

Drury S - Plan Variation - Masterplanning

Proposed Precinct Provisions **Mix 1**

Assume 15% discount for linked activities

				Trip Rates / hr		Re-adjusted for Discounting			
		Assume	Rooms / HHs etc	AM	PM	AM		PM	
Land use	**GFA**					**In**	**Out**	**In**	**Out**
Supermarket	5,000			5	15	106	106	319	319
Bulk Retail	5,500			5	5	117	117	117	117
Retail - Assume 75% external attraction only	2,200			3	13	25	25	107	107
Commercial services - Assume ancillary to other activities	2,200								
Office	7,700			1.6	1.6	84	21	21	84
Hotel	0	70m2 GFA / room	0	1	1	0	0	0	0
Residential	13,200	100m2 GFA / HH	132	0.8	0.8	27	63	63	27
Retirement	22,000	100m2 GFA / HH	220	0.3	0.3	28	28	28	28
Total	**57,800**					**383**	**356**	**639**	**666**
						746		**1,336**	

Drury S - Plan Variation - Masterplanning

Proposed Precinct Provisions **Mix 2**

Assume 15% discount for linked activities

				Trip Rates / hr		Re-adjusted for Discounting			
		Assume	Rooms / HHs etc	AM	PM	AM		PM	
Land use	**GFA**					**In**	**Out**	**In**	**Out**
Supermarket	5,000			5	15	106	106	319	319
Bulk Retail	5,500			5	5	117	117	117	117
Retail - Assume 75% external attraction only	2,200			3	13	25	25	107	107
Commercial services - Assume ancillary to other activities	2,200								
Office	11,600			1.6	1.6	126	32	32	126
Hotel	0	70m2 GFA / room	0	1	1	0	0	0	0
Residential	8,800	100m2 GFA / HH	88	0.8	0.8	18	42	42	18
Retirement	22,000	100m2 GFA / HH	220	0.3	0.3	28	28	28	28
Total	**57,300**					**416**	**346**	**628**	**699**
						769		**1,359**	

Drury S - Plan Variation - Masterplanning

Proposed Precinct Provisions **Mix 3**

Assume 15% discount for linked activities

				Trip Rates / hr		Re-adjusted for Discounting			
		Assume	Rooms / HHs etc	AM	PM	AM		PM	
Land use	**GFA**					**In**	**Out**	**In**	**Out**
Supermarket	5,000			5	15	106	106	319	319
Bulk Retail	5,500			5	5	117	117	117	117
Retail - Assume 75% external attraction only	2,200			3	13	25	25	107	107
Commercial services - Assume ancillary to other activities	2,200								
Office	3,900			1.6	1.6	42	11	11	42
Hotel	0	70m2 GFA / room	0	1	1	0	0	0	0
Residential	17,600	100m2 GFA / HH	176	0.8	0.8	36	84	84	36
Retirement	22,000	100m2 GFA / HH	220	0.3	0.3	28	28	28	28
Total	**58,400**					**351**	**367**	**649**	**633**
						725		**1,315**	

Drury S - Plan Variation - Masterplanning

Proposed Precinct Provisions **Mix 4**

Assume 15% discount for linked activities

				Trip Rates / hr		Re-adjusted for Discounting			
		Assume	Rooms / HHs etc	AM	PM	AM		PM	
Land use	**GFA**					**In**	**Out**	**In**	**Out**
Supermarket	5,000			5	15	106	106	319	319
Bulk Retail	5,500			5	5	117	117	117	117
Retail - Assume 75% external attraction only	3,300			3	13	37	37	161	161
Commercial services - Assume ancillary to other activities	3,300								
Office	9,600			1.6	1.6	104	26	26	104
Hotel	0	70m2 GFA / room	0	1	1	0	0	0	0
Residential	11,000	100m2 GFA / HH	110	0.8	0.8	22	52	52	22
Retirement	26,400	100m2 GFA / HH	264	0.3	0.3	34	34	34	34
Total	**64,100**					**415**	**367**	**685**	**733**
						793		**1,466**	

Appendix B

Predicted Traffic Generation – Light Industrial Area

Drury S - Plan Variation - Masterplanning

Light vs Heavy Comparison

Previous Drury South Industrial Trip Rates

Source: Drury Traffic Models

	Trip Rate / Hectare		Assumptions
	AM	PM	20 hectares
Heavy Industrial	15.0	15.7	
Light Industrial	15.0	15.7	
Predicted Trips	**300**	**314**	

Light Industrial Trip Rates

Source: NZ Trips and Parking Database 2018

	Trip Rates (per 100m2 GFA)		Proposed Development		Predicted Trips	Assumptions
AM	0.61	per 100m2	39,000	m2	**240**	30 employees per hectare
PM	0.89	per 100m2	39,000	m2	**349**	65 m2 per employee
	site development ratio =		20%	GFA vs Site Area		

B

Appendix B – Transport Network Modelling Assumptions

Infrastructure	2026 without Mill Road Corridor	2026 with Mill Road Corridor
Road 1 to Intersection 2	✓	✓
Roads 2E, 2W, 4, 6, 7	✓	✓
Road 1A & 3	✓	✓
Road 5	✓	✓
Quarry Road (urban 60kph)	✓	✓
Road 1B (to Link Rd or Mill Road Corridor)	✓	✓
Great South Rd/Quarry Rd roundabout	✓	✓
SH22/Great South Road signals	✓	✓
Quarry access on Road 2E	✓	✓
Mill Road (Fitzgerald Rd to Great South Rd)	×	✓
Mill Road to Papakura	×	✓
Mill Road to Pukekohe	×	×
SH1 Ramps at Mill Road Corridor	×	✓
Ramarama Rd to Ararimu Rd link	×	×
Ramarama Rd to Fitzgerald Rd link	×	×
Development Staging	Full Development	Full Development

C

Appendix C – Intersection 1 Modelling Outputs

2026 Without Mill Road Corridor

With E-W link

Full Drury South Precinct Development

With All Pedestrian Crossings

AM and PM Models

MOVEMENT SUMMARY

Site: 101 [2026 AM - Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	1.5	0.354	48.5	LOS D	5.3	38.1	0.92	0.74	1.26	31.0
2	T1	239	4.0	0.354	41.6	LOS D	5.3	38.1	0.92	0.74	1.09	31.9
3	R2	31	2.2	0.106	43.8	LOS D	1.3	9.4	0.89	0.71	0.89	31.2
Approach		271	3.8	0.354	41.9	LOS D	5.3	38.1	0.92	0.74	1.07	31.8
East: Road5												
4	L2	29	2.5	0.050	16.7	LOS B	0.5	3.6	0.70	0.67	0.70	40.5
5	T1	1	9.3	0.050	12.1	LOS B	0.5	3.6	0.70	0.67	0.70	40.8
6	R2	43	11.0	0.059	38.8	LOS D	0.8	6.4	0.83	0.69	0.83	32.4
Approach		73	7.6	0.059	29.6	LOS C	0.8	6.4	0.77	0.68	0.77	35.3
North: Road1B												
7	L2	140	15.5	0.195	23.7	LOS C	4.2	33.5	0.66	0.72	0.66	37.4
8	T1	246	12.6	0.757	45.5	LOS D	12.2	94.6	1.00	0.91	1.11	30.8
9	R2	212	15.6	0.792	53.7	LOS D	10.9	86.9	1.00	0.92	1.18	28.7
Approach		597	14.3	0.792	43.3	LOS D	12.2	94.6	0.92	0.87	1.03	31.3
West: Road3												
10	L2	271	12.4	0.388	26.9	LOS C	9.3	71.8	0.75	0.77	0.75	36.2
11	T1	9	9.6	0.024	33.6	LOS C	0.4	2.7	0.82	0.56	0.82	34.3
12	R2	1	7.0	0.003	37.7	LOS D	0.0	0.3	0.81	0.59	0.81	32.8
Approach		281	12.3	0.388	27.2	LOS C	9.3	71.8	0.75	0.76	0.75	36.1
All Vehicles		1223	11.1	0.792	38.5	LOS D	12.2	94.6	0.87	0.80	0.96	32.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	44.2	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	32	44.2	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	32	44.2	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	32	44.2	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		126	44.2	LOS E			0.94	0.94

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: 101 [2026 AM - Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

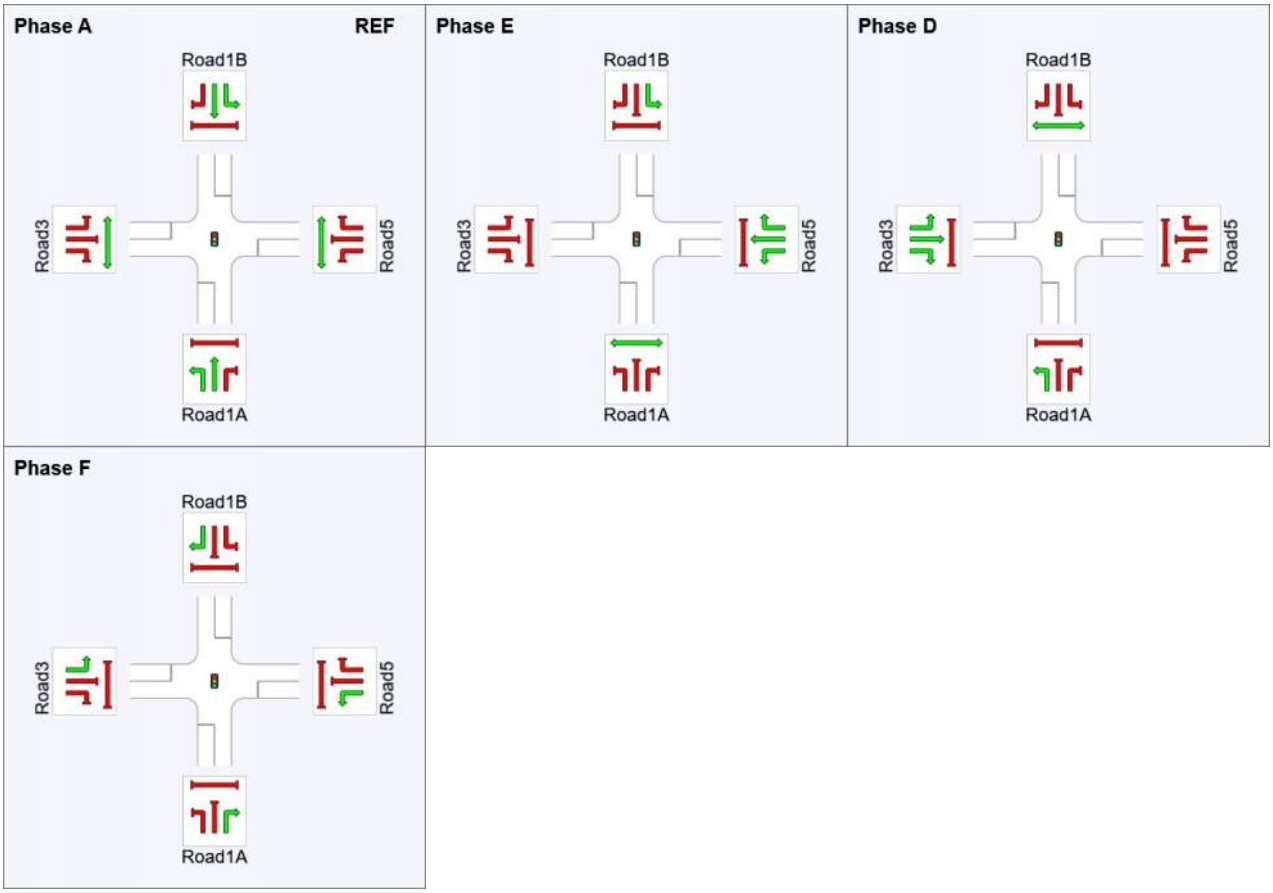
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, E, D, F
Output Phase Sequence: A, E, D, F

Phase Timing Summary

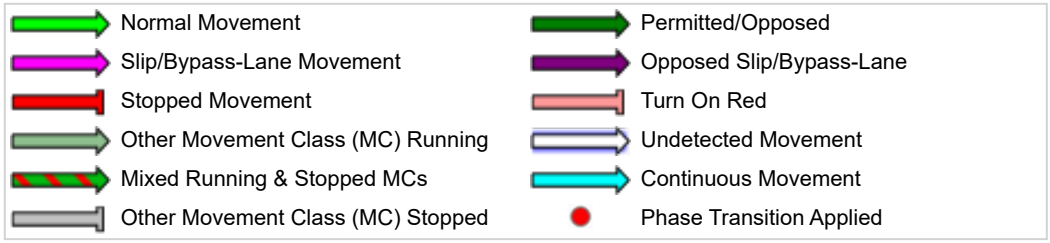
Phase	A	E	D	F
Phase Change Time (sec)	0	24	51	78
Green Time (sec)	18	21	21	16
Phase Time (sec)	24	27	27	22
Phase Split	24%	27%	27%	22%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:17:01 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

MOVEMENT SUMMARY

Site: 101 [2026 PM - Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	2.9	0.278	69.5	LOS E	3.7	27.8	0.95	0.74	1.35	26.3
2	T1	124	10.0	0.278	60.9	LOS E	3.7	28.1	0.95	0.74	1.15	27.3
3	R2	20	2.9	0.050	46.9	LOS D	1.0	7.2	0.81	0.69	0.81	30.4
Approach		146	9.0	0.278	59.0	LOS E	3.7	28.1	0.93	0.73	1.10	27.7
East: Road5												
4	L2	29	2.0	0.072	26.2	LOS C	1.0	7.5	0.78	0.68	0.78	36.7
5	T1	4	8.9	0.072	21.6	LOS C	1.0	7.5	0.78	0.68	0.78	37.0
6	R2	358	15.0	0.661	61.5	LOS E	11.0	86.8	0.99	0.83	1.01	27.0
Approach		391	14.0	0.661	58.4	LOS E	11.0	86.8	0.97	0.82	0.99	27.6
North: Road1B												
7	L2	174	13.4	0.222	26.9	LOS C	6.5	50.8	0.64	0.73	0.64	36.2
8	T1	153	4.3	0.299	40.5	LOS D	7.7	55.7	0.84	0.69	0.84	32.2
9	R2	442	12.1	0.799	32.7	LOS C	18.9	145.9	0.97	0.89	1.03	34.4
Approach		768	10.8	0.799	33.0	LOS C	18.9	145.9	0.87	0.81	0.90	34.3
West: Road3												
10	L2	446	15.6	0.531	16.3	LOS B	10.3	82.0	0.71	0.77	0.71	40.5
11	T1	19	9.4	0.063	49.7	LOS D	1.0	7.7	0.88	0.63	0.88	29.8
12	R2	2	9.5	0.006	53.3	LOS D	0.1	0.7	0.86	0.61	0.86	28.8
Approach		467	15.3	0.531	17.8	LOS B	10.3	82.0	0.71	0.77	0.71	39.8
All Vehicles		1772	12.6	0.799	36.7	LOS D	18.9	145.9	0.86	0.79	0.89	33.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	59.2	LOS E	0.1	0.1	0.96	0.96
P2	East Full Crossing	32	59.2	LOS E	0.1	0.1	0.96	0.96
P3	North Full Crossing	32	59.2	LOS E	0.1	0.1	0.96	0.96
P4	West Full Crossing	32	59.2	LOS E	0.1	0.1	0.96	0.96
All Pedestrians		126	59.2	LOS E			0.96	0.96

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: 101 [2026 PM - Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

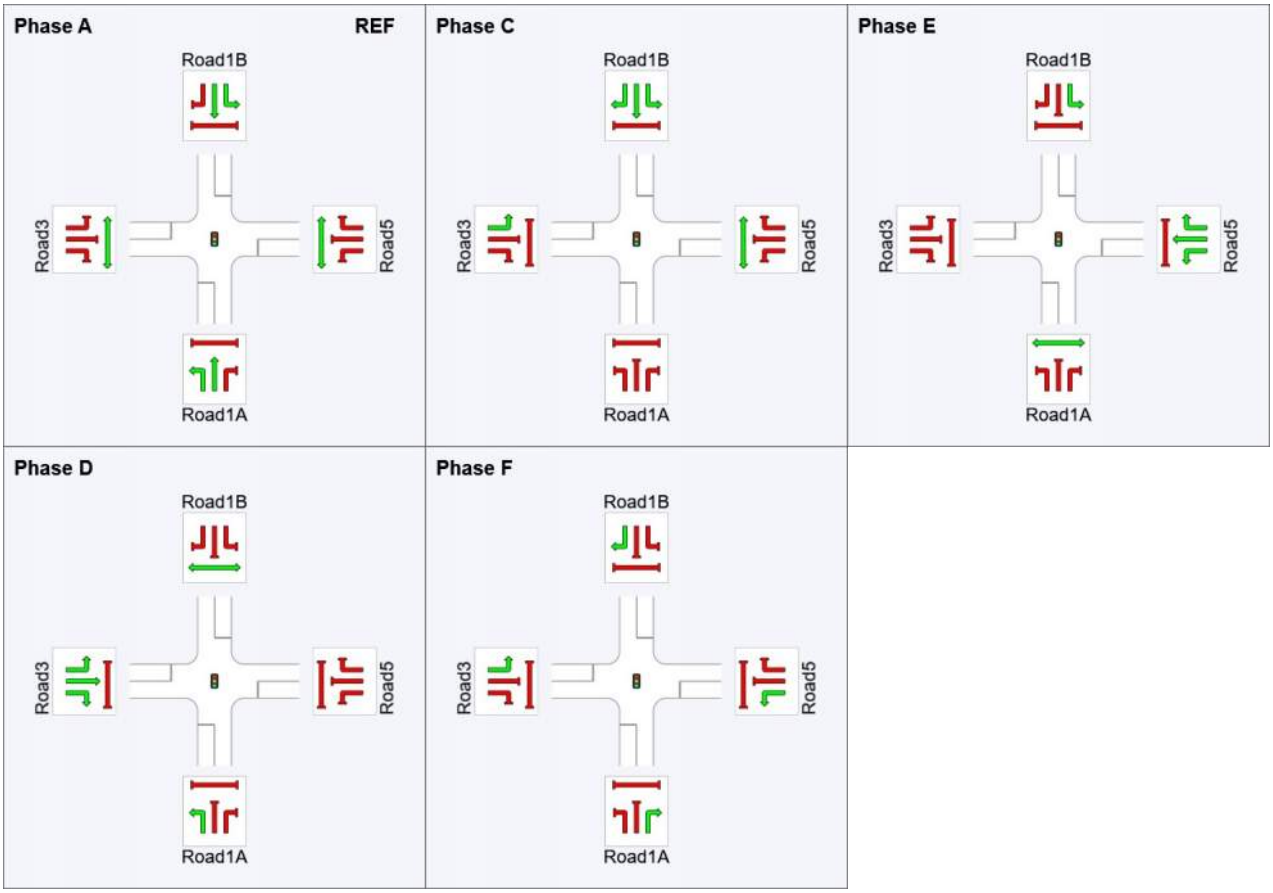
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, C, E, D, F
Output Phase Sequence: A, C, E, D, F

Phase Timing Summary

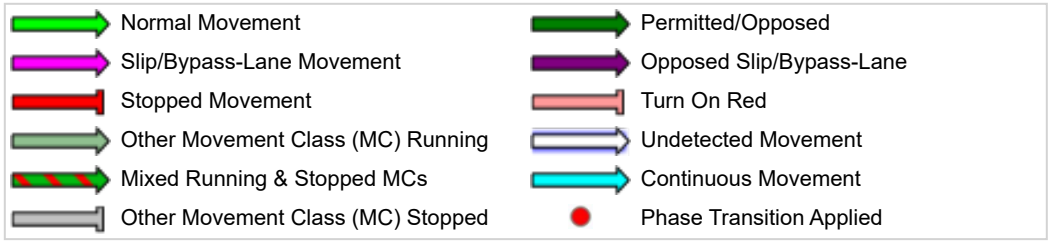
Phase	A	C	E	D	F
Phase Change Time (sec)	0	22	41	68	95
Green Time (sec)	16	13	21	21	29
Phase Time (sec)	22	19	27	27	35
Phase Split	17%	15%	21%	21%	27%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:17:10 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

2026 Without Mill Road Corridor

With E-W Link

Full Drury South Precinct Development

Without Pedestrian Crossings

AM and PM Models

MOVEMENT SUMMARY

Site: 101 [2026 AM - No Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	1.5	0.316	29.7	LOS C	3.1	22.5	0.90	0.72	1.21	36.9
2	T1	239	4.0	0.316	24.0	LOS C	3.1	22.6	0.90	0.71	1.05	37.6
3	R2	31	2.2	0.085	26.2	LOS C	0.8	5.4	0.84	0.70	0.84	36.7
Approach		271	3.8	0.316	24.3	LOS C	3.1	22.6	0.89	0.71	1.03	37.5
East: Road5												
4	L2	29	2.5	0.058	13.7	LOS B	0.4	2.9	0.75	0.67	0.75	41.8
5	T1	1	9.3	0.058	9.2	LOS A	0.4	2.9	0.75	0.67	0.75	42.2
6	R2	43	11.0	0.124	33.0	LOS C	0.6	4.7	0.94	0.70	0.94	34.2
Approach		73	7.6	0.124	25.0	LOS C	0.6	4.7	0.86	0.68	0.86	37.0
North: Road1B												
7	L2	140	15.5	0.210	17.6	LOS B	2.7	21.7	0.69	0.72	0.69	39.9
8	T1	246	12.6	0.681	26.2	LOS C	7.2	56.0	0.98	0.87	1.07	36.8
9	R2	212	15.6	0.633	30.2	LOS C	6.1	48.4	0.97	0.84	1.03	35.2
Approach		597	14.3	0.681	25.6	LOS C	7.2	56.0	0.91	0.82	0.97	36.9
West: Road3												
10	L2	271	12.4	0.397	18.8	LOS B	5.8	44.8	0.76	0.77	0.76	39.4
11	T1	9	9.6	0.050	27.7	LOS C	0.3	2.0	0.93	0.62	0.93	36.3
12	R2	1	7.0	0.006	31.7	LOS C	0.0	0.2	0.92	0.59	0.92	34.7
Approach		281	12.3	0.397	19.1	LOS B	5.8	44.8	0.76	0.76	0.76	39.3
All Vehicles		1223	11.1	0.681	23.8	LOS C	7.2	56.0	0.87	0.78	0.93	37.6

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

PHASING SUMMARY

Site: 101 [2026 AM - No Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

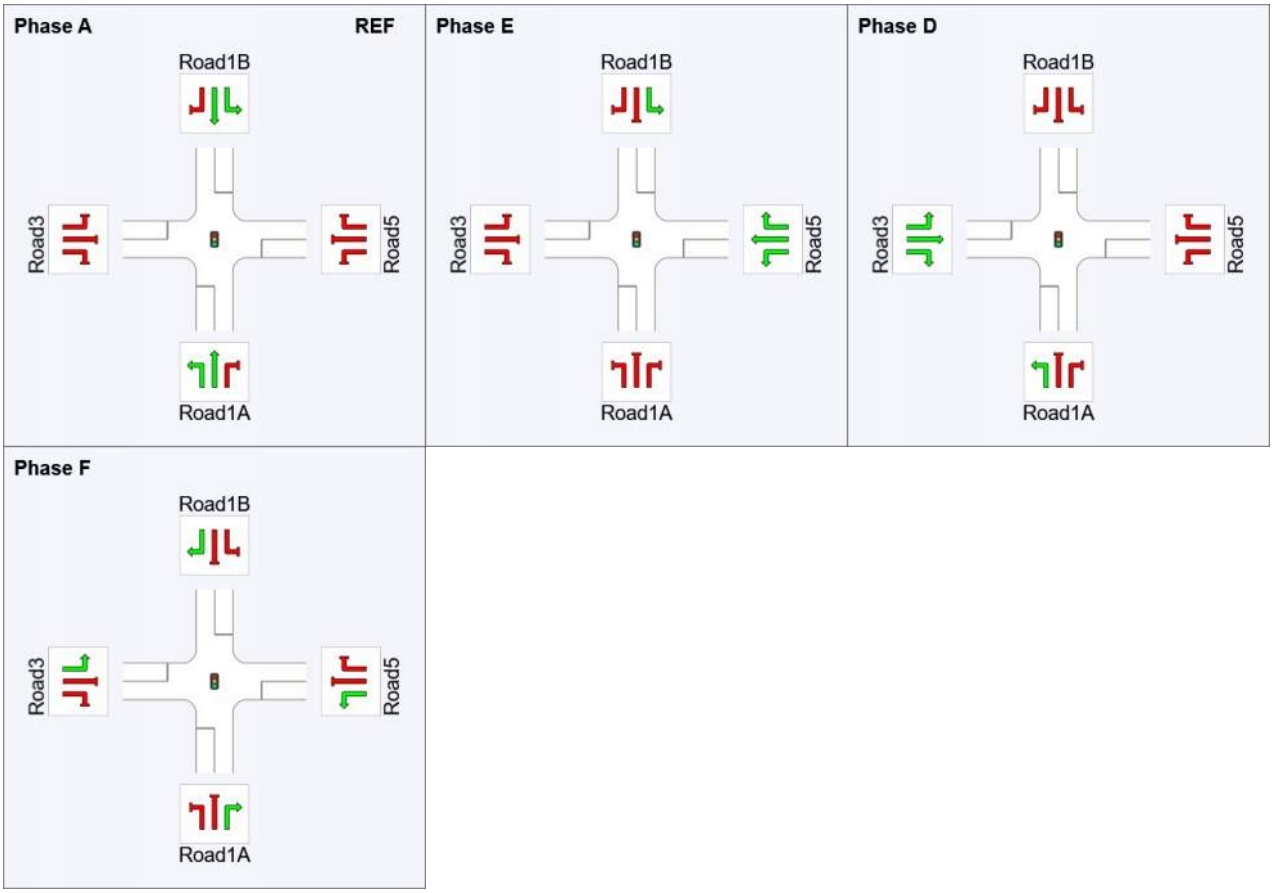
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, E, D, F
Output Phase Sequence: A, E, D, F

Phase Timing Summary

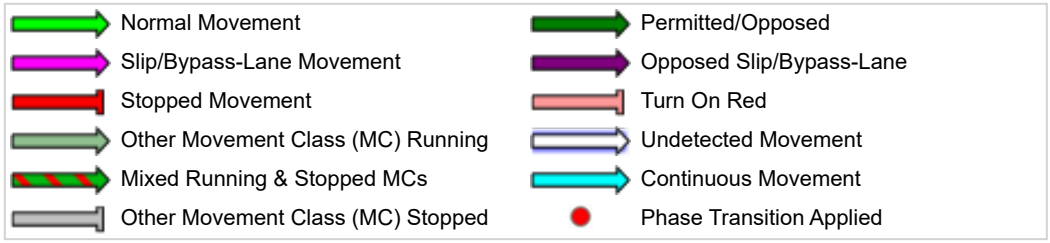
Phase	A	E	D	F
Phase Change Time (sec)	0	18	30	42
Green Time (sec)	12	6	6	12
Phase Time (sec)	18	12	12	18
Phase Split	30%	20%	20%	30%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:18:33 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

MOVEMENT SUMMARY

Site: 101 [2026 PM - No Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	2.9	0.455	52.2	LOS D	2.5	19.0	1.00	0.77	1.47	30.1
2	T1	124	10.0	0.455	44.4	LOS D	2.5	19.2	1.00	0.76	1.23	31.1
3	R2	20	2.9	0.049	30.9	LOS C	0.6	4.5	0.81	0.68	0.81	35.0
Approach		146	9.0	0.455	42.6	LOS D	2.5	19.2	0.97	0.75	1.18	31.6
East: Road5												
4	L2	29	2.0	0.066	18.2	LOS B	0.7	4.9	0.77	0.67	0.77	39.9
5	T1	4	8.9	0.066	13.6	LOS B	0.7	4.9	0.77	0.67	0.77	40.2
6	R2	358	15.0	0.777	45.7	LOS D	7.6	59.7	1.00	0.92	1.22	30.5
Approach		391	14.0	0.777	43.4	LOS D	7.6	59.7	0.98	0.90	1.19	31.2
North: Road1B												
7	L2	174	13.4	0.216	17.9	LOS B	4.0	30.9	0.62	0.72	0.62	39.8
8	T1	153	4.3	0.307	25.9	LOS C	4.9	35.3	0.85	0.69	0.85	36.9
9	R2	442	12.1	0.765	21.9	LOS C	11.5	88.9	0.95	0.89	1.04	38.3
Approach		768	10.8	0.765	21.8	LOS C	11.5	88.9	0.86	0.81	0.90	38.3
West: Road3												
10	L2	446	15.6	0.548	12.9	LOS B	6.9	55.1	0.75	0.78	0.75	42.0
11	T1	19	9.4	0.136	39.6	LOS D	0.7	5.5	0.96	0.67	0.96	32.5
12	R2	2	9.5	0.013	42.9	LOS D	0.1	0.5	0.94	0.60	0.94	31.3
Approach		467	15.3	0.548	14.1	LOS B	6.9	55.1	0.76	0.78	0.76	41.5
All Vehicles		1772	12.6	0.777	26.2	LOS C	11.5	88.9	0.87	0.81	0.95	36.6

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

PHASING SUMMARY

Site: 101 [2026 PM - No Ped X noMill + E-W link]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

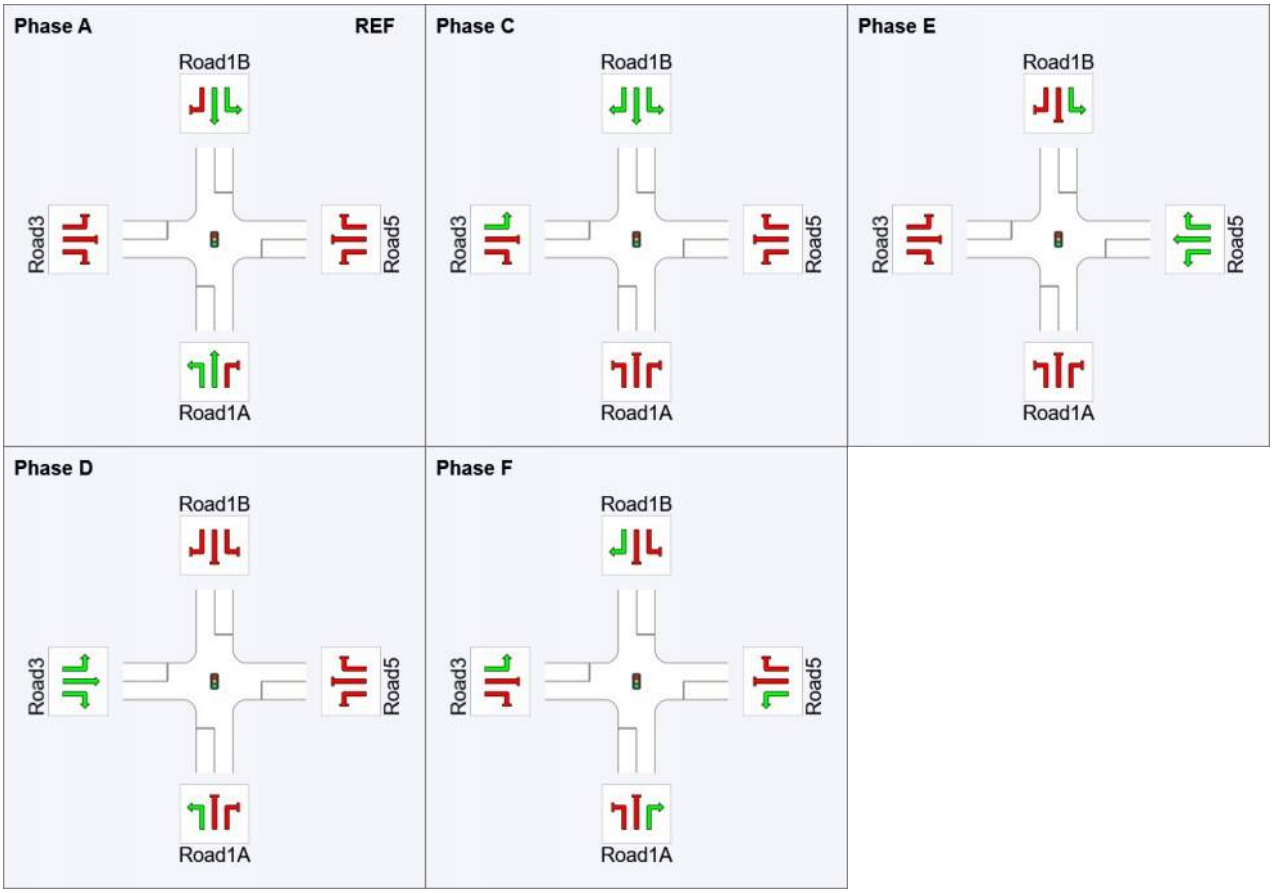
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, C, E, D, F
Output Phase Sequence: A, C, E, D, F

Phase Timing Summary

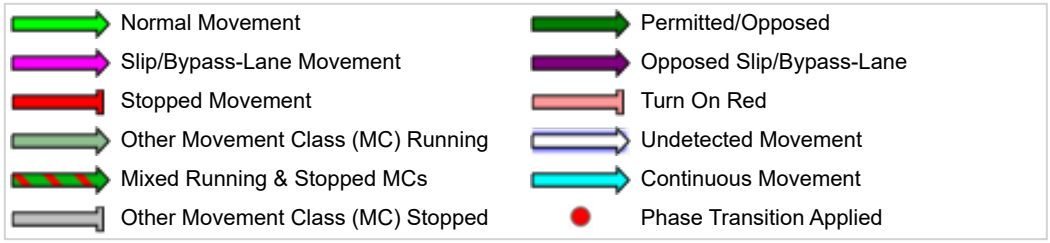
Phase	A	C	E	D	F
Phase Change Time (sec)	0	12	27	44	56
Green Time (sec)	6	9	11	6	18
Phase Time (sec)	12	15	17	12	24
Phase Split	15%	19%	21%	15%	30%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:25:02 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

2026 With Mill Road Corridor

With E-W Link and left out

Full Drury South Precinct Development

With All Pedestrian Crossings

AM and PM Models

MOVEMENT SUMMARY

Site: 101 [2026 AM - Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	1.5	0.527	56.7	LOS E	7.5	53.6	0.97	0.79	1.28	29.0
2	T1	281	3.1	0.527	50.0	LOS D	7.5	53.6	0.97	0.78	1.13	29.7
3	R2	36	1.9	0.078	38.0	LOS D	1.5	10.5	0.79	0.70	0.79	32.8
Approach		319	3.0	0.527	48.7	LOS D	7.5	53.6	0.95	0.77	1.09	30.0
East: Road5												
4	L2	9	2.7	0.020	20.0	LOS C	0.2	1.6	0.74	0.63	0.74	39.2
5	T1	1	9.5	0.020	15.5	LOS B	0.2	1.6	0.74	0.63	0.74	39.5
6	R2	65	26.2	0.108	44.9	LOS D	1.5	12.5	0.86	0.71	0.86	30.7
Approach		75	23.1	0.108	41.4	LOS D	1.5	12.5	0.84	0.70	0.84	31.7
North: Road1B												
7	L2	287	20.9	0.477	33.1	LOS C	11.8	97.3	0.81	0.80	0.81	34.1
8	T1	142	17.3	0.556	48.6	LOS D	7.3	58.7	0.98	0.79	0.98	30.1
9	R2	318	13.3	0.737	47.3	LOS D	16.3	127.5	0.98	0.87	1.03	30.2
Approach		747	17.0	0.737	42.1	LOS D	16.3	127.5	0.91	0.83	0.94	31.6
West: Road3												
10	L2	195	10.3	0.233	22.4	LOS C	6.0	45.9	0.62	0.72	0.62	37.9
11	T1	10	9.6	0.029	38.8	LOS D	0.4	3.4	0.84	0.58	0.84	32.7
12	R2	1	7.0	0.003	42.8	LOS D	0.0	0.4	0.83	0.59	0.83	31.3
Approach		206	10.2	0.233	23.3	LOS C	6.0	45.9	0.63	0.71	0.63	37.6
All Vehicles		1347	13.0	0.737	40.7	LOS D	16.3	127.5	0.88	0.79	0.92	32.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	49.2	LOS E	0.1	0.1	0.95	0.95
P2	East Full Crossing	32	49.2	LOS E	0.1	0.1	0.95	0.95
P3	North Full Crossing	32	49.2	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	32	49.2	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		126	49.2	LOS E			0.95	0.95

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: 101 [2026 AM - Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

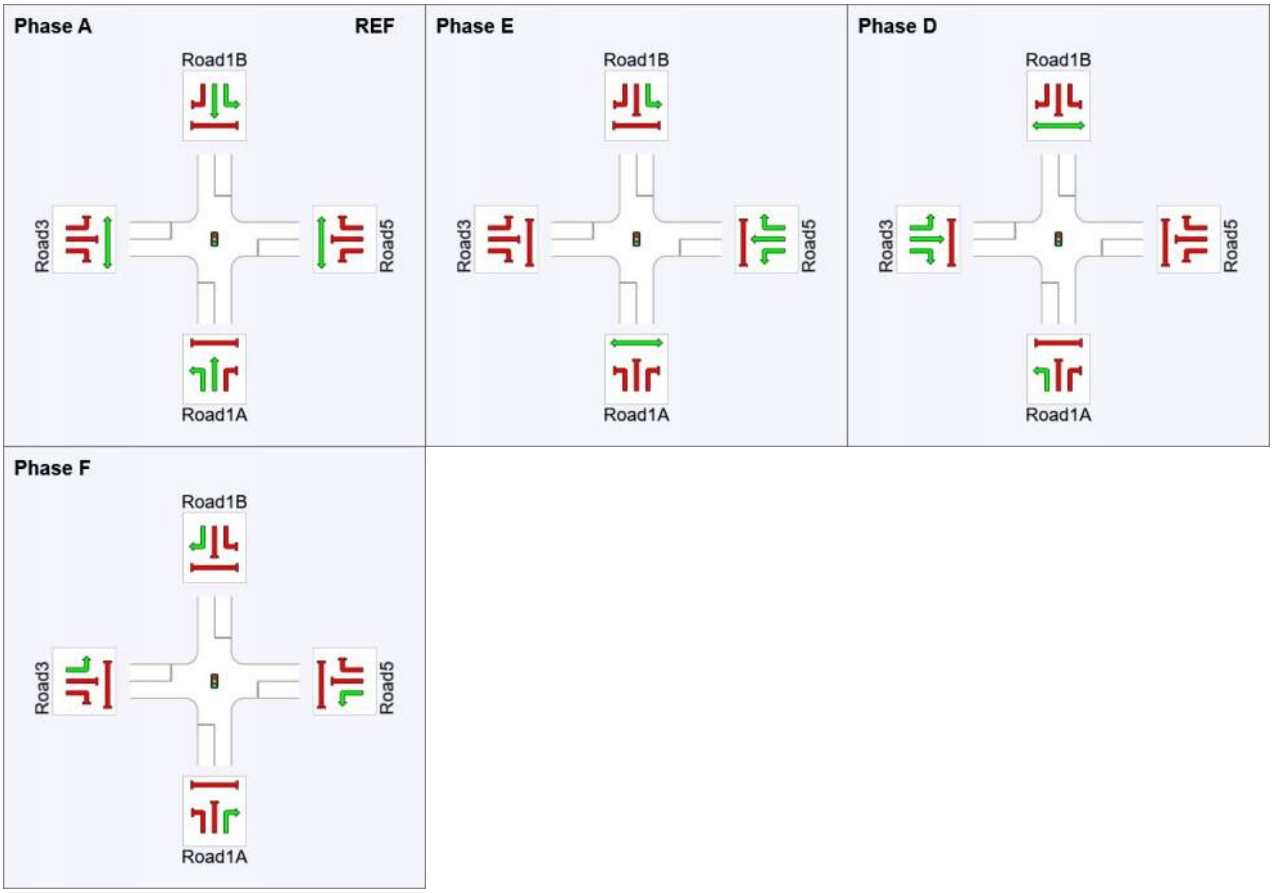
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, E, D, F
Output Phase Sequence: A, E, D, F

Phase Timing Summary

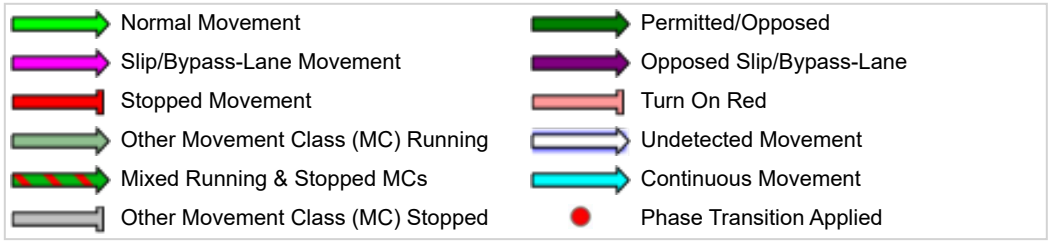
Phase	A	E	D	F
Phase Change Time (sec)	0	22	49	76
Green Time (sec)	16	21	21	28
Phase Time (sec)	22	27	27	34
Phase Split	20%	25%	25%	31%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:38:14 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

MOVEMENT SUMMARY

Site: 101 [2026 PM - Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 125 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	2.9	0.463	69.8	LOS E	6.3	47.7	0.97	0.79	1.41	26.3
2	T1	215	8.9	0.463	60.5	LOS E	6.3	47.7	0.97	0.78	1.19	27.4
3	R2	12	4.1	0.038	50.4	LOS D	0.6	4.4	0.86	0.67	0.86	29.5
Approach		228	8.6	0.463	60.0	LOS E	6.3	47.7	0.97	0.77	1.18	27.5
East: Road5												
4	L2	28	2.1	0.243	40.5	LOS D	3.6	25.6	0.89	0.73	0.99	32.9
5	T1	58	0.7	0.243	35.9	LOS D	3.6	25.6	0.89	0.73	0.99	33.1
6	R2	530	13.7	0.851	66.4	LOS E	17.4	136.4	1.00	0.94	1.20	26.1
Approach		616	11.9	0.851	62.4	LOS E	17.4	136.4	0.98	0.91	1.17	26.8
North: Road1B												
7	L2	258	14.4	0.308	24.6	LOS C	9.2	72.5	0.64	0.74	0.64	37.1
8	T1	426	6.9	0.816	49.4	LOS D	25.8	191.5	1.00	0.94	1.08	29.8
9	R2	367	13.5	0.774	33.3	LOS C	15.3	119.7	0.98	0.88	1.04	34.2
Approach		1051	11.1	0.816	37.7	LOS D	25.8	191.5	0.90	0.87	0.96	32.9
West: Road3												
10	L2	354	11.9	0.431	16.6	LOS B	8.0	62.0	0.70	0.76	0.70	40.4
11	T1	19	9.3	0.063	47.1	LOS D	1.0	7.5	0.87	0.63	0.87	30.5
12	R2	2	9.5	0.006	50.7	LOS D	0.1	0.7	0.85	0.61	0.85	29.4
Approach		376	11.8	0.431	18.3	LOS B	8.0	62.0	0.71	0.75	0.71	39.6
All Vehicles		2270	11.2	0.851	43.4	LOS D	25.8	191.5	0.90	0.85	1.00	31.2

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	56.7	LOS E	0.1	0.1	0.95	0.95
P2	East Full Crossing	32	56.7	LOS E	0.1	0.1	0.95	0.95
P3	North Full Crossing	32	56.7	LOS E	0.1	0.1	0.95	0.95
P4	West Full Crossing	32	56.7	LOS E	0.1	0.1	0.95	0.95
All Pedestrians		126	56.7	LOS E			0.95	0.95

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: 101 [2026 PM - Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 125 seconds (Site Optimum Cycle Time - Minimum Delay)

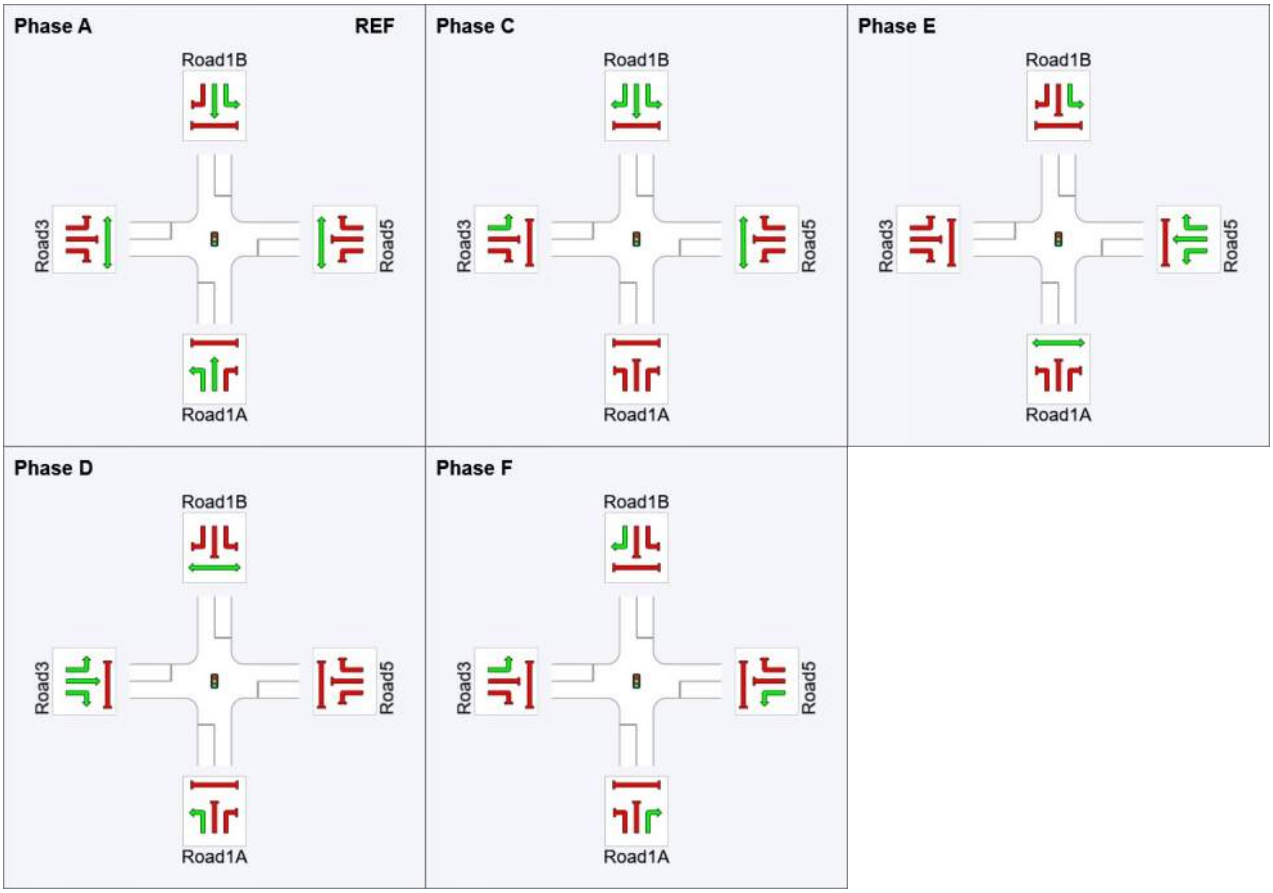
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, C, E, D, F
Output Phase Sequence: A, C, E, D, F

Phase Timing Summary

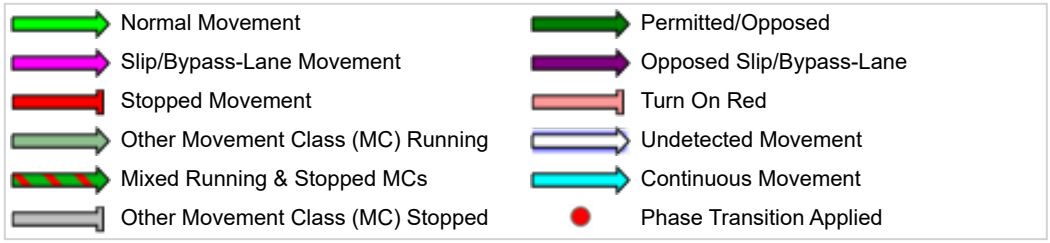
Phase	A	C	E	D	F
Phase Change Time (sec)	0	22	41	70	97
Green Time (sec)	16	13	23	21	22
Phase Time (sec)	22	19	29	27	28
Phase Split	18%	15%	23%	22%	22%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:38:24 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

2026 With Mill Road Corridor

With E-W Link and left out

Full Drury South Precinct Development

Without Pedestrian Crossings

AM and PM Models

MOVEMENT SUMMARY

Site: 101 [2026 AM - No Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	1.5	0.632	36.6	LOS D	4.3	31.0	1.00	0.85	1.41	34.5
2	T1	281	3.1	0.632	30.9	LOS C	4.3	31.0	1.00	0.84	1.26	35.1
3	R2	36	1.9	0.070	21.7	LOS C	0.8	5.6	0.76	0.69	0.76	38.4
Approach		319	3.0	0.632	29.9	LOS C	4.3	31.0	0.97	0.82	1.20	35.5
East: Road5												
4	L2	9	2.7	0.022	14.0	LOS B	0.1	1.0	0.76	0.63	0.76	41.9
5	T1	1	9.5	0.022	9.5	LOS A	0.1	1.0	0.76	0.63	0.76	42.2
6	R2	65	26.2	0.207	33.8	LOS C	0.9	8.1	0.95	0.72	0.95	33.9
Approach		75	23.1	0.207	31.0	LOS C	0.9	8.1	0.93	0.70	0.93	34.8
North: Road1B												
7	L2	287	20.9	0.561	23.7	LOS C	7.2	59.8	0.88	0.81	0.88	37.3
8	T1	142	17.3	0.693	30.9	LOS C	4.5	35.8	1.00	0.88	1.18	35.2
9	R2	318	13.3	0.662	26.5	LOS C	8.7	68.1	0.94	0.85	0.98	36.5
Approach		747	17.0	0.693	26.3	LOS C	8.7	68.1	0.93	0.84	0.98	36.6
West: Road3												
10	L2	195	10.3	0.233	14.5	LOS B	3.3	25.5	0.62	0.71	0.62	41.3
11	T1	10	9.6	0.056	27.8	LOS C	0.3	2.2	0.93	0.63	0.93	36.3
12	R2	1	7.0	0.006	31.7	LOS C	0.0	0.2	0.92	0.59	0.92	34.7
Approach		206	10.2	0.233	15.2	LOS B	3.3	25.5	0.63	0.71	0.63	41.0
All Vehicles		1347	13.0	0.693	25.7	LOS C	8.7	68.1	0.89	0.81	0.98	36.8

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

PHASING SUMMARY

Site: 101 [2026 AM - No Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

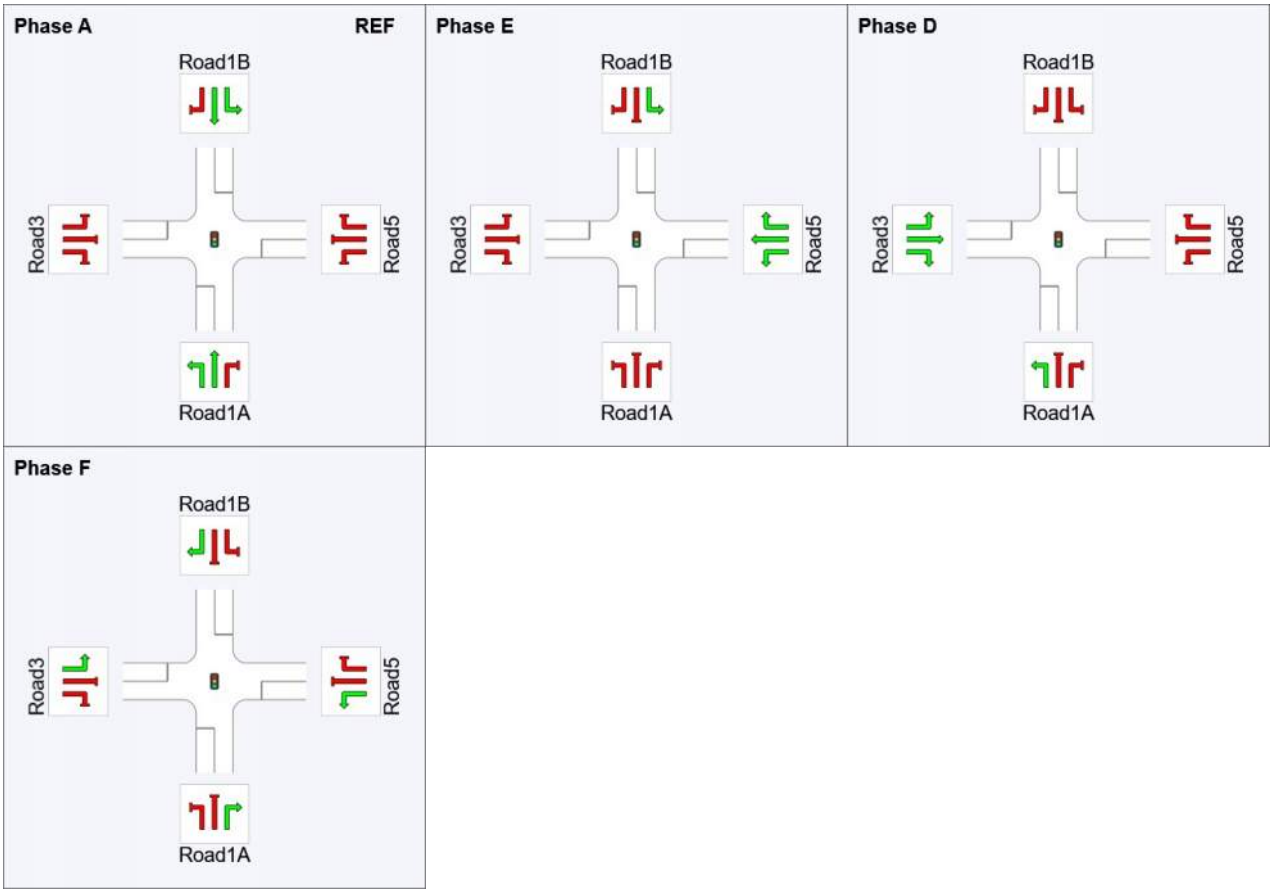
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, E, D, F
Output Phase Sequence: A, E, D, F

Phase Timing Summary

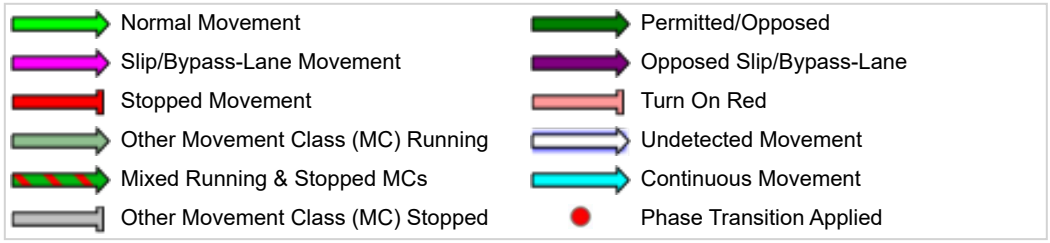
Phase	A	E	D	F
Phase Change Time (sec)	0	13	25	37
Green Time (sec)	7	6	6	17
Phase Time (sec)	13	12	12	23
Phase Split	22%	20%	20%	38%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:38:34 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

MOVEMENT SUMMARY

Site: 101 [2026 PM - No Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road1A												
1	L2	1	2.9	0.553	54.6	LOS D	4.5	33.8	0.99	0.80	1.53	29.5
2	T1	215	8.9	0.553	45.6	LOS D	4.5	33.9	0.99	0.79	1.26	30.8
3	R2	12	4.1	0.040	37.2	LOS D	0.4	3.1	0.87	0.67	0.87	33.0
Approach		228	8.6	0.553	45.2	LOS D	4.5	33.9	0.99	0.78	1.24	30.9
East: Road5												
4	L2	28	2.1	0.214	23.7	LOS C	2.2	15.5	0.86	0.69	0.86	38.7
5	T1	58	0.7	0.214	19.1	LOS B	2.2	15.5	0.86	0.69	0.86	39.0
6	R2	530	13.7	0.783	44.1	LOS D	11.5	90.2	1.00	0.92	1.17	31.0
Approach		616	11.9	0.783	40.9	LOS D	11.5	90.2	0.98	0.89	1.13	31.9
North: Road1B												
7	L2	258	14.4	0.277	15.4	LOS B	5.6	44.1	0.56	0.71	0.56	40.9
8	T1	426	6.9	0.809	35.3	LOS D	18.2	135.0	0.99	0.97	1.13	33.7
9	R2	367	13.5	0.801	27.0	LOS C	11.1	86.6	0.99	0.92	1.14	36.3
Approach		1051	11.1	0.809	27.6	LOS C	18.2	135.0	0.89	0.89	0.99	36.2
West: Road3												
10	L2	354	11.9	0.503	15.3	LOS B	6.4	49.7	0.79	0.78	0.79	40.9
11	T1	19	9.3	0.150	42.5	LOS D	0.8	6.1	0.97	0.68	0.97	31.7
12	R2	2	9.5	0.014	45.7	LOS D	0.1	0.5	0.95	0.60	0.95	30.6
Approach		376	11.8	0.503	16.9	LOS B	6.4	49.7	0.80	0.78	0.80	40.2
All Vehicles		2270	11.2	0.809	31.2	LOS C	18.2	135.0	0.91	0.86	1.02	34.9

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

Site: 101 [2026 PM - No Ped X FullDev + E-W link + left out]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site Optimum Cycle Time - Minimum Delay)

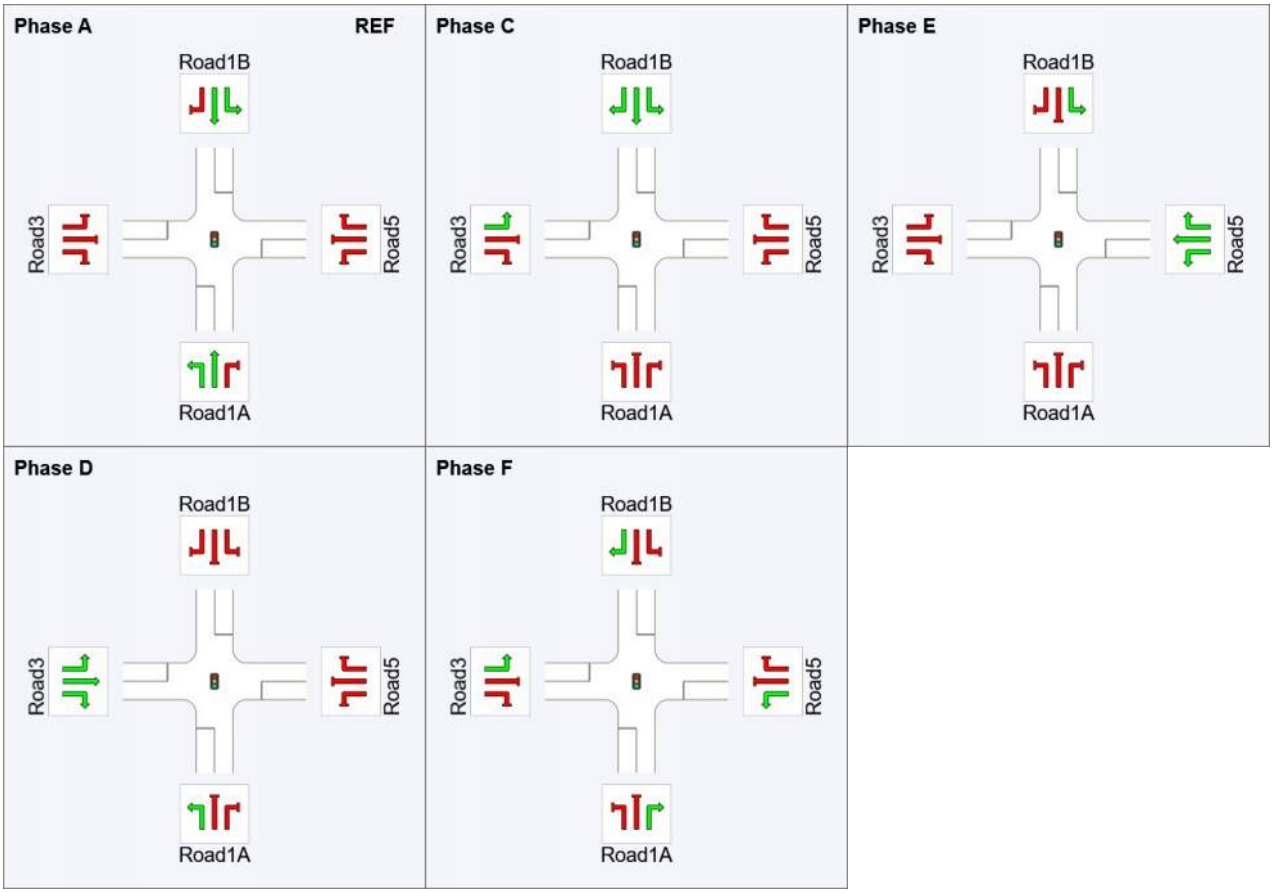
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Single diamond
Reference Phase: Phase A
Input Phase Sequence: A, C, E, D, F
Output Phase Sequence: A, C, E, D, F

Phase Timing Summary

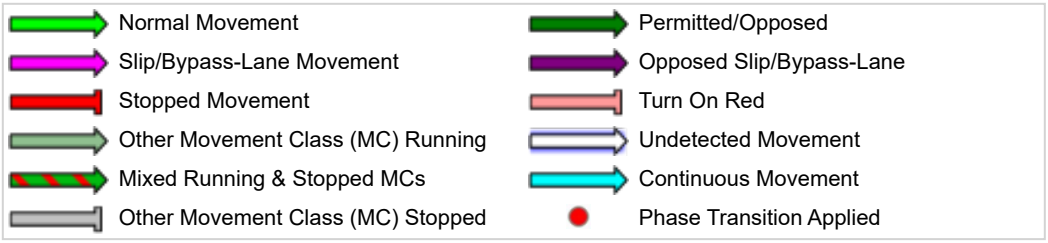
Phase	A	C	E	D	F
Phase Change Time (sec)	0	15	30	53	65
Green Time (sec)	9	9	17	6	14
Phase Time (sec)	15	15	23	12	20
Phase Split	18%	18%	27%	14%	24%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 11 November 2019 2:38:46 PM
Project: \\Beca.net\projects\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I1-SingleDiamond.sip8

D

Appendix D – Intersection 2 Modelling Outputs

MOVEMENT SUMMARY

Site: 101 [I2 2026 AM - Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	247	4.2	0.824	53.2	LOS D	12.6	91.0	1.00	0.92	1.22	36.2
2	T1	272	1.1	0.824	47.2	LOS D	13.4	94.5	1.00	0.95	1.21	40.1
3	R2	436	6.4	0.864	49.3	LOS D	22.2	163.9	1.00	0.96	1.21	37.0
Approach		955	4.3	0.864	49.7	LOS D	22.2	163.9	1.00	0.95	1.21	37.7
East: Road 2W												
4	L2	93	4.0	0.228	36.9	LOS D	3.6	26.4	0.85	0.75	0.85	40.1
5	T1	2	37.0	0.228	32.3	LOS C	3.6	26.4	0.85	0.75	0.85	33.2
6	R2	30	17.0	0.284	54.0	LOS D	1.4	11.4	0.99	0.72	0.99	30.5
Approach		125	7.7	0.284	40.9	LOS D	3.6	26.4	0.88	0.74	0.88	37.8
North: Road 1A												
7	L2	178	12.4	0.620	46.8	LOS D	8.0	61.8	0.98	0.82	0.99	32.8
8	T1	68	2.3	0.209	37.4	LOS D	2.8	19.7	0.90	0.69	0.90	43.1
9	R2	1	0.5	0.002	31.2	LOS C	0.0	0.2	0.73	0.60	0.73	38.1
Approach		247	9.6	0.620	44.1	LOS D	8.0	61.8	0.96	0.78	0.97	35.9
West: Road 3												
10	L2	1	6.5	0.001	13.4	LOS B	0.0	0.2	0.43	0.57	0.43	45.1
11	T1	16	11.9	0.039	30.4	LOS C	0.6	4.6	0.80	0.57	0.80	35.2
12	R2	99	1.6	0.856	61.1	LOS E	5.3	37.3	1.00	0.95	1.41	34.1
Approach		117	3.1	0.856	56.3	LOS E	5.3	37.3	0.97	0.89	1.31	34.3
All Vehicles		1444	5.4	0.864	48.5	LOS D	22.2	163.9	0.98	0.90	1.15	37.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	44.6	LOS E	0.1	0.1	0.97	0.97
P2	East Full Crossing	32	43.6	LOS E	0.1	0.1	0.96	0.96
P3	North Full Crossing	32	44.6	LOS E	0.1	0.1	0.97	0.97
P4	West Full Crossing	32	41.7	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		126	43.6	LOS E			0.96	0.96

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: 101 [I2 2026 AM - Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

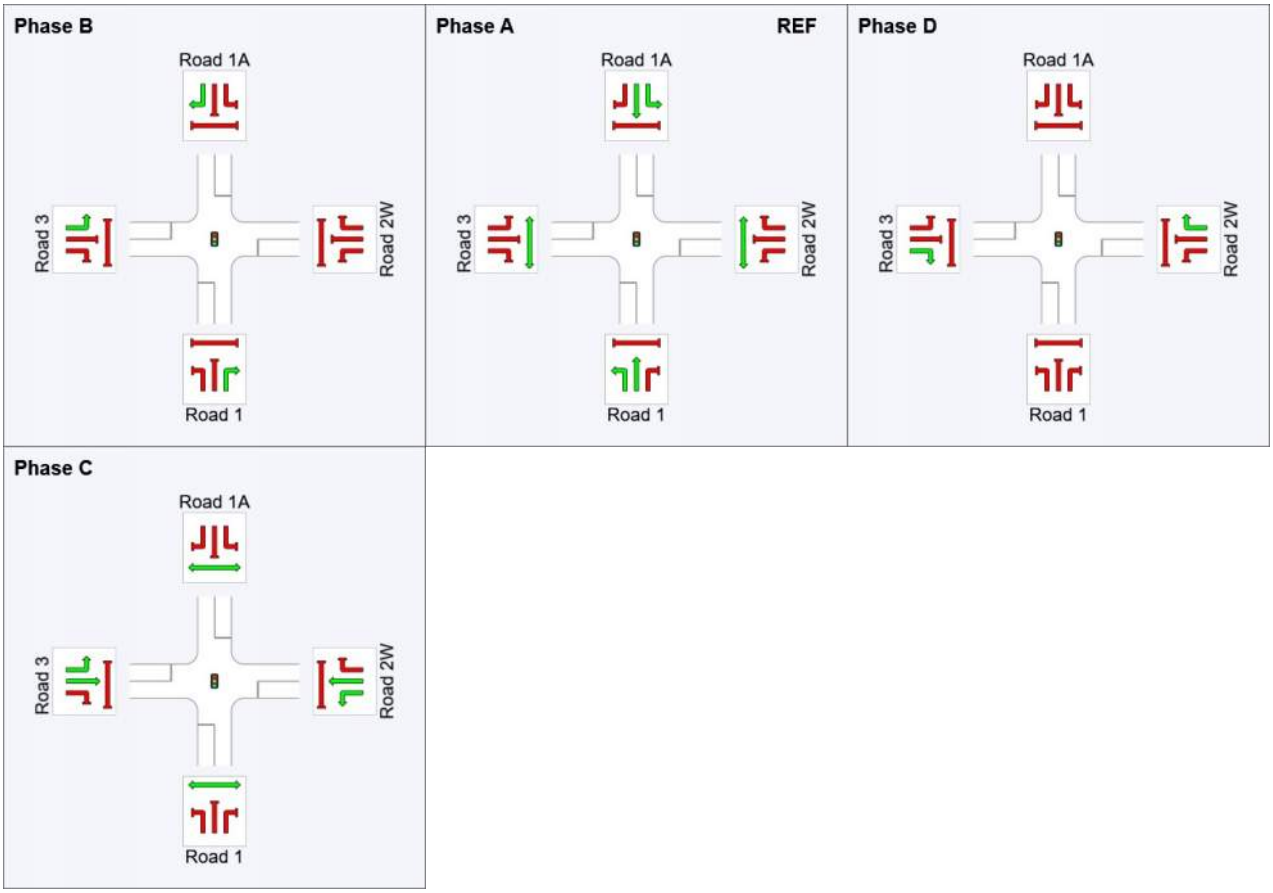
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

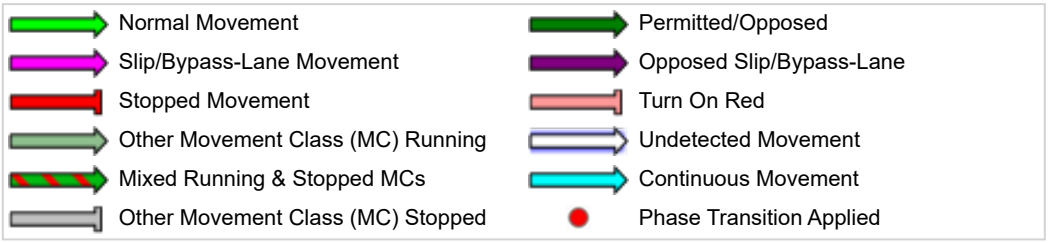
Phase	B	A	D	C
Phase Change Time (sec)	62	0	22	34
Green Time (sec)	27	16	6	22
Phase Time (sec)	33	22	12	28
Phase Split	35%	23%	13%	29%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 PM - Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	354	5.4	0.897	56.9	LOS E	19.1	140.3	1.00	0.98	1.30	35.3
2	T1	66	2.9	0.156	32.4	LOS C	2.5	17.9	0.84	0.65	0.84	44.8
3	R2	140	6.2	0.933	68.1	LOS E	7.9	58.3	1.00	1.01	1.53	32.8
Approach		560	5.3	0.933	56.8	LOS E	19.1	140.3	0.98	0.95	1.31	35.6
East: Road 2W												
4	L2	362	6.0	0.890	54.4	LOS D	19.6	144.5	1.00	0.99	1.28	35.5
5	T1	4	18.5	0.890	49.8	LOS D	19.6	144.5	1.00	0.99	1.28	28.6
6	R2	57	9.5	0.156	38.1	LOS D	2.2	16.6	0.85	0.73	0.85	35.0
Approach		424	6.6	0.890	52.2	LOS D	19.6	144.5	0.98	0.96	1.23	35.4
North: Road 1A												
7	L2	30	8.8	0.238	38.8	LOS D	3.8	27.4	0.86	0.71	0.86	36.5
8	T1	170	1.7	0.238	33.1	LOS C	3.9	27.7	0.86	0.69	0.86	44.3
9	R2	1	1.0	0.007	49.2	LOS D	0.0	0.3	0.93	0.59	0.93	32.4
Approach		201	2.7	0.238	34.1	LOS C	3.9	27.7	0.86	0.69	0.86	43.2
West: Road 3												
10	L2	3	9.3	0.004	23.9	LOS C	0.1	0.6	0.64	0.60	0.64	40.1
11	T1	34	10.6	0.080	30.9	LOS C	1.2	9.4	0.81	0.61	0.81	35.1
12	R2	338	1.1	0.871	53.1	LOS D	17.6	124.2	1.00	0.97	1.26	35.9
Approach		375	2.0	0.871	50.9	LOS D	17.6	124.2	0.98	0.94	1.21	35.9
All Vehicles		1560	4.5	0.933	51.2	LOS D	19.6	144.5	0.97	0.92	1.20	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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	44.6	LOS E	0.1	0.1	0.97	0.97
P2	East Full Crossing	32	39.0	LOS D	0.1	0.1	0.91	0.91
P3	North Full Crossing	32	44.6	LOS E	0.1	0.1	0.97	0.97
P4	West Full Crossing	32	41.7	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		126	42.5	LOS E			0.95	0.95

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: 101 [I2 2026 PM - Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

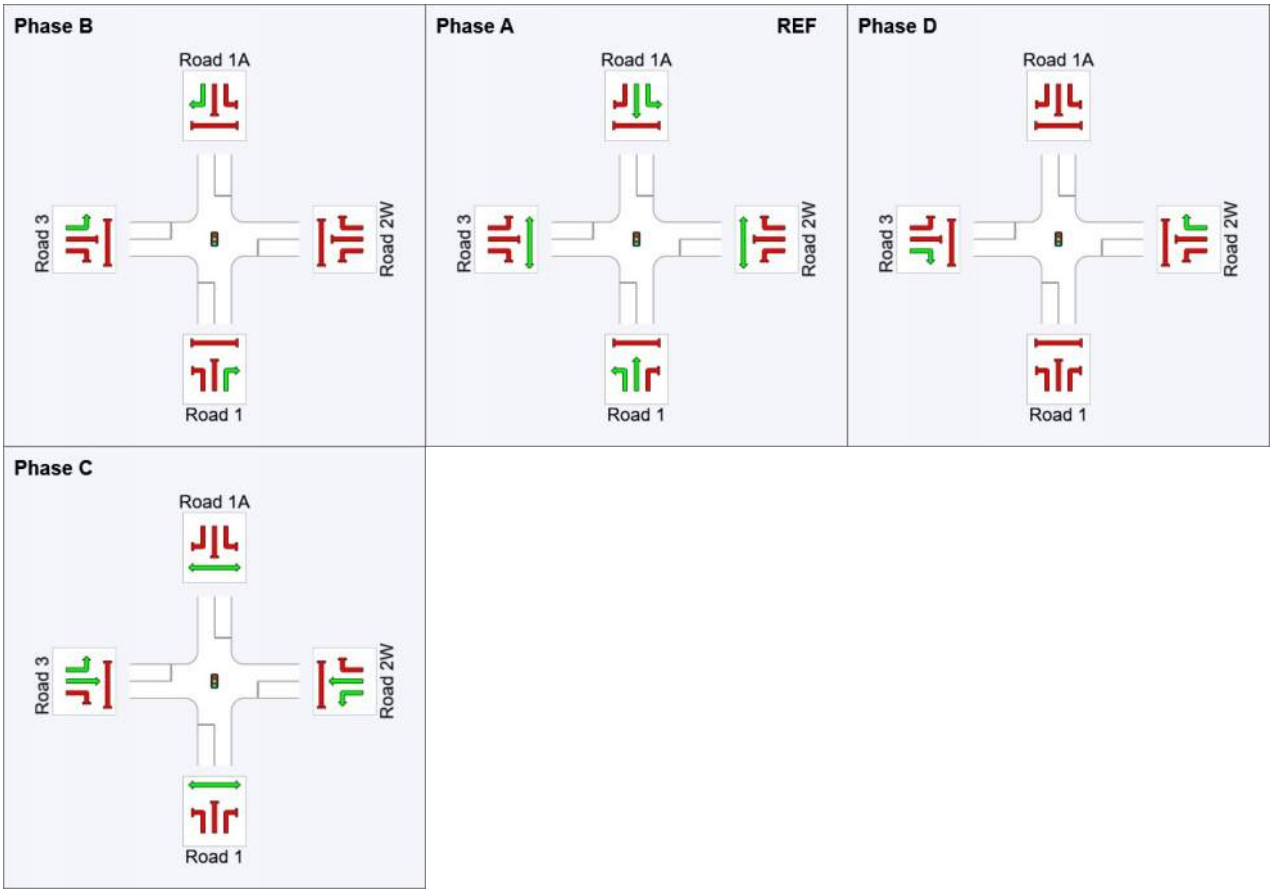
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

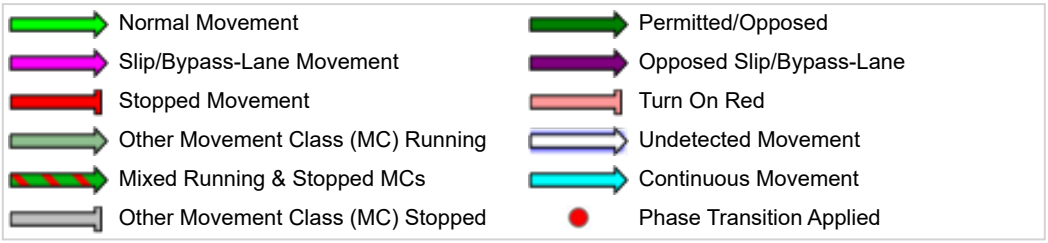
Phase	B	A	D	C
Phase Change Time (sec)	81	0	27	53
Green Time (sec)	8	21	20	22
Phase Time (sec)	14	27	26	28
Phase Split	15%	28%	27%	29%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 AM - Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	149	1.5	0.553	39.8	LOS D	8.9	63.1	0.94	0.80	0.94	40.3
2	T1	266	0.5	0.553	36.5	LOS D	8.9	63.1	0.95	0.79	0.95	43.0
3	R2	355	1.6	0.791	44.1	LOS D	15.9	113.2	1.00	0.91	1.13	38.4
Approach		770	1.2	0.791	40.6	LOS D	15.9	113.2	0.97	0.85	1.03	40.3
East: Road 2W												
4	L2	38	5.3	0.092	33.1	LOS C	1.4	10.1	0.80	0.70	0.80	41.3
5	T1	2	36.5	0.092	28.5	LOS C	1.4	10.1	0.80	0.70	0.80	34.4
6	R2	48	11.5	0.423	51.7	LOS D	2.2	17.0	1.00	0.74	1.00	31.1
Approach		88	9.5	0.423	43.2	LOS D	2.2	17.0	0.91	0.72	0.91	35.7
North: Road 1A												
7	L2	70	23.0	0.141	30.0	LOS C	2.2	18.7	0.76	0.73	0.76	38.2
8	T1	17	1.7	0.051	33.3	LOS C	0.6	4.6	0.86	0.61	0.86	44.4
9	R2	1	0.5	0.002	32.7	LOS C	0.0	0.2	0.77	0.59	0.77	37.5
Approach		89	18.5	0.141	30.7	LOS C	2.2	18.7	0.78	0.71	0.78	39.7
West: Road 3												
10	L2	2	5.3	0.002	13.9	LOS B	0.0	0.2	0.46	0.57	0.46	44.9
11	T1	15	12.7	0.033	27.8	LOS C	0.5	3.8	0.79	0.56	0.79	36.2
12	R2	57	2.7	0.465	51.6	LOS D	2.6	18.5	1.00	0.75	1.00	36.3
Approach		73	4.8	0.465	46.0	LOS D	2.6	18.5	0.94	0.70	0.94	36.4
All Vehicles		1020	3.7	0.791	40.4	LOS D	15.9	113.2	0.95	0.81	0.99	39.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	42.1	LOS E	0.1	0.1	0.97	0.97
P2	East Full Crossing	32	41.1	LOS E	0.1	0.1	0.96	0.96
P3	North Full Crossing	32	42.1	LOS E	0.1	0.1	0.97	0.97
P4	West Full Crossing	32	39.3	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		126	41.2	LOS E			0.96	0.96

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: 101 [I2 2026 AM - Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

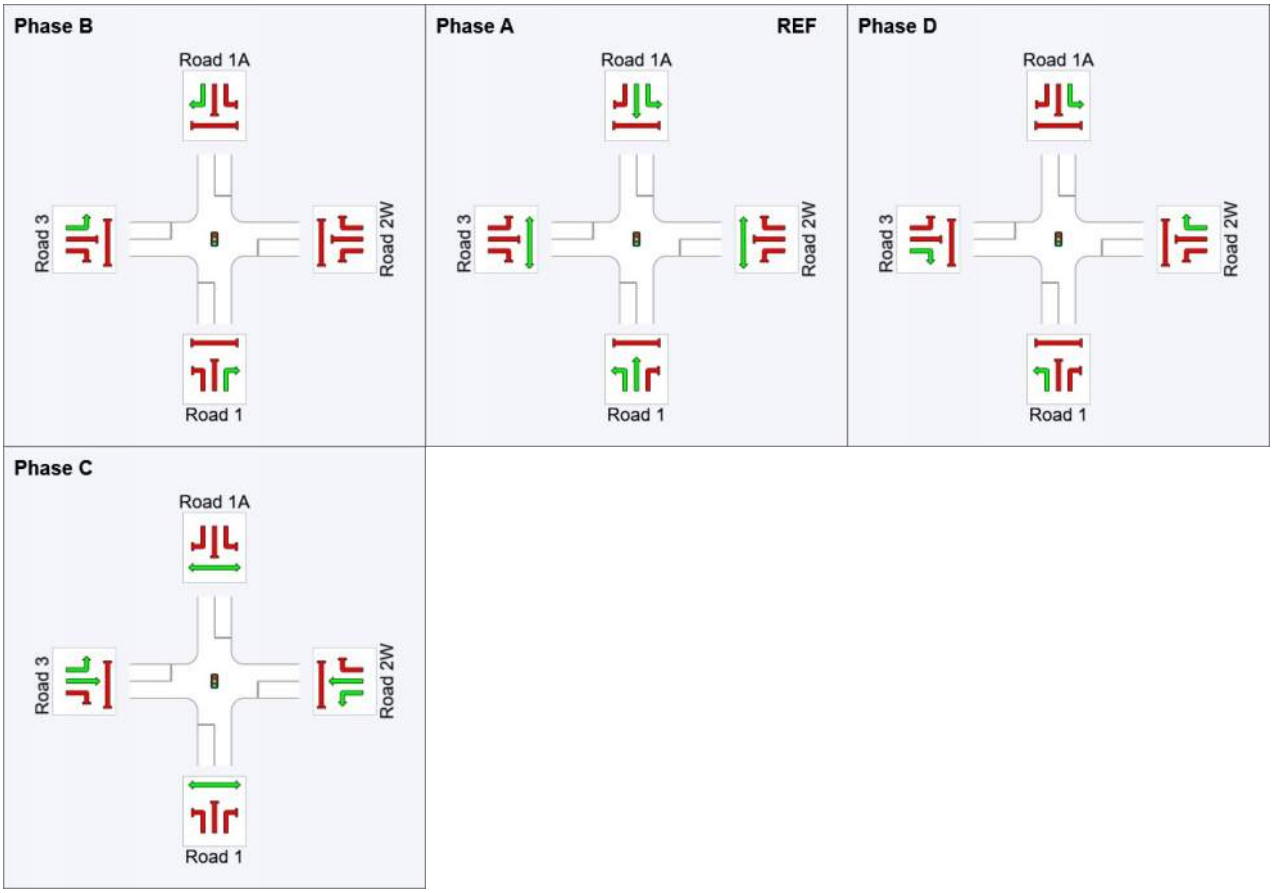
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

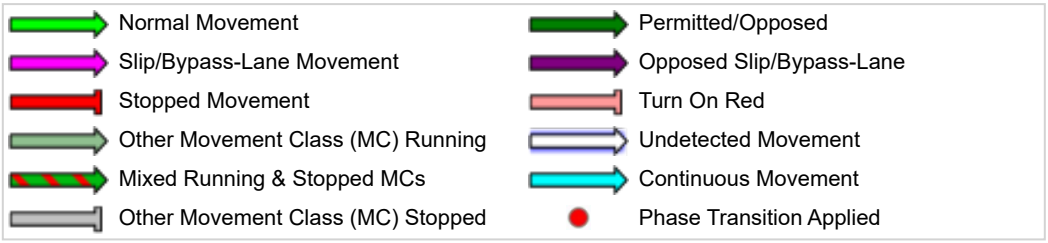
Phase	B	A	D	C
Phase Change Time (sec)	62	0	22	34
Green Time (sec)	22	16	6	22
Phase Time (sec)	28	22	12	28
Phase Split	31%	24%	13%	31%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 PM - Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	174	2.1	0.244	24.5	LOS C	4.9	34.7	0.72	0.76	0.72	44.7
2	T1	54	0.8	0.147	31.5	LOS C	1.9	13.3	0.87	0.66	0.87	45.1
3	R2	70	2.8	0.273	42.0	LOS D	2.7	19.3	0.93	0.75	0.93	39.0
Approach		297	2.1	0.273	29.9	LOS C	4.9	34.7	0.79	0.74	0.79	43.3
East: Road 2W												
4	L2	219	2.0	0.472	33.8	LOS C	8.0	56.9	0.89	0.80	0.89	41.1
5	T1	4	19.9	0.472	29.2	LOS C	8.0	56.9	0.89	0.80	0.89	34.1
6	R2	127	10.1	0.568	44.1	LOS D	5.2	39.8	0.99	0.80	0.99	33.2
Approach		351	5.2	0.568	37.5	LOS D	8.0	56.9	0.93	0.80	0.93	38.4
North: Road 1A												
7	L2	55	10.8	0.325	36.9	LOS D	4.4	32.5	0.89	0.74	0.89	36.9
8	T1	187	0.6	0.325	32.3	LOS C	4.4	32.5	0.90	0.73	0.90	44.5
9	R2	208	10.0	0.849	52.2	LOS D	9.7	73.9	1.00	0.96	1.32	31.6
Approach		450	6.2	0.849	42.1	LOS D	9.7	73.9	0.95	0.84	1.09	37.7
West: Road 3												
10	L2	2	9.4	0.002	17.1	LOS B	0.0	0.3	0.54	0.58	0.54	43.2
11	T1	34	10.6	0.072	25.7	LOS C	1.1	8.1	0.79	0.58	0.79	36.9
12	R2	194	1.7	0.818	49.7	LOS D	8.9	62.9	1.00	0.94	1.27	36.7
Approach		230	3.0	0.818	45.9	LOS D	8.9	62.9	0.96	0.89	1.19	36.8
All Vehicles		1328	4.5	0.849	38.8	LOS D	9.7	73.9	0.91	0.81	1.00	38.9

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	32	39.6	LOS D	0.1	0.1	0.97	0.97
P2	East Full Crossing	32	38.6	LOS D	0.1	0.1	0.95	0.95
P3	North Full Crossing	32	39.6	LOS D	0.1	0.1	0.97	0.97
P4	West Full Crossing	32	36.8	LOS D	0.1	0.1	0.93	0.93
All Pedestrians		126	38.7	LOS D			0.95	0.95

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: 101 [I2 2026 PM - Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 85 seconds (Site Optimum Cycle Time - Minimum Delay)

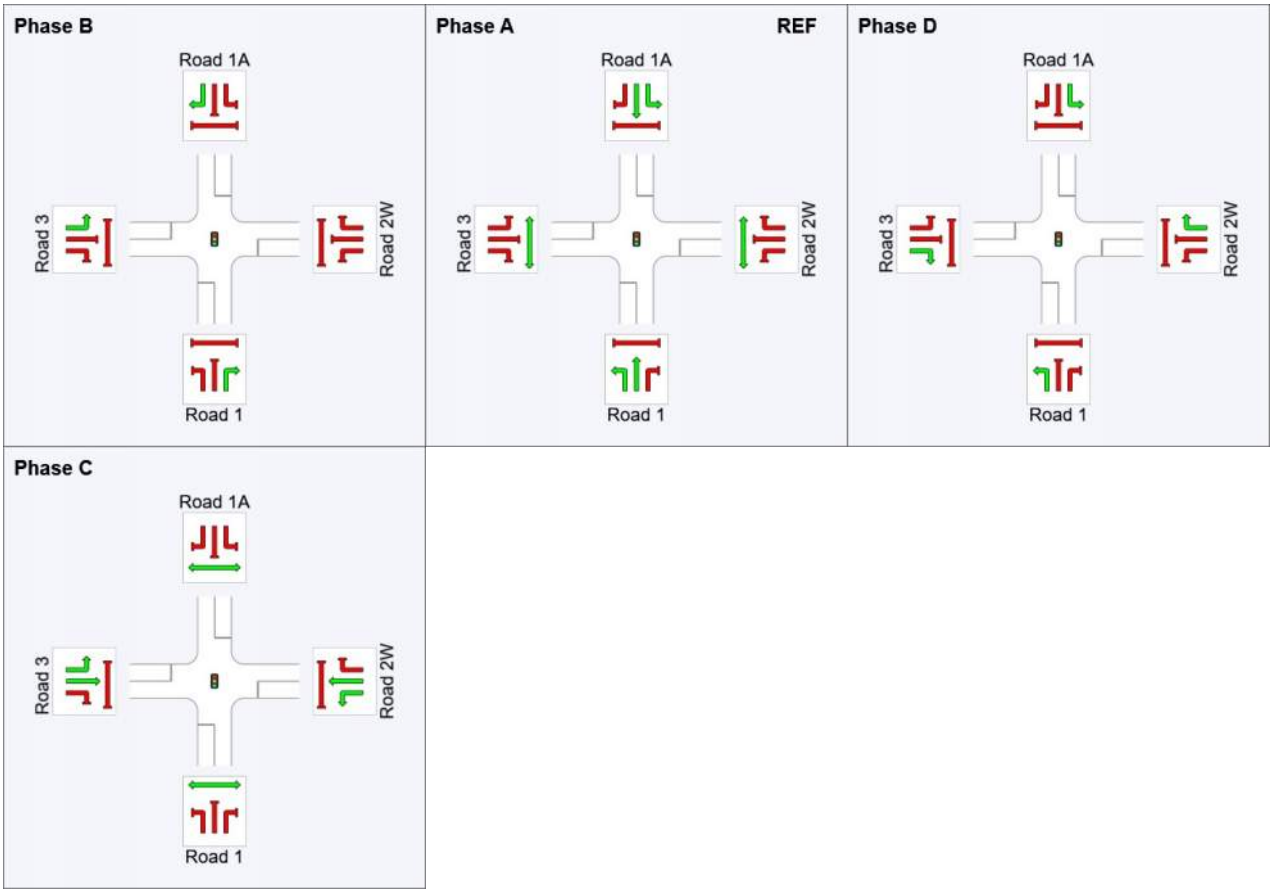
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

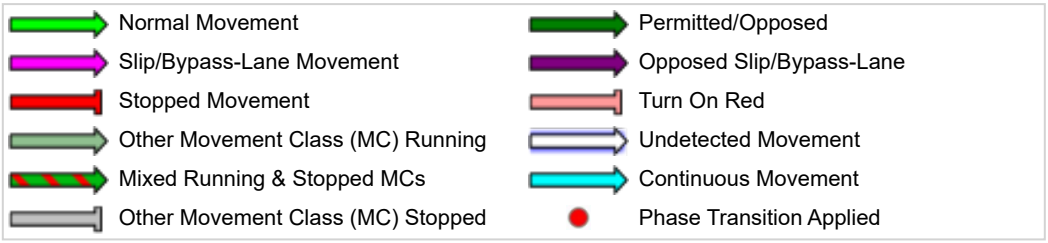
Phase	B	A	D	C
Phase Change Time (sec)	67	0	22	39
Green Time (sec)	12	16	11	22
Phase Time (sec)	18	22	17	28
Phase Split	21%	26%	20%	33%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 AM - No Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	247	4.2	0.744	40.0	LOS D	9.5	68.6	1.00	0.89	1.14	39.6
2	T1	272	1.1	0.744	34.2	LOS C	10.1	71.3	1.00	0.90	1.13	44.1
3	R2	436	6.4	0.737	31.4	LOS C	15.0	110.7	0.94	0.88	1.01	42.2
Approach		955	4.3	0.744	34.4	LOS C	15.0	110.7	0.97	0.89	1.07	42.0
East: Road 2W												
4	L2	93	4.0	0.661	44.7	LOS D	3.7	27.3	1.00	0.84	1.15	37.9
5	T1	2	37.0	0.661	40.1	LOS D	3.7	27.3	1.00	0.84	1.15	31.0
6	R2	30	17.0	0.224	42.2	LOS D	1.1	8.8	0.97	0.72	0.97	33.6
Approach		125	7.7	0.661	44.0	LOS D	3.7	27.3	0.99	0.81	1.11	37.0
North: Road 1A												
7	L2	178	12.4	0.560	36.8	LOS D	6.2	47.9	0.96	0.81	0.96	35.8
8	T1	68	2.3	0.189	28.4	LOS C	2.1	15.3	0.88	0.67	0.88	46.2
9	R2	1	0.5	0.002	23.1	LOS C	0.0	0.2	0.68	0.59	0.68	41.3
Approach		247	9.6	0.560	34.5	LOS C	6.2	47.9	0.93	0.77	0.93	39.0
West: Road 3												
10	L2	1	6.5	0.001	14.7	LOS B	0.0	0.1	0.52	0.57	0.52	44.4
11	T1	16	11.9	0.114	36.6	LOS D	0.6	4.6	0.96	0.66	0.96	33.2
12	R2	99	1.6	0.676	44.8	LOS D	3.9	27.8	1.00	0.84	1.16	38.0
Approach		117	3.1	0.676	43.3	LOS D	3.9	27.8	0.99	0.81	1.13	37.5
All Vehicles		1444	5.4	0.744	36.0	LOS D	15.0	110.7	0.97	0.85	1.06	40.7

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

Site: 101 [I2 2026 AM - No Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

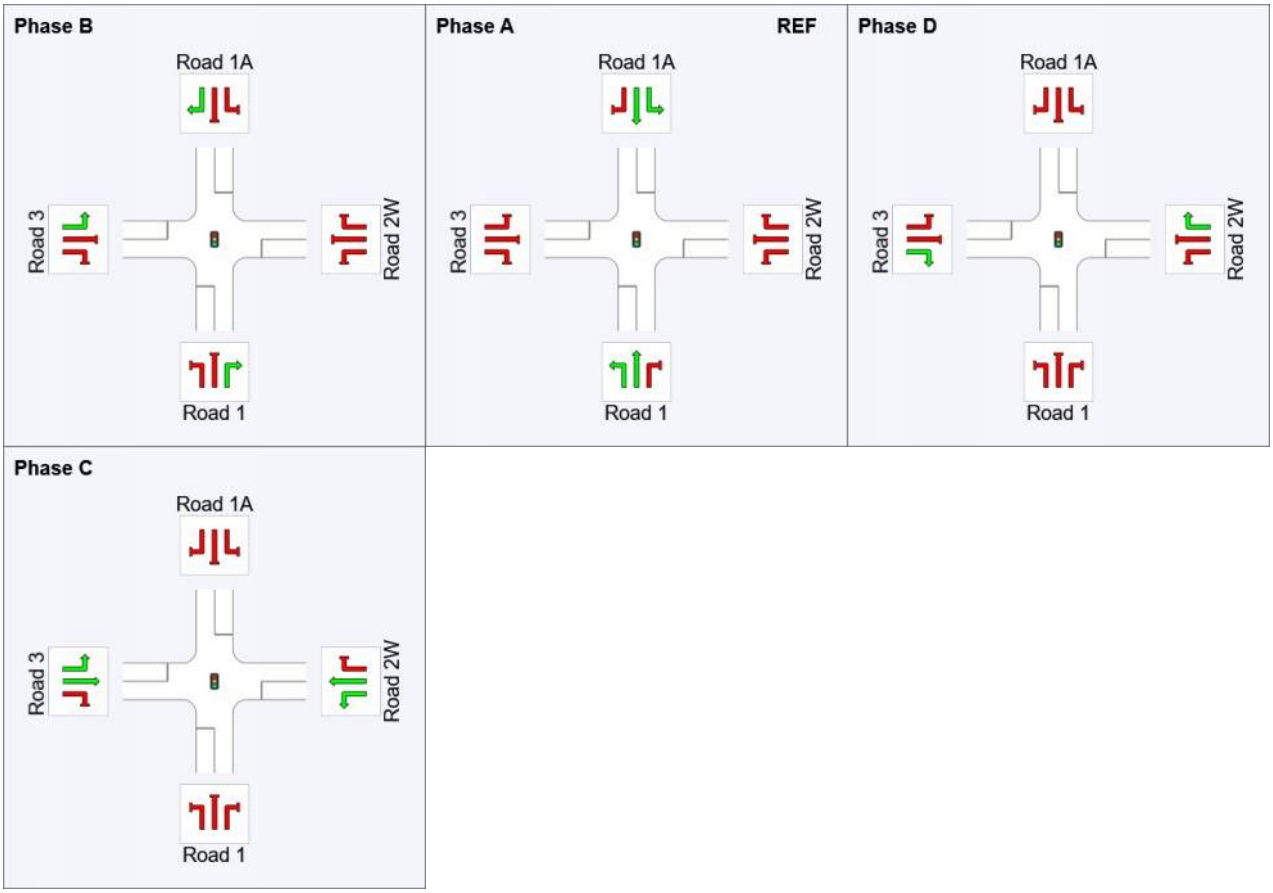
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

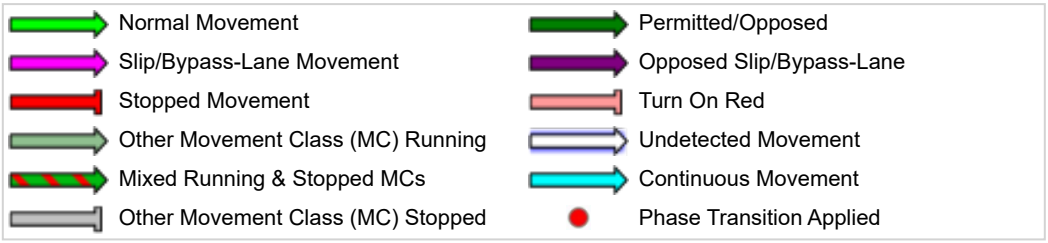
Phase	B	A	D	C
Phase Change Time (sec)	44	0	20	32
Green Time (sec)	25	14	6	6
Phase Time (sec)	31	20	12	12
Phase Split	41%	27%	16%	16%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 PM - No Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	354	5.4	0.897	56.9	LOS E	19.1	140.3	1.00	0.98	1.30	37.3
2	T1	66	2.9	0.156	32.4	LOS C	2.5	17.9	0.84	0.65	0.84	44.8
3	R2	140	6.2	0.933	68.1	LOS E	7.9	58.3	1.00	1.01	1.53	32.8
Approach		560	5.3	0.933	56.8	LOS E	19.1	140.3	0.98	0.95	1.31	36.8
East: Road 2W												
4	L2	362	6.0	0.890	54.4	LOS D	19.6	144.5	1.00	0.99	1.28	35.5
5	T1	4	18.5	0.890	49.8	LOS D	19.6	144.5	1.00	0.99	1.28	31.9
6	R2	57	9.5	0.156	38.1	LOS D	2.2	16.6	0.85	0.73	0.85	35.0
Approach		424	6.6	0.890	52.2	LOS D	19.6	144.5	0.98	0.96	1.23	35.4
North: Road 1A												
7	L2	30	8.8	0.238	38.8	LOS D	3.8	27.4	0.86	0.71	0.86	36.5
8	T1	170	1.7	0.238	33.1	LOS C	3.9	27.7	0.86	0.69	0.86	44.3
9	R2	1	1.0	0.007	49.2	LOS D	0.0	0.3	0.93	0.59	0.93	35.3
Approach		201	2.7	0.238	34.1	LOS C	3.9	27.7	0.86	0.69	0.86	43.2
West: Road 3												
10	L2	3	9.3	0.004	23.9	LOS C	0.1	0.6	0.64	0.60	0.64	42.1
11	T1	34	10.6	0.080	30.9	LOS C	1.2	9.4	0.81	0.61	0.81	37.9
12	R2	338	1.1	0.871	53.1	LOS D	17.6	124.2	1.00	0.97	1.26	37.8
Approach		375	2.0	0.871	50.9	LOS D	17.6	124.2	0.98	0.94	1.21	37.9
All Vehicles		1560	4.5	0.933	51.2	LOS D	19.6	144.5	0.97	0.92	1.20	37.4

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

Site: 101 [I2 2026 PM - No Ped X Full Dev no Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 95 seconds (Site Optimum Cycle Time - Minimum Delay)

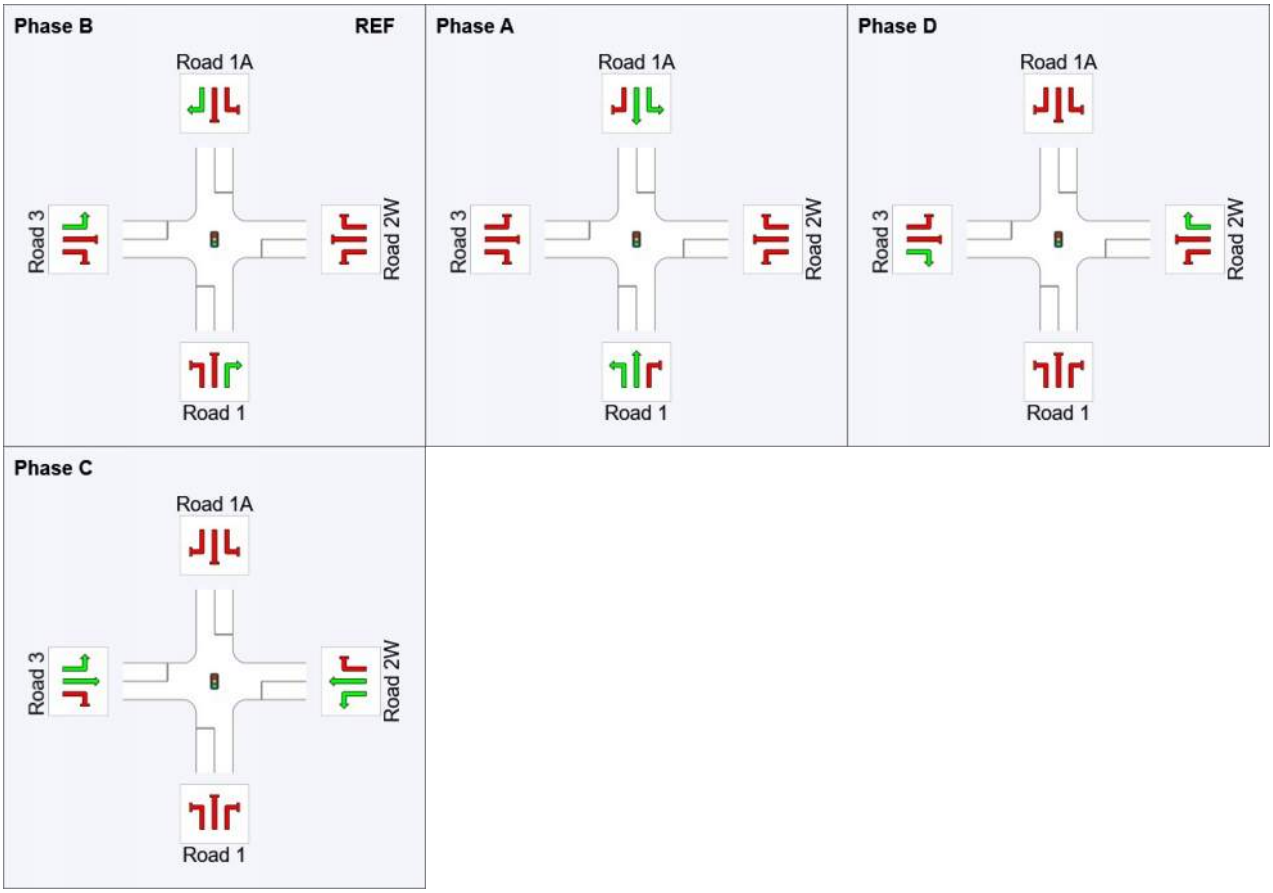
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase B
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

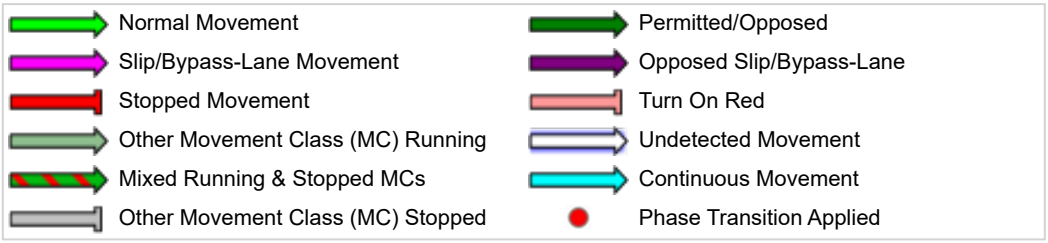
Phase	B	A	D	C
Phase Change Time (sec)	0	14	41	67
Green Time (sec)	8	21	20	22
Phase Time (sec)	14	27	26	28
Phase Split	15%	28%	27%	29%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 AM - No Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	149	1.5	0.644	34.7	LOS C	6.4	45.5	0.98	0.84	1.05	41.7
2	T1	266	0.5	0.644	29.0	LOS C	6.7	47.0	0.98	0.83	1.04	45.7
3	R2	355	1.6	0.699	30.0	LOS C	10.8	76.3	0.95	0.86	1.02	42.7
Approach		770	1.2	0.699	30.5	LOS C	10.8	76.3	0.97	0.85	1.03	43.5
East: Road 2W												
4	L2	38	5.3	0.243	36.4	LOS D	1.3	9.4	0.96	0.72	0.96	40.3
5	T1	2	36.5	0.243	31.7	LOS C	1.3	9.4	0.96	0.72	0.96	33.4
6	R2	48	11.5	0.305	36.8	LOS D	1.6	11.9	0.97	0.74	0.97	35.4
Approach		88	9.5	0.305	36.5	LOS D	1.6	11.9	0.97	0.73	0.97	37.7
North: Road 1A												
7	L2	70	23.0	0.260	32.4	LOS C	2.0	17.0	0.91	0.75	0.91	37.3
8	T1	17	1.7	0.053	25.0	LOS C	0.5	3.4	0.87	0.61	0.87	47.5
9	R2	1	0.5	0.002	23.6	LOS C	0.0	0.2	0.74	0.59	0.74	41.1
Approach		89	18.5	0.260	30.8	LOS C	2.0	17.0	0.90	0.72	0.90	39.6
West: Road 3												
10	L2	2	5.3	0.002	14.5	LOS B	0.0	0.2	0.55	0.58	0.55	44.5
11	T1	15	12.7	0.088	30.8	LOS C	0.5	3.5	0.94	0.65	0.94	35.1
12	R2	57	2.7	0.336	36.7	LOS D	1.8	13.0	0.97	0.74	0.97	40.3
Approach		73	4.8	0.336	35.0	LOS D	1.8	13.0	0.96	0.72	0.96	39.5
All Vehicles		1020	3.7	0.699	31.4	LOS C	10.8	76.3	0.96	0.82	1.01	42.4

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

Site: 101 [I2 2026 AM - No Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

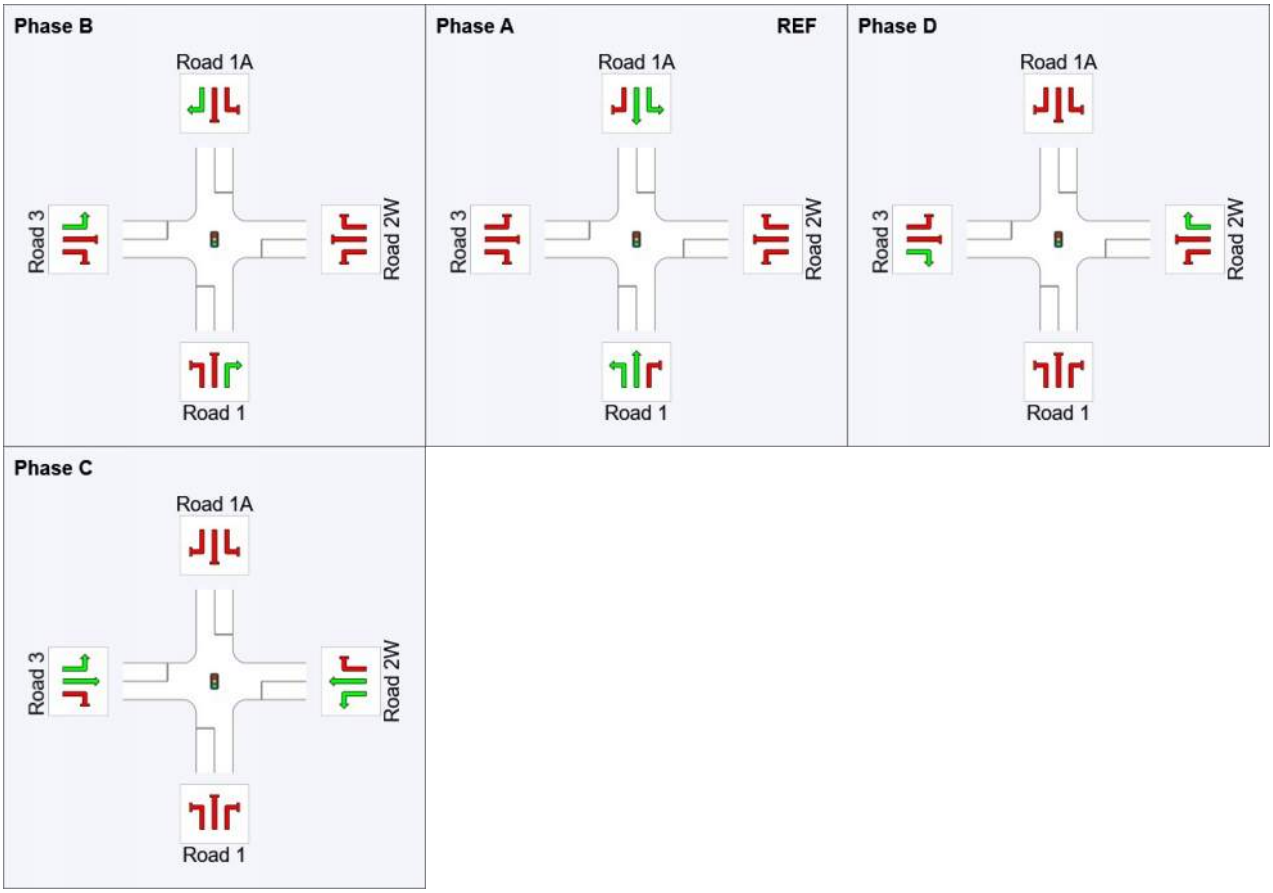
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing - Copy
Reference Phase: Phase A
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

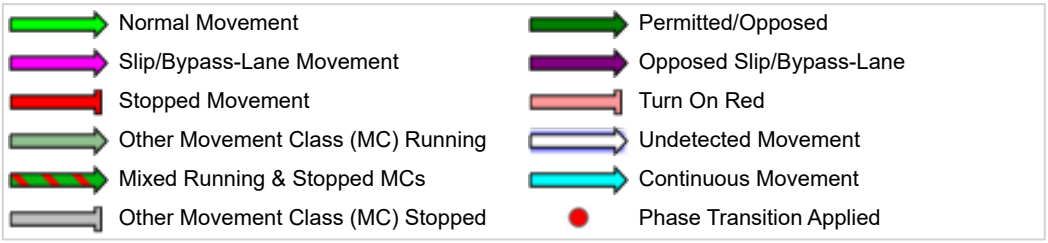
Phase	B	A	D	C
Phase Change Time (sec)	41	0	17	29
Green Time (sec)	18	11	6	6
Phase Time (sec)	24	17	12	12
Phase Split	37%	26%	18%	18%

See the Phase Information section in the Detailed Output 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, 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: 101 [I2 2026 PM - No Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Road 1												
1	L2	174	2.1	0.791	33.5	LOS C	4.8	34.4	1.00	0.93	1.37	42.9
2	T1	54	0.8	0.230	23.0	LOS C	1.3	9.0	0.94	0.70	0.94	48.3
3	R2	70	2.8	0.275	27.8	LOS C	1.6	11.8	0.93	0.75	0.93	43.4
Approach		297	2.1	0.791	30.3	LOS C	4.8	34.4	0.97	0.85	1.19	43.8
East: Road 2W												
4	L2	219	2.0	0.872	35.4	LOS D	6.7	47.5	1.00	1.06	1.54	40.6
5	T1	4	19.9	0.872	30.8	LOS C	6.7	47.5	1.00	1.06	1.54	36.6
6	R2	127	10.1	0.613	29.8	LOS C	3.3	25.0	0.99	0.83	1.11	37.8
Approach		351	5.2	0.872	33.3	LOS C	6.7	47.5	1.00	0.98	1.38	39.7
North: Road 1A												
7	L2	55	10.8	0.535	30.1	LOS C	3.0	21.7	0.98	0.78	1.01	39.4
8	T1	187	0.6	0.535	24.3	LOS C	3.1	21.9	0.98	0.78	1.01	47.5
9	R2	208	10.0	0.856	35.8	LOS D	6.1	46.5	1.00	1.01	1.51	38.9
Approach		450	6.2	0.856	30.3	LOS C	6.1	46.5	0.99	0.89	1.24	42.4
West: Road 3												
10	L2	2	9.4	0.003	14.2	LOS B	0.0	0.2	0.61	0.59	0.61	45.7
11	T1	34	10.6	0.133	21.5	LOS C	0.8	5.9	0.91	0.66	0.91	40.9
12	R2	194	1.7	0.882	36.5	LOS D	5.9	41.6	1.00	1.06	1.60	41.8
Approach		230	3.0	0.882	34.2	LOS C	5.9	41.6	0.98	1.00	1.49	41.7
All Vehicles		1328	4.5	0.882	31.8	LOS C	6.7	47.5	0.99	0.92	1.31	41.9

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.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

PHASING SUMMARY

Site: 101 [I2 2026 PM - No Ped X Full Dev with Mill Rd]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

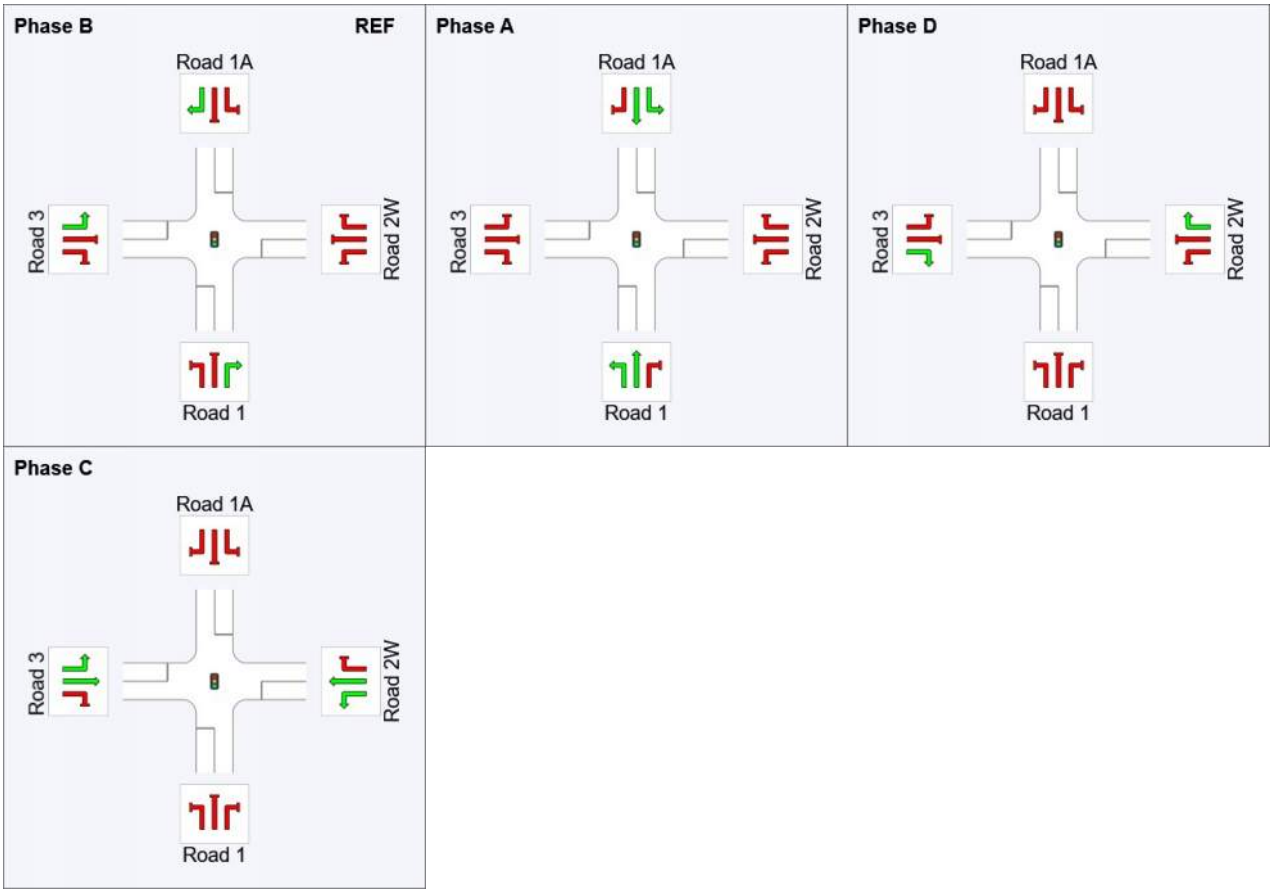
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Split Phasing
Reference Phase: Phase B
Input Phase Sequence: B, A, D, C
Output Phase Sequence: B, A, D, C

Phase Timing Summary

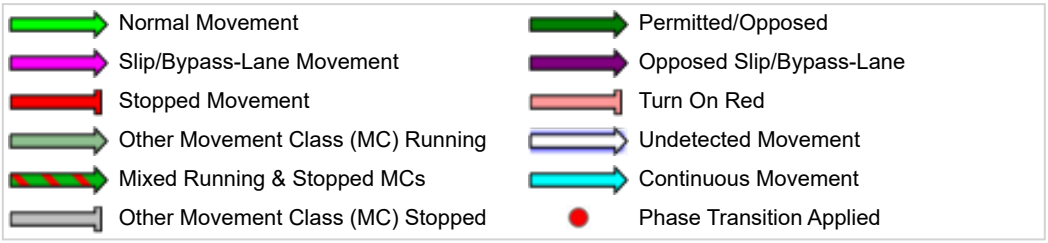
Phase	B	A	D	C
Phase Change Time (sec)	0	13	25	37
Green Time (sec)	7	6	6	7
Phase Time (sec)	13	12	12	13
Phase Split	26%	24%	24%	26%

See the Phase Information section in the Detailed Output 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, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



Organisation: BECA LIMITED | Processed: Monday, 9 September 2019 11:19:27 AM
Project: P:\382\3820130\TTR\Plan Variation 2018\Masterplanning\SIDRA\SIDRA Models\I2 v8 - Copy.sip8