
# Williamtown SAP

## B.3.2C Traffic and Transport Report

**Department of Planning and Environment**

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# Executive Summary

The Williamtown Special Activation Precinct (SAP) site is located 15km north of Newcastle, adjacent to Newcastle Airport. The proposed SAP is connected by an existing rural road network, with Newcastle to the south, A1 Pacific Highway to the west and Nelson Bay to the north-east. The road network surrounding the SAP is generally flat terrain, single lane in each direction with limited active transport and public transport facilities. The existing road network surrounding the SAP currently operates at acceptable traffic capacity, however Nelson Bay Road and Industrial Drive are nearing capacity and portions of these road have upgrades planned by TfNSW. The proposed Nelson Bay Road upgrade by TfNSW will benefit the wider Hunter Region community by improving safety and reducing travel time between Newcastle and Nelson Bay via Williamtown, Bobs Farm and Salt Ash. It will also enhance freight and general access to the SAP as the proposed Nelson Bay Road upgrade as an additional route which reduces through traffic on the existing roads adjacent to the SAP. Roads such as Cabbage Tree Road and Nelson Bay Road between Cabbage Tree Road and Meadowie Road are anticipated to have less congestion which extends the existing capacity of the road network.

The SAP is strategically located for freight distribution, including proximity to the Port of Newcastle, M1, HEX, and Newcastle Airport. It is served well by freight routes in all directions, including Medowie Road to the north, Tomago Road, Cabbage Tree Road and Masonite Road to the west and Nelson Bay Road to the east and south.

At the two Enquiry by Design Workshop (EbD) workshops, several aspirational SAP structure plan scenarios were identified. These scenarios had varying size, land use and goals, in terms of desired precinct outcomes. For each of these scenarios, transport requirements were tested to understand impacts, gaps and upgrade requirements to allow the scenarios to function. This process resulted in the Structure Plan, generating approximately 7,194 jobs by 2041 as per the Williamtown SAP Market Sounding and Economics Report (Deloitte 2021) including jobs generated by the Astra Aerolab development.

Our analysis also suggests construction or upgrade of the following roads and intersections are required by 2041 due to traffic directly driven by the SAP development.

- Tomago Road. The timing of the required north and south bound lane upgrades is Horizon 1 (2021-2026) and Horizon 3 (2036-2041) respectively
- Various additional signalised and unsignalized intersections on Cabbage Tree roads (as SAP access points).
- Upgrade of the existing Nelson Bay Road – Williamtown Drive intersection
- Upgrade of the existing Tomago Road - WesTrac access road intersection

It is noted that even without the additional traffic generated by the SAP, the roads and intersections below are likely to require upgrade by 2041 based on predicted general traffic growth for the area, irrespective of the SAP development. For these items, the SAP's traffic impacts accelerate but not drive the need for these infrastructure upgrades. Funding apportionments percentages are suggested to the extent that the SAP is responsible for the accelerated need for the upgrade.

- Nelson Bay Road south of Cabbage Tree Road
- Industrial Drive east and west of Tourle Street
- Upgrade existing Nelson Bay Road - Cabbage Tree Road intersection
- Upgrade existing Industrial Drive - Tourle Street intersection

The structure plan benefits from a compact layout, which results in easier and faster journeys and promotes active travel as a viable and attractive mode of transport. With increased density, enhanced public transport connections are more feasible and justifiable, including consideration for linking the SAP with the future planned Fast Rail connection into Newcastle to provide increased transport opportunities. Bus patronage data indicate that there is available capacity to accommodate potential increase in bus usage. It is recommended to provide ongoing monitoring of the usage of these services during the first few years after the SAP is established at six-month intervals. Should bus service reliability and journey time be impacted, a review and consideration of additional services and increased bus frequencies can be undertaken.

The internal green space serves the surrounding land use well increases health and recreation benefits. Walkability within the SAP will be integral to its success, with recommendations to consider providing a walkway along Cabbage Tree Road and Nelson Bay Road, adjacent to and within the SAP. It is also important to provide an adequate network of high amenity footpaths internally to the SAP, ideally a minimum 2m width with adequate lighting, rest opportunities, and other amenities to support walking journeys. The cycleway along Nelson Bay Road should be connected to this loop to provide a connected cycling network.

Although there may be capacity challenges on some roads and intersections, particularly as the SAP develops, the proposed layout is suitable from a traffic and transport perspective. It is recommended during subsequent design development of the SAP, to further consider the internal layout of the SAP and opportunities to encourage traffic to the site from the west along Tomago / Cabbage Tree Road, using a route which is considered to have sufficient traffic capacity.

# 1 Introduction

## 1.1 Purpose

### 1.1.1 Vision

As discussed in the Structure Plan Report by Hatch Robert Day, the vision for the Williamtown SAP is multi-faceted. All government institutions have expressed the need to build on the existing defence and aerospace nature of the area. Accompanied by vital precinct aspects including road network capacity, public transport options, freight movement and active transport facilities with a sustainable focus geared towards economic development (refer to Figure 1-1). The scenarios were assessed and evaluated against the vision and objectives to land on a structure plan.

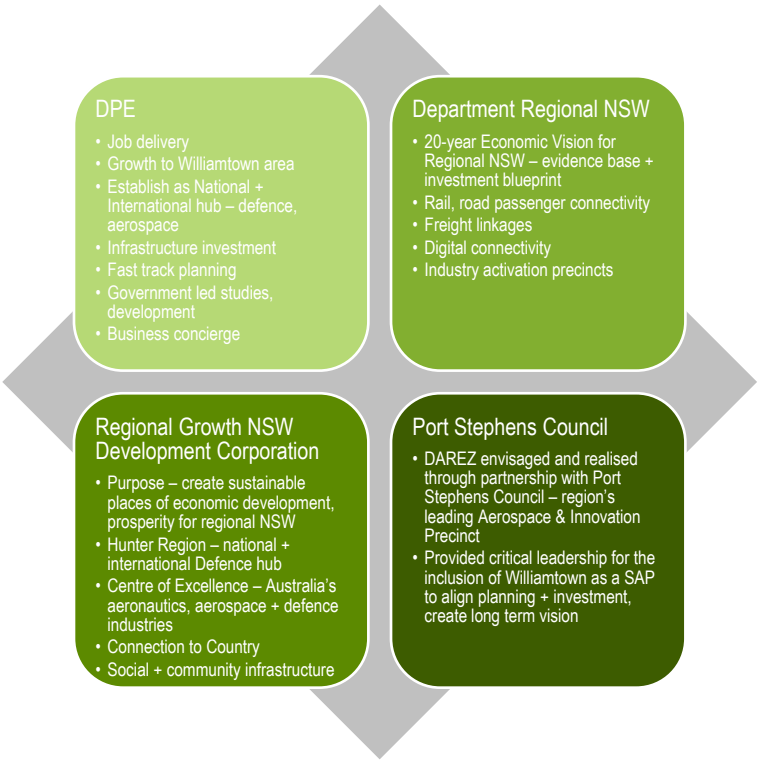



**Figure 1-1: Williamtown Vision (Source: Structure Plan Report, Hatch Roberts Day)**

### 1.1.2 Scope

The individual phase of the Williamtown SAP project was to determine the existing regional context as part of the baseline assessment. From this, potential scenarios and the structure plan was developed and assessments across the disciplines undertaken. The respective strengths and weaknesses of each option were expanded upon. For the Traffic and Transport study, a comparison of the scenarios included a review of these in terms of the precinct vision and respective road network impacts, similarly for the structure plan layout.

This comparison took place both on a macro and micro level:

- Macro in terms of reviewing the overarching focus of each option and how it satisfies the transport-related vision (transport planning)
- Micro in terms of whether the road network can accommodate the traffic demand by applying the necessary assumptions and conducting an analysis (traffic engineering)

In order to perform the micro analysis, the team used SIDRA intersection analysis software to consider the performance of the individual intersections, these results are presented in Chapters 2 and 3. The outcomes

of this analysis identified key infrastructure upgrades that would be required to support the future development of the SAP. The feasibility of the traffic and transport recommendations was not considered.

### 1.1.3 Williamtown SAP Strategy

The Department of Planning, Industry and Environment (DPE) and Regional Growth NSW Development Corporation's (DRNSW) establishment of Special Activation Precincts (SAPs) is an innovative approach to plan and deliver infrastructure projects in strategic regional locations in NSW. Investment in these specific areas of Regional NSW 'activate' State or regionally significant economic development and job creation as part of the 20-Year Economic Vision. A strategic need from a land use demand and supply perspective, is that there is limited long term availability of readily developable land. The SAP will seek to resolve environmental, drainage and other development constraints in a coordinated precinct scale approach as opposed to a site-by-site basis.

