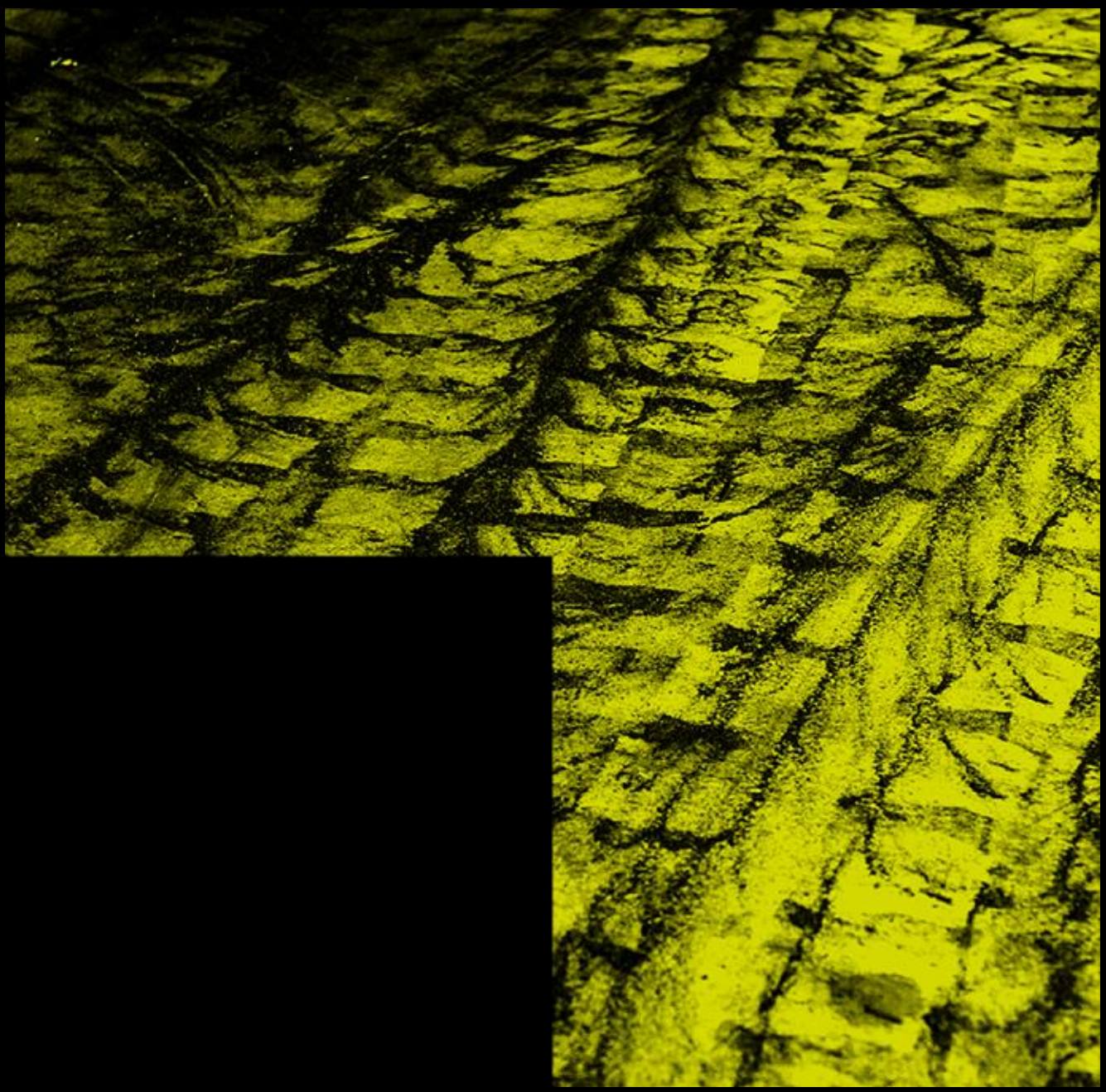
STUBBS FARM PLAN CHANGE

Integrated Transportation Assessment

SF Estate Ltd.



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CONTENTS

APPENDICES

EXCUTIVE SUAMMARY

This report has been prepared to inform the Warkworth North Structure Plan and Plan Change on behalf of SF Estate Limited.

This report is one of a range of technical reports prepared for the Plan change project. The purpose of this report is to inform the Assessment of Environment Effects (AEE) and to support the resource consent applications. The development includes four broadly different types of neighbourhood, giving options in living choices and employment opportunity. These can be characterised as commercial and light industrial, a small business neighbourhood centre, higher density residential and single house zone. This type of arrangement will provide some employment but also internalising some retail based trips and distributing these across several retail/commercial areas in Warkworth, including the existing town centre area.

Included in the report is a review of existing conditions in vicinity of the subject site and an assessment of the effects of this proposed development for assessing the existing conditions, specific proposals, analysis traffic modelling, and provide an assessment of the proposed development integrate with the future road network.

A number of transport projects are proposed in vicinity of the subject site, including those in Supporting Growth – Delivering Transport Networks for the Warkworth Area. These include Ara Tuhono - Puhoi to Warkworth motorway (by NZTA), Matakana Link road (by AT) and improvements to the Hill Road/SH1 intersection. The intersection with Matakana Link Road at the eastern end is proposed to have a single lane during the first stage and 2-lane roundabout for second stage. These improvements will result in major traffic redistribution around Warkworth and allow for significant growth into the future.

The proposed Western Link between Falls Road and State Highway 1 is planned to be constructed through the subject site, as part of the development of the area. The proposed Western Link is proposed to have a road reserve width of 29.5m, consistent with that proposed for the Matakana Link Road and can accommodate up to two lanes in each direction. The configuration of the Western Link can be determined as design proceeds, in consultation with AT to match the different arrangement in different stages. The proposed Western Link will include walking and cycling facilities on each side of the road and all proposed local roads will include walking facilities on each side of the road.

The Western Link is anticipated to be a limited access road with restrictions on the number of vehicle accesses on the road. This will reduce the number of conflict and crossing points on the route for pedestrian and cyclists.

The methodology for assessing the traffic effect on the wider road network of the proposed development involves modelling the traffic effects through staging development.

In summary, the proposed development in Warkworth North will create a more integrated live, work, play environment and increase the vibrancy and sustainability of this area.

1.0
INTRODUCTION

This report has been prepared to inform the Warkworth North Structure Plan and Plan Change on behalf of SF Estate Limited. The boundary for the Structure Plan and Plan Change are shown in Figure 1.

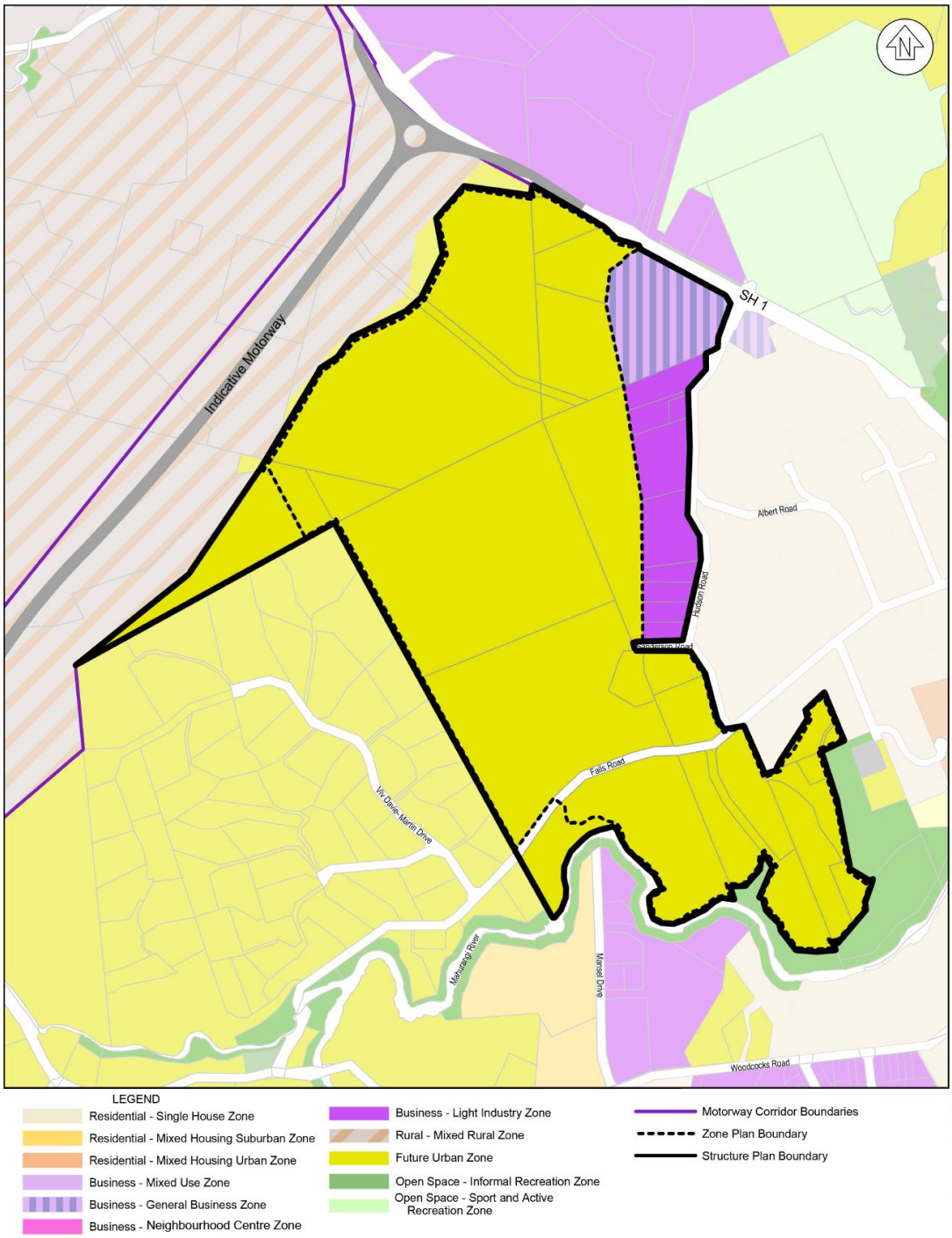


FIGURE 1: STRUCTURE PLAN AREA

The Warkworth North Structure Plan area includes the Future Urban zoned land bounded by the proposed Puhoi to Warkworth motorway extension in the north-west, the Viv-Davie Martin Drive countryside living area to the west, the Mahurangi River to the south, and Hudson Road and State Highway 1 to the east and north-east.

The area proposed to be rezoned as part of the Plan Change more or less applies to the Structure Plan area, with the exception of 141 Carran Road, the western extent of Lot 1 DP 508375, and the existing General Business and Light Industrial zoned land to the east.

Following the introduction of the Auckland Unitary Plan (AUP) (Operative in part) in November 2016, the zoning rules and controls changed substantially. Areas within Auckland that are deemed appropriate for future development but have not yet been planned in detail, were zoned Future Urban. The intention is that the zoning is changed through a private plan change, during which design parameters such as intensity, road alignment and stormwater management can be determined in an integrated manner.

Warkworth has been identified as an appropriate location for future development with the potential to become a satellite city of Auckland. The development potential for the Warkworth area has been defined in the Future Urban Land Supply strategy (FULSS) dated July 2017, and into three sub areas;

- Warkworth North – a total of 324 ha including 69ha live zoned business, approximately 2300 dwellings, no centres;
- Warkworth North East – 192ha, approximately 1600 dwellings, no centres; and
- Warkworth South – 493ha, approximately 3700 dwellings, 1 neighbourhood centre.

2.0 BACKGROUND

2.1 THE NEED FOR AN ITA

Rule 1.5.2 of the AUP Structure Plan Guidelines states that an Integrated Transport Assessment (ITA) may be required when changing the zoning of land. While no threshold for when an ITA will be required is presented in the AUP, Auckland Transport's Integrated Transport Assessment Guidelines (January 2015) (ITA Guidelines) recommends the thresholds presented in Table 1.

TABLE 1: THRESHOLDS FOR AN ITA

LAND USE TYPE	THRESHOLD
Residential	120 dwellings
Retail	1,000m² GFA
Office	5,000m² GFA
Industrial	10,000m² GFA
Warehousing	10,000m² GFA
Educational Uses	100 students
General Trip Generation	100 vehicles per hour.

The proposed structure plan and plan change will exceed these thresholds. Completion of an ITA in accordance with the guidelines is appropriate.

2.2 BACKGROUND OF THE SITE

SF Estate Limited plan to develop two sections of partially developed land on either side of Falls Road, Warkworth. The sections have a combined area of 98.91ha.

The land is currently occupied by four large residential houses and grazing, and is predominantly grassland with bush.

The northern section is located to the north of Falls Road. To the west of the subject site is zoned as future urban zone which gain access from Viv Davie Martin Drive and to the east is a range of business activities (general business zone and light industry zone) which gain access from Hudson Road and are separated from the site by a stream. The land to the north is farm land zoned Future Urban, though a section of land on the south western corner is zoned Business – light industry zone.

The southern section is located to the south of Falls Road. On both the western and eastern sides of the site the land is presently used as farm land and is zoned Future Urban. To the south of the site there is a retirement village zoned Residential – Mixed Housing Suburban and an undeveloped lot zoned Business – Light Industry. Both these sites are separated from the subject site by the Mahurangi River.

2.3 SCOPE OF WORKS

The following report includes a review of existing conditions and an assessment of the effects of this proposed development under the following headings;

- Existing conditions
- Specific proposal

- Traffic Modelling
- Integration with the future road network
- Construction traffic
- Conclusions and recommendations.

3.0
EXISTING CONDITIONS

3.1 EXISTING TRAFFIC VOLUMES AND CLASSIFICATION

The following traffic counts have been gathered from the websites of Auckland Transport, the New Zealand Transport Agency (NZTA), and the Rodney District Council's (RDC) Road Asset Maintenance Manual 2010 (RAMM) for key roads in the wider network surrounding the development.

- Falls Road 1163 vehicles per day (vpd) (2015 count)
- Hill Street 3088vpd (2015 count)
- Falls Road 674vpd (2010 count)
- Mansel Drive 338vpd (2010 count)
- State Highway 1 (SH1) – South of Hill Street 21,332vpd (2015 Count)

It is noted that there has been a significant amount of development on Mansel Drive since these counts were taken and Mansel Drive has recently (March 2017) been connected to Falls Road. This would likely have led to an increase in traffic, so traffic volumes on these two roads are expected to be higher than reported above. Similarly, flows on Woodcocks Road will have reduced, with possible small changes on SH1.

3.2 PROPOSED WORKS IN THE AREA

The area around Warkworth has seen significant development in the past 20 years. This was recognised by the former Rodney District Council and NZTA who considered how the roading network could be developed to provide for historical and future growth. The Auckland Council Fut*ure Urban Land Supply Strategy (FULSS)* outlines that between 2022 and 2026, Warkworth North and North East (the area that the structure plan and plan change area lies within) will grow to a capacity of 3,200 and 3,900 dwellings. Details of the FULSS as it relates to this site are outlined later in this report.

To mitigate the impact on the transport network in and around Warkworth, the Western Link, a Northern and Southern connection to State Highway 1 was proposed to the west of Warkworth which will would allow north and southbound traffic on State Highway 1 to bypass Warkworth and reduce local congestion. Initially the Western Link was to join SH1 at McKinney Road in the south, and use Hill Street and Hudson Road to provide a connection back to SH1 in the north. The southern connection is currently being revised by AT, but has yet to be finalised. The northern connection has been altered to provide a more direct connection west of Hudson Road, through the subject site.

There are numerous transport projects proposed and also included in Supporting Growth – Delivering Transport Networks (supporting growth) for the Warkworth area as shown Figure 2.

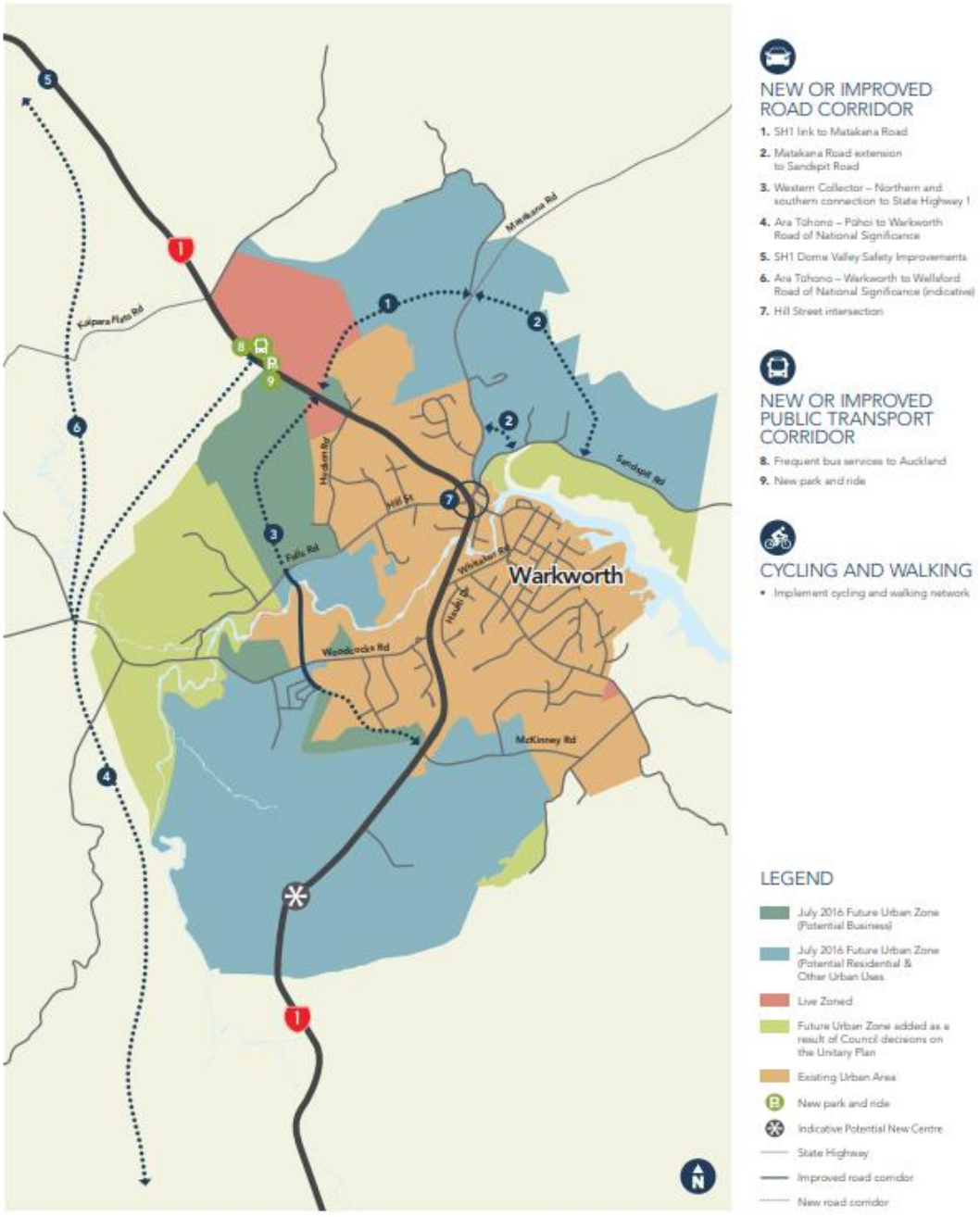


FIGURE 2: FUTURE TRANSPORT NETWORK FOR WARKWORTH

The Supporting Growth has identifies the following future projects for Warkworth North:

1. State Highway 1 link to Matakana Road
2. Matakana Road extension to Sandspit Road
3. Western Link – Northern and southern connection to State Highway 1
4. Ara Tuhono – Puhoi to Warkworth Road of National Significance
5. State Highway 1 Dome Valley Safety Improvements
6. Ara Tuhono – Warkworth to Wellsford Road of National Significance (indicative)

7. Hill Street intersection
8. Frequent Bus services to Auckland
9. New park and ride

The section of the Western Link between Falls Road and State Highway 1 to the north (shown as 3 in Figure 2) is planned to be constructed through the subject site. This section of the Western Link has therefore been integrated into the planning of the road layout within the site.

3.3 PUBLIC TRANSPORT ACCESSIBILITY

The new bus services between Warkworth and the Hibiscus Coast, and new local services, was active from Sunday 30 September 2018.

The new bus services is shown in Figure 3 below.

FIGURE 3: BUS SERVCES FROM WARKWORTH AND THE KOWHAI COAST

The new route 995 provides a direct link between Warkworth and Hibiscus Coast Station at Silverdale. This service will run every 30 minutes at peak times on weekdays, and hourly at other times, 7 days a week.

Two new routes 996 and 997 servicing the Kowhai Coast. The two new services will replace the existing Kowhai Coast service. The new bus network will not serve Whangateau. This is due to the small number of passengers travelling to and from here on the existing Kowhai Connection.

The two new routes 996 and 997 runs up to eight times daily Monday to Friday and up to four times per day on Saturday and Sunday.

All the proposed new services have been integrated into the AT Hop system.

A development of this size will result in a significant population increase in Warkworth and along with further development of future urban areas and critical infrastructure such as the motorway, is also likely to result in an increase in the demand for future public transport. Auckland Transport's 'Supporting Growth' has also stated that a park and ride could be established that would make effective use of the new motorway and reduce reliance on car trips to and from the south. It also earmarks the new motorway as accommodating the anticipated frequent bus services.

As part of the roading cross-sections proposed as part of this development, there is adequate width to provide for additional bus services as they are required. No specific stops are proposed at this stage as the location and type of infrastructure is unknown. The proposed local roads can also accommodate bus services when comes to the public transport network design stage.

3.4 WALKING AND CYCLING INFRASTRUCTURE

Currently there is little in the way of walking or cycling infrastructure in the area. None of the existing sections of the Western Link have made allowances for any separate cycle infrastructure.

No information on the volume of cyclists in the area is available, but volumes are anecdotally low given the employment nature of the surrounding zone, the 70-100km/h speed limit in much of the area, as well as the lack of footpaths on Falls Road adjacent to the subject site (which is expected given its rural nature).

A footpath and a shared path have been constructed on Falls Road, between Mansel Drive and approximately 70m to the east of the Falls Road/Mansel Drive intersection. These facilities connect to similar non-motorised user facilities on Mansel Drive.

There is a footpath on the southern side of Hill Street but there are no facilities for non-motorised users between View Road and where the new footpath/shared path has been constructed at the Falls Road/Mansel Drive intersection. The section of Falls Road without any off-road facilities is approximately 730m long.

As discussed later, the proposed Western Link through this site includes the provision for on road separated cycle facilities in addition to footpaths along its length. Local roads would not have specific cycle facilities and cyclists would share the road with vehicles.

The proposed development of the Matakana Link Road by AT will include new walking and cycling facilities, which will create a new connection in the active transport network.

The Matakana Link Road is proposed to be developed in two stages. Stage 1 is proposed to have a 3.5m shared footpath/cycle way on one side of the road, separated from traffic by a 2.7m berm with trees and street lights. Stage 2 is proposed to have footpaths and cycle facilities on each side of the road. The footpaths are proposed to be raised above the cycle facilities, separating them with a kerb. The footpaths are to the outside of the cycle lanes, away from the road carriageway.

Figure 4 below shows the proposed greenways network in Warkworth.

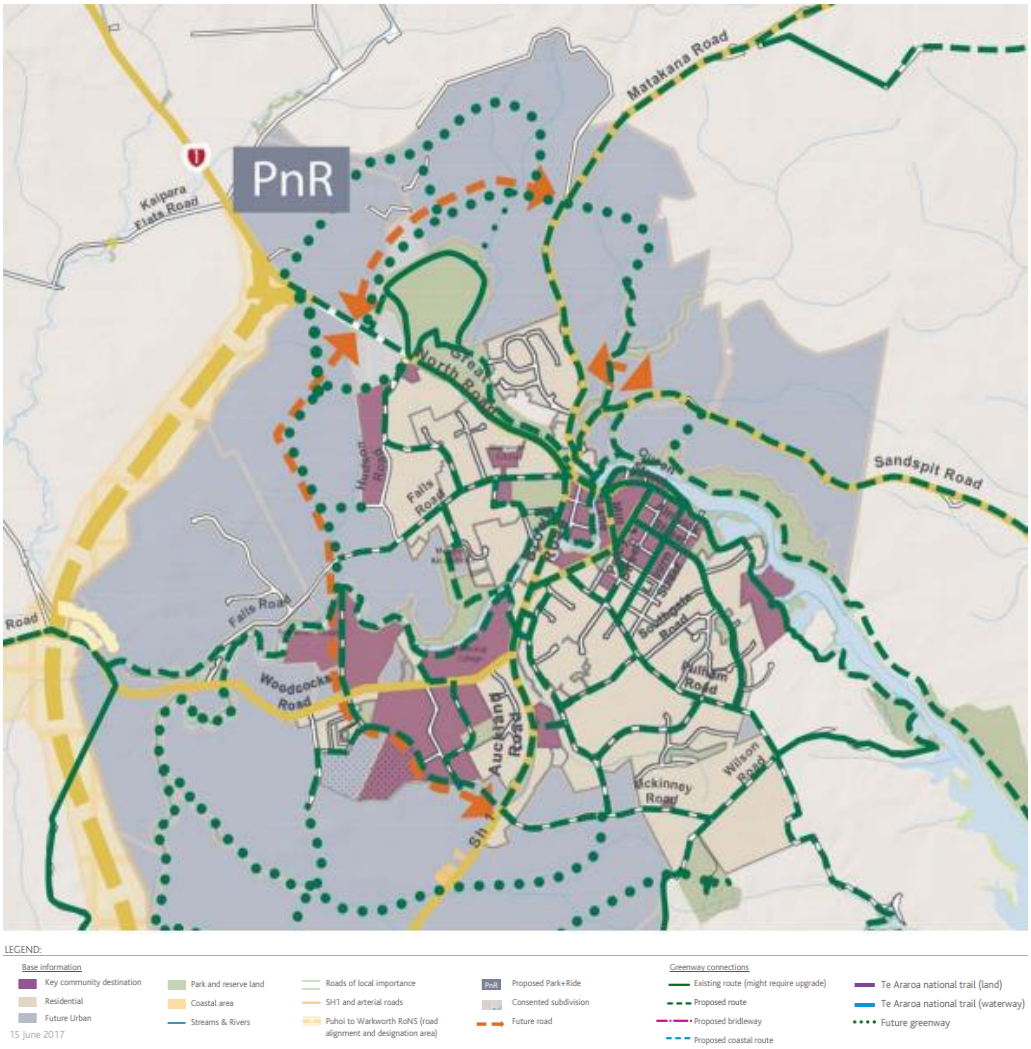


FIGURE 4: PROPOSED GREENWAY NETWORK PLAN IN WARKWORTH

The indicative initial greenway network that could be developed in the area to provide linkages through the proposed roads and connect to local schools, employment areas and also the town centre. Such a network could be expanded in the future, including making allowances for further connections to development at and through the McKinney Valley.

3.5 ROAD SAFETY

In many ways it is difficult to quantify any potential crash locations due to the rapid growth of the area. Historically, crash clusters have been centred along the main arterials and motorways, primarily the Hill Street/State Highway 1 intersection (although this intersection has a good crash record), the Woodcocks Road/State Highway 1 intersection and the Hudson Road/State Highway 1 intersection.

In particular, the major signalised junctions in the area continue to have the highest number of crashes. Auckland Transport has considered both low and high cost options through regular reviews of the network and investigation of specific projects, such as the Hill Street intersection.

The crash risk in the area is anticipated to reduce once the Western Link and Matakana Link roads are completed by allowing motorists to bypass the Hill Street and

Woodcocks Road intersection. A further reduction is anticipated once the Puhoi to Warkworth motorway is constructed as motorists will be able to bypass the local road network entirely on a much higher standard, and safer, road.

In terms of this plan change, the anticipation is that the intersections will be built to current design standards and should afford a level of safety in excess of many of the older intersections in the area. Better walking and cycle facilities, including crossing areas, will provide a generally safer network within the plan change area. Integration to the adjacent land uses will also help to provide more consistency across the network and improve safety beyond this future urban area.

3.5.1 CRASH HISTORY

A search was conducted of the New Zealand Transport Agency's (NZTA) Crash Analysis System (CAS) for crashes in the five-year period from 2012 to 2016.

There were no reported crashes within a 100m radius of the site. This includes the intersection of Falls Road and Hudson Road, Falls Road and Mansel Drive and Falls Road and Viv Davie-Martin Drive. It is acknowledged that at the time this report was prepared that the Falls Road/Mansel Drive had only recently been completed and any non-injury crashes that had occurred since construction was complete would not have been entered into CAS.

While the intersection of State Highway 1 and Hill Street is not within 100m of the property, an assessment of the crash rate of this intersection was undertaken as there will be an increase in traffic at the intersection once the site has been developed. There were 19 recorded crashes within the past five years. The crash data can be found in Appendix 1.

Additionally, the intersection of State Highway 1 and Hudson Road has three recorded crashes. These intersections are not within the scope of this project but should be noted regardless. Therefore, it is expected that the development within the structure plan and plan change area will not result in any significant effect on the safety of the local road network due to the alleviated pressure on the network from the proposed Western Link.

3.6 EXISTING WORKPLACE TRIP DISTRIBUTION

As part of the initial consideration for the site, an assessment was made of the possible trip distribution from the proposed development. Information relating to workplace and residence locations gathered as part of the 2013 census was obtained from the website of Statistics New Zealand. The subject site falls within the Warkworth (505500) mesh block. The proposal includes both residential and commercial activity, thus both trip generations to and from the site have been investigated.

While this has been superseded to some degree with completion of the updated ART11.4 regional transportation model, prepared by Auckland Transport, it remains an important consideration in terms of local connections and traffic patterns along more minor parts of the network not covered by the larger scale model.

In a wider sense, the results showed that 36% of Warkworth workplace trips were external to the zones and 64% were internal. Conversely, the residential trips to work showed that 33.4% of trips were within Warkworth i.e. people living and working in Warkworth. Given the proximity of employment opportunities to the residential zones, this general distribution is expected to continue with this proposed development.

3.7 PUHOI TO WARKWORTH MODELLING

To provide some context and background, the original modelling for the Puhoi to Warkworth motorway needed to make a number of assumptions in terms of development patterns and roading alignment around the Warkworth area. This included development of the Western Link route, which was identified through Hudson Road at that time.

The report identified average historical growth in Warkworth of around 4.1% and estimated SH1 volumes would increase to around 25,000 vpd in 2026 from 21,000 in 2015. Hudson Road (as the Western Link was estimated to carry 7900vpd in the base case (without the motorway) and 14,000vpd with the motorway, in 2026. The report noted that some assumptions were made in terms of land use projections in the Warkworth area, and in particular this area. Section 2.4.1 – Project land use assumptions notes that;

"*We made some additional alterations to the land-use assumptions in Warkworth. We anticipate that when the Project is in place, the land closest to the northern interchange will become more attractive. On this basis, we allocated all future land-use growth in the Structure Plan area around Woodcocks Road to model zones adjacent to Hudson Road. The sensitivity of the assessment to this assumption is discussed in Section 4.10.*"

Then in Section 4.10 it noted that;

"*As described in section 2.4.1, we anticipate that when the Project is in place, the land closest to the northern interchange will become more attractive. On this basis, we reallocated all the growth around Woodcocks Road to zones adjacent to Hudson Road (refer Section 2.4.1). This has resulted in two way increases in traffic volumes between the Base Case and the Project scenario of 6,100 vpd (77%) to 14,000 vpd on the section of Hudson Road from SH1 to Albert Street in 2026. The SH1 / Hudson Road intersection is about to be signalised (due for completion in 2013). Given the low base volumes and commercial nature of the adjacent land-uses, we do not consider there will be any adverse effects from this increased volume of traffic.*

In saying that, any effect from increased traffic would be a result of the land-use assumptions made rather than as a result of the Project itself. Section 4.10 details a number of sensitivity tests we have undertaken. One of these tests was to see what the effects of the Project would be if the relocation of growth north to Hudson Road did not eventuate. As can be seen in Table 9, if the land-use did not relocate to Hudson Road, volumes on Hudson Road would be very similar between the Base Case and the Project scenario. Another sensitivity test assumed that the 1% induced traffic did not eventuate. Under that scenario, there is almost no increase in volumes on Hudson Road compared to the Base Case.

This sensitivity analysis indicates that Auckland Council has the ability to manage land-use growth in the Warkworth area through its planning processes to ensure that the transportation effects of any land-use changes are properly addressed."

The land use projection provides a good basis to assess the likely effects of this development. As identified in the trip generation section of this report, the residential and mixed use components will likely generate higher traffic volumes than the lower density land use originally identified for this area. The modelling did however adopt a higher demand land usage in this area for the option assessment.

Based on the information in the modelling report, it would be reasonable to assume a likely upper traffic volume range for the Western Link of 14,000 vpd by 2026. This allows for some degree of higher trip generation (an amount of which will be internal to the development area with residential and employment trips occurring in the same area), but also that there will still be a considerable amount of traffic on Hudson Road

as a result of that development, which would be in addition to the new Western Link alignment.

In terms of travel times around Warkworth, the report identifies that;

"*Average travel times within the cordon are forecast to decrease from 6 minutes to 4.5 minutes (a decrease of 1.5 minutes or 35%) in the PM peak period. Similar scales of decreases are forecast across all the modelled periods. These decreases indicate that congestion within Warkworth will decrease with the Project in the future. In fact even with the large increase in forecast land-use and traffic volumes, congestion within Warkworth will remain close to 2009 levels in 2026 with the Project in place. This forecast reduction in congestion within Warkworth is a significant benefit of the Project.*"

The realignment of the Western Link and expansion of the local road network will clearly increase capacity, reliability and certainty that the additional traffic generated by this development can be provided for in terms of the local network, but also supports the regional projects aimed at improving long term connectivity to that part of the Auckland Region.

Updated land use information and modelling outcomes are discussed later in this report.

4.0
SPECIFIC PROPOSAL

4.1 SITE LAYOUT

The proposal is to plan change the sites into various different density residential zones, light industry zone and one neighbourhood centre zone. This would allow for the following development:

- 3000m^2 approx of Business – Neighbourhood Centre Zoned Land
- 13.4 Hectares of Business –Light Industry Zoned Land
- The proposed zonings will enable approximately 1000 to 1200 dwellings in the plan change area.

Figure 5 shows the extent of the structure plan as contained by the solid black line. The underlying land use areas are those currently shown in the AUP.

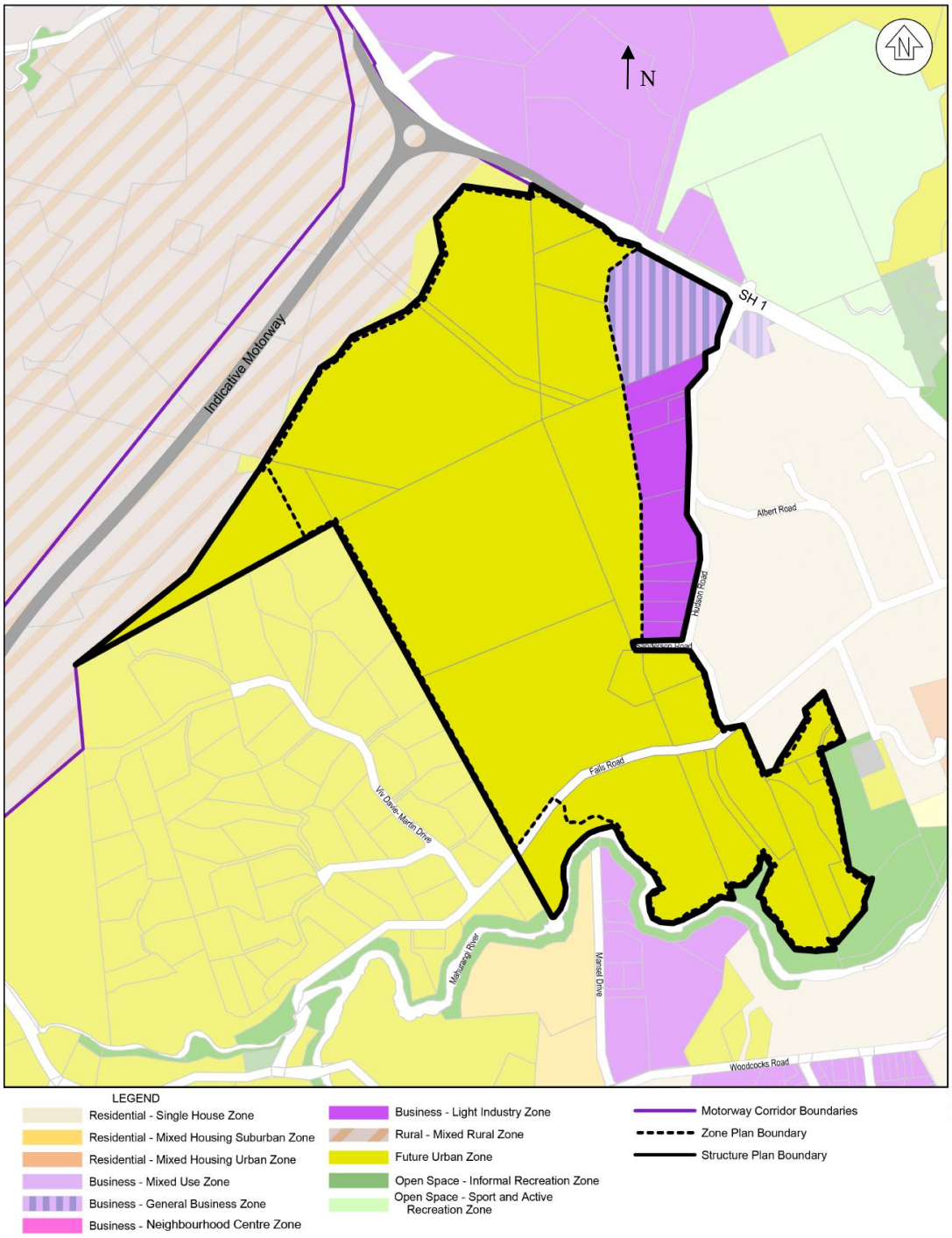


FIGURE 5 STRUCTURE PLAN BOUNDARY EXTENT

The proposed plan change regarding dwellings will be developed in eight stages. The stages is shown in Figure 6 below.

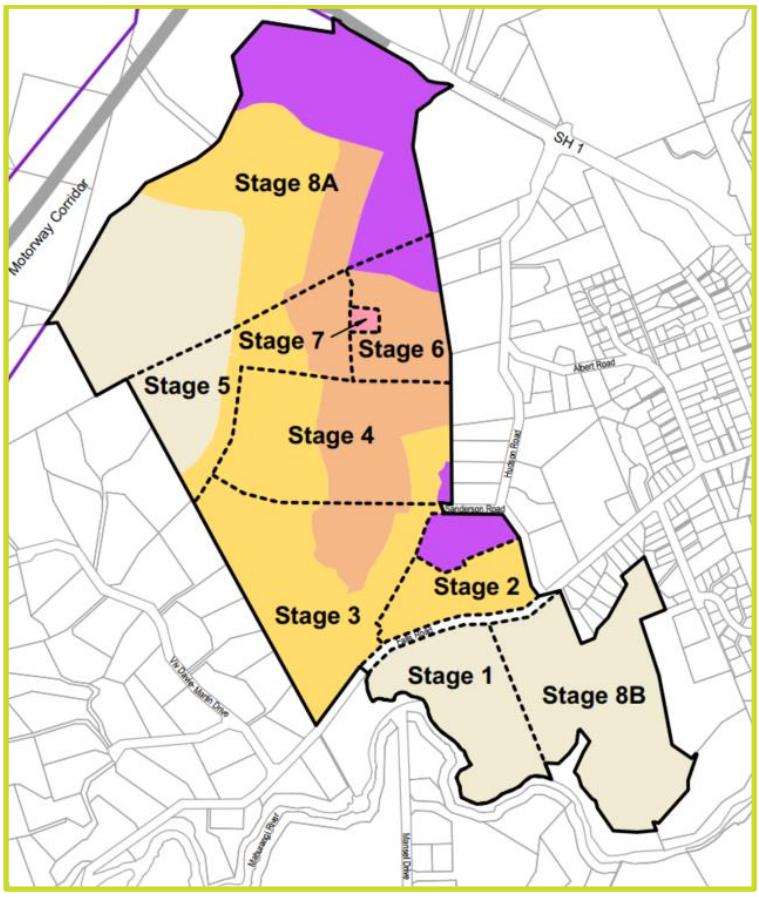


FIGURE 6: INDICATIVE STAGING PLAN AND LAYOUT

Stage 1 and Stage 8B will include the area south of Falls Road as shown in the above figure. Stages 1 and 8B would not require any changes to the Mansel Drive/Falls Road intersection as all access would be directly off Falls Road.

The rest of the stages would be developed either before or after completion of the Western Link through to the existing SH1 and future Matakana Link Road junction in the north. Overall timing of this is not yet confirmed.

The Western Link will pass through the structure plan and plan change area. There are two key junctions at each end of the proposed Western Link, the intersection with the existing SH1 at the northern end (which will also connect to the Matakana Link Road) and the junction at Falls Road in the south. Both intersections are analysed and discussed further in this report later.

Based on the AUP, all roads are classified as either arterial roads or non-arterial roads. The definition for collector and other levels of roading is done through AT internal documents, primarily the Roads and Streets Framework (RASF). The design of the proposed roads will follow the RASF to support growing of Warkworth. The RASF bring 'place' and 'movement' together. The 'place' is including AUP, Local Board Plans, and Centre Plans. The 'movement' is including Auckland Transport Alignment Project (ATAP), Network Plans, Corridor Plans, and Transport for Future Urban Growth (TFUG). Therefore, the RASF describes balances and integrates the intended strategic and local place and movement functions of roads and streets, as well as the levels of service for all transport modes. Following the RASF objectives, we consider that all proposed new roads will be designed in ways that better relate to the surrounding context and serve the users and surrounding local community better.

4.2 ROADS AND STREETS FRAMEWORK

As mentioned above, the proposed development will include the Warkworth Western Link with limited accesses for proposed local roads to commercial and non-commercial areas. Western Link is an Arterial Road connecting the intersection where Mansel Drive and Falls Road meet and the State Highway 1.

The RASF has classified the roads into nine types and also recognises that a road can consist of different street types along this full length. Figure 7 below is shown the roads and streets family in the RASF.

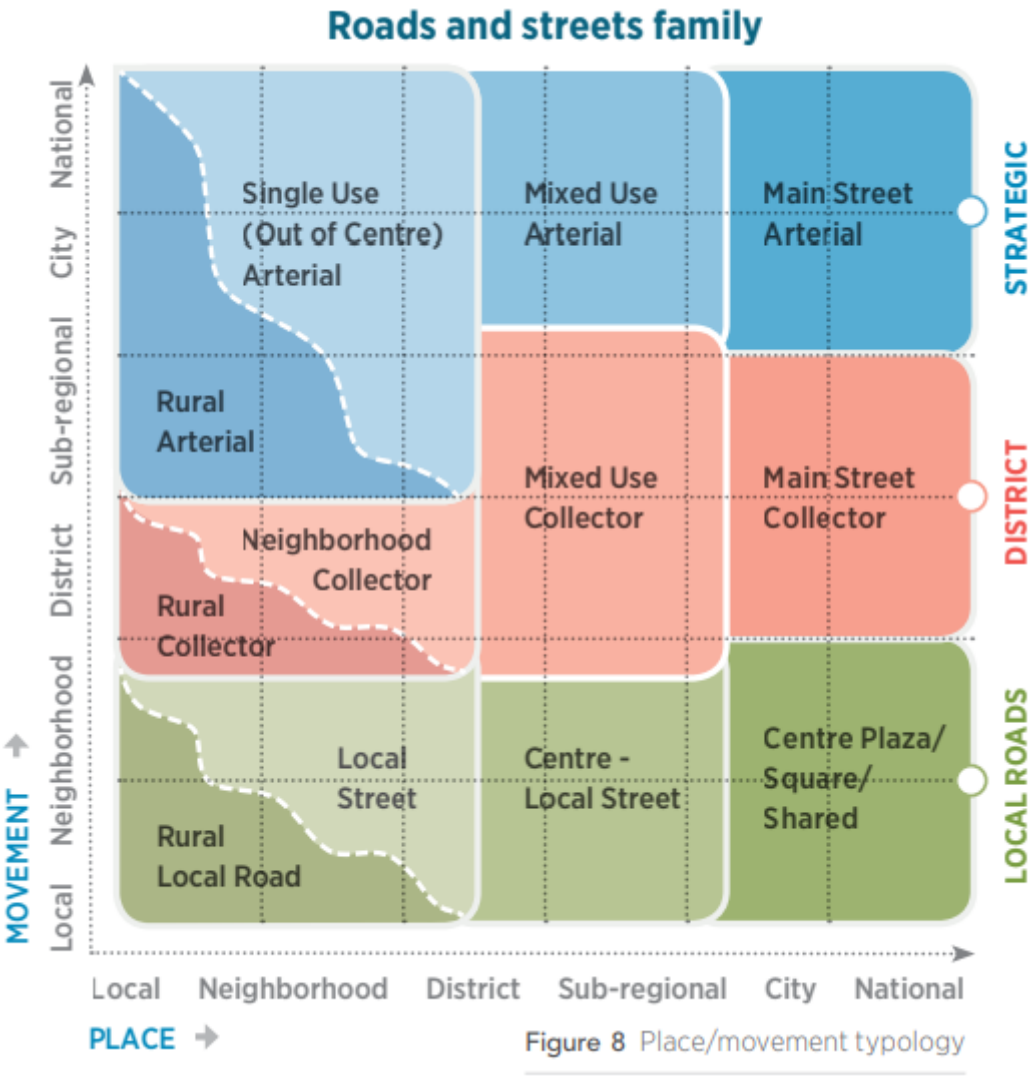


FIGURE 7: RAODS AND STREETS FRAMWORK - ROADS AND STREETS FAMILY

The Western Link will have a road reserve width of 29.5m, or to be consistent with that of the Matakana Link Road. The RASF identifies a number of different roading classifications, including Mixed Use Arterial and Main Street Arterial. For both, road widths of 20-30m are specified and therefore the overall road reserve width is consistent with this. The various cross sections are provided in the report later. The road width and proposed formation of the cross section has included all items required by AT to accommodate a future Arterial Road. The provided width will include a provision for four traffic lanes, separate cycle facilities, footpaths and landscaping. The alignment of the road is not only in line with what is identified in its Transport Growth Networks – North and Warkworth documents but also in line with

the proposed Matakana Link in different stages. It is noted that AT will ultimately have control over access to the proposed Western Link.

It is expected other proposed roads would be local roads or neighbourhood collector roads and the design of these would be consistent with the RASF.

4.3 PROPOSED PUBLIC TRANSPORTATION

There has recently been changes to Warkworth public transport that is implemented in September 2018. This includes scheduled services serving the outer settlements (Matakana, Snells Beach, etc) and a link between Warkworth and the Hibiscus Coast Highway bus stations

The design of Western Link does not preclude it use as a future public transport route. The cross section design (details will be mentioned in the report later) is wide enough to accommodate buses and could be used as a bus route in the future.

4.4 PROPOSED PEDESTRIAN AMENITY

All proposed roads will include footpath to ensure the walkable catchment to link to Warkworth town centre, school and other community areas. The proposal on Western Link Road will align the provision of the Matakana Link in different stages.

4.5 FALLS ROAD / MANSEL DRIVE INTERSECTION

The recent completion of the bridge at the northern end of Mansel Drive has resulted in an altered roading pattern in the area. The new roading alignment of the intersection of Mansel Drive and Falls Road is shown in Figure 8.

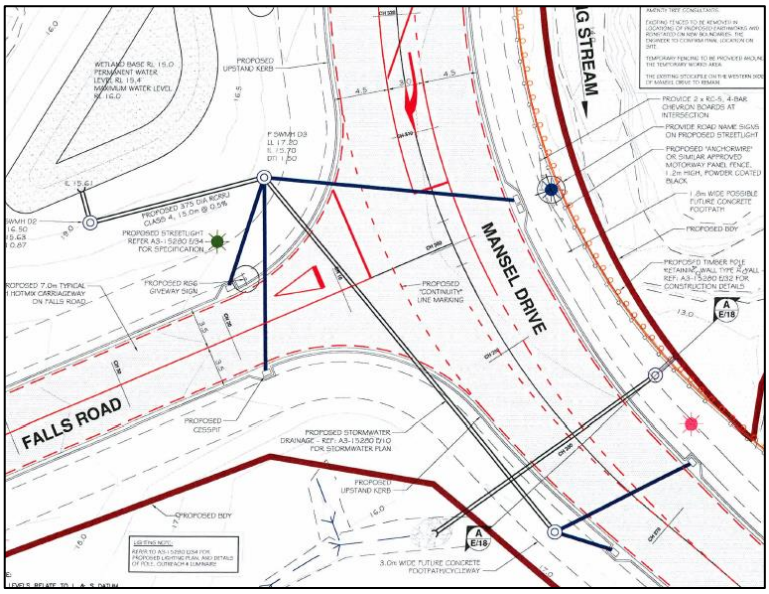


FIGURE 8 NEW ROAD LAYOUT OF THE MANSEL DRIVE/FALLS ROAD INTERSECTION

The primary southern access to the proposed site will be through the Mansel Drive and Falls Road intersection, which provides priority to vehicles on Mansel Drive and the eastern approach on Falls Road. The western approach on Falls Road is now subject to a Give Way control. This intersection will need to be reconfigured when the Western Link is constructed and priority given to this through route. The connection to the Western Link, the main road within the subdivision will extend from Mansel Drive across Falls Road. Options for this intersection are discussed as part of the modelling section in this report.

The new bridge on Falls Road will need to be reconstructed to provide a more appropriate cross section.

4.6 GENERAL ON-STREET PARKING

At this stage, it is intended that the parking for residential dwellings and neighbourhood centre zone will meet the requirements in the AUP. In that respect, parking requirements of the dwellings will be met on site. Visitor parking is provided on street, primarily in on-street or recessed parking bays identified in each of the cross sections.

On-street parking requirements for visitors vary depending on the surrounding environment. The AUP does not require any visitor parking ancillary to the parking required on each residential site. Typically however around 0.5 spaces per dwelling is available for parking on road for much of the road lengths identified in the design and will easily provide for visitor parking. In the absence of detailed information relating to the locations of vehicle crossings it is not possible to be specific in terms of the number of spaces. This would be addressed as part of the future resource consent applications.

4.7 INDICATIVE ROAD CROSS SECTIONS

4.7.1 WESTERN LINK

The width of the Western Link needs to provide for both short and longer term traffic usage. Initially the layout would need to provide for two traffic lanes (plus walking, cycling, planting and service areas), but ultimately four traffic lanes could be required. The configuration of the proposed Western Link can be modified based on different stages of the Matakana Link. The background to this proposal is discussed in the modelling sections of this report.

In the long term, the Western Link will provide two traffic lanes in both directions. The applicant is flexible with the timing of this and is open to constructing the road to the four lane full width. There is a risk that vehicle speeds will increase as the road is initially underutilised, potentially causing safety issues.

Initially a 32m Arterial Road cross section was required and provided by Auckland Transport throughout consultation as shown below in Figure 9. Achieving such a cross section is challenging in the topography of the area and we consider that providing the elements necessary for an integrated transportation network is more important than an arbitrary road width. In addition, it is noted that sufficient road width is provided and changes can be made to accommodate further increasing traffic demand.

FIGURE 9: 32M TYPICAL ARTERIAL CROSS SECTION

It is also noted that AT has taken a similar approach for the Matakana Link Road, which is also an arterial Road, but with a 29.5m cross section currently proposed. As mentioned previously, Matakana Link will be constructed in stages, with the eastern two lanes to be constructed in 2021 (Stage 1) and two additional lanes constructed on the western side in the future when traffic demand exceeds capacity which at this stage is expected to be between 2036 and 2046.

It is therefore proposed to develop the Western Link to be consistent with the facilities proposed for the Matakana Link Road. There may be additional green space that could provide an open green area adjacent to the road and serve to improve the amenity along this side, along with possible provision of meandering footpaths.

The proposed Western Link will be located to the west of the Business – Neighbourhood Centre zone.

The proposed Western Link will intersect with SH1 and the proposed Matakana Link. This intersection (SH1/Matakana Link/Western Link intersection) is proposed to be a signalised intersection. The arrangement and phases will align with the proposed Matakana Link.

It may be necessary to provide some pedestrian crossing facilities along the Western Link road. These could be in the form of a signalised pedestrian crossing, stage zebra crossings, or uncontrolled crossings between the outside kerb and the median.

It is also desirable that some form of threshold is used to demarcate each end of the neighbourhood centre area. This could be in the form of a different material or surfacing. The aim of this is to encourage drivers to slow down through this area, but also be more aware of vehicle and pedestrian manoeuvres.

4.7.2 LOCAL ROADS

Local roads provide a visual connection from the Western Link to the wider development and will collect and distribute local traffic to the Western Link. The allocation of 17m road reserves will have capacity for rain gardens, wide berms and on-street parking. The specific design will be determined when subdivision resource consent applications are lodged, but to demonstrate that this width is appropriate, the cross section could include the following elements;

- Rear berms;
- 1.8m footpaths;

- Parking on each side (possibly semi recessed with planted areas/narrowings); and
- One traffic lane in each direction.

This cross section is in line with AT requirements and typical of local roads (typical 15m wide) throughout the region. We consider that the wider road reserve will provide more options for AT to cope with their future plan.

Please note, visitor parking spaces are only provided for two lane situations and no parking provision are proposed for the section of road with two lanes in each directions.

4.7.3 LANEWAYS

Local laneways will be provided in some locations to serve higher density developments such as terraced housing. This will limit the number of vehicle crossings on the local streets. The design of the laneways would be determined as part of future resource consent applications.

5.0 TRANSPORTATION MODELLING

5.1 FUTURE URBAN LAND SUPPLY STRATEGY (FULSS)

The FULSS refresh was released in July 2017 and has formed the basis for updated regional transportation modelling undertaken by AT. The background to the FULSS was the Sub-RAP report prepared by Jacobs New Zealand Limited in May 2015 for the Warkworth area as well as Wellsford and Algies Bay.

The previous Warkworth Structure Plan, prepared by Rodney District Council in 2004 had projected a population of 8,000 residents by 2044. This is clearly well out of date.

The FULSS development around the Warkworth area is divided into three sections, with the expected development as below;

- Warkworth North – 324ha total, with 69ha of live zoned business land; approximately 2,300 dwellings and no centre.
- Warkworth North East – 192ha total with approximately 1600 dwellings and no centre.
- Warkworth South – 493ha total including approximately 3700 dwellings and 1 neighbourhood centre.

The structure plan and plan change area falls into the Warkworth North area. This area will include significant roading projects completed by 2021 to allow development of a local roading network to support initial development of this area. Sequencing for Warkworth South and Warkworth North East is expected to occur later. The timing of these subsequent developments is reflected in the updated traffic modelling.

The overall development does include some commercial area, so is not completely aligned with the FULSS expectations. In terms of future year modelling however, the impact of this in terms of the overall Warkworth area is likely to be small. Provision of a neighbourhood centre or commercial/retail areas is likely to internalise more traffic and result in fewer trips beyond the extent of the area.

5.2 PREDICTED TRAFFIC VOLUMES

AT have supplied modelled information for this area of Warkworth based on 2026, 2036 and 2046 models from the Auckland Regional Transportation (ART) model. 2026 does not include the Western Link in the model, but it is included in 2036 and 2046. Information was suppled for the ART 9 model (pre-update) and ART 11 (post-update) scenarios).

Using a generally accepted industry ‘rule of thumb’ that morning plus evening peak traffic multiplied by five is equivalent to the average daily flow, the overall north south flows through the Western Link and Hudson Road are;

PRE-UPDATE FLOWS

- 2026 – 5,000vpd
- 2036 – 8,985vpd
- 2046 – 12,830vpd

POST-UPDATE FLOWS

- 2026 – 6,335vpd
- 2036 – 14,170vpd
- 2046 – 21,070vpd

The ART model is a higher level model and so does not contain all roading links or points of origin and destination. In this situation, the node, or area for origin and destination of traffic in this area is shown on Hudson Road. What this means is that more traffic is shown moving through the 'old' Western Link route along Mansel Drive, Falls Road and Hudson Road to then access the existing SH1. This is however not a realistic situation once the Western Link is constructed through to the existing SH1.

In order to provide a realistic scenario for consideration, we initially reversed the ART flows shown for Proposed Western Link and Hudson Road respectively. The results of this showed the following volumes.

PRE-UPDATE FLOWS

- 2026 – Hudson Road 5,000vpd (as no Western Link in this model so includes all local and through traffic)
- 2036 – Hudson Road 3,375vpd, Western Link 5,610vpd.
- 2046 – Hudson Road 5,505vpd, Western Link 7,325vpd

POST-UPDATE FLOWS

- 2026 – Hudson Road 6,335vpd (as no Western Link in this model so includes all local and through traffic)
- 2036 – Hudson Road 3,040vpd, Western Link 11,130vpd.
- 2046 – Hudson Road 5,420vpd, Western Link 15,650vpd

We consider the split between Hudson Road and the proposed Western Link is an appropriate distribution of traffic and accounts for growth along Hudson Road and the surrounding area that would continue to access the existing SH1 using this road.

5.3 MODEL UPDATES

Recently, AT have lodged a Notice of Requirement (NOR) for the Matakana Link road and modelling has been undertaken for this link by Jacobs. The report is updated in October 2018. This is based on a further update called the i11.4 ART model.

In addition, a separate NZTA project looking at the intersection of the existing SH1, Matakana Link Road and the Western Link is currently being undertaken. The updated report from Jacobs includes the SIDRA model for Matakana link and SH1. However, the Western Link is not included in the report.

5.4 KEY INTERSECTION ANALYSIS

The key connection points between this site and the surrounding network will be at the existing SH1/Western Link intersection, and the southern intersection with Falls Road and Mansel Drive.

5.4.1 NORTHERN INTERSECTION FOR WESTERN LINK / MATAKANA LINK / SH1

The northern intersection includes the connection to the Matakana Link Road and is being modelled by AT as part of undertaking the assessment of this link. In relation to this plan change, we have modelled this junction in conjunction with the report from Jacobs for Matakana Link/SH1 intersection. The SIDRA model is also in line with the updated ART modelling and FULSS land uses to ensure consistency between the two analyses. The proposed signalised intersection layouts is shown in Figure 10 below.

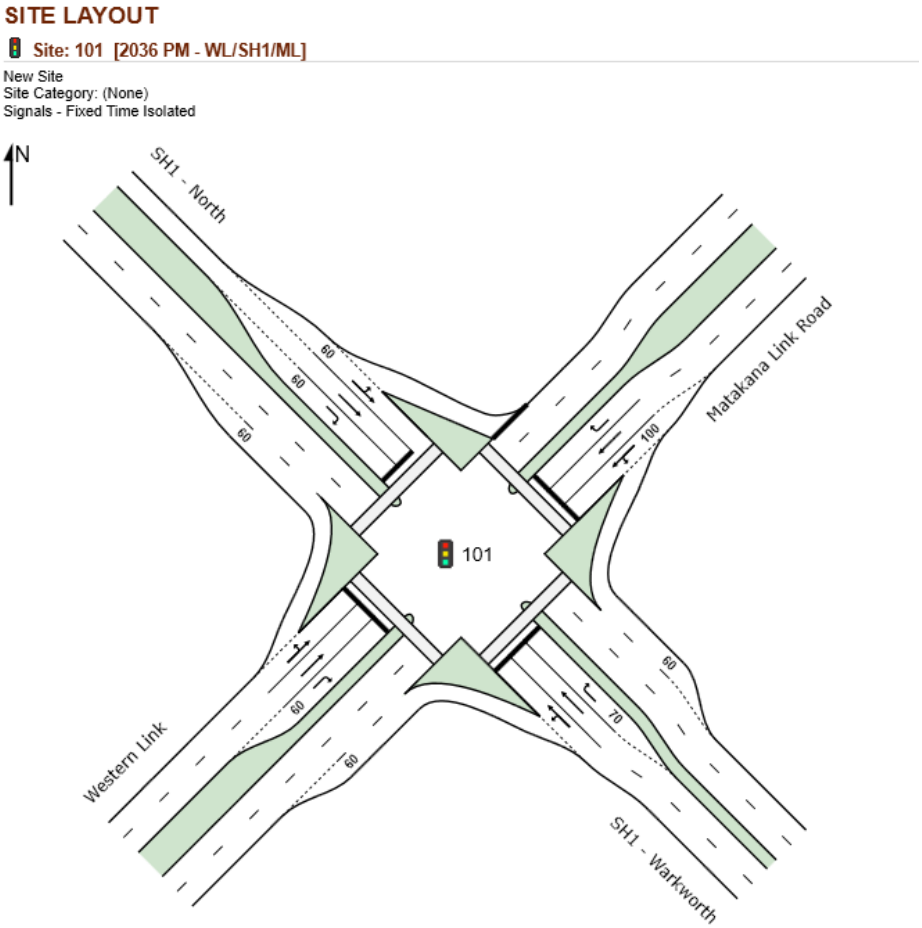


FIGURE 10: LAYOUT FOR THE INTERSECTION OF WESTERN LINK/MATAKANA LINK/SH1

This model is for 2036 of morning peak and afternoon peak. The volumes used in Jacob's report for SH1/Matakana Link intersection for year 2036 includes Stage 2. The timeframes for the proposed stages in the plan change zone and the construction of the Western Link is unclear. However, 2036 is considered as the ultimate result for the proposed changes. The overall traffic volumes are the same as those used in the Jacobs model, with the distribution altered to allow for the Western Link road in line with the earlier modelled outputs from the i11 model.

Table 2 below show the SIDRA results for 2036 for both AM peak and PM peak.

TABLE 2: SIDRA REULTS FOR SH1/MLR/WL INTERSECTION IN 2036

SECTION	AM PEAK			PM PEAK		
	DELAY (S)	LOS	QUEUE (M)	DELAY (S)	LOS	QUEUE (M)
SH1 – Warkworth	44	D	61	46.8	D	101

TABLE 2: SIDRA REULTS FOR SH1/MLR/WL INTERSECTION IN 2036

SECTION	AM PEAK			PM PEAK		
	DELAY (S)	LOS	QUEUE (M)	DELAY (S)	LOS	QUEUE (M)
MLR	42.9	D	144	65.7	E	195
SH1 – North	48.3	D	110	44.1	D	181
Western Link	44	D	50	39.8	D	67.4

Full SIDRA outputs are in Appendix 2.

These results indicate that the final intersection for SH1/ Matakana Link / Western Link performs at LOS D on average. Most of delays is expected around 40 sections and queues are not expected to block any adjacent intersection. So the adverse traffic impact is considered minor. It is also noted that both models have a cycle times considerably less than 150s. This means that this intersection is not at its maximum capacity. The exact phase and layout of the signalised intersection can be determined at the detail design stage.

5.4.2 SOUTHERN INTERSECTION FOR WESTERN LINK / FALLS ROAD

SIDRA model for the intersection of the southern end of the Western Link is undertaken. Intersection turning movement counts were obtained for the Falls Road, Hudson Road intersection and then updated to allow for the greater use of the proposed Western Link in comparison to Hudson Road.

Intersection analysis was undertaken using SIDRA, considering priority, signalised and roundabout options for 2036 and 2046. We note that 2026 does not include the proposed Western Link, whereas it is highly likely that this road will be in place by this time. This suggests that the land use scenario timing could be considered earlier than modelled through the ART model.

The proposed intersection layouts, traffic volumes modelled and output of morning (AM) peak, interpeak and evening (PM) peak, are provided in Appendix 2

The 2036 analysis is based on two lane approached (one lane in each direction) for the proposed Western Link, while 2046 is based on four lane approaches (two lanes in each direction).

The proposed layouts for 2036 and 2046 for Western Link and Falls Road intersection with priority control is shown in figures below:

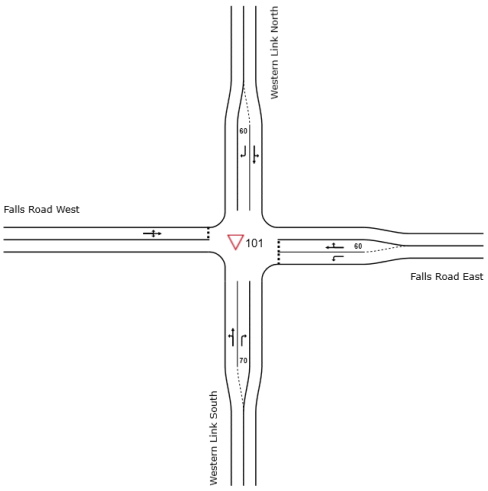


FIGURE 11: LAYOUT FOR SOURTHEN END INTERSECTION - PRIORITY 2036

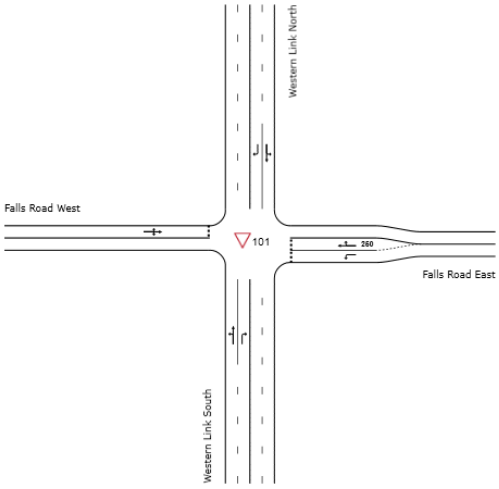


FIGURE 12: LAYOUT FOR SOURTHERN END INTERSECTION - PRIORITY 2046

The proposed layouts for 2036 and 2046 for Western Link and Falls Road intersection with priority control is shown in figures below:

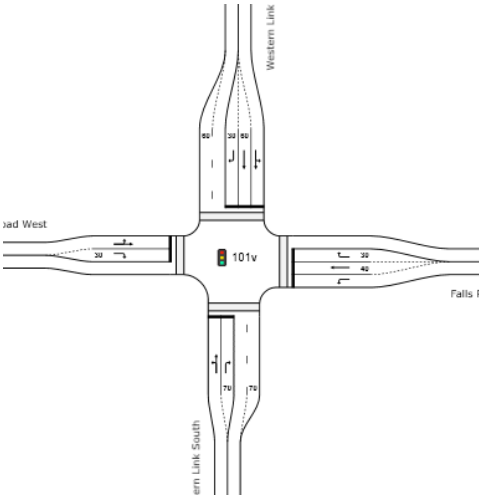


FIGURE 13: LAYOUT FOR SOURTHEN END INTERSECTION – SIGNAL 2036

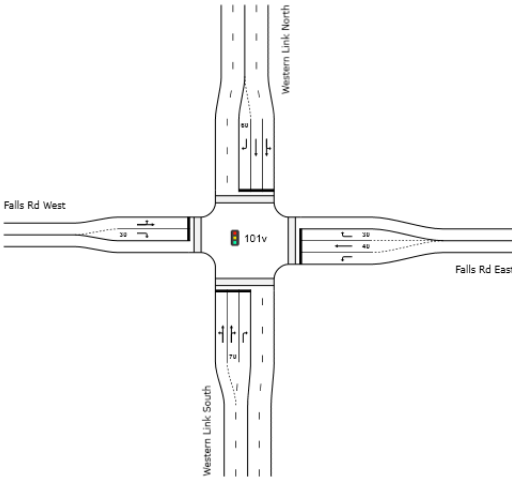


FIGURE 14: LAYOUT FOR SOURTHERN END INTERSECTION – SIGNAL 2046

The proposed layouts for 2036 and 2046 for Western Link and Falls Road intersection with priority control is shown in figures below:

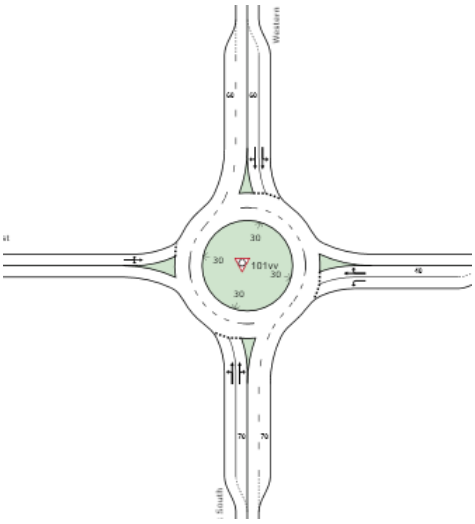


FIGURE 15: LAYOUT FOR SOURTHEN END INTERSECTION – SIGNAL 2036

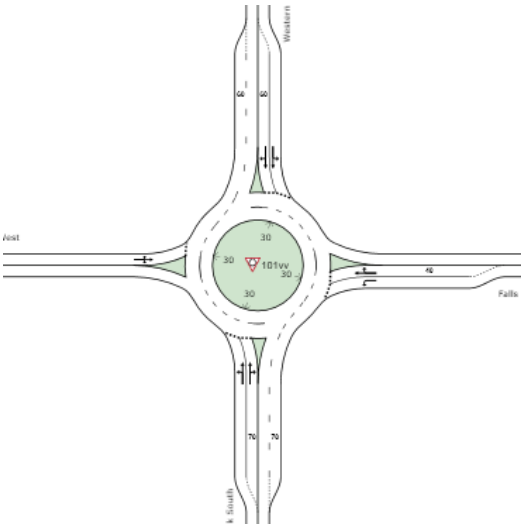


FIGURE 16: LAYOUT FOR SOURTHERN END INTERSECTION – SIGNAL 2046

While this proposed plan change allows for future four lanes northern side of Falls Road, the existing Mansel Drive road cross section south of Falls Road would require considerable widening to accommodate a four lane configuration that would comply with AT's requirements. As the ART model allows for land uses from all development areas in Warkworth, the modelling undertaken for this junction does not only relate to that generated from the area within this plan change. The generation of this area is in fact only a portion of total traffic expected, as discussed in the following section. Also, given proposed staging of this development, all construction works are expected to be complete well before 2036, so any additional traffic in the 2046 model will occur from outside of this plan change area.

The results of the analysis are shown in the following Tables.

TABLE 3: SOURTHERN INTERSECTION LOS / AVERAGE DELAY (S) 2036

TIME	PRIORITY CONTROL	TRAFFIC SIGNALS	ROUNDABOUT
AM peak	NA/5.9	LOS C/28.2	LOS A/3.9
Inter Peak	NA/6.7	LOS C/28.0	LOS A/4.1
PM peak	NA/23.9	LOS C/32.6	LOS A/4.7

Note: NA is because that side road has right turn out only. Main roads are at LOS A or B for all movements.

TABLE 4: SOURTHERN INTERSECTION LOS / AVERAGE DELAY (S) 2046

TIME	PRIORITY CONTROL	TRAFFIC SIGNALS	ROUNDABOUT
AM peak	LOS F/70.8	LOS C/28.1	LOS A/8.0
Inter Peak	LOS F/67.6	LOS C/29.8	LOS A/4.9
PM peak	LOS F/423.3	LOS D/44.1	LOS B/11.5

The conclusions from the analysis are that a priority junction will function adequately with the exception of the side roads which will experience congestion. Both these movements have alternative routes.

Both traffic signals and a roundabout option function through 2036 and 2046. For vehicles, a roundabout operates better, but traffic signals will provide a more compact form and will operate more safely for pedestrians and cyclists using the junction. In addition, it is considered that the subject site would have restricted area for installing a two way roundabout.

Based on the analysis undertaken, it is recommended that a set of traffic signals is installed at this junction. No changes to the Mansel Drive bridge are required.

5.4.3 TRIP GENERATION OF THE EXISTING WARKWORTH AREA

The distribution of work related trips to and from the wider region accounts for 36% of the estimated trips generated within the development area. The remaining 64% of trips are associated with people who both live and work within Warkworth. This pattern of distribution follows a logical pattern given the diverse and significant work opportunities either existing or being created in the immediate 2km radius of the site.

Within the 36% of regional trips, it has been necessary to identify how that distribution is likely to occur. To simplify the distribution, we have looked at residential areas within the immediate zones and distributed the trips according to this.

- SH1 to the south
- Matakana Road to the northeast
- SH1 to the north
- Sandspit Road to the southeast
- Woodcocks Road to the southwest
- Warkworth Area

TABLE 4: EXPECTED EMPLOYMENT RELATED TRIP DISTRIBUTION

ORIGIN	DISTRIBUTION %	DAILY TRIPS PER ROUTE
SH1 to the south	21.4%	534
Matakana Road to the northeast	7.5%	187
SH1 to the north	2.7%	67
Sandspit Road to the southeast	3.7%	92
Woodcocks Road to the southwest	0.8%	20
Warkworth Area	63.9%	1,594*
Total	100%	2,494

5.5 EFFECT ON THE LOCAL NETWORK

The construction of the Western Link will initially have one lane in each direction. It is expected that within 10 years of post-construction, the road will be widened to four lanes (by AT) with two lanes in each direction to accommodate for the increased demand of the road network.

The development will include improvements to the road frontage on Falls Road and Hudson Road for the sections adjacent to the subject site. The exact nature of these improvements will be determined when a subdivision resource consent application is lodged but it is likely to include the construction of footpaths.

Falls Road in front of the site and between the site and View Road has no pedestrian facilities. We are aware of a recent project by Auckland Transport to construct a footpath on the southern side of Falls Road between View Road and Hudson Road. This project has recently been completed.

We have then summarised the traffic effect of the proposal on:

- The Western Link connects to the bridge in the south.
- Falls Road
- Hill Street/SH1 intersection

The SIDRA modelling has covered the intersection of the Western Link/Falls Road/Mansel Road. The SIDRA model results have indicated that the proposal will have less than minor effect on the bridge in the south. No change to the bridge design is proposed at this stage.

In addition, we have also reviewed the report prepared by Jacob New Zealand Limited (Jacobs). The report is mainly for Matakana Bypass Link Road (MLR) project.

This report has included SIDRA models: intersections for stages 1 and 2 of the eastern end of the Matakana Link and Matakana Road, intersection for Clayden Road and Matakana Road, intersection for Matakana Link Road and SH1.

The MLR model indicates that both routes experience delay in the evening, but the MLR route avoids the Hill Street intersection and the section of Matakana Road between Clayden Road and Sandspit Road, which are the most significant sources of delay for the SH1 route in the model. While MLR provides an alternative route for bypassing the congested area around the Hill Street intersection, it does not mitigate all the delays and queuing where Hill Street, Elizabeth Street, and Sandspit Road come together. Similar to the Western Link, the proposed MLR project does not include public transport infrastructure. However, the design of both Western Link and MLR project does not preclude their use as a future public transport route.

6.0 INTEGRATION WITH THE FUTURE ROAD NETWORK

6.1 MATAKANA LINK ROAD

Matakana Link Road will form a connection between Matakana Road and State Highway 1, north of Warkworth. The proposed road will intersect State Highway 1 and the Western Link at a signalised intersection in close proximity to the Hudson Road intersection as shown in Figure 17. This will provide another arterial route for the local community. Auckland Transport and the NZTA have signed an agreement to prioritise this project. Construction is scheduled to be completed by 2021.

This project is proposed to be constructed in stages. The eastern two lanes to be constructed in 2021 (Stage 1) and two additional lanes constructed on the western side in the future when traffic demand exceeds capacity which at this stage is expected to be between 2036 and 2046 (stage 2).

Figure 17: Matakana Link Road labelled as No.1

Local residents are particularly concerned about the Hill Street intersection, a notoriously complex crossroads between Matakana, Sandspit, Warkworth Town Centre and State Highway 1. The Matakana Link Road will allow motorists not travelling to the town centre to bypass this intersection and make use of the Western Link or the Ara Tuhono-Puhoi to Warkworth Road.

6.2 FUTURE LINK ROAD EXTENSION TO SANDSPIT ROAD

The linkage across the north-eastern area of Warkworth is split into the Matakana Link Road and Sandspit Link Road, which would form a 'ring' around the north-eastern area. The Sandspit Link Road is shown as NO.2 in Figure 17 above. The extension will support the growth in the eastern beaches such as Sandspit, Snells Beach and Algies Bay. Like the Matakana Link Road, the Matakana Road Extension will alleviate pressure on the Hill Street intersection and provide easier thoroughfare to State Highway 1.

At this stage the Matakana Link Road is funded and identified for completion prior to that of the motorway extension. There is no current timing proposed for further investigation of construction of the Sandspit Link Road.

6.3 WESTERN LINK– NORTHERN AND SOUTHERN CONNECTIONS TO STATE HIGHWAY 1

The Western Link, as mentioned in Section 2.0 is a further measure to provide alternative routes to State Highway 1 in and around Warkworth. This Link will by-pass Warkworth Town Centre. The southern connection will be in the vicinity of McKinney Road and the new Matakana Link Road in the north. The implementation of the Western Link will be agreed upon Developer Funding agreement.

The first section of this road has been completed with the construction of the link from Mansel Drive to Falls Road. The second section of the Western Link adjacent to the north of Falls Road. The second section is identified as being completed by AT and the timeframe is not agreed at this stage. This proposal will seek to bring that forward and introduce developer funding to complete this link.

The final stage of the Western Link includes the southern link from the existing extents of Stage 1 through to SH1 in the south.

6.4 ARA TUHONO-PUHOI TO WARKWORTH ROAD OF NATIONAL SIGNIFICANCE

The Ara Tuhono-Puhoi to Warkworth project aims to provide reduced travel times and better freight connection between Northland and Auckland, Waikato and Tauranga hubs. The road will comprise of a two lane two way carriageway and is 18.5km long between Johnstone's Hill tunnel and the northern part of Warkworth. The project is scheduled for completion in 2022.

This link is an important one for the development of Warkworth as it provide capacity relief to the existing SH1, which would be over capacity if the remainder of the development areas around Warkworth were completed. The new motorway link also allows development to focus the wider network connections away from the southern end of Warkworth more towards the north. Effectively splitting the focus of the centre allows a more managed network growth pattern to be used and will see Warkworth develop as more of a regional centre in the future.

6.5 OTHER LAND BEYOND THIS SITE

Two areas of Future Urban land are identified beyond the Stubbs Farm site. To the west are the current Countryside living area built around Viv Davie Martin Lane, and also the area to the north that is ultimately bordered by the new motorway.

The proposed roading layout would provide connections to both of these areas to ensure the permeability and integrity of walking, cycling and roading connections is maintained.

6.6 AUCKLAND REGIONAL PUBLIC TRANSPORT PLAN (RPTP)

The vision of the RPTP is broadly around increasing the number of people using public transport and better aligning services with land use patterns. This is further outlined in the ten policies and objectives listed in Chapter 6 of the RPTP.

In a wider context, public transport (PT) throughout Auckland needs to increase patronage in combination with the major roading projects throughout the region to provide for the future of the city. The RPTP is an instrument for engaging with the

public on the design and operation of the PT network and a statement of intent by Auckland Transport in this regard.

The latest survey by Auckland Transport on public transport implementation in Warkworth did not include any new routes along Falls Road, which is understandable given the level of residential and commercial development in this area. However, the area is rapidly expanding. The recently constructed Summerset residential area with adjacent commercial space on Mansel Drive is an example of the increasing use of the western portion of Warkworth. This development will only improve the viability for such a service.

The proposed road widths could support the introduction of a bus network through this area in the future. Depending on the timing for consideration of a network, these changes could be incorporated as part of construction.

It is also noted that a park and ride has been identified for this general area in Warkworth, so there is clearly a drive to increase bus usage, although this is currently focused on a centralised bus area that would presumably use the new motorway to get commuters to Auckland and the northern suburbs.

6.7 AUCKLAND CYCLE NETWORK (ACN)

The provision of the shared or dedicated cycle paths within the development and along the existing road frontage is entirely consistent with supporting the existing infrastructure in terms of the wider cycle network. The increase in residential density and proximity of these facilities will only encourage their use with resultant safety and amenity benefits for the cycle network, with a possible network outlined earlier in this report.

While the provision of increased cycle infrastructure is in line with the cycling aspirations of Auckland Transport the Western Link is not featured on Auckland Transport's proposed Auckland cycle network map due to its distance from the CBD.

6.8 REGIONAL ARTERIAL ROAD PLAN (RARP)

The RARP was completed in 2009 by Auckland Regional Transport Authority (ARTA) and has been adopted by AT. The purpose of the plan is to define the form and function of regional arterial roads and to provide a framework for the integrated management of these roads, including their interaction with surrounding land uses.

The development of the roading network in this area, and primarily the arterial road network is clearly defined. The subject site is well located between State Highway 1, Matakana Road and Sandspit Road, which are all classed as Arterial roads.

6.9 CORRIDOR MANAGEMENT PLANS

Corridor Management Plans (CMPs) provide a long term vision for key arterial roads throughout the city. The Western Link itself is not the subject of a CMP, nor is it likely to be in the future.

Much of the focus of CMPs has been on improving conditions for buses and cyclists while attempting to maintain general traffic capacity to provide a more holistic transport network. The mixed use and residential development that the proposed plan change that will enable the integration and support both PT and increased cycle use in the area would only add support to these improvements on the arterial network, when they occur. As such, the proposed plan change is seen as being consistent with the objectives and policies of CMP's in a wider sense.

6.10 AUCKLAND UNITARY PLAN POLICIES AND OBJECTIVES

Both sections B3.3.1 Transport objectives in Regional Police Statement (RPS) under *B3 Ngā pūnaha hanganga, kawekawe me ngā pūngao - Infrastructure, transport and energy* of the AUP.

B3.3.1.(1) of the objectives states:

(1) Effective, efficient and safe transport that:

(a) supports the movement of people, goods and services;

(b) integrates with and supports a quality compact urban form;

(c) enables growth;

(d) avoids, remedies or mitigates adverse effects on the quality of the environment and amenity values and the health and safety of people and communities; and

(e) facilitates transport choices, recognises different trip characteristics and enables accessibility and mobility for all sectors of the community.

We consider that the proposed development will align with all objectives as the result of the development will provide an effective, efficient and safe transport network by creating another link to provide options for traffic travelling around the Warkworth town centre. This is part of Auckland Transport's project to support the region growth. Warkworth is expected to grow to a substantial satellite town of more than 20,000 people over the next few decades. In addition, increased public transport services are also planned between Auckland and Warkworth enables to provide more options of for the community to travel.

In vicinity of the subject site, the proposed transport upgrades: Puhoi to Warkworth motorway extension, Matakana Link Road and the proposed Western Link will make this area and the road network more effective and efficient to support the urban growth development. In addition, appropriate modeling and design will also provide to confirm and ensure the safe transport environment is provided.

The proposed Warkworth Western Link Project is an improvement for the road connections to the west of the State Highway 1 to support the future urbanisation of the Warkworth. The proposed Western Link will help alleviate pressure within the township by providing a strong north-south alternative route to the existing SH1 between the northern end of Warkworth.

Therefore, the proposed plan change complies with the objectives stated above.

The AUP sets out the objectives and policies to support the operation and development of an integrated transport network in Auckland. This assessment considers the plan change in relation to the six AUP objectives (E27.2), these being:

(1) Land use and all modes of transport are integrated in a manner that enables (a) the benefits of an integrated transport network to be realised, and (b) the adverse effects of traffic generation on the transport network to be managed.

The proposed development will add traffic to the road network, but also result in a considerable improvement to network capacity, connectivity and resilience. The proposed road will incorporate with all functions of the road to serve all type of road users on the road and ensure the safety for all road users (eg. walking and cycling). Modeling has been adopted to ensure that motorists time loss are minimised. The adverse effects of this will be managed by the implementation of the Western Link and ultimately the Ara Tuhono-Puhoi to Warkworth State Highway. Footpaths will connect

to the existing network and future cycle and potential public transport improvements to the wider area will integrate with the residential activity.

The development is entirely consistent with this policy.

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

The proposed development will integrate all transport modes and will be entirely consistent with this objective.

(3) Parking and loading supports urban growth and the quality compact urban form.

Parking will be determined at the resource consent application stage, but is expected to comply with the standards of the Auckland Unitary Plan. The road cross sections and facilities within the development will provide an environment that encourages walking and cycling.

As discussed in the cross-section section of this report, the aim is to provide a compact form within the Western Link to provide not only for short and long term transport needs for this link, but also to allow the remainder for the development to create good urban form and provide for other transport modes.

It is considered that the proposed cross sections are entirely consistent with this objective.

(4) The provision of safe and efficient parking, loading and access is commensurate with the character, scale and intensity of the zone.

The roads are to be designed and built to meet AUP requirements and the desire to create opportunities for people to use walking and cycling as part of normal everyday trips. Beyond the site, AT will need to consider and prioritise upgrades to support the infrastructure created within this development site.

The design of accesses, parking and loading will be developed as resource consent applications for individual developments are submitted.

The proposal is consistent with this objective.

(5) Pedestrian safety and amenity along public footpaths is prioritised.

Pedestrian connectivity will link to the existing network through Falls Road or Mansel Drive. Beyond the development, the footpaths provide the opportunity to link to other developments in a consistent manner which will see progressive expansion of pedestrian facilities that will ultimately tie into the remainder of facilities around Warkworth.

(6) Road/rail crossings operate safely with neighbouring land use and development.

This objective is not applicable there are no level crossings in the area. Road crossings and intersections will be designed through the resource consent stages, but will be consistent with modern design practices.

7.0
AUCKLAND TRANSPORT COMMENTS

Auckland Transport (AT) have provided initial answers and comments on earlier versions of this ITA and these are included for completeness. Their comments are shown in italics to the following questions. The name of the same road is now changed from Western Link to Western Link.

It is important to note that whilst we can provide you with information regarding AT's network requirements / technical standards, this email shall not be considered as a formal response to any Structure Plan or Plan Change application. Any formal response specific to a Structure Plan or Plan Change application would need to come via Auckland Council. In addition, we are happy to provide information regarding AT projects such as the proposed Western Link. However, any information provided will be limited as the Western Link project has not been progressed to a stage that we can provide you with detailed information.

Overall there is a limited amount of information we can provide until either the Auckland Council structure plan or your proposed private Structure Plan application is more progressed. This will include the provision of an ITA as required by the Unitary Plan Appendix 1. In particular, modelling as part of the ITA is a crucial element to inform the network requirements. A key part of this will be consideration of any changes to the land use that you are proposing e.g. from business to residential and/or relocating business land from this area to elsewhere. Such changes will influence the assumptions, form and function for the transport network including future Western Link or any additional arterial roads. Any arterial cross sections cannot be 'confirmed' until the wider context is known.

- Confirmation of the entry and exit points being consistent with the proposed corridors in the attached plan. Namely: Entry from Mansel Drive from what I assume would be a signalised intersection or roundabout incorporating Falls Road. This would require works within the newly created title to be vested to AT.

  While your assumption aligns with the indicative images in the Supporting Growth document, further investigation is required to understand its feasibility and constraints. It is recommended that the feasibility of connecting the Western Link to the new bridge on Mansel Drive be assessed and discussed with Auckland Transport at a technical engineering level and the constructability of the alignment confirmed. Until these investigations take place, it is not possible for AT to give firm advice on the location and form of this intersection.

- Exit on SH1 on the corridor of the Matakana Link Road connection which is assumed to be a signalised intersection.

  As noted in Supporting Growth, this is our current thinking at a high level. Until the design work for the Matakana Link Road is progressed, it is not possible to provide any more information.

- Confirmation of the cross section. It is noted that we are still working on the finer details of cycle paths being incorporated into the wider landscaping corridors and hope to have this resolved in the coming week.

  As per our previous discussions, it will not be possible to confirm the cross section at this early stage. Further information to determine a desired cross section and width is needed, including the future role of the road in its wider networks. An ITA will provide more detail such as modelling to inform future traffic flows and a cycling network plan.

  The design of the transport network will be in accordance with AT's standards and guidance both at a technical level (Transport Design Manual) and at a higher level (Roads and Streets Framework).

- Developer / funding agreement and purchase of both the road construction land additional to what would be required for the road corridor for subdivision purposes only.

  The width of the proposed road and the surrounding land use are still unknown. Therefore, we cannot determine what difference there may be between a road for wider purposes and your development. We can provide more information as the Structure Plan progresses.

- Subject of course to acceptance of the Private Plan change it is our intention to construct the Western Link in a timely manner in conjunction with the subdivision. In that regard we would need some surety on a deal being done by AT for the road continuing from our subdivision through the land for the Foodstuffs' supermarket to the SH1 connection and Matakana Link Road.

  As above, until there is more certainty on a structure plan, the Matakana Link road and updated modelling, we are not in a position to confirm details for the Western Link.

  It is also relevant that the route selection and protection for that route will be undertaken by an Alliance of which AT will be a member. Until the Alliance is set up later this year, I cannot confirm its actions. Overall, the Alliance and AT will be more than happy to work with developers to deliver the arterial network in a manner than assists the development of the surrounding land whilst maintaining the strategic form and function of the arterial network

- In relation 4) above, should discussions with Food Stuffs break down, would it be AT's intention to instigate a public works ACT process to service the road between our subdivision and SH1 and would the timing of this process align with a targeted date of July next year for Resource Consent of the subdivision?

  As above, this is a matter which the Alliance will have to consider.

Additional and ongoing discussions have continued with AT throughout the remainder of 2017 and 2018. This has included discussions on cross sections and coordination with the development of the Matakana Link Road.

8.0 IMPLEMENTATION

The table below has shown the necessary infrastructure upgrades will be implemented in a sequence that aligns with the staging of the development. The table below includes

TABLE: IMPLEMENTATION

PROPOSED INFRASTURCTURE	REQUIRED BY	ESTIMATED COST	FUNDED BY
Warkworth Western Link	Timing dependent on Staging provisions	Unknown	Developer required to construct suitable road, with developer funding agreement required to provide full four lane cross section
Local roads within the plan change area	As required by staging of the development	Unknown	Developers within the plan change area
Signalised intersection of Mansell Drive/Falls Road	Dependent on staging	Unknown	Developer
Matakana Link Road Stage 1	2021	Unknown	AT
Matakana Link Road Stage 2	2036-2046	Unknown	AT
Puhoi to Warkworth Motorway	2021	Unknown	NZTA
Intersection of existing SH1/Western Link/ Matakana Link Road	2021	Unknown	NZTA/AT

9.0
CONSTRUCTION TRAFFIC MANAGEMENT

It is standard practice that the applicant is to submit a Construction Traffic Management Plan (CTMP) so that any potential adverse effects of construction traffic will be mitigated. The CTMP is to be approved by Council and this requirement should be included in the conditions of consent. In this case the CTMP will likely be developed by the contractor as they will have the best information regarding the staging of the development and the specifics of any construction methodologies. The CTMP will need to consider integration with the four major roading projects aforementioned in the area.

The CTMP needs to address how deliveries would be made to the site, location of loading areas (such as any temporary use of the on-street traffic lane), how heavy or over dimension vehicles would be brought to and removed from the site, etc.

The CTMP should include details (among other general issues listed in the standard CTMP list) of hours of operation, location of parking for workers or sub-contractors who need to have their vehicles on or close to the site, when vehicles would be able to use the roadway to load or unload (if at all), wheel washing, maintenance of pedestrian access, adequate signage and ensuring that access to neighbouring properties is not compromised.

In this particular location, the earthworks for the site will be undertaken initially, with a cut/fill balance anticipated for the wider area. This means that apart from initially bringing machinery onto site, traffic volumes are relatively low with staff and servicing vehicles.

Following bulk earthworks, volumes will increase as services and roads are constructed to provide access to the individual lots. The material deliveries for the site can be managed through a traffic management plan, and if there are particular concerns with specific intersections heavy vehicles can be routed to reduce the impact on the intersections in question.

The construction of individual sites will also happen in a planned manner, rather than the sometimes haphazard way that generally released subdivisions can occur.

Overall, the provision of an appropriate CMTP will ensure that construction traffic is dealt with appropriately and the effects mitigated appropriately.

10.0
CONCLUSION AND RECOMMENDATIONS

The proposed structure plan and plan change area is situated on the western periphery of Warkworth Town Centre and its location provides the opportunity to create a genuine live, work, play environment that is lacking in many new development areas. The surrounding road network is undergoing substantial changes over the next few years and the SF Estates area will play a significant part in forming a section of the Western Link, a road that connects State Highway 1 to the north and south of Warkworth Town Centre, allowing motorists to bypass the local road network.

With excellent connections to a motorway network, longer distance trips can be undertaken without impacting on existing residential areas. With all the extra road infrastructure planned in the area, including the Matakana Link Road and Ara Tuhono-Puhoi to Warkworth State Highway the traffic resulting from development enabled by the plan change will be adequately accommodated on the wider road network.

The substantial development occurring throughout Warkworth will see the local road network in this area develop in the coming years. Careful and integrated planning should result in a network able to safely and efficiently provide for a wide range of transport modes and provide choice for residential and workplace travellers alike.

The local road network is designed with low impact roads that provide for vehicular travel, walking and cycling within the development and connections to the existing road network as much as possible. The Western Link is not part of the identified Auckland Cycle Network for recreational users and links to existing paths but contributes to the cycling facilities in Warkworth, which are currently lacking.

Warkworth is expected to grow to a substantial size within the next ten years. The population is expected to increase to approximately 20,000 (the population in June 2016 was recorded as 4,650) with the area acting as a satellite city, alleviating housing restrictions in other Auckland suburbs. The proposal will generate housing opportunities for 500 families as well as provide a work and leisure environment that is both comfortable and safe.

Overall, the development should result in a more integrated live, work, play area and increase the vibrancy and sustainability of this area.

It will achieve the objectives of AT's proposed road network in this area and be an important stage in realising the continued expansion capability of Warkworth in terms of the Auckland Plan and FULSS objectives.

11.0 LIMITATIONS

11.1 GENERAL

This report is for the use by SF Estate Ltd. only, and should not be used or relied upon by any other person or entity or for any other project.

This report has been prepared for the particular project described to us and its extent is limited to the scope of work agreed between the client and Harrison Grierson Consultants Limited. No responsibility is accepted by Harrison Grierson Consultants Limited or its directors, servants, agents, staff or employees for the accuracy of information provided by third parties and/or the use of any part of this report in any other context or for any other purposes.

APPENDICES

APPENDIX 1
CAS DATA

First Street	Distance	D/I/R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day DDD	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
ELIZABETH ST		I	SLIP ROAD	201141056	07/10/2011	Fri	1100	CAR1 SBD on SLIP ROAD hit rear end of CAR2 stop/slow for obstruction	CAR1 following too closely	Dry	Bright	Fine	Multi Rd Join	Give Way Sign			
HILL ST	40	S	SH 1N	201548556	06/11/2015	Fri	1515	BUS1 EBD on HILL ST hit rear end of CAR2 stop/slow for queue	BUS1 misjudged speed of own vehicle	Dry	Bright	Fine	Unknown	N/A			
MATAKANA ROAD	5	N	ELIZABETH ST	201550604	11/12/2015	Fri	1146	CAR1 NBD on MATAKANA ROAD lost control on curve and hit CAR2 head on	CAR1 Entering / On curve, Lost control Under Braking	Wet	Overcast	Light Rain	T Type Junction	Nil			
MATAKANA ROAD		I	ELIZABETH ST	201131167	25/02/2011	Fri	2020	CAR2 turning right hit by oncoming CAR1 WBD on MATAKANA ROAD	CAR1 Failed to give way At a priority traffic control CAR2 alcohol test above limit or test refused	Dry	Twilight	Fine	T Type Junction	Give Way Sign			
MATAKANA ROAD		I	ELIZABETH ST	201641336	21/06/2016	Tue	1452	TRUCK1 SBD on MATAKANA ROAD hit CAR2 merging from the left	CAR2 alcohol test above limit or test refused, Failed to give way At a priority traffic control	Dry	Overcast	Fine	X Type Junction	Give Way Sign			
MATAKANA ROAD		I	ELIZABETH ST	201642002	01/07/2016	Fri	1100	CAR1 SBD on MATAKANA ROAD hit CAR2 crossing at right angle from right	CAR1 Failed to give way At a priority traffic control	Dry	Bright	Fine	X Type Junction	Give Way Sign			
MATAKANA ROAD		I	ELIZABETH ST	201447254	24/10/2014	Fri	0910	CAR1 NBD on ELIZABETH ST turning right hit CAR2 also turning right from opposite direction	CAR1 did not see or look for other party until too late CAR2 Failed to give way At a priority traffic control, failed to give way at driveway, new driver / under instruction ENV: entering or leaving car parking building / area	Dry	Bright	Fine	Driveway	Nil			
MATAKANA ROAD	300	S	MELWOOD DRIVE	201441358	08/08/2014	Fri	2240	VAN1 SBD on MATAKANA ROAD lost control; went off road to right, VAN1 hit Cliff Bank, Ditch	VAN1 alcohol test above limit or test refused, lost control, attention diverted by cigarette etc ENV: road slippery (rain)	Wet	Dark	Light Rain	Unknown	N/A			
1N/363/2.308		I	SLIP ROAD	201339730	27/10/2013	Sun	1500	VAN1 SBD on SH 1N hit rear end of CAR2 stop/slow for queue	VAN1 too far left/right	Dry	Bright	Fine	Y Type Junction	Nil			
SLIP ROAD		I	GREAT NORTH ROAD	201336240	05/08/2013	Mon	2215	CAR1 NBD on SLIP ROAD hit rear end of CAR2 stop/slow for cross traffic	CAR1 inattentive, attention diverted	Dry	Dark	Fine	Y Type Junction	Give Way Sign			
1N/363/2.335	15	N	HILL ST	201335748	09/07/2013	Tue	0740	BUS1 SBD on SH 1N overtaking VAN2	BUS1 misjudged size or position of fixed object or obstacle	Dry	Bright	Fine	Unknown	Traffic Signal			
1N/363/2.335	15	N	MATAKANA ROAD	201134072	13/05/2011	Fri	1840	SUV1 SBD on SH 1N hit rear end of CAR2 stop/slow for signals	SUV1 attention diverted by cigarette etc	Dry	Dark	Fine	Multi Rd Join	Traffic Signal			
MATAKANA ROAD		I	GREAT NORTH ROAD	201143133	29/12/2011	Thu	2330	CAR1 WBD on MATAKANA ROAD hit rear end of CAR2 stop/slow for signals	CAR1 Inappropriate speed, following too closely, failed to notice car slowing	Wet	Dark	Unknow	Multi Rd Join	Traffic Signal			
1N/363/2.35		I	HILL ST	201550597	26/02/2015	Thu	1312	CAR1 NBD on SH 1N changing lanes/overtaking to right hit CAR2	CAR1 Did not check / notice another party behind, misjudged speed of own vehicle	Dry	Bright	Fine	X Type Junction	Traffic Signal			
1N/363/2.35		I	HILL ST	201637930	03/05/2016	Tue	1230	CAR1 SBD on SH 1N changing lanes to left hit CAR2	CAR1 Approaching a traffic control, cut in after overtaking, evading enforcement	Unkno	Bright	Unknow	X Type Junction	Traffic Signal			
1N/363/2.35		I	MATAKANA ROAD	201531326	05/02/2015	Thu	1245	CAR1 NBD on SH 1N hit rear end of VAN2 stop/slow for signals	CAR1 too fast on straight, lost control, wrong pedal / foot slipped	Dry	Bright	Fine	X Type Junction	Traffic Signal			
1N/363/2.35		I	MATAKANA ROAD	201332599	08/04/2013	Mon	1725	CAR1 SBD on SH 1N hit rear end of VAN2 stop/slow for signals	CAR1 misjudged speed of own vehicle, intimidating driving	Dry	Bright	Fine	X Type Junction	Traffic Signal			
1N/363/2.35		I	MATAKANA ROAD	201236279	30/07/2012	Mon	1407	CAR1 NBD on SH 1N hit CAR2 crossing at right angle from right	CAR1 did not stop at steady red light	Wet	Overcast	Heavy Rain	Multi Rd Join	Traffic Signal			
1N/363/2.365	15	S	HILL ST	201356315	22/10/2013	Tue	1835	CAR1 SBD on SH 1N hit rear end of SUV2 stop/slow for obstruction	CAR1 Inappropriate speed	Dry	Bright	Fine	X Type Junction	Traffic Signal			

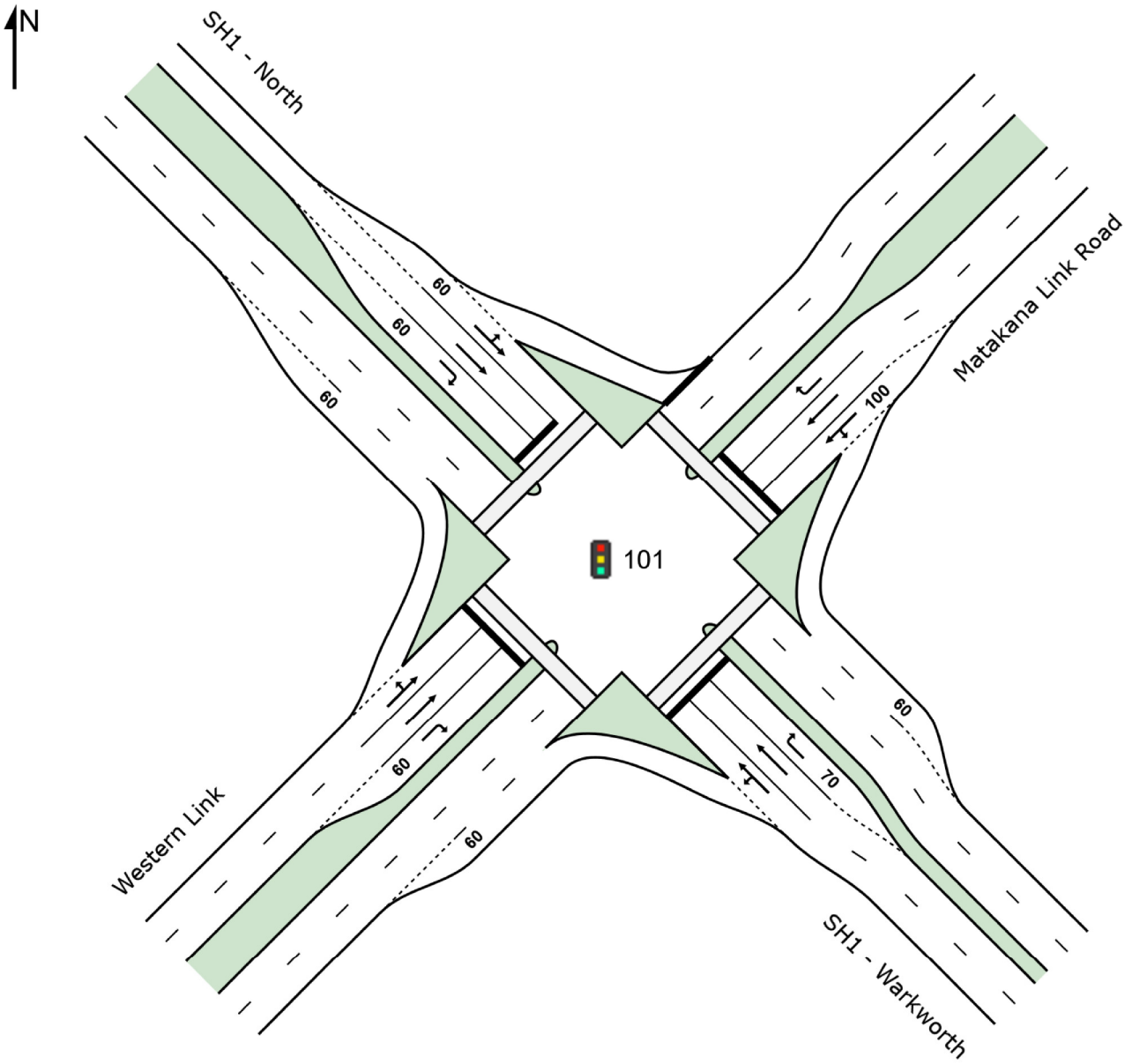
First Street	D/I/R	Second street or landmark	Crash Number	Date DD/MM/YYYY	Day DDD	Time HHMM	Description of Events	Crash Factors (ENV = Environmental factors)	Road	Natural Light	Weather	Junction	Cntrl	Tot Inj F A T	S E R	M I N
1N/363/1.296	I	HUDSON ROAD	201330922	17/01/2013	Thu	0825	CAR1 SBD on SH 1N hit rear of CAR2 turning right from centre line	CAR1 following too closely	Dry	Bright	Fine	T Type Junction	Give Way Sign			
1N/363/1.296	I	HUDSON ROAD	201417576	19/11/2014	Wed	1520	TRUCK1 WBD on SH 1N hit rear end of CAR2 stop/slow for signals	TRUCK1 too fast on straight, following too closely	Dry	Bright	Fine	X Type Junction	Traffic Signal			1
1N/363/1.326	30S	HUDSON ROAD	201357518	21/12/2013	Sat	1032	CAR1 SBD on SH 1N hit rear end of SUV2 stop/slow for queue	CAR1 Inappropriate speed	Dry	Bright	Fine	Unknown	Nil			

APPENDIX 2
INTERSECTION AND SIDRA ANALYSIS

SITE LAYOUT

Site: 101 [2036 AM - WL/SH1/ML]

New Site
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101 [2036 AM - WL/SH1/ML]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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
SouthEast: SH1 - Warkworth												
4	L2	43	5.0	0.581	48.0	LOS D	8.3	60.8	0.97	0.80	0.97	35.0
5	T1	313	5.0	0.581	42.8	LOS D	8.3	60.8	0.97	0.80	0.97	35.2
6	R2	78	5.0	0.271	46.3	LOS D	3.4	25.0	0.92	0.76	0.92	33.7
Approach		434	5.0	0.581	44.0	LOS D	8.3	60.8	0.96	0.79	0.96	34.9
NorthEast: Matakana Link Road												
7	L2	83	5.0	0.165	29.7	LOS C	3.5	25.2	0.73	0.70	0.73	40.9
8	T1	101	5.0	0.165	29.5	LOS C	3.5	25.2	0.79	0.65	0.79	40.1
9	R2	385	5.0	0.826	49.3	LOS D	19.7	143.9	1.00	0.93	1.16	32.7
Approach		569	5.0	0.826	42.9	LOS D	19.7	143.9	0.92	0.85	1.03	34.9
NorthWest: SH1 - North												
10	L2	197	5.0	0.721	41.2	LOS D	12.2	89.0	0.97	0.90	1.02	36.6
11	T1	339	5.0	0.721	44.9	LOS D	12.2	89.0	0.99	0.88	1.06	35.5
12	R2	277	5.0	0.858	57.5	LOS E	15.1	109.9	1.00	0.97	1.28	30.6
Approach		813	5.0	0.858	48.3	LOS D	15.1	109.9	0.99	0.91	1.13	33.9
SouthWest: Western Link												
1	L2	126	5.0	0.152	20.0	LOS C	3.5	25.3	0.57	0.68	0.57	45.3
2	T1	53	5.0	0.152	36.4	LOS D	3.5	25.3	0.86	0.68	0.86	37.4
3	R2	147	5.0	0.514	48.3	LOS D	6.8	49.6	0.96	0.80	0.96	33.1
Approach		326	5.0	0.514	35.4	LOS D	6.8	49.6	0.79	0.73	0.79	37.8
All Vehicles		2142	5.0	0.858	44.0	LOS D	19.7	143.9	0.94	0.84	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.

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
P2	SouthEast Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P3	NorthEast Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	NorthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	44.3	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.

MOVEMENT SUMMARY

Site: 101 [2036 PM - WL/SH1/ML]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

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
SouthEast: SH1 - Warkworth												
4	L2	61	5.0	0.527	42.2	LOS D	7.1	51.9	0.95	0.79	0.95	36.8
5	T1	279	5.0	0.527	37.4	LOS D	7.1	51.9	0.96	0.78	0.96	37.0
6	R2	266	5.0	0.891	57.6	LOS E	13.8	101.0	1.00	1.02	1.41	30.6
Approach		606	5.0	0.891	46.8	LOS D	13.8	101.0	0.98	0.89	1.16	33.9
NorthEast: Matakana Link Road												
7	L2	146	5.0	0.225	24.1	LOS C	4.6	33.8	0.69	0.72	0.69	43.3
8	T1	106	5.0	0.225	30.0	LOS C	4.6	33.8	0.84	0.69	0.84	40.0
9	R2	380	5.0	1.004	91.7	LOS F	26.7	194.7	1.00	1.22	1.84	23.7
Approach		633	5.0	1.004	65.7	LOS E	26.7	194.7	0.90	1.01	1.40	28.7
NorthWest: SH1 - North												
10	L2	657	5.0	0.902	36.8	LOS D	24.8	180.9	0.89	1.05	1.15	38.0
11	T1	362	5.0	0.902	51.0	LOS D	24.8	180.9	0.99	1.08	1.38	33.0
12	R2	288	5.0	0.852	52.1	LOS D	14.2	103.3	1.00	0.97	1.29	32.0
Approach		1307	5.0	0.902	44.1	LOS D	24.8	180.9	0.94	1.04	1.24	35.1
SouthWest: Western Link												
1	L2	188	5.0	0.531	37.3	LOS D	9.2	67.4	0.91	0.80	0.91	37.8
2	T1	218	5.0	0.531	36.6	LOS D	9.2	67.4	0.95	0.79	0.95	37.2
3	R2	200	5.0	0.669	45.7	LOS D	8.7	63.4	0.99	0.84	1.04	33.9
Approach		606	5.0	0.669	39.8	LOS D	9.2	67.4	0.95	0.81	0.97	36.2
All Vehicles		3153	5.0	1.004	48.1	LOS D	26.7	194.7	0.94	0.96	1.21	33.6

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

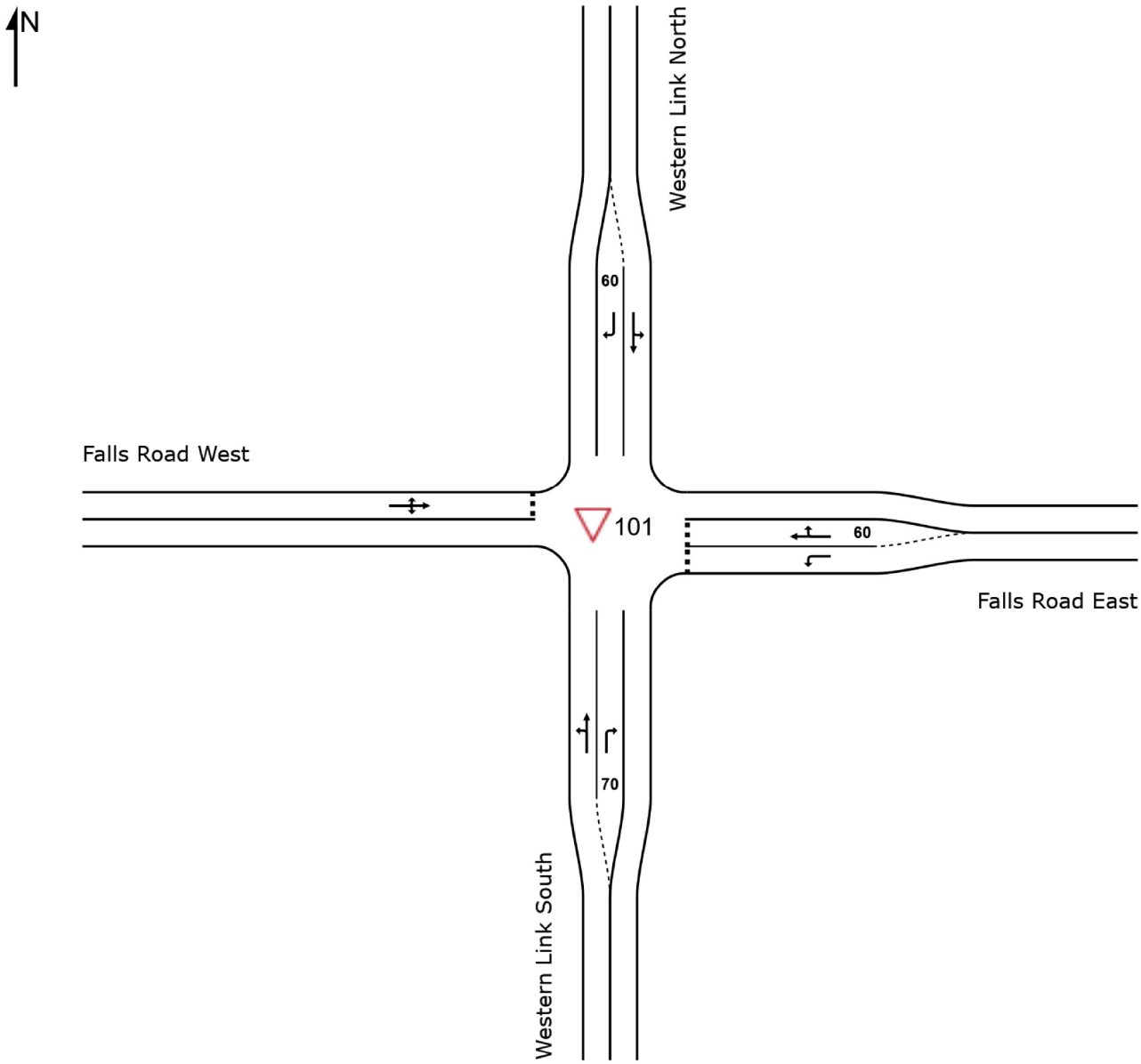
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P2	SouthEast Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	NorthEast Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	NorthWest Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P1	SouthWest Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			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.

SITE LAYOUT

Site: 101 [Priority 2036 AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Priority 2036 AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

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: Western Link South												
1	L2	6	5.0	0.352	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.3
2	T1	656	5.0	0.352	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
3	R2	158	5.0	0.118	5.7	LOS A	0.5	4.0	0.40	0.59	0.40	45.5
Approach		820	5.0	0.352	1.2	NA	0.5	4.0	0.08	0.12	0.08	49.0
East: Falls Road East												
4	L2	164	5.0	0.168	6.0	LOS A	0.6	4.7	0.39	0.61	0.39	45.6
5	T1	37	5.0	0.313	33.9	LOS D	1.1	8.0	0.91	0.99	1.05	33.2
6	R2	5	5.0	0.313	53.3	LOS F	1.1	8.0	0.91	0.99	1.05	33.0
Approach		206	5.0	0.313	12.2	LOS B	1.1	8.0	0.49	0.69	0.52	42.4
North: Western Link North												
7	L2	6	5.0	0.151	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.3
8	T1	276	5.0	0.151	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
9	R2	42	5.0	0.052	7.9	LOS A	0.2	1.5	0.58	0.74	0.58	44.2
Approach		324	5.0	0.151	1.1	NA	0.2	1.5	0.08	0.11	0.08	49.1
West: Falls Road West												
10	L2	28	5.0	0.652	25.3	LOS D	3.1	22.6	0.93	1.17	1.59	31.1
11	T1	77	5.0	0.652	47.7	LOS E	3.1	22.6	0.93	1.17	1.59	31.2
12	R2	5	5.0	0.652	83.4	LOS F	3.1	22.6	0.93	1.17	1.59	31.0
Approach		111	5.0	0.652	43.6	LOS E	3.1	22.6	0.93	1.17	1.59	31.1
All Vehicles		1461	5.0	0.652	5.9	NA	3.1	22.6	0.20	0.28	0.25	46.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 SUMMARY

Site: 101 [Priority 2036 IP]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

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: Western Link South												
1	L2	6	5.0	0.101	4.6	LOS A	0.0	0.0	0.00	0.02	0.00	49.3
2	T1	182	5.0	0.101	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	49.9
3	R2	559	5.0	0.541	9.1	LOS A	4.5	32.5	0.67	0.99	1.03	43.8
Approach		747	5.0	0.541	6.9	NA	4.5	32.5	0.50	0.74	0.77	45.2
East: Falls Rd East												
4	L2	181	5.0	0.244	7.8	LOS A	0.9	6.8	0.54	0.77	0.54	44.7
5	T1	27	5.0	0.299	40.4	LOS E	1.0	7.4	0.93	1.00	1.05	31.2
6	R2	5	5.0	0.299	59.6	LOS F	1.0	7.4	0.93	1.00	1.05	31.0
Approach		214	5.0	0.299	13.3	LOS B	1.0	7.4	0.60	0.81	0.62	41.9
North: Western Link North												
7	L2	5	5.0	0.261	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
8	T1	487	5.0	0.261	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
9	R2	39	5.0	0.026	5.2	LOS A	0.1	0.8	0.30	0.54	0.30	45.5
Approach		532	5.0	0.261	0.5	NA	0.1	0.8	0.02	0.04	0.02	49.6
West: Falls Rd West												
10	L2	39	5.0	0.390	11.5	LOS B	1.6	11.5	0.66	0.82	0.89	35.4
11	T1	33	5.0	0.390	43.2	LOS E	1.6	11.5	0.66	0.82	0.89	35.5
12	R2	4	5.0	0.390	85.9	LOS F	1.6	11.5	0.66	0.82	0.89	35.3
Approach		76	5.0	0.390	29.3	LOS D	1.6	11.5	0.66	0.82	0.89	35.5
All Vehicles		1568	5.0	0.541	6.7	NA	4.5	32.5	0.36	0.52	0.50	45.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 SUMMARY

Site: 101 [Priority 2036 PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

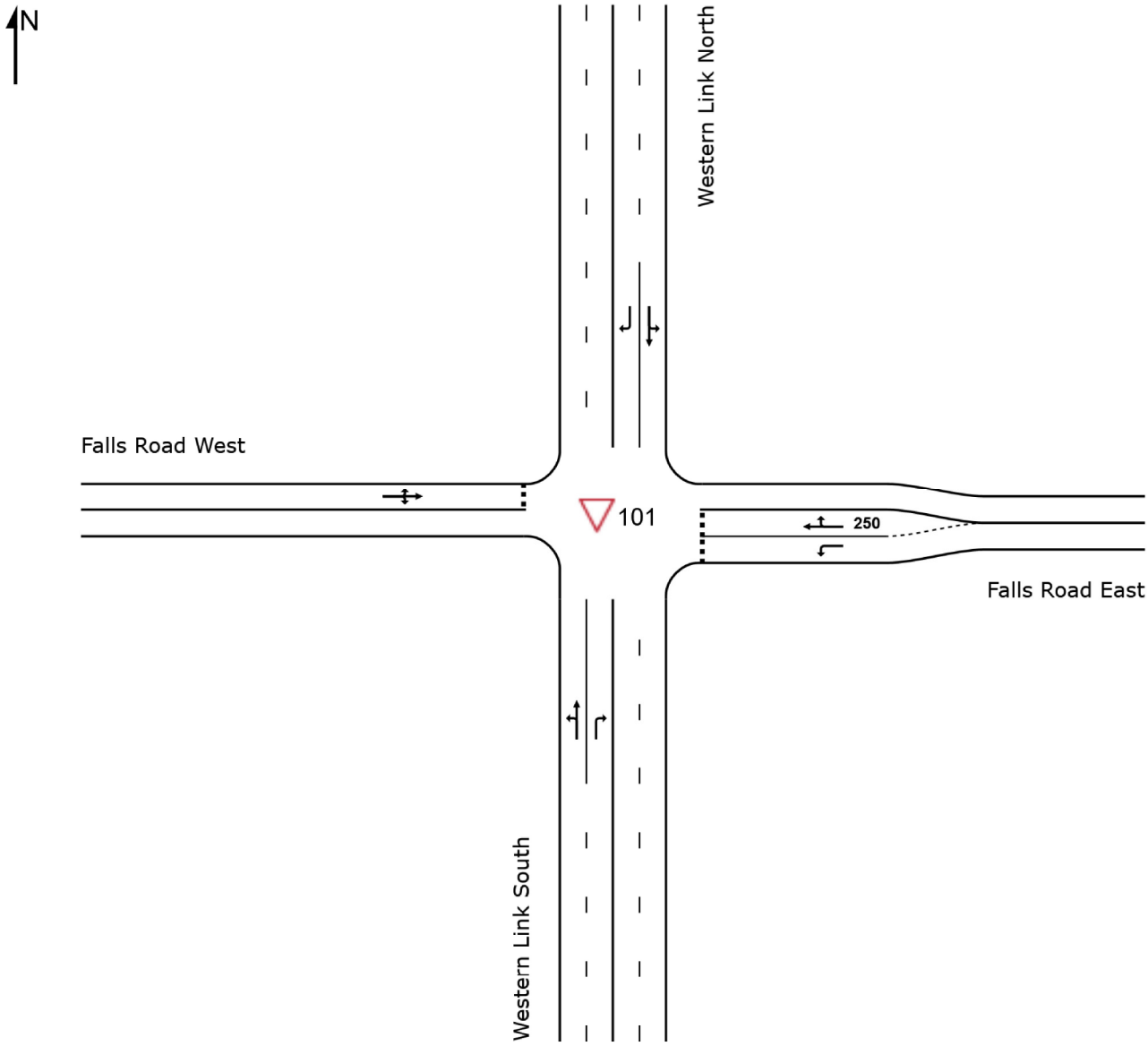
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Western Link South												
1	L2	6	5.0	0.235	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
2	T1	435	5.0	0.235	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
3	R2	214	5.0	0.327	10.7	LOS B	1.5	11.3	0.72	0.93	0.88	43.0
Approach		655	5.0	0.327	3.6	NA	1.5	11.3	0.23	0.31	0.29	47.4
East: Falls Rd East												
4	L2	260	5.0	0.578	15.8	LOS C	3.0	21.9	0.82	1.09	1.36	40.7
5	T1	33	5.0	0.724	129.1	LOS F	2.6	19.2	0.99	1.12	1.48	17.3
6	R2	6	5.0	0.724	179.7	LOS F	2.6	19.2	0.99	1.12	1.48	17.3
Approach		299	5.0	0.724	31.7	LOS D	3.0	21.9	0.84	1.10	1.37	34.6
North: Western Link North												
7	L2	6	5.0	0.418	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	49.3
8	T1	783	5.0	0.418	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	63	5.0	0.057	6.4	LOS A	0.2	1.8	0.48	0.64	0.48	45.1
Approach		853	5.0	0.418	0.6	NA	0.2	1.8	0.04	0.05	0.04	49.5
West: Falls Rd West												
10	L2	37	5.0	1.234	303.5	LOS F	17.4	127.4	1.00	2.49	5.55	8.6
11	T1	55	5.0	1.234	355.9	LOS F	17.4	127.4	1.00	2.49	5.55	8.6
12	R2	5	5.0	1.234	477.8	LOS F	17.4	127.4	1.00	2.49	5.55	8.6
Approach		97	5.0	1.234	342.6	LOS F	17.4	127.4	1.00	2.49	5.55	8.6
All Vehicles		1903	5.0	1.234	23.9	NA	17.4	127.4	0.28	0.43	0.61	37.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

SITE LAYOUT

Site: 101 [Priority 2046 AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)



MOVEMENT SUMMARY

Site: 101 [Priority 2046 AM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

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: Western Link South												
1	L2	6	5.0	0.486	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	49.3
2	T1	911	5.0	0.486	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
3	R2	302	5.0	0.267	6.7	LOS A	1.3	9.4	0.53	0.70	0.53	45.3
Approach		1219	5.0	0.486	1.7	NA	1.3	9.4	0.13	0.18	0.13	48.6
East: Falls Road East												
4	L2	375	5.0	0.458	8.6	LOS A	2.7	19.8	0.58	0.88	0.79	44.3
5	T1	38	5.0	1.311	494.6	LOS F	10.8	78.6	1.00	1.66	3.55	6.1
6	R2	5	5.0	1.311	560.4	LOS F	10.8	78.6	1.00	1.66	3.55	6.1
Approach		418	5.0	1.311	59.6	LOS F	10.8	78.6	0.62	0.96	1.08	26.8
North: Western Link North												
7	L2	5	5.0	0.224	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
8	T1	418	5.0	0.224	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
9	R2	42	5.0	0.083	11.1	LOS B	0.3	2.2	0.73	0.88	0.73	42.8
Approach		465	5.0	0.224	1.1	NA	0.3	2.2	0.07	0.09	0.07	49.2
West: Falls Road West												
10	L2	24	5.0	2.503	1423.1	LOS F	39.8	290.9	1.00	2.63	6.97	2.3
11	T1	58	5.0	2.503	1458.9	LOS F	39.8	290.9	1.00	2.63	6.97	2.3
12	R2	5	5.0	2.503	1636.8	LOS F	39.8	290.9	1.00	2.63	6.97	2.3
Approach		87	5.0	2.503	1459.7	LOS F	39.8	290.9	1.00	2.63	6.97	2.3
All Vehicles		2189	5.0	2.503	70.8	NA	39.8	290.9	0.25	0.40	0.57	24.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 SUMMARY

Site: 101 [Priority 2046 IP]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

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: Western Link South												
1	L2	6	5.0	0.423	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	49.3
2	T1	792	5.0	0.423	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
3	R2	351	5.0	0.489	11.5	LOS B	3.0	21.7	0.74	1.02	1.13	42.8
Approach		1148	5.0	0.489	3.6	NA	3.0	21.7	0.23	0.31	0.34	47.5
East: Falls Rd East												
4	L2	353	5.0	0.709	17.2	LOS C	4.8	34.8	0.85	1.24	1.76	40.1
5	T1	29	5.0	1.701	874.5	LOS F	13.8	100.5	1.00	1.66	3.59	3.6
6	R2	5	5.0	1.701	950.6	LOS F	13.8	100.5	1.00	1.66	3.59	3.5
Approach		387	5.0	1.701	95.1	LOS F	13.8	100.5	0.86	1.27	1.92	20.9
North: Western Link North												
7	L2	5	5.0	0.390	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	49.3
8	T1	732	5.0	0.390	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	40	5.0	0.062	9.3	LOS A	0.2	1.7	0.65	0.81	0.65	43.7
Approach		777	5.0	0.390	0.6	NA	0.2	1.7	0.03	0.05	0.03	49.5
West: Falls Rd West												
10	L2	39	5.0	2.567	1500.7	LOS F	36.8	268.3	1.00	2.59	6.49	2.2
11	T1	35	5.0	2.567	1557.5	LOS F	36.8	268.3	1.00	2.59	6.49	2.2
12	R2	4	5.0	2.567	1797.2	LOS F	36.8	268.3	1.00	2.59	6.49	2.2
Approach		78	5.0	2.567	1542.1	LOS F	36.8	268.3	1.00	2.59	6.49	2.2
All Vehicles		2391	5.0	2.567	67.6	NA	36.8	268.3	0.29	0.46	0.70	25.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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 SUMMARY

Site: 101 [Priority 2046 PM]

New Site
Site Category: (None)
Giveway / Yield (Two-Way)

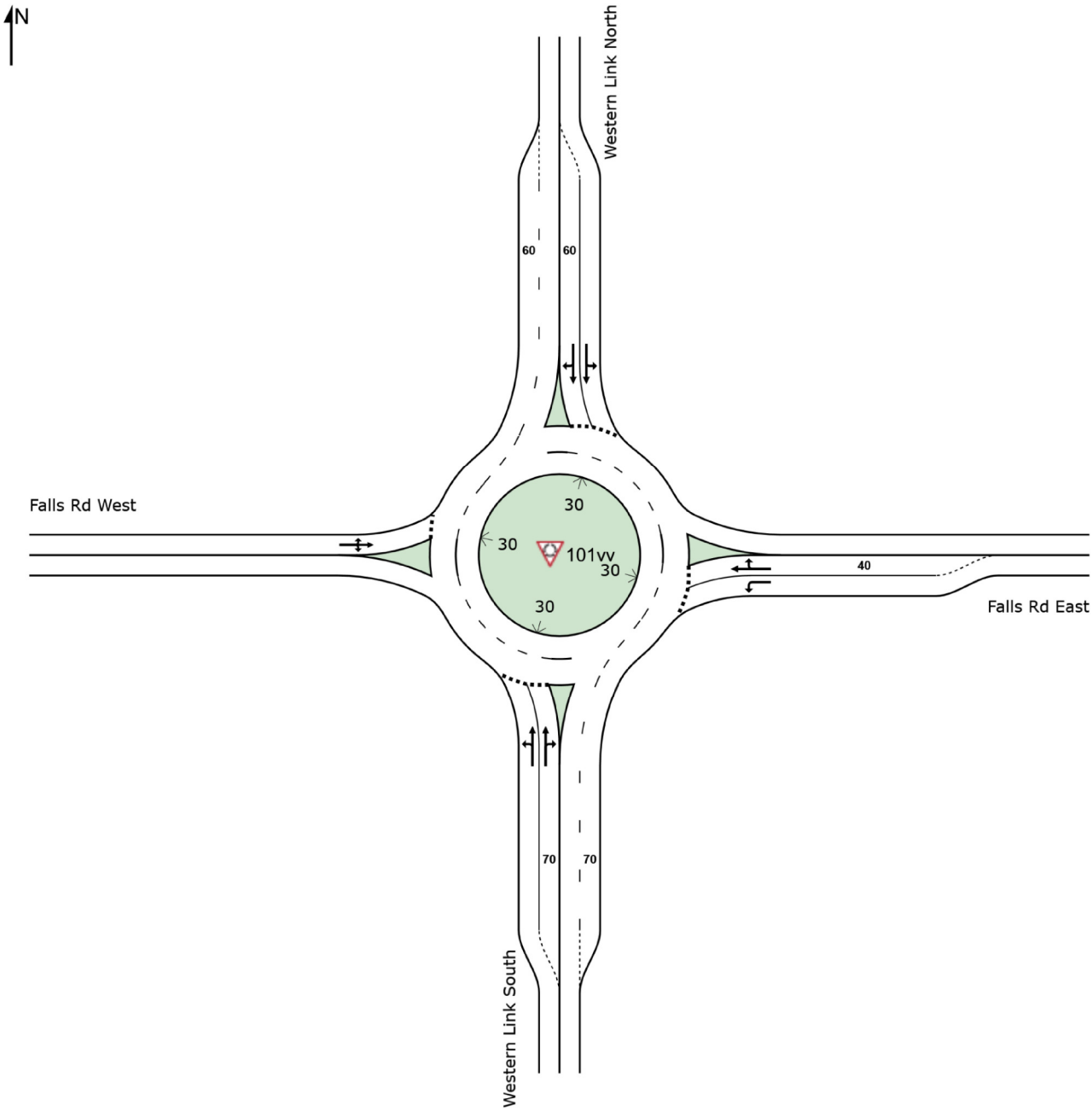
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Western Link South												
1	L2	6	5.0	0.347	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.3
2	T1	649	5.0	0.347	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	49.9
3	R2	486	5.0	1.528	498.4	LOS F	113.2	826.4	1.00	7.31	21.20	6.3
Approach		1142	5.0	1.528	212.3	NA	113.2	826.4	0.43	3.11	9.03	12.7
East: Falls Rd East												
4	L2	441	5.0	0.665	13.0	LOS B	5.1	37.2	0.74	1.14	1.42	42.1
5	T1	33	5.0	6.491	5237.2	LOS F	35.6	259.8	1.00	1.40	2.67	0.6
6	R2	6	5.0	6.491	5233.2	LOS F	35.6	259.8	1.00	1.40	2.67	0.6
Approach		480	5.0	6.491	436.8	LOS F	35.6	259.8	0.76	1.16	1.53	6.7
North: Western Link North												
7	L2	6	5.0	0.303	4.6	LOS A	0.0	0.0	0.00	0.01	0.00	49.4
8	T1	1131	5.0	0.303	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
9	R2	60	5.0	0.073	7.9	LOS A	0.3	2.1	0.59	0.75	0.59	44.5
Approach		1197	5.0	0.303	0.5	NA	0.3	2.1	0.03	0.04	0.03	49.6
West: Falls Rd West												
10	L2	36	5.0	10.009	8249.5	LOS F	76.5	558.6	1.00	1.79	3.77	0.4
11	T1	54	5.0	10.009	8300.4	LOS F	76.5	558.6	1.00	1.79	3.77	0.4
12	R2	5	5.0	10.009	8301.4	LOS F	76.5	558.6	1.00	1.79	3.77	0.4
Approach		95	5.0	10.009	8281.2	LOS F	76.5	558.6	1.00	1.79	3.77	0.4
All Vehicles		2914	5.0	10.009	424.6	NA	113.2	826.4	0.34	1.49	3.92	7.1

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
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.

SITE LAYOUT

Site: 101vv [Roundabout 2036 AM]

New Site
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101vv [Roundabout 2036 AM]

New Site
Site Category: (None)
Roundabout

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: Western Link South												
1	L2	6	5.0	0.206	3.1	LOS A	1.1	9.0	0.29	0.31	0.29	48.0
2	T1	656	5.0	0.403	2.5	LOS A	2.8	20.0	0.29	0.36	0.29	49.0
3	R2	158	5.0	0.403	7.9	LOS A	2.8	20.0	0.29	0.38	0.29	49.3
Approach		820	5.0	0.403	3.6	LOS A	2.8	20.0	0.29	0.36	0.29	49.0
East: Falls Rd East												
4	L2	164	5.0	0.141	3.6	LOS A	0.7	5.2	0.45	0.50	0.45	47.5
5	T1	37	5.0	0.058	4.3	LOS A	0.3	1.9	0.49	0.50	0.49	48.3
6	R2	5	5.0	0.058	9.8	LOS A	0.3	1.9	0.49	0.50	0.49	48.9
Approach		206	5.0	0.141	3.9	LOS A	0.7	5.2	0.46	0.50	0.46	47.7
North: Western Link North												
7	L2	6	5.0	0.103	3.9	LOS A	0.5	3.7	0.42	0.41	0.42	47.4
8	T1	276	5.0	0.184	3.3	LOS A	1.0	7.3	0.42	0.42	0.42	48.6
9	R2	42	5.0	0.184	8.6	LOS A	1.0	7.3	0.41	0.42	0.41	49.1
Approach		324	5.0	0.184	4.0	LOS A	1.0	7.3	0.42	0.42	0.42	48.7
West: Falls Rd West												
10	L2	28	5.0	0.156	6.1	LOS A	0.7	5.4	0.65	0.70	0.65	46.4
11	T1	77	5.0	0.156	5.9	LOS A	0.7	5.4	0.65	0.70	0.65	47.8
12	R2	5	5.0	0.156	11.4	LOS B	0.7	5.4	0.65	0.70	0.65	48.4
Approach		111	5.0	0.156	6.2	LOS A	0.7	5.4	0.65	0.70	0.65	47.5
All Vehicles		1461	5.0	0.403	3.9	LOS A	2.8	20.0	0.37	0.42	0.37	48.6

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

Site: 101vv [Roundabout 2036 IP]

New Site
Site Category: (None)
Roundabout

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: Western Link South												
1	L2	6	5.0	0.193	3.2	LOS A	1.1	8.5	0.32	0.33	0.32	47.8
2	T1	559	5.0	0.379	2.7	LOS A	2.6	18.8	0.33	0.38	0.33	48.7
3	R2	181	5.0	0.379	8.0	LOS A	2.6	18.8	0.33	0.41	0.33	49.0
Approach		746	5.0	0.379	4.0	LOS A	2.6	18.8	0.33	0.39	0.33	48.8
East: Falls Rd East												
4	L2	181	5.0	0.176	4.4	LOS A	0.9	6.6	0.56	0.61	0.56	47.2
5	T1	59	5.0	0.091	5.0	LOS A	0.4	3.0	0.57	0.60	0.57	48.0
6	R2	5	5.0	0.091	10.5	LOS B	0.4	3.0	0.57	0.60	0.57	48.6
Approach		245	5.0	0.176	4.7	LOS A	0.9	6.6	0.56	0.60	0.56	47.4
North: Western Link North												
7	L2	5	5.0	0.165	3.9	LOS A	0.9	6.3	0.43	0.40	0.43	47.4
8	T1	487	5.0	0.295	3.2	LOS A	1.8	13.1	0.43	0.40	0.43	48.7
9	R2	39	5.0	0.295	8.6	LOS A	1.8	13.1	0.44	0.40	0.44	49.2
Approach		532	5.0	0.295	3.6	LOS A	1.8	13.1	0.43	0.40	0.43	48.7
West: Falls Rd West												
10	L2	39	5.0	0.103	5.7	LOS A	0.5	3.5	0.62	0.66	0.62	46.6
11	T1	33	5.0	0.103	5.4	LOS A	0.5	3.5	0.62	0.66	0.62	48.0
12	R2	4	5.0	0.103	10.9	LOS B	0.5	3.5	0.62	0.66	0.62	48.6
Approach		76	5.0	0.103	5.9	LOS A	0.5	3.5	0.62	0.66	0.62	47.3
All Vehicles		1599	5.0	0.379	4.1	LOS A	2.6	18.8	0.41	0.44	0.41	48.5

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

Site: 101vv [Roundabout 2036 PM]

New Site
Site Category: (None)
Roundabout

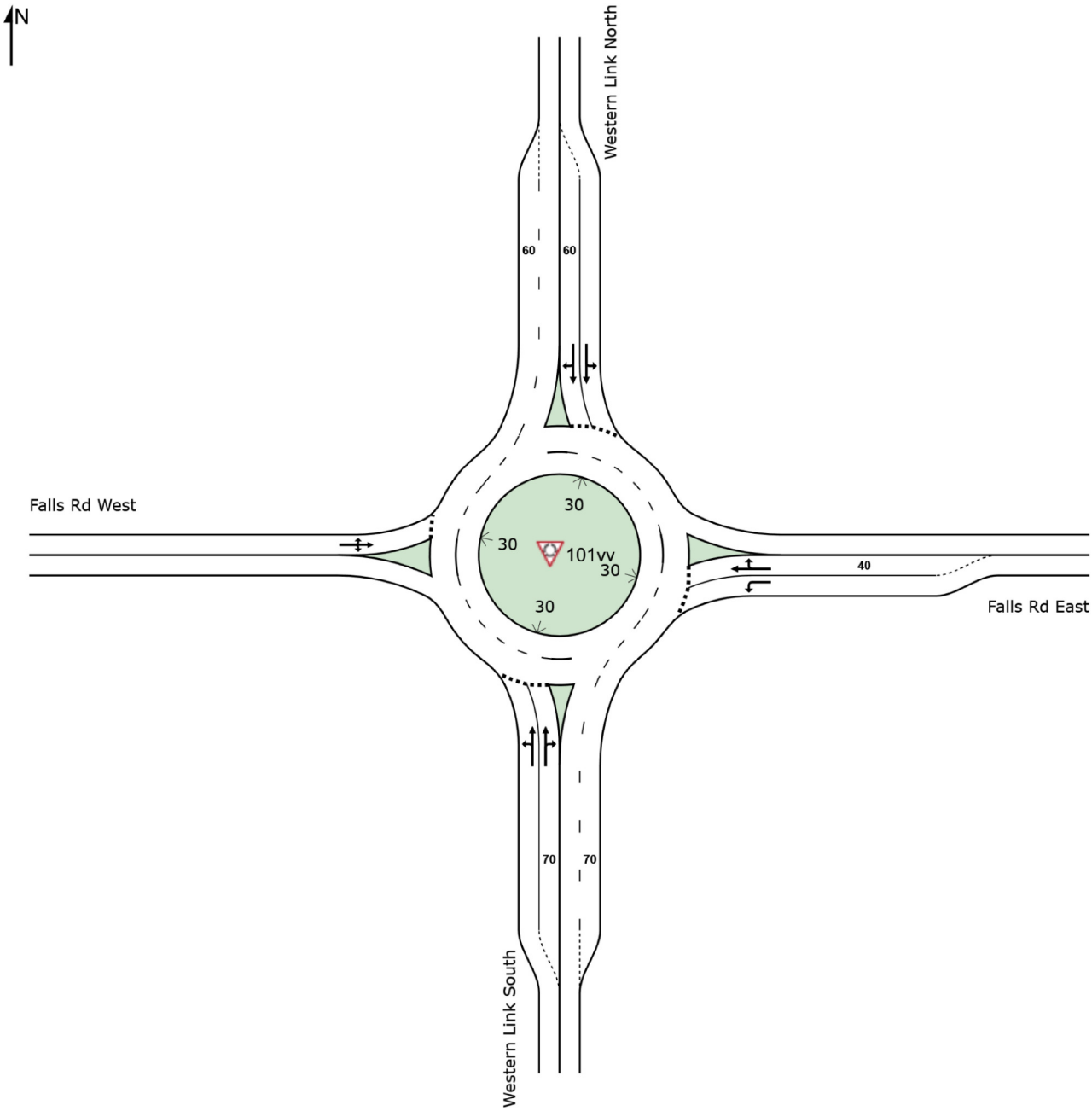
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Western Link South												
1	L2	6	5.0	0.171	3.2	LOS A	0.9	7.2	0.31	0.33	0.31	47.8
2	T1	435	5.0	0.335	2.6	LOS A	2.2	15.8	0.31	0.40	0.31	48.6
3	R2	214	5.0	0.335	8.0	LOS A	2.2	15.8	0.31	0.44	0.31	48.8
Approach		655	5.0	0.335	4.4	LOS A	2.2	15.8	0.31	0.41	0.31	48.7
East: Falls Rd East												
4	L2	260	5.0	0.310	5.7	LOS A	1.8	12.9	0.73	0.79	0.73	46.7
5	T1	33	5.0	0.078	7.1	LOS A	0.3	2.6	0.68	0.74	0.68	47.0
6	R2	6	5.0	0.078	12.6	LOS B	0.3	2.6	0.68	0.74	0.68	47.5
Approach		299	5.0	0.310	6.0	LOS A	1.8	12.9	0.73	0.79	0.73	46.8
North: Western Link North												
7	L2	6	5.0	0.275	4.5	LOS A	1.6	11.3	0.51	0.47	0.51	47.1
8	T1	783	5.0	0.492	3.9	LOS A	3.6	26.2	0.56	0.47	0.56	48.2
9	R2	63	5.0	0.492	9.2	LOS A	3.6	26.2	0.58	0.47	0.58	48.6
Approach		853	5.0	0.492	4.3	LOS A	3.6	26.2	0.56	0.47	0.56	48.2
West: Falls Rd West												
10	L2	37	5.0	0.125	5.3	LOS A	0.6	4.2	0.60	0.63	0.60	46.7
11	T1	55	5.0	0.125	5.1	LOS A	0.6	4.2	0.60	0.63	0.60	48.1
12	R2	5	5.0	0.125	10.6	LOS B	0.6	4.2	0.60	0.63	0.60	48.7
Approach		97	5.0	0.125	5.5	LOS A	0.6	4.2	0.60	0.63	0.60	47.6
All Vehicles		1903	5.0	0.492	4.7	LOS A	3.6	26.2	0.50	0.51	0.50	48.1

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

SITE LAYOUT

Site: 101vv [Roundabout 2046 AM]

New Site
Site Category: (None)
Roundabout



MOVEMENT SUMMARY

Site: 101vv [Roundabout 2046 AM]

New Site
Site Category: (None)
Roundabout

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: Western Link South												
1	L2	6	5.0	0.292	3.1	LOS A	1.8	13.4	0.32	0.32	0.32	47.8
2	T1	302	5.0	0.292	2.7	LOS A	1.8	13.4	0.32	0.32	0.32	49.3
3	R2	911	5.0	0.607	8.1	LOS A	6.1	44.7	0.42	0.55	0.42	46.7
Approach		1219	5.0	0.607	6.8	LOS A	6.1	44.7	0.40	0.49	0.40	47.3
East: Falls Rd East												
4	L2	375	5.0	0.373	4.5	LOS A	2.4	17.6	0.67	0.63	0.67	46.9
5	T1	38	5.0	0.071	5.2	LOS A	0.3	2.5	0.60	0.61	0.60	47.8
6	R2	5	5.0	0.071	10.7	LOS B	0.3	2.5	0.60	0.61	0.60	48.4
Approach		418	5.0	0.373	4.6	LOS A	2.4	17.6	0.66	0.63	0.66	47.0
North: Western Link North												
7	L2	5	5.0	0.297	12.2	LOS B	1.9	13.7	0.88	0.91	0.88	43.6
8	T1	418	5.0	0.531	13.3	LOS B	5.1	37.4	0.95	1.04	1.14	43.8
9	R2	42	5.0	0.531	19.4	LOS B	5.1	37.4	0.98	1.10	1.26	43.9
Approach		465	5.0	0.531	13.8	LOS B	5.1	37.4	0.95	1.04	1.15	43.8
West: Falls Rd West												
10	L2	24	5.0	0.165	8.6	LOS A	0.8	6.1	0.77	0.84	0.77	45.2
11	T1	58	5.0	0.165	8.3	LOS A	0.8	6.1	0.77	0.84	0.77	46.5
12	R2	5	5.0	0.165	13.8	LOS B	0.8	6.1	0.77	0.84	0.77	47.1
Approach		87	5.0	0.165	8.7	LOS A	0.8	6.1	0.77	0.84	0.77	46.2
All Vehicles		2189	5.0	0.607	7.9	LOS A	6.1	44.7	0.58	0.65	0.62	46.4

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

Site: 101vv [Roundabout 2046 IP]

New Site
Site Category: (None)
Roundabout

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: Western Link South												
1	L2	3	5.0	0.280	3.0	LOS A	1.7	13.4	0.29	0.31	0.29	47.9
2	T1	792	5.0	0.550	2.6	LOS A	4.9	35.1	0.33	0.38	0.33	48.6
3	R2	351	5.0	0.550	8.0	LOS A	4.9	35.1	0.34	0.42	0.34	48.7
Approach		1145	5.0	0.550	4.2	LOS A	4.9	35.1	0.33	0.39	0.33	48.7
East: Falls Rd East												
4	L2	353	5.0	0.410	5.9	LOS A	2.6	18.9	0.76	0.83	0.80	46.6
5	T1	29	5.0	0.068	6.7	LOS A	0.3	2.2	0.67	0.71	0.67	47.2
6	R2	5	5.0	0.068	12.2	LOS B	0.3	2.2	0.67	0.71	0.67	47.8
Approach		387	5.0	0.410	6.1	LOS A	2.6	18.9	0.75	0.82	0.78	46.7
North: Western Link North												
7	L2	5	5.0	0.278	5.3	LOS A	1.6	11.6	0.60	0.57	0.60	46.7
8	T1	732	5.0	0.498	4.7	LOS A	3.6	26.6	0.65	0.55	0.65	47.8
9	R2	40	5.0	0.498	10.0	LOS B	3.6	26.6	0.67	0.55	0.67	48.3
Approach		777	5.0	0.498	5.0	LOS A	3.6	26.6	0.65	0.55	0.65	47.9
West: Falls Rd West												
10	L2	39	5.0	0.136	7.8	LOS A	0.7	4.8	0.73	0.80	0.73	45.6
11	T1	35	5.0	0.136	7.6	LOS A	0.7	4.8	0.73	0.80	0.73	46.9
12	R2	4	5.0	0.136	13.1	LOS B	0.7	4.8	0.73	0.80	0.73	47.5
Approach		78	5.0	0.136	8.0	LOS A	0.7	4.8	0.73	0.80	0.73	46.3
All Vehicles		2387	5.0	0.550	4.9	LOS A	4.9	35.1	0.52	0.53	0.52	48.0

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

Site: 101vv [Roundabout 2046 PM]

New Site
Site Category: (None)
Roundabout

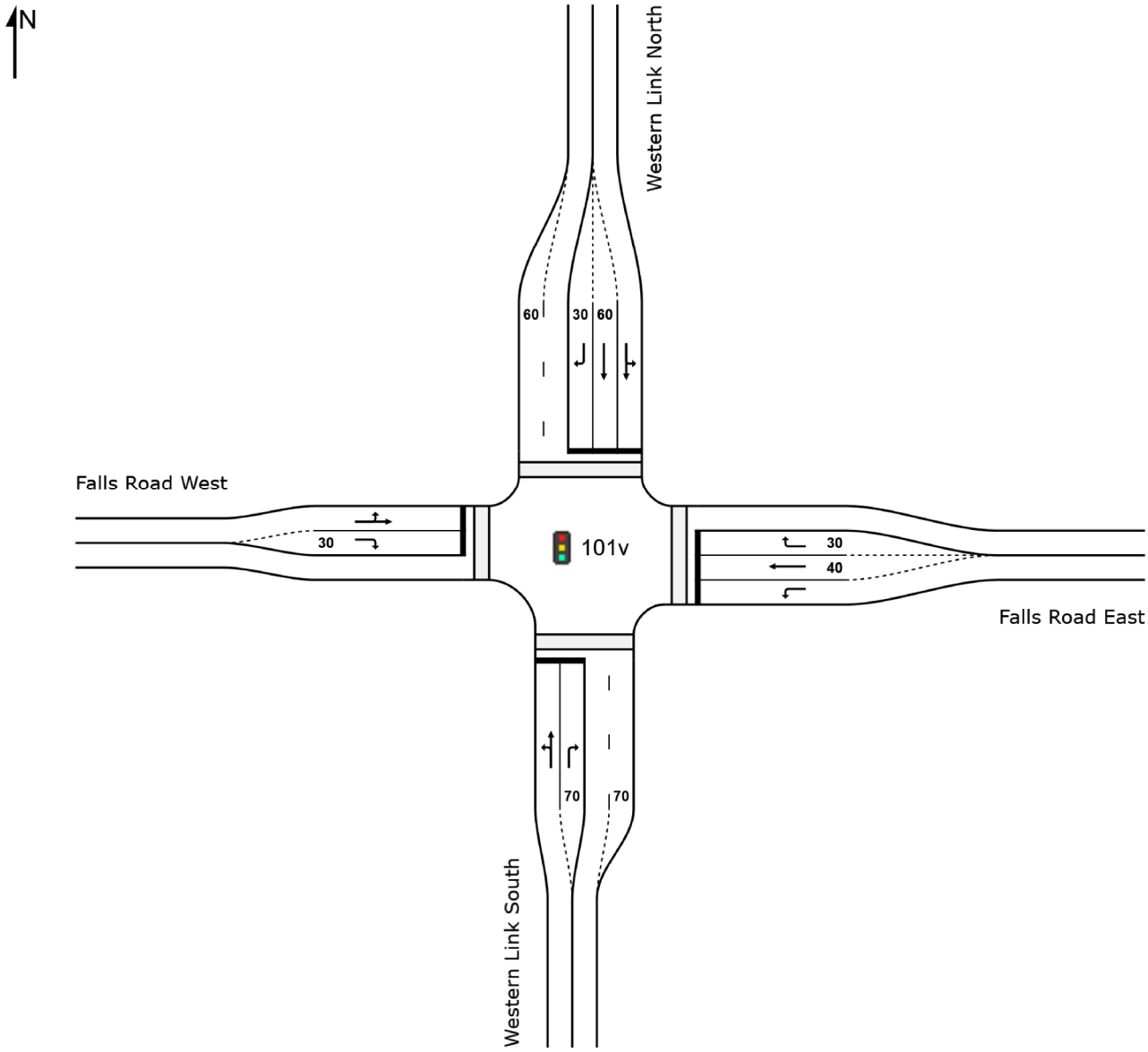
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Western Link South												
1	L2	6	5.0	0.292	3.2	LOS A	1.9	14.3	0.36	0.33	0.36	47.7
2	T1	649	5.0	0.572	2.8	LOS A	5.5	39.8	0.40	0.41	0.40	48.2
3	R2	486	5.0	0.572	8.2	LOS A	5.5	39.8	0.44	0.48	0.44	48.0
Approach		1142	5.0	0.572	5.1	LOS A	5.5	39.8	0.42	0.44	0.42	48.1
East: Falls Rd East												
4	L2	441	5.0	0.773	16.6	LOS B	8.1	58.8	1.00	1.25	1.59	41.1
5	T1	33	5.0	0.111	8.9	LOS A	0.6	4.1	0.82	0.87	0.82	45.9
6	R2	6	5.0	0.111	14.4	LOS B	0.6	4.1	0.82	0.87	0.82	46.5
Approach		480	5.0	0.773	16.1	LOS B	8.1	58.8	0.99	1.22	1.53	41.5
North: Western Link North												
7	L2	6	5.0	0.493	8.4	LOS A	3.7	26.8	0.79	0.85	0.90	45.6
8	T1	1131	5.0	0.882	15.3	LOS B	18.9	137.8	0.94	1.23	1.59	42.9
9	R2	60	5.0	0.882	23.8	LOS C	18.9	137.8	1.00	1.39	1.89	41.8
Approach		1197	5.0	0.882	15.7	LOS B	18.9	137.8	0.94	1.23	1.60	42.9
West: Falls Rd West												
10	L2	36	5.0	0.170	7.9	LOS A	0.9	6.2	0.76	0.83	0.76	45.5
11	T1	54	5.0	0.170	7.7	LOS A	0.9	6.2	0.76	0.83	0.76	46.9
12	R2	5	5.0	0.170	13.2	LOS B	0.9	6.2	0.76	0.83	0.76	47.4
Approach		95	5.0	0.170	8.1	LOS A	0.9	6.2	0.76	0.83	0.76	46.4
All Vehicles		2914	5.0	0.882	11.3	LOS B	18.9	137.8	0.74	0.91	1.10	44.7

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

SITE LAYOUT

Site: 101v [Signalised 2036 AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101v [Signalised 2036 AM]

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: Western Link South												
1	L2	6	5.0	0.777	25.4	LOS C	24.9	181.5	0.81	0.75	0.83	38.6
2	T1	656	5.0	0.777	20.8	LOS C	24.9	181.5	0.81	0.75	0.83	38.9
3	R2	158	5.0	0.259	30.3	LOS C	5.6	40.7	0.77	0.75	0.77	35.2
Approach		820	5.0	0.777	22.7	LOS C	24.9	181.5	0.80	0.75	0.82	38.1
East: Falls Road East												
4	L2	164	5.0	0.183	19.2	LOS B	4.4	31.8	0.58	0.70	0.58	39.2
5	T1	37	5.0	0.150	42.6	LOS D	1.6	11.9	0.92	0.68	0.92	31.6
6	R2	5	5.0	0.049	54.6	LOS D	0.3	1.9	0.97	0.64	0.97	28.5
Approach		206	5.0	0.183	24.3	LOS C	4.4	31.8	0.65	0.70	0.65	37.3
North: Western Link North												
7	L2	6	5.0	0.202	38.4	LOS D	3.4	25.1	0.85	0.67	0.85	33.8
8	T1	276	5.0	0.489	35.4	LOS D	8.3	60.7	0.89	0.73	0.89	33.7
9	R2	42	5.0	0.391	57.0	LOS E	2.1	15.5	1.00	0.73	1.00	27.9
Approach		324	5.0	0.489	38.3	LOS D	8.3	60.7	0.90	0.73	0.90	32.8
West: Falls Road West												
10	L2	28	5.0	0.469	49.8	LOS D	5.0	36.2	0.97	0.77	0.97	30.4
11	T1	77	5.0	0.469	45.2	LOS D	5.0	36.2	0.97	0.77	0.97	30.6
12	R2	5	5.0	0.049	54.6	LOS D	0.3	1.9	0.97	0.64	0.97	28.3
Approach		111	5.0	0.469	46.8	LOS D	5.0	36.2	0.97	0.76	0.97	30.4
All Vehicles		1461	5.0	0.777	28.2	LOS C	24.9	181.5	0.82	0.74	0.83	36.0

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	53	44.3	LOS E	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	44.3	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	44.3	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.

MOVEMENT SUMMARY

Site: 101v [Signalised 2036 IP]

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: Western Link South												
1	L2	6	5.0	0.704	24.3	LOS C	18.9	137.9	0.82	0.73	0.82	39.0
2	T1	559	5.0	0.704	19.7	LOS B	18.9	137.9	0.82	0.73	0.82	39.4
3	R2	182	5.0	0.397	35.0	LOS C	6.7	49.2	0.88	0.79	0.88	33.7
Approach		747	5.0	0.704	23.4	LOS C	18.9	137.9	0.83	0.74	0.83	37.8
East: Falls Rd East												
4	L2	181	5.0	0.233	21.8	LOS C	5.0	36.4	0.67	0.73	0.67	38.2
5	T1	27	5.0	0.109	37.9	LOS D	1.1	7.9	0.91	0.66	0.91	33.0
6	R2	5	5.0	0.044	49.0	LOS D	0.2	1.7	0.96	0.64	0.96	29.8
Approach		214	5.0	0.233	24.6	LOS C	5.0	36.4	0.71	0.72	0.71	37.2
North: Western Link North												
7	L2	5	5.0	0.290	32.3	LOS C	5.3	38.5	0.83	0.68	0.83	35.9
8	T1	487	5.0	0.702	30.8	LOS C	13.6	99.6	0.91	0.78	0.93	35.2
9	R2	39	5.0	0.326	51.0	LOS D	1.8	12.8	0.99	0.73	0.99	29.3
Approach		532	5.0	0.702	32.3	LOS C	13.6	99.6	0.91	0.78	0.93	34.7
West: Falls Rd West												
10	L2	39	5.0	0.321	45.1	LOS D	3.0	21.9	0.95	0.74	0.95	31.3
11	T1	33	5.0	0.321	40.5	LOS D	3.0	21.9	0.95	0.74	0.95	31.5
12	R2	4	5.0	0.035	48.9	LOS D	0.2	1.3	0.96	0.64	0.96	29.7
Approach		76	5.0	0.321	43.3	LOS D	3.0	21.9	0.95	0.74	0.95	31.3
All Vehicles		1568	5.0	0.704	27.5	LOS C	18.9	137.9	0.85	0.75	0.85	36.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			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.

MOVEMENT SUMMARY

Site: 101v [Signalised 2036 PM]

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: Western Link South												
1	L2	6	5.0	0.749	35.5	LOS D	17.9	131.0	0.95	0.86	1.00	34.9
2	T1	435	5.0	0.749	30.9	LOS C	17.9	131.0	0.95	0.86	1.00	35.1
3	R2	214	5.0	0.825	51.7	LOS D	10.3	75.3	1.00	0.96	1.28	29.2
Approach		655	5.0	0.825	37.7	LOS D	17.9	131.0	0.96	0.89	1.09	32.9
East: Falls Rd East												
4	L2	260	5.0	0.450	30.9	LOS C	9.1	66.7	0.84	0.80	0.84	34.9
5	T1	33	5.0	0.130	38.0	LOS D	1.3	9.5	0.91	0.67	0.91	32.9
6	R2	6	5.0	0.053	49.1	LOS D	0.3	2.0	0.96	0.65	0.96	29.7
Approach		299	5.0	0.450	32.0	LOS C	9.1	66.7	0.85	0.78	0.85	34.5
North: Western Link North												
7	L2	6	5.0	0.347	25.5	LOS C	7.9	57.7	0.75	0.64	0.75	38.5
8	T1	783	5.0	0.841	28.8	LOS C	23.1	169.0	0.86	0.84	0.97	35.9
9	R2	63	5.0	0.167	36.3	LOS D	2.3	16.8	0.85	0.73	0.85	33.2
Approach		853	5.0	0.841	29.3	LOS C	23.1	169.0	0.86	0.83	0.96	35.7
West: Falls Rd West												
10	L2	37	5.0	0.398	44.7	LOS D	3.8	28.1	0.96	0.76	0.96	31.6
11	T1	55	5.0	0.398	40.1	LOS D	3.8	28.1	0.96	0.76	0.96	31.8
12	R2	5	5.0	0.044	49.0	LOS D	0.2	1.7	0.96	0.64	0.96	29.6
Approach		97	5.0	0.398	42.4	LOS D	3.8	28.1	0.96	0.75	0.96	31.6
All Vehicles		1903	5.0	0.841	33.3	LOS C	23.1	169.0	0.90	0.84	0.99	34.3

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

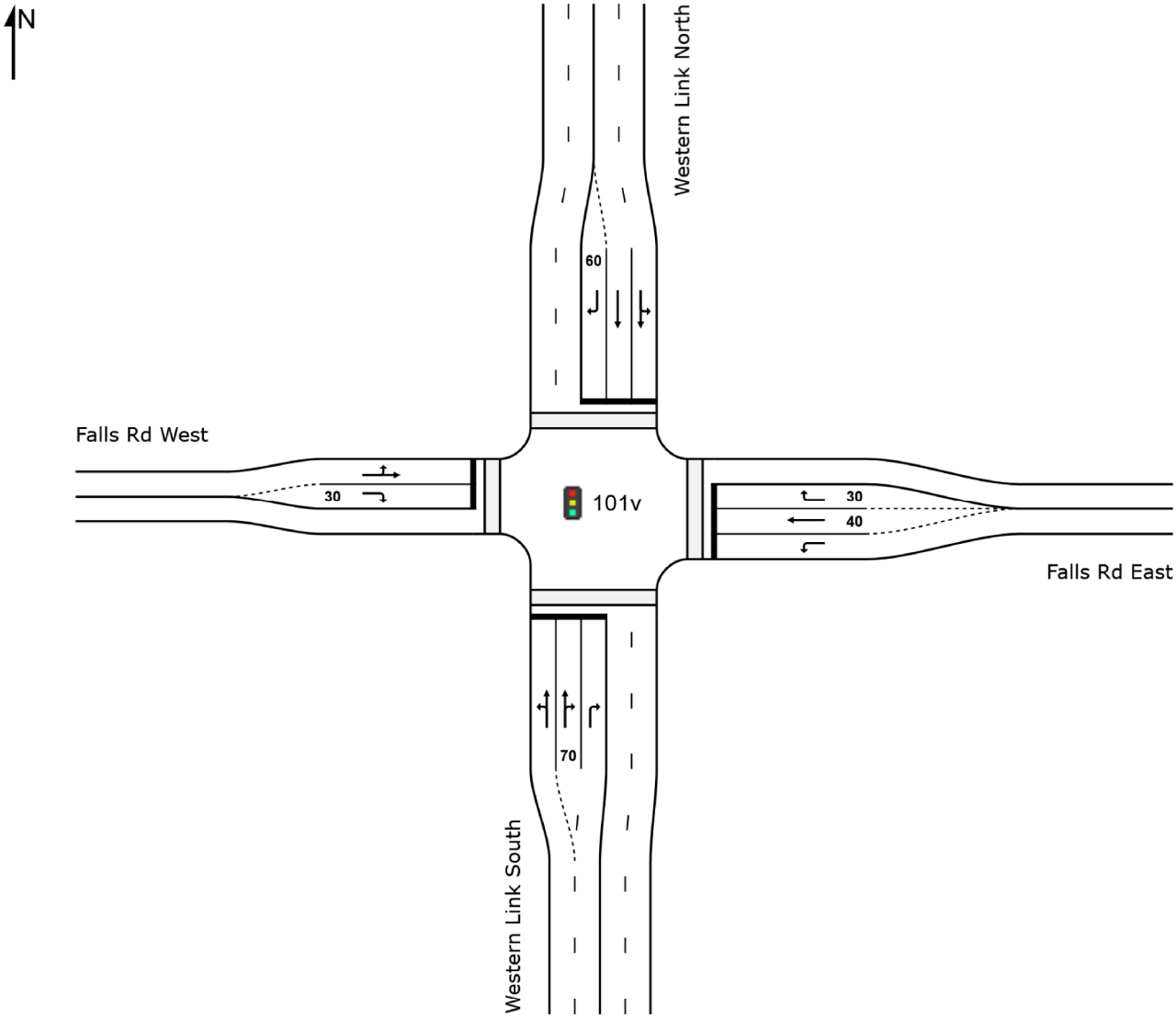
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			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.

SITE LAYOUT

Site: 101v [Signalised 2046 AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated



MOVEMENT SUMMARY

Site: 101v [Signalised 2046 AM]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 115 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: Western Link South												
1	L2	6	5.0	0.779	23.8	LOS C	30.0	219.0	0.78	0.71	0.78	39.2
2	T1	911	5.0	0.779	18.0	LOS B	30.0	219.0	0.73	0.66	0.73	40.1
3	R2	302	5.0	0.412	30.4	LOS C	12.0	87.4	0.76	0.78	0.76	35.2
Approach		1219	5.0	0.779	21.1	LOS C	30.0	219.0	0.74	0.69	0.74	38.8
East: Falls Rd East												
4	L2	375	5.0	0.405	19.8	LOS B	11.6	84.8	0.60	0.74	0.60	39.0
5	T1	38	5.0	0.165	49.8	LOS D	1.9	14.2	0.93	0.69	0.93	29.8
6	R2	5	5.0	0.056	63.1	LOS E	0.3	2.1	0.97	0.65	0.97	26.7
Approach		418	5.0	0.405	23.0	LOS C	11.6	84.8	0.64	0.73	0.64	37.7
North: Western Link North												
7	L2	5	5.0	0.538	48.9	LOS D	10.7	78.1	0.94	0.78	0.94	30.9
8	T1	418	5.0	0.538	44.2	LOS D	10.8	78.5	0.94	0.78	0.94	31.1
9	R2	42	5.0	0.450	65.9	LOS E	2.5	18.0	1.00	0.73	1.00	26.1
Approach		465	5.0	0.538	46.3	LOS D	10.8	78.5	0.95	0.78	0.95	30.6
West: Falls Rd West												
10	L2	24	5.0	0.392	57.3	LOS E	4.4	32.3	0.97	0.76	0.97	28.6
11	T1	58	5.0	0.392	52.7	LOS D	4.4	32.3	0.97	0.76	0.97	28.8
12	R2	5	5.0	0.056	63.1	LOS E	0.3	2.1	0.97	0.65	0.97	26.7
Approach		87	5.0	0.392	54.6	LOS D	4.4	32.3	0.97	0.75	0.97	28.6
All Vehicles		2189	5.0	0.779	28.1	LOS C	30.0	219.0	0.77	0.72	0.77	36.0

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	53	51.8	LOS E	0.2	0.2	0.95	0.95
P2	East Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95
P4	West Full Crossing	53	51.8	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	51.8	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.

MOVEMENT SUMMARY

Site: 101v [Signalised 2046 IP]

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: Western Link South												
1	L2	6	5.0	0.796	28.4	LOS C	25.2	183.9	0.88	0.84	0.94	37.4
2	T1	792	5.0	0.796	22.2	LOS C	25.2	183.9	0.83	0.78	0.88	38.4
3	R2	351	5.0	0.704	37.3	LOS D	14.3	104.5	0.96	0.86	0.99	33.0
Approach		1148	5.0	0.796	26.8	LOS C	25.2	183.9	0.87	0.80	0.91	36.5
East: Falls Rd East												
4	L2	353	5.0	0.446	22.5	LOS C	10.5	76.5	0.72	0.77	0.72	37.9
5	T1	29	5.0	0.117	37.9	LOS D	1.2	8.5	0.91	0.66	0.91	33.0
6	R2	5	5.0	0.044	49.0	LOS D	0.2	1.7	0.96	0.64	0.96	29.8
Approach		387	5.0	0.446	24.0	LOS C	10.5	76.5	0.74	0.76	0.74	37.4
North: Western Link North												
7	L2	5	5.0	0.774	41.4	LOS D	16.4	119.4	0.99	0.93	1.09	33.0
8	T1	732	5.0	0.774	36.8	LOS D	16.4	119.4	0.99	0.93	1.09	33.3
9	R2	40	5.0	0.335	51.0	LOS D	1.8	13.2	0.99	0.73	0.99	29.3
Approach		777	5.0	0.774	37.5	LOS D	16.4	119.4	0.99	0.92	1.09	33.0
West: Falls Rd West												
10	L2	39	5.0	0.330	45.2	LOS D	3.1	22.5	0.95	0.75	0.95	31.3
11	T1	35	5.0	0.330	40.6	LOS D	3.1	22.5	0.95	0.75	0.95	31.5
12	R2	4	5.0	0.035	48.9	LOS D	0.2	1.3	0.96	0.63	0.96	29.8
Approach		78	5.0	0.330	43.3	LOS D	3.1	22.5	0.95	0.74	0.95	31.3
All Vehicles		2391	5.0	0.796	30.4	LOS C	25.2	183.9	0.89	0.83	0.94	35.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
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	53	39.3	LOS D	0.1	0.1	0.94	0.94
P2	East Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
P4	West Full Crossing	53	39.3	LOS D	0.1	0.1	0.94	0.94
All Pedestrians		211	39.3	LOS D			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.

MOVEMENT SUMMARY

Site: 101v [Signalised 2046 PM]

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: Western Link South												
1	L2	6	5.0	0.839	42.7	LOS D	35.8	261.4	0.92	0.87	0.98	32.6
2	T1	649	5.0	0.839	38.0	LOS D	35.8	261.4	0.91	0.87	0.97	32.9
3	R2	486	5.0	0.839	55.7	LOS E	27.7	202.5	0.97	0.90	1.08	28.3
Approach		1142	5.0	0.839	45.6	LOS D	35.8	261.4	0.94	0.88	1.01	30.8
East: Falls Rd East												
4	L2	441	5.0	0.614	35.2	LOS D	21.2	154.8	0.82	0.82	0.82	33.5
5	T1	33	5.0	0.150	56.7	LOS E	1.9	13.8	0.93	0.69	0.93	28.2
6	R2	6	5.0	0.076	71.8	LOS E	0.4	2.9	0.98	0.65	0.98	25.1
Approach		480	5.0	0.614	37.1	LOS D	21.2	154.8	0.83	0.81	0.83	32.9
North: Western Link North												
7	L2	6	5.0	0.845	50.0	LOS D	36.6	267.4	0.99	0.95	1.06	30.6
8	T1	1131	5.0	0.845	45.1	LOS D	36.6	267.4	0.97	0.93	1.06	30.9
9	R2	60	5.0	0.150	48.2	LOS D	3.1	22.3	0.84	0.74	0.84	29.9
Approach		1197	5.0	0.845	45.3	LOS D	36.6	267.4	0.97	0.92	1.04	30.9
West: Falls Rd West												
10	L2	36	5.0	0.462	65.2	LOS E	5.5	40.2	0.98	0.77	0.98	26.8
11	T1	54	5.0	0.462	60.6	LOS E	5.5	40.2	0.98	0.77	0.98	27.0
12	R2	5	5.0	0.064	71.6	LOS E	0.3	2.4	0.98	0.65	0.98	25.2
Approach		95	5.0	0.462	62.9	LOS E	5.5	40.2	0.98	0.76	0.98	26.8
All Vehicles		2914	5.0	0.845	44.6	LOS D	36.6	267.4	0.93	0.88	1.00	31.0

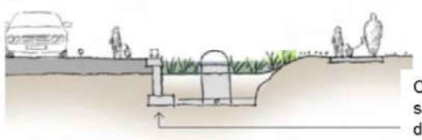
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay 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	53	59.3	LOS E	0.2	0.2	0.96	0.96
P2	East Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
P4	West Full Crossing	53	59.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		211	59.3	LOS E			0.96	0.96

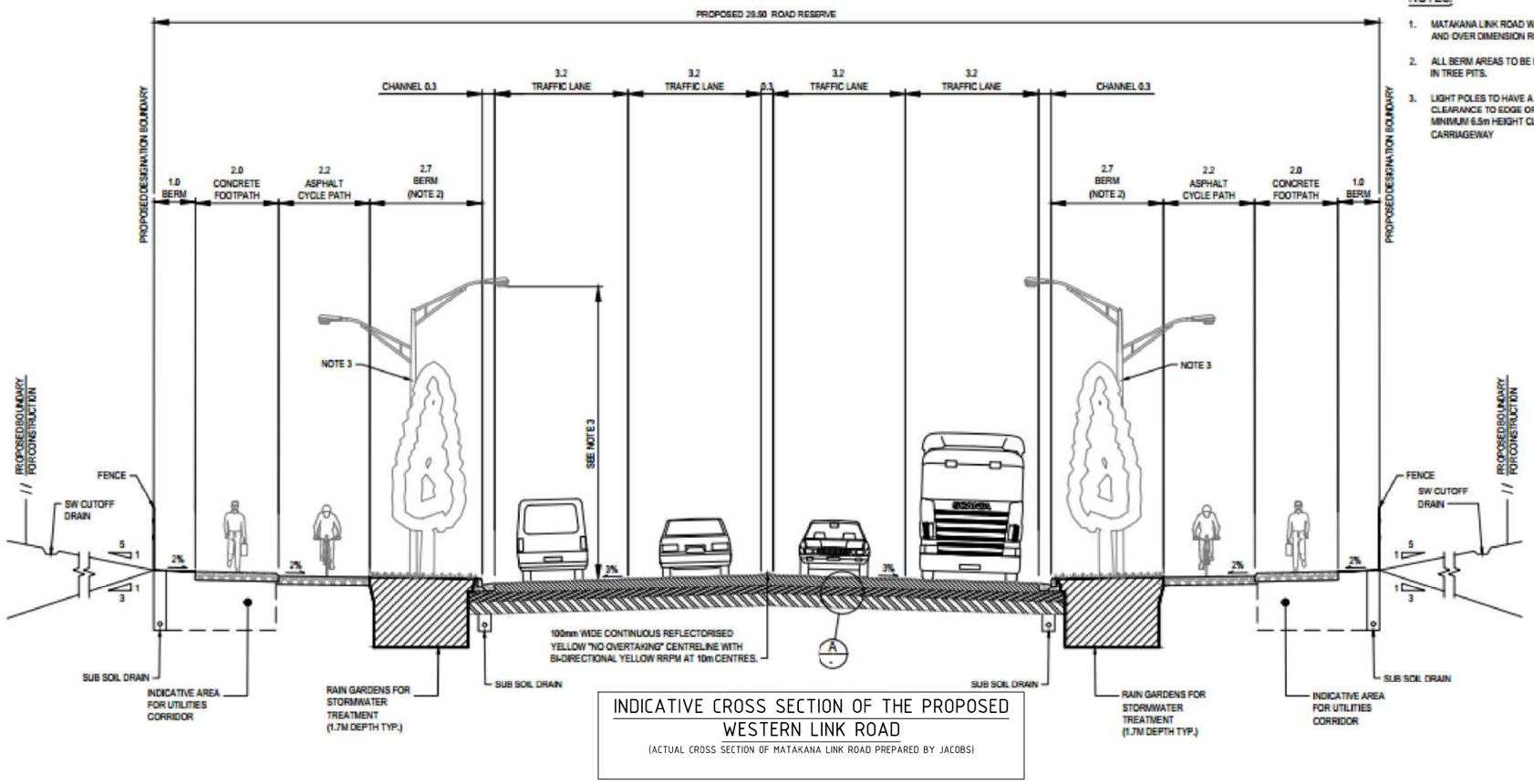
Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

APPENDIX 3
INDICATIVE CROSS SECTIONS



Concrete wall to support side of device if adjacent to road

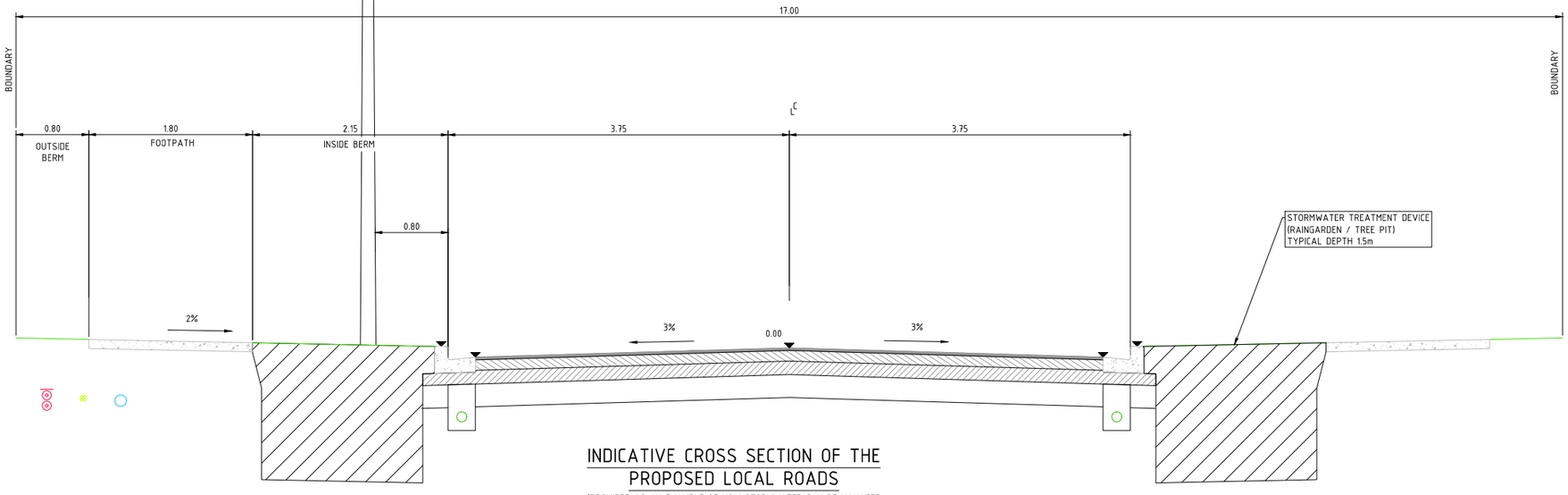
DEVICE ADJACENT TO ROAD
EXAMPLE FROM GD01



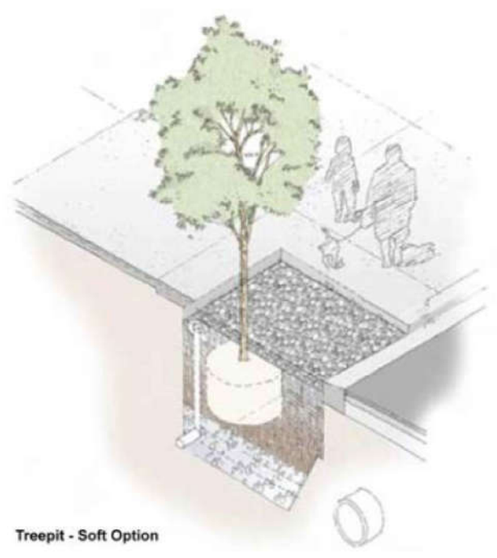
INDICATIVE CROSS SECTION OF THE PROPOSED WESTERN LINK ROAD
(ACTUAL CROSS SECTION OF MATAKANA LINK ROAD PREPARED BY JACOBS)

NOTES:

1. MATAKANA LINK ROAD WILL BE AN OVERWEIGHT AND OVER DIMENSION ROUTE
2. ALL BERM AREAS TO BE PLANTED WITH TREES IN TREE PITS.
3. LIGHT POLES TO HAVE A 0.5m MINIMUM CLEARANCE TO EDGE OF CYCLE PATH AND MINIMUM 6.5m HEIGHT CLEARANCE TO CARRIAGEWAY



INDICATIVE CROSS SECTION OF THE PROPOSED LOCAL ROADS
(PROVIDED AS AN EXAMPLE OF HOW STORMWATER CAN BE MANAGED WITHIN THE 17m WIDER ROAD CORRIDORS)



TREE PIT EXAMPLE FROM GD01

REV	DATE	AMENDMENTS	CHECKED
2	16.01.2019	SUB-PRECINCT EXTENT	N. JULL
1	16.10.2018	TITLES UPDATED	N. JULL

Design:	NJ
Date:	16.10.2018
Check:	SR
Job No:	11875

Subject:	PROPOSED WARKWORTH NORTH PLAN CHANGE
Client:	TURNSTONE CAPITAL LP - (WARKWORTH NORTH)
Address:	NORTH WARKWORTH
Drawing Title:	PRECINCT PLAN 3 - ROAD SECTIONS AND ROAD STORMWATER MANAGMENT

Drawing No:	405
Revision No:	2
Scale:	NTS
Issued for:	PLANNING

CHESTER
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