The Williamtown SAP's vision is based on six key visions as shown in Figure 1-2. The strategic need for growth in the Hunter Region involves:

- **The Place** – leveraging the vicinity of the RAAF and civil aviation operators attract local employment and commercial investment
- **Economy and Industry** – facilitate development of additional employment land for Defence and aerospace industries
- **Environment and Sustainability** – regionally coordinated approach to flooding, water cycle management and contamination while preserving and enhancing the natural environment
- **Infrastructure and Connectivity** – providing infrastructure to resolve development constraints to reduce investment barriers to entry and enable effective connections to nearby Hunter Region infrastructure
- **Connection to Country** – To preserve, respect and integrate Aboriginal cultural heritage, particularly the Worimi people
- **Social and Community Infrastructure** – Enabling high skill employment, innovation, education and skill training opportunities


**Figure 1-2: Williamtown SAP Visions**

# 2 Background Context

## 2.1 Williamtown SAP

### 2.1.1 Williamtown SAP Location

Williamtown is located approximately 150km north-east of Sydney and 30km north-east of the Newcastle CBD in New South Wales.

The Hunter Region has the largest share of both regional population growth and regional employment and is in the state's fastest growing corridor (Sydney to Newcastle). Greater Newcastle is the centrepiece of the Hunter Region with 95% of residents living within 30 minutes of the strategic centre.

Newcastle Airport and the Port of Newcastle are recognised as global gateways targeted to enable the region and the state to satisfy the demand from growing Asian economies for products and services associated with education, health, agriculture, resources and tourism (Hunter Regional Plan, 2036). The Hunter Regional Plan 2036 identifies that the region's ongoing economic prosperity will depend on its ability to capitalise on its global gateway assets and as such cites a need to expand the capacity of Newcastle Airport and the Port of Newcastle.

The Williamtown SAP site study area covers approximately 11,408ha of land and is low-lying coastal land on the edge of Fullerton Cove and Stockton Beach within Port Stephens Local Government Area in the Hunter Region and Greater Newcastle.

The Williamtown SAP is focused on leveraging employment and investment opportunities associated with its strategic location to the Williamtown Aerospace Precinct (WAP) which includes:

- RAAF Base Williamtown where the F35 Australia Joint Strike Fighter (JSF) fleet is based in. The area has also been affected by Per- and Polyfluoroalkyl Substances (PFAS) contamination associated with past activities conducted at the Williamtown RAAF Base.
- Newcastle Airport which is jointly owned by Port Stephens Council and Newcastle City Council, leased from the Department of Defence and shares their airport runway with RAAF Base Williamtown
- The Defence and Aerospace Related Employment Zone (DAREZ) which is intended for the development of aerospace and defence specific industries near the adjoining Newcastle Airport
- Bushland vegetation is prominent in the area with some areas containing threatened flora and fauna species as well as important wetland areas
- Rural and agricultural lands
- Rural and low density residential development in Williamtown
- Commercial and light industrial clusters associated with the airport and RAAF Base along key road corridors
- The study area is also crossed by several roadways

The study area is presented in Figure 2-1.

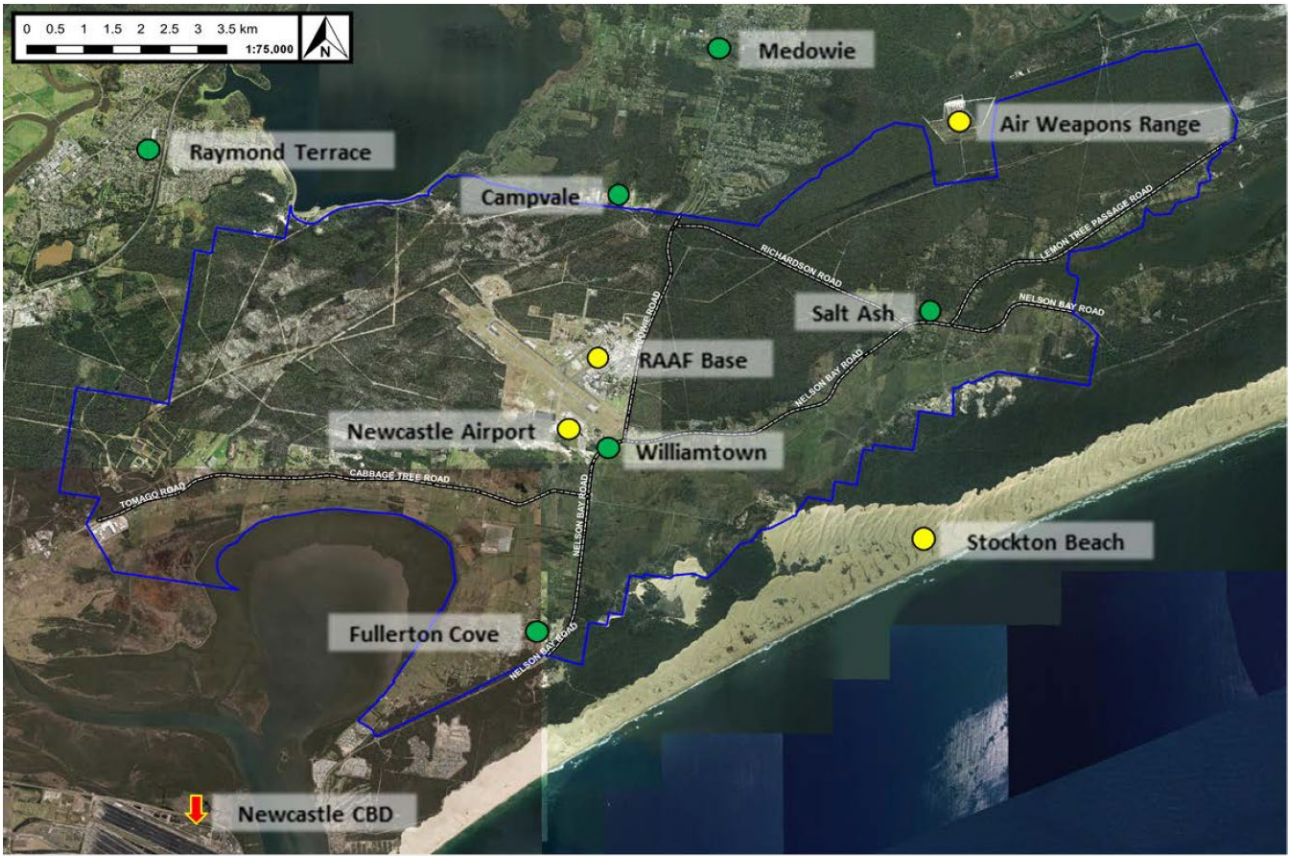



**Figure 2-1: Williamtown SAP Study Area**

### 2.1.2 Williamtown Traffic and Transport Strategic Context

With the Hunter Region incorporating the state's largest share of both regional population growth and employment and located adjacent to the state's fastest growing corridor (Sydney to Newcastle), the Williamtown SAP will contribute to this forecasted growth. The SAP aims to build on the identity of the area as a civil aviation hub, supported by other industrial operations. Additional employment opportunities will be generated by the development of the Williamtown SAP, with environmental and sustainable policies at the heart of the strategy. With the projected increase in people living and working in and around the SAP, there are opportunities to improve the local and regional transport system to support the effective growth and development of the area.

The major road upgrades relevant to the Williamtown SAP include the Nelson Bay Road upgrade and the M1 Pacific Motorway extension to Raymond Terrace. Both these projects will yield significant improvements for the area in terms of journey time, road safety and connectivity both internally and externally to the Williamtown SAP. Enhanced facilities for pedestrians and bicycle riders will also contribute to the health and social wellbeing of the communities. Lastly the movement of freight, tourism and rural industries are all advanced by the road upgrade projects.

## 2.2 Existing Land Use

Williamtown is currently dominated by the Royal Australian Air Force (RAAF) Base in Williamtown and Newcastle Airport, which serve as key local employment providers. The western section of Williamtown is primarily semi-rural with low density residential dwellings. The 2016 Census shows a total of 885 people living in Williamtown, with 39.1% of residents working for the RAAF Base in Williamtown.

The existing land use within the SAP precinct is shown in Figure 2-2. Land use is different for the areas north and south of Cabbage Tree Road and Nelson Bay Road. To the north, the land use is predominantly managed resource protection and nature conservation, with the area surrounding Newcastle Airport allocated to services. To the south, land use is predominantly grazing modified pastures.

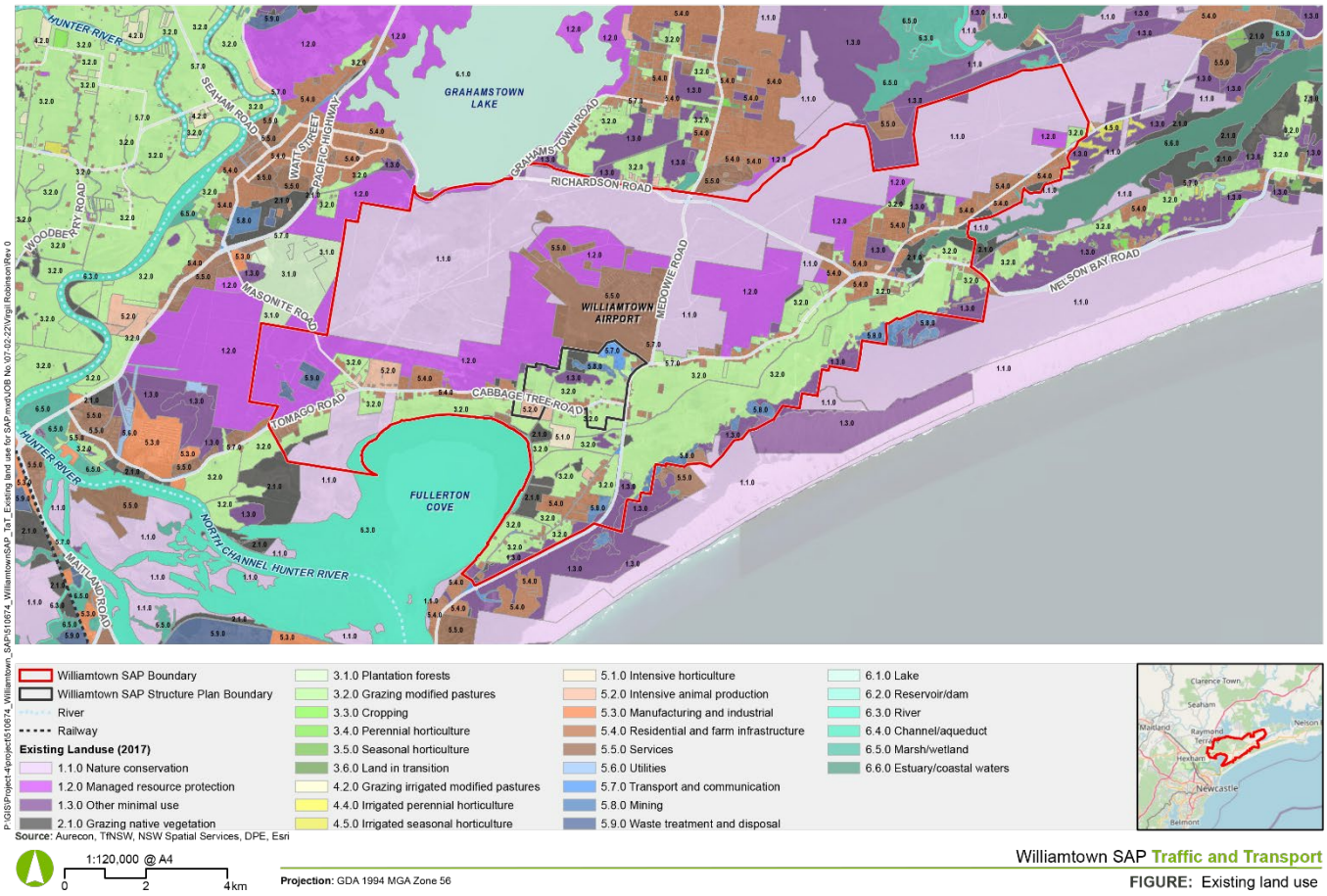



**Figure 2-2: SAP Precinct Existing Land Use**

## 2.3 Existing Transport Situation

Data for Port Stephens LGA was obtained from the Economic Development Team at Port Stephens Council. The majority of people working in the LGA also reside in the LGA, followed by Newcastle, Maitland and Lake Macquarie (refer to Figure 2-3). Trips into the LGA tend to originate from the south/south west in the morning peak and reverse in the evening peak.

For those residing in Port Stephens, LGA, the patterns are similar (refer to Figure 2-4), with most residents working in the LGA itself, followed again by Newcastle, Maitland and Lake Macquarie. Port Stephens is largely a residential area, so trip numbers from Port Stephens are higher than those into the LGA, suggesting that many residents work in Newcastle, Maitland, Lake Macquarie.

A total of 13,137 employed people resides in Port Stephens, with 8,520 of those working in the LGA as well (refer to Table 2-1). A total of 4,617 residents leave Port Stephens to travel to work outside of the LGA, and 2,664 travel from other LGAs into Port Stephens for work. With these trip patterns, roads to the south and southwest of Port Stephens are expected to be busier than other roads, particularly as the Williamtown SAP develops. Internal movements will also influence capacity of the road network.

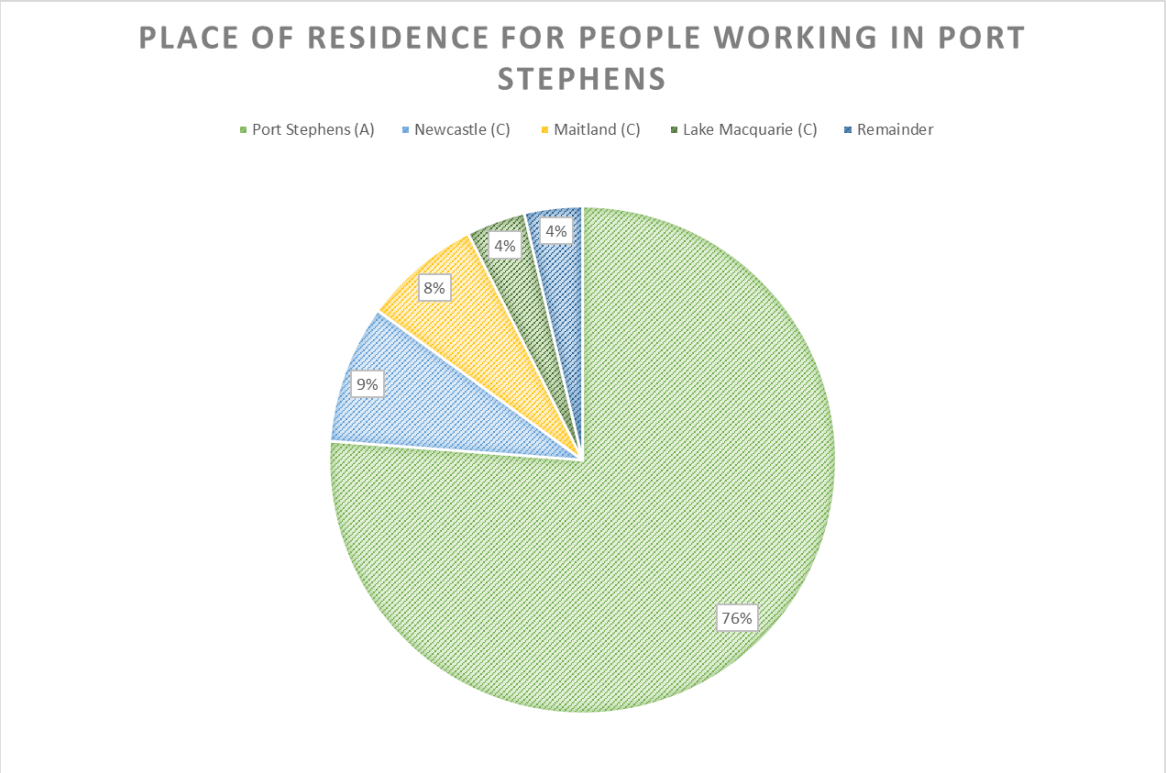



**Figure 2-3: Place of Residence for People Working in Port Stephens (Source: Port Stephens Council Remplan[1])**

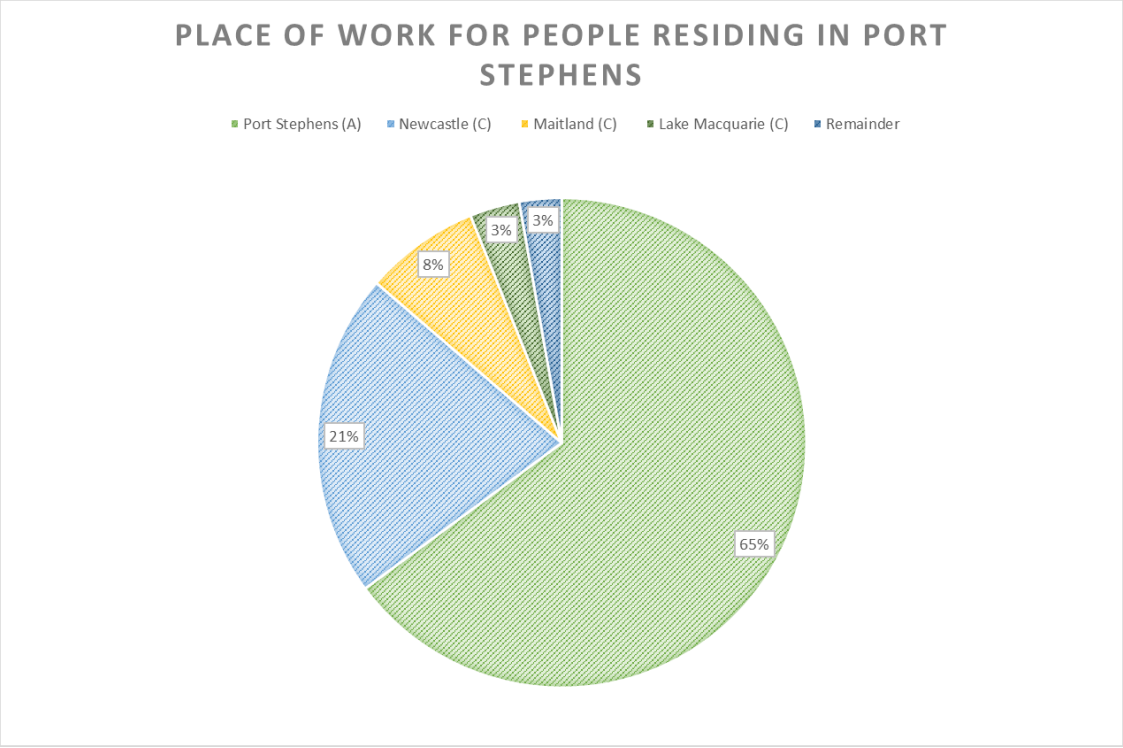



**Figure 2-4: Place of Work for People Residing in Port Stephens (Source: Port Stephens Council Remplan[2]**

**Table 2-1: People working and residing in Port Stephens (Source: Port Stephens Council Remplan)**

| People working in Port Stephens | | People residing in Port Stephens | |
|---|---|---|---|
| **Place of Usual Residence** | **Number of people** | **Place of Usual Work** | **Number of people** |

[1] Source: https://app.remplan.com.au/portstephens/economy/workers/place-of-usual-residence?state=o1gGcR!VvbAIA0gGFY8oRmSkPAPvs1s4hgx6TwMhyh7GFKHdD47jkhJ7RyC2SllK3uY89
[2] Source: https://app.remplan.com.au/portstephens/economy/workers/place-of-usual-work?state=o1gGcR!4Yd3ioNPlFky01ef64P4viPskho82tBJsWhkRSOHkmG4jxfee6MohdSmm6Pl64Y

| | | | |
|---|---|---|---|
| Port Stephens (A) | 8521 | Port Stephens (A) | 8520 |
| Newcastle (C) | 988 | Newcastle (C) | 2820 |
| Maitland (C) | 841 | Maitland (C) | 998 |
| Lake Macquarie (C) | 420 | Lake Macquarie (C) | 433 |
| Remainder | 414 | Remainder | 366 |
| **Total** | **11,184** | **Total** | **13,137** |

## 2.4 Policy Overview and Analysis

A number of relevant government plans, policies and strategies relating to the vision, development and objectives for Williamtown SAP are detailed below.

### 2.4.1 NSW Future Transport Strategy 2056

Future Transport 2056 Strategy is the overarching State Government plan to guide better delivery of Government services and provides priorities for action. Transport in regional NSW will be built on the hub and spoke model, to capitalise on the role that regional cities and centres play as hubs for employment and services such as retail, health, education and cultural activities.

Some relevant transport initiatives identified over the next 10 to 20 years in the Strategy that will impact on the Williamtown SAP include:

- Nelson Bay Road improvements
- M1, Hexham, Raymond Terrace upgrades
- Lower Hunter freight corridor protection
- Tomago Road improvements focusing on Pacific Highway to Williamtown Greater Newcastle rapid bus package
- Greater Newcastle place plans
- Newcastle light rail network extension
- Fast Rail Network – Northern Corridor: Central Coast, Newcastle, Taree and Port Macquarie
- Hunter Pinch Points

### 2.4.2 Regional NSW Services and Infrastructure Plan

The Regional NSW Services and Infrastructure Plan is a blueprint for NSW Government's regional transport strategy through to 2056. It identifies trends, services and infrastructure needs that are shaping transport in regional NSW, including improvements to road and rail as shown in Figure 2-5.

Of note are the new/improved sections of the M1 Pacific Motorway, Golden Highway and works at nearby Muswellbrook and Singleton, along with upgrades to nearby sections of existing rail and improving connectivity in the region around Williamtown. A potential higher speed rail connection could benefit the Williamtown SAP, with faster access for areas located to the north and south. The plan includes forecast population growth for the Hunter region as outlined below in

Table 2-2.

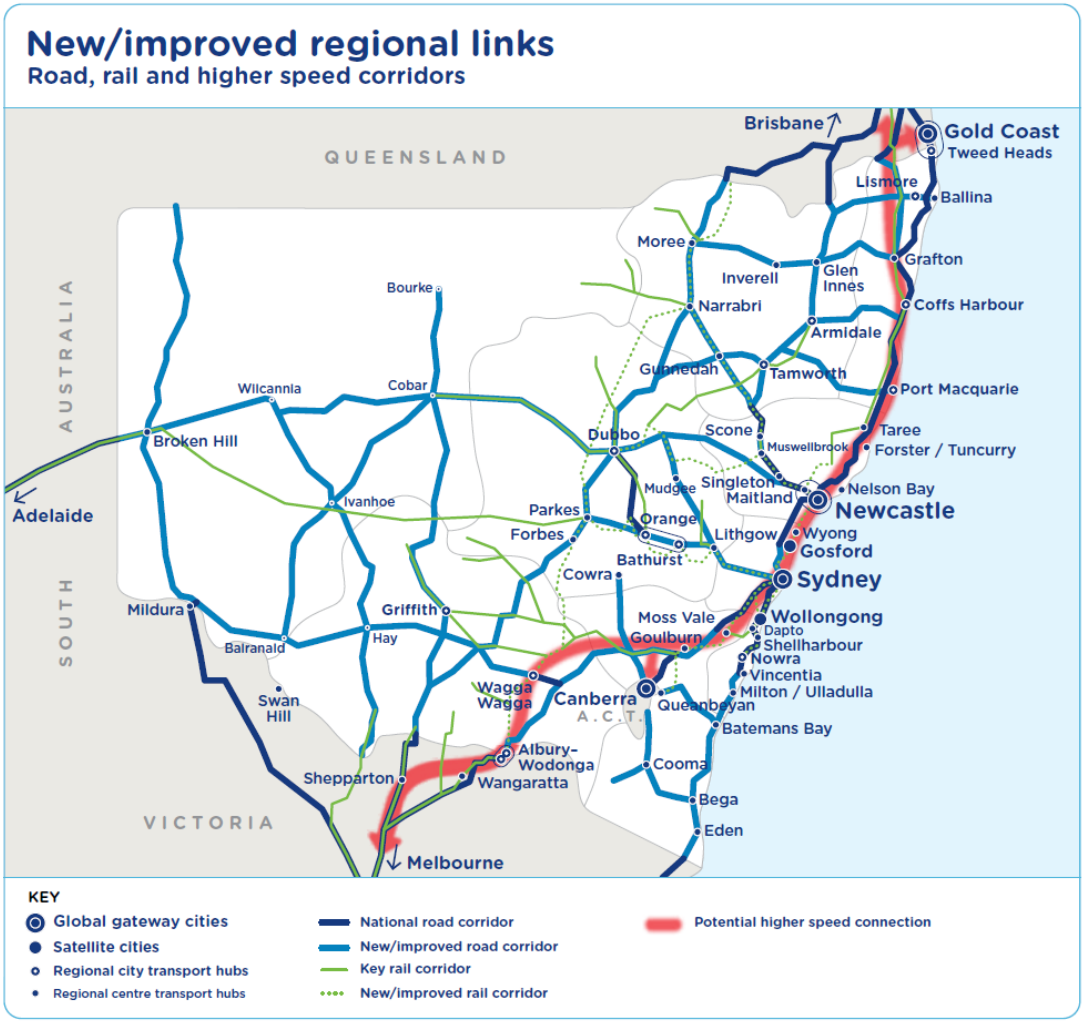



**Figure 2-5: Future Movement Corridors (Source: Regional NSW Services and Infrastructure Plan, 2018)**

**Table 2-2: Hunter Population Projections (Source: Regional NSW Services and Infrastructure Plan, 2018)**

| Location | Population | | |
|---|---|---|---|
| | 2016 | 2036 | 2056 |
| – Hunter | 0.73M | 0.86M | 0.94M |

## 2.4.3 Hunter Regional Plan 2036

The Hunter Regional Plan 2036 is a 20-year blueprint for the future of the Hunter. The plan's vision is to create a leading regional economy in Australia, with a vibrant metropolitan city at the heart and a recognition that Defence is an important contributor to the Hunter economy. The RAAF Base has plans to upgrade the national air defence infrastructure in the area, catering to an emerging cluster of aerospace knowledge industries, creating opportunities for new and existing business for the area. Newcastle Airport will also play a key role in providing ongoing support to the operations of the RAAF Base in Williamtown, enabling the development of high-technology industries, defence, and aerospace activities.

## 2.4.4 Greater Newcastle Future Transport Plan

This plan identifies and explores key relevant initiatives across Greater Newcastle including:

- Development of integrated public transport network including bus, rail and station upgrades
- Facilitating car sharing services

- Development of active transport networks
- Opportunities to extend Newcastle Light Rail
- Addressing road network pinch points
- Protection of freight corridors and reinforcing links to port and airport

Similar to other strategic plans, the Greater Newcastle Transport Plan identifies the expansion of Newcastle Airport and recent investment in the airport's facilities along with substantial upgrades that are proposed for the Williamtown RAAF base to support the F-35 program. The Plan highlights investment in key regional roads including the Nelson Bay Road upgrade to improve connectivity through Williamtown.

The Plan also recognises the economic benefits that the airport and its facilities provide to the wider region and that improving transport infrastructure around the airport will improve access for tourism and trade and encourage investment.

### 2.4.5 Greater Newcastle Metropolitan Plan 2036

The four key outcomes of the Greater Newcastle Metropolitan Plan 2036 include:

- Create a workforce skilled and ready for the new economy
- Enhance environment, amenity and resilience for quality of life
- Deliver housing close to jobs and services
- Improve connections to jobs, services and recreation

Williamtown is recognised as the main defence base for the maintenance of advanced Joint Strike Fighters (F-35). A defence and aerospace industry has emerged from links between universities, Newcastle Airport and the RAAF Base. Williamtown is also recognised as a key trading hub, due to its proximity to Newcastle Airport and key road corridors linking the airport to surrounding regions. The Plan outlines key growth in passengers (1.2m in 2016 to 2.6m in 2036) and jobs (5,300 jobs in 2016 to 8.300 jobs in 2036) for the aerospace and defence precinct, and envisions a 25-minute drive by private vehicle or 45-minute bus ride through improved transport connections.

### 2.4.6 Freight Plans

The NSW Freight and Ports Plan (2018-2023) emphasises the importance of freight to the economy. Most of the freight is moved by road in NSW, with rail also serving a significant component of the local freight task. The three highest volume outbound commodities by 2036 for the Hunter Region include:

- Manufactures (fuel and lubricant) – 46%
- Coal – 11%
- Construction materials – 4%

In the Plan, Newcastle Port is identified as Australia's largest terminal for coal exports, with plans to diversify and expand the Port's trading base to include a wider range of commodities. Medium to long-term constraints include the pressures on the shared rail network in the Upper Hunter Valley and access via the New England and Golden highways.

### 2.4.7 Other Guiding Policies and Strategies

Other relevant policies and strategies include:

**Future Transport 2056 – NSW Electric and Hybrid Vehicle Plan**

This plan recognises the global transformation that is taking place from traditional combustion engines to electric, hybrid and fuel cell vehicles. Actions within the plan include the following three key priority areas:

- Vehicle availability
- Charging points
- Customer information

For the Williamtown SAP the main consideration for electric and hybrid vehicles is around charging points.

**Future Transport 2056 – Connected and Automated Vehicles Plan**

This plan provides details on the NSW Government approach to the adoption of connected and automated vehicles. Key goals outlined in the plan include:

- Support implementation of nationally consistent regulation, standards and policies
- Increase the proportion of passenger and freight vehicles in NSW with the latest CAV safety technologies
- Build infrastructure capability to support at-scale operations of partially, conditionally and highly automated vehicles on motorways and major roads

For the Williamtown SAP the main consideration of this plan is adopting infrastructure than will not hinder future implementation of technologies to support connected and automated vehicles.

## 2.5 Current and Future Developments

This section details key existing and committed future developments within the SAP investigation area that have or are likely to have an impact on the traffic, transport and freight in the region (all shown on Figure 2-6 below).

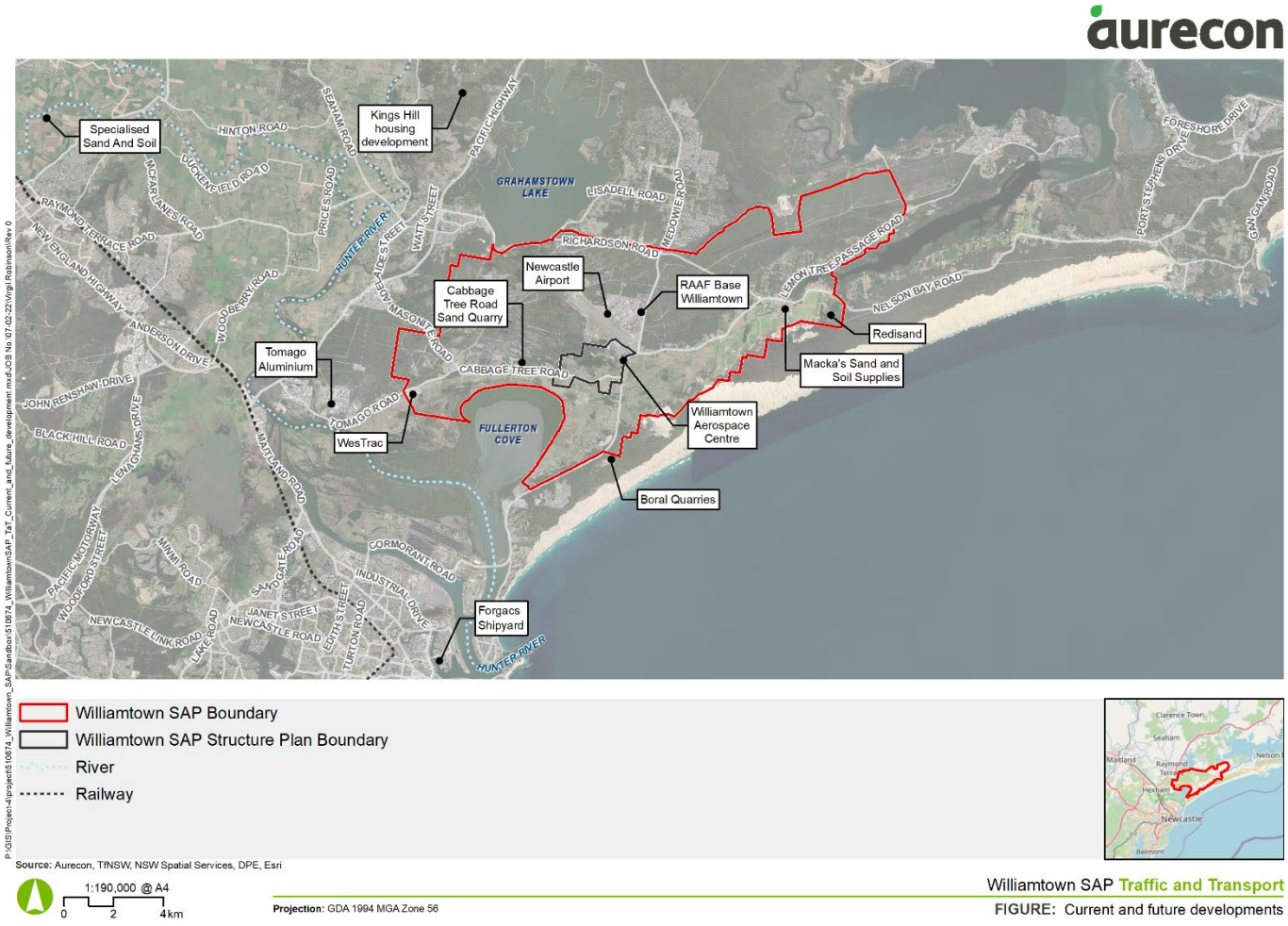



**Figure 2-6 Current and future developments within the SAP investigation area**

### 2.5.1 Newcastle Airport

The Airport is unique in accessing the airfield and runways of the RAAF Base Williamtown. In 2019 over 1.2 million passengers passed through Newcastle Airport. Parking actions per month in 2018 ranged between 15,000 and 20,000 with the busiest periods in December, January and July (Newcastle Airport Parking

Forecast 2018). It was also indicated that the parking provision at Newcastle Airport could support the parking demand for FY19.

The 2036 Newcastle Airport Vision was released in 2018, providing the long-term master plan for airport development. The airport site covers 110ha, including a 28ha lease area occupied by terminal infrastructure as well as additional landside business park area on adjoining private land.

The master plan document identifies an intent for Newcastle Airport to offer direct international flights to key trading and tourism destinations as the potential for future growth in air traffic demand is recognised for both passenger and freight.

Five airside and landside precincts are proposed in the master plan as well as an environmental buffer zone. The 2016 traffic volumes for Airport traffic are indicated as 301 two-way trips at 8:00am in the ARUP Technical Note titled Extract in Traffic Demand.

As part of the 2036 Vision for the Newcastle Airport, infrastructure is mainly included internally to the Airport. The Airport Vision for 2076 mentions a rail link connecting to Newcastle Airport (refer to Figure 2-7).

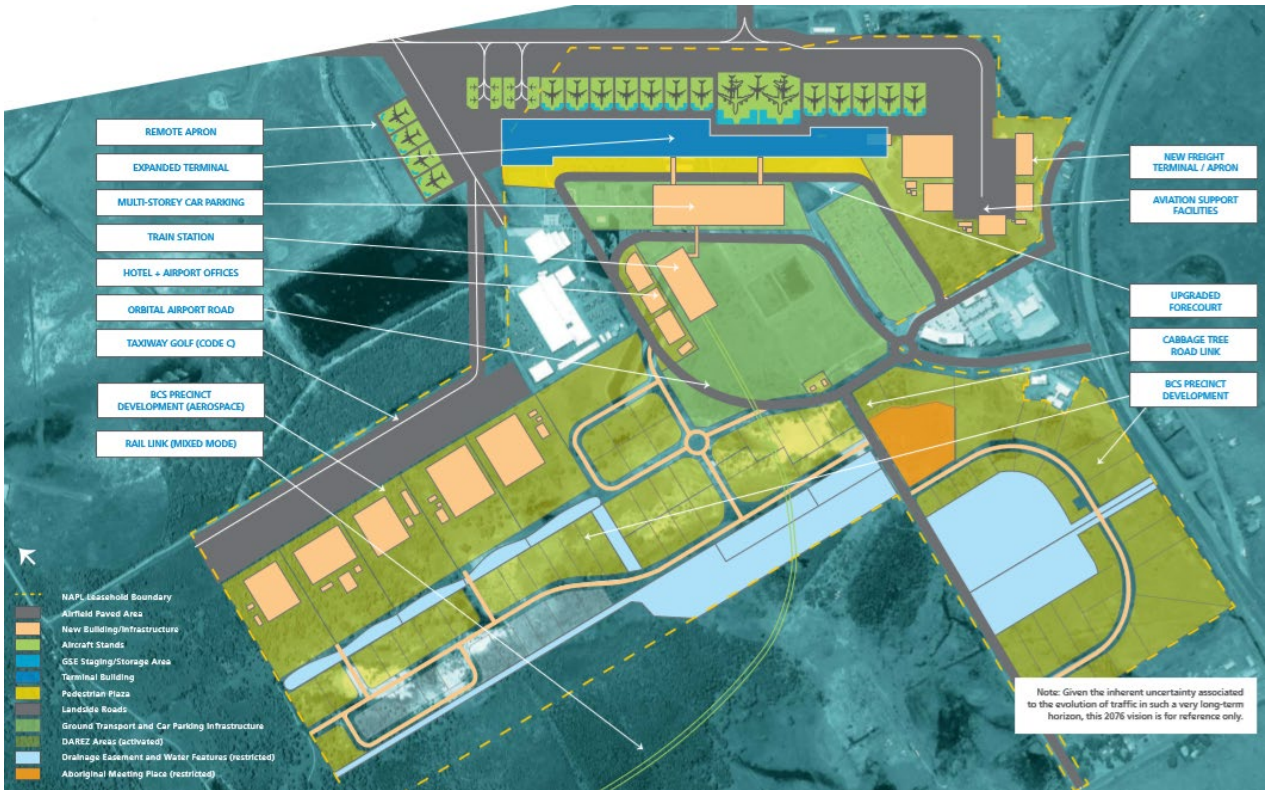



**Figure 2-7: Newcastle Airport Vision for 2076 (Source: 2036 Newcastle Airport Vision)**

A media release dated 7 May 2021[3], indicated that the Commonwealth Government will invest $66 million to fund upgrades to the Newcastle Airport runway. The runway will be widened to accommodate longer range domestic and international passenger services as well as increased large freight capabilities. The upgrades to Code E status would mean larger aircraft like Boeing 777s and Airbus A330s could land in Newcastle, which will enable a significant increase in passenger and air freight capacity, and will open up the Hunter Region to a number of new global destinations such as North Asia, the Pacific, the Middle East and North America.

### 2.5.2 Astra Aerolab and Technology Park

The Astra Aerolab in Williamtown is a globally significant Defence and Aerospace precinct which is being developed on 76 hectares of rezoned land in Port Stephens that has an existing development consent. It adjoins the Williamtown RAAF Base and Newcastle Airport and presents a rare opportunity to build a nationally significant and unique industry cluster that is a catalyst for the expansion of science, technology and manufacturing industries, increasing employment and jobs for the area.

[3] Source: Jobs boom takes off in the Hunter with Newcastle Airport investment | Prime Minister of Australia (pm.gov.au)

The strategic importance of the Astra Aerolab is highlighted as follows:

- Increase economic activity and industry in the region in the commercial, industrial and technological fields
- Protect and support the operations of the RAAF Base in Williamtown, which is a significant element in the Australian Defence Force capability
- Protect and support the Newcastle Airport
- Critical need for employment lands in proximity and having strong supportive synergies to these existing Base and Airport facilities
- Strategically connected at the junction of road links to Newcastle and the Pacific Highway
- The area is important to the environmental management needs of the area including flooding, soils and habitat management

The adjacent RAAF base is Australia's primary Defence Fighter Base and houses Australia's new fleet of F-35 Joint Strike Fighters[4]. The location of the Astra Aerolab is indicated in Figure 2-8.

The purpose of the Astra Aerolab will be to service and maintain Australian fighter jets. The new Astra Aerolab precinct will allow aviation companies to establish themselves in the region and support the Royal Australian Air Force combat aircraft, including the F-35A Joint Strike Fighter. The NSW Government has provided $11.7 million to the 76-hectare precinct[5] for vital infrastructure, including an access road, power, water, gas, sewer and data connections. The project commenced on 14 May 2019 with Stage 1 works including[6]:

- Road pavements, sewer and water
- Lighting, CCTV and fencing
- Street furniture, signage, high quality landscaping and street art

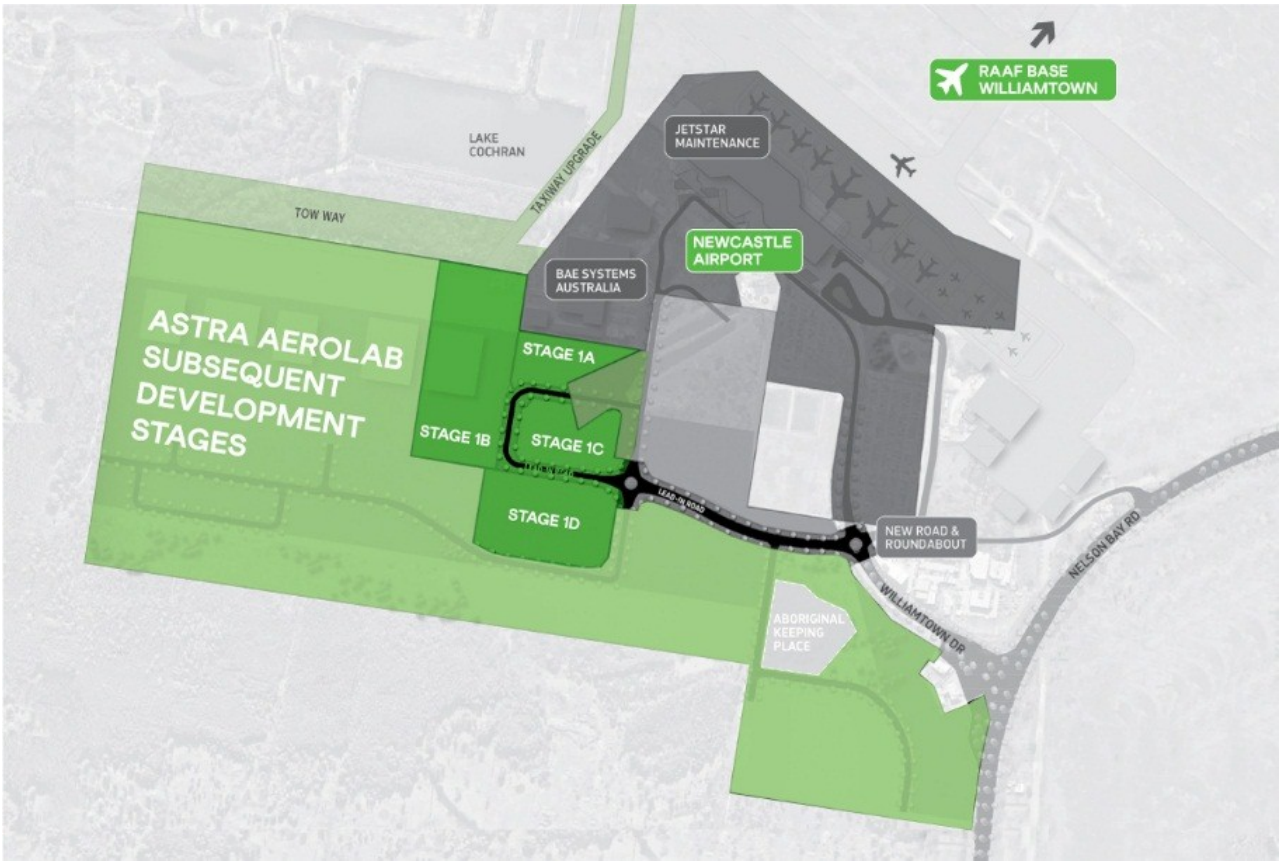



**Figure 2-8: Location of Astra Aerolab development and staging (Source: https://www.urbantaskforce.com.au/urban-taskforce-supports-astra-aerolab-in-the-hunter/)**

[4] Source: https://www.astraaerolab.com.au/about
[5] Source: https://www.nsw.gov.au/news/astra-aerolab-to-open-hunter
[6] Source: https://www.newcastleairport.com.au/our-future/astra-aerolab

The 2016 traffic volumes for the Astra Aerolab indicate 85 two-way trips from 8:00am to 10:00am in the ARUP Technical Note titled Extract in Traffic Demand.

**BAE Systems**

BAE Systems is based in Williamtown for over 20 years supporting the maintenance and upgrade of Defence aircraft. Currently BAE's warehouse footprint is around 8,000m$^2$ at Williamtown and employs around 260 people. Current indication is that around 12 heavy vehicle deliveries are made each day to the BAE Systems Warehouse in Williamtown. It is indicated that currently no B-double vehicles can access the BAE Williamtown site/Airport. The Hawk Lead-In Fighter (LIF) project includes the following vehicle trips (excluding delivery vans):

- 2 Semi-Trailers per week (average)
- 8-10 Rigid Trucks per week (average)

By 2025, the F-35 program is predicted to employ an additional 280 people at BAE Systems in Williamtown and the required warehouse footprint will increase to approximately 20,000m$^2$. This includes a new F-35 Air Vehicle Support Services (AVSS) contract to establish sovereign maintenance and supply-chain support for the Australian fleet at RAAF Bases at Williamtown, which will employ 46 BAE Systems Australia staff, providing direct, on-the-ground support to RAAF personnel sustaining the F-35. Minimal vehicle movements are expected for 2020 but are presumed to increase in the next 5 years. Weekly expectations are indicated in Table 2-3.

**Table 2-3: Expected weekly vehicle movement for the F35 program (Source: BAE Systems Australia)**

| Type | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|
| Semi-Trailers | 1 | 1 | 2 | 2 | 3 | 4 |
| Rigid Trucks | 4 | 10 | 15 | 20 | 25 | 25 |

### 2.5.3 Williamtown Aerospace Centre

The Williamtown Aerospace Centre (WAC) is located adjacent to the Newcastle Airport between Williamtown Drive and Nelson Bay Road (refer to Figure 2-9). The WAC was designed from the ground up to enhance and facilitate commercial activities in the land adjoining the RAAF Base Williamtown and Newcastle Airport. As a site, WAC includes the Newcastle Airport Precinct and 120 hectares of industrial and business land[7]. The commercial, campus-style tech park includes commercial offices, and technical and light industrial spaces for lease.

[7] Source: https://www.defenceconnect.com.au/key-enablers/5625-williamtown-aerospace-centre-the-leading-edge-defence-industry-cluster-at-the-heart-of-the-raaf


**Figure 2-9: Williamtown Aerospace Centre (Source: Williamtown Aerospace website)**

### 2.5.4 RAAF Base Williamtown

The Air Force is proud to have been part of the Hunter since the late 1930s when the Defence Practice Area was first designated at Williamtown and has a strong positive relationship with the local community. The Royal Australian Airforce (RAAF) Base Williamtown is home to the tactical fighter element of the Air Combat Group and the Airborne Early Warning and Control (AEW&C) element of Surveillance and Response Group. The RAAF Base Williamtown has the largest footprint in Williamtown and employs 4500 people.

Fuel deliveries represent a substantial proportion of base freight and is generally delivered via the access on Medowie Road (significant in terms of fuel supply and defence cargo for freight movement). Other road freight for the base comes from the Defence Storage National Distribution Centre in Wattle Grove along with Orchard Hills and Myambat bases which provide Williamtown RAAF Base with deliveries of dangerous goods and other high value freight. Dangerous goods furthermore include Class 1 dangerous goods (ie. ammunition), with deliveries to the base arriving 24/7, dependent upon operational tempos.

Base freight deliveries will grow in proportion to BAE contracts with JSF (Joint Strike Fighter) and international partners. As a result, PBS level 2/3 vehicles will have to enter and operate along the final mile to service potential warehousing and freight depots. These vehicles will also be travelling along connecting roads to gain access for airport cargo movements. The transport and storage of dangerous goods, truck parking and trailer parking will all require available land space to conduct these movements and operations. The Williamtown RAAF currently forecast moderate increase in personnel of around 20% over the next 20 years.

### 2.5.5 Cabbage Tree Road Sand Quarry

The Cabbage Tree Sand Quarry is located at 398 Cabbage Tree Road. The Cabbage Tree Sand quarry is currently operational and is planned to extract up to 530,000 tonnes per annum over a period of 6 to 15 years[8]. The establishment of the Quarry includes the construction of an intersection with Cabbage Tree Road, sealed and gravel access roads, a site office, a workshop and weighbridges. As part of the project, upgrades have been made to the existing property access to a left in left out intersection with deceleration and acceleration lanes included in the project. Cabbage Tree Road is an important corridor for freight movement.

[8] Source: 2019 Annual Environmental Review, Cabbage Tree Road Sand Quarry

The sand quarry generates an average daily traffic of 126 one-way heavy vehicle movements during operation, resulting in a 29% increase in heavy vehicles and 2% increase in overall traffic along Cabbage Tree Road. Cabbage Tree Road is part of the HML network[9] (refer to Figure 2-19).

### 2.5.6 Kings Hill Development

The Kings Hill Urban Release Area (URA) is a 3,500-lot housing development master plan located north of Raymond Terrace and south of Eagleton in the Port Stephens Local Government Area. The concept plan went through public exhibition mid-2019. The Master Plan and proposed Concept Access Road Plan was included in the Development Application (DA) Planning Agreement (October 2019). Negotiations are taking place about providing an interchange along the Pacific Highway to provide access to the Kings Hill URA.

The latest information about Kings Hill Development include the Community and Recreation Infrastructure Study, dated April 2020. According to the study, it is understood that only 250 dwellings can be developed before the interchange is built. Timing of construction of the interchange is currently unknown, therefore scheduling of the overall Kings Hill development is also uncertain.

### 2.5.7 Forgacs Shipyard in Tomago

Civmec recently purchased the Forgacs shipyard at Tomago. The purpose-built shipyard is situated on the Hunter River, 14 kilometres from the Port of Newcastle, with the 227,000m$^2$ site incorporating 535 metres of river frontage and two ship basins[10]. Civmec will develop the Tomago site to operate as a multi-disciplinary facility which will in future replicate Civmec's flagship operations at Henderson, Western Australia.

### 2.5.8 WesTrac in Tomago

The WesTrac NSW head office has been located in Tomago since 2012, west of the SAP, and is a major Cat equipment dealer. WesTrac covers a wide range of machinery and construction equipment as well as comprehensive whole-of-life management solutions assisting with maintenance aspects. WesTrac services many mines in the Hunter Valley and is therefore a significant stakeholder, their services include moving Over-Size Over-Mass (OSOM) Load Carrying vehicles along Tomago Road. Tomago Road / Cabbage Tree Road important for freight movements (OSOM transported 24/7), to be considered for future SAP road planning.

### 2.5.9 Tomago Aluminium

Tomago Aluminium is located north of Tomago Road, west of the Williamtown SAP. Tomago Aluminium is one of Australasia's largest aluminium smelters and operates 24 hours a day since 1983[11]. The smelter produces 580,000 tonnes of aluminium every year, which is 25% of Australia's primary aluminium. Ninety percent of the product made at Tomago is exported to the Asia-Pacific region.

The owners provide raw materials to Tomago that are converted to aluminium at the Tomago plant. The product is supplied back to the owners who then take it to market. Tomago employs 950 staff (full time equivalent) as well as 190 contractors. The staff are drawn from a significant geographic area throughout the Hunter Valley and Central Coast travelling from as far as 100km south, 80km north and 50km west of the plant. The staff component of members working normal daywork personnel (Monday to Friday) amounts to 400 people, commencing between 6am and 8am and finishing between 2pm and 5pm. The operational workforce rotates their shifts every day of the year, with each shift crew amounting to 150 people, working 12-hour shifts, either 6am to 6pm or 6pm to 6am. Therefore 150 people arriving (starting a shift) and 150 people departing (finishing their shift) at 6am and 6pm on a daily basis.

The inbound movements (raw products) are moved by road from Kooragang Island to Tomago Aluminium and include:

- Alumina approximately 1,150,000 tonnes per annum, 75 trucks per day (7 days per week 24hr)
- Petroleum Coke approximately 220,000 tonnes per annum, 15 trucks per day (7 days per week 24hr)

[9] Source: https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html
[10] Source: https://www.civmec.com.au/what-we-do/capabilities/shipbuilding
[11] Source: https://www.tomago.com.au/about-us/our-story

The outbound movements (finished product) are moved from Tomago Aluminium to the rail siding at Sandgate and include:

- Approximately 600,000 tonnes per annum, 60 trucks per day (Monday to Friday excluding public holidays from 6am to 3pm)

Other imported products, typically in via Sydney Port to rail siding at Sandgate and trucked to site via road:

- Approximately 16,000 tonnes per annum, 5 trucks per day (Monday to Friday excluding public holidays from 6am to 3pm)

### 2.5.10 Sand Mines in the Area

As indicated in Section 2.4.6, the Port Stephens area is home to various industries involved in manufacturing as well as construction and materials. A number of mines are present in the area, including Newcastle Sand located at 282 Cabbage Tree Road which constitutes a 3.25 million tonne sand resource quarry. Newcastle Sand supplies to the Hunter and Sydney regions and produces three key products:

- White/Industrial sand
- Concrete/Asphalt
- Landscaping sand

Newcastle Sand extracts a maximum of 530,000 tonnes per annum[12] and trades 69 hours per week. Important to note that Newcastle Sand is responsible for a maximum of 10 truckloads per hour. Therefore, the impact on the surrounding road network is well-controlled and managed.

Holcim Salt Ash is also located within the Williamtown SAP study area along Oakvale Drive, south of the Nelson Bay Road / Lemon Tree Passage Road / Oakvale Drive intersection. Holcim Salt Ash was purchased in April 2020 from Sibelco Australia and is a sand operation. Holcim supplies construction materials including aggregates, sand, concrete and precast concrete products. According to the NSW Planning Portal, Holcim Salt Ash Sand Operations proposes to extract and process up to 550,000 tonnes per annum of sand using dry extraction and dredging techniques to import up to 200,000 tonnes per annum of sand from Holcim's Tanilba Bay, Anna Bay and other local operations. The magnitude of annual sand extraction is quite similar between Holcim Salt Ash and Newcastle Sand. Therefore, it is expected that the truckloads per hour will be in the same range of approximately 10 per hour.

Macka's Sand and Soil Supplies is located next to Holcim Salt Ash south of Nelson Bay Road and east of Oakvale Drive, close to the Nelson Bay Road / Lemon Tree Passage Road / Oakvale Drive intersection and has been operating since 1992. Macka's Sand and Soil supplies to a variety of industrial uses including construction, landscape, sport and recreation, glass and foundry and government sectors. Macka's Sand and Soil moves 2 million tonnes of Stockton sand per year[13]. Macka's Sand and Soil has requested a modification in October 2020 to allow the transportation of 10% additional product from Lot 218. This increase includes a further 100,000t, increasing the total tonnage to 1,100,000t during the calendar year 2020[14].

It is important to consider all road access points for freight whilst undertaking future planning for the SAP, as it is critical for these sand mines. Industries like WesTrac and the mines in and around Williamtown support each other, thereby generating a market and growing the economic potential of the area.

## 2.6 Overview of Committed Infrastructure

### 2.6.1 Nelson Bay Road Upgrade

Transport for New South Wales (TfNSW) is currently undertaking a $275 million project which includes improvements to the Nelson Bay Road corridor including duplicating the road between Williamtown and

[12] Source: https://www.newcastlesand.com.au/
[13] Source: https://www.cjd.com.au/about/testimonials/construction/mackas-and-cjd/
[14] Source: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=MP08-0142-MOD-3%2120201026T044633.836%20GMT

Bobs Farm and upgrading the Nelson Bay Road / Lemon Tree Passage Road intersection and the Nelson Bay Road / Medowie Road intersection.

Nelson Bay Road is a major connection between Newcastle and the Newcastle Airport, RAAF base and Nelson Bay. Nelson Bay Road is used by around 25,000 motorists each day and increases during holiday periods[15].

The 43km corridor stretches from Stockton Bridge to the Church Street intersection in Nelson Bay.

TfNSW is delivering upgrades and planning for future improvements to:

- Provide better connectivity for residents, businesses and the community to Newcastle Airport and Williamtown RAAF base.
- Improve traffic flow, journey times and safety for motorists on Nelson Bay Road.
- Improve pedestrian and bicycle safety by providing enhanced facilities.
- Promote freight efficiency by ensuring future freight demands are met and encouraging the use of higher productivity vehicles.
- Support tourism and rural industries as a major economic driver in the Port Stephens area.

The upgrading of the Nelson Bay Road / Medowie Road intersection is complete and included the following project features[16]:

- Provided a left turn lane on the western leg of the roundabout towards Medowie.
- Improved the alignment of the roundabout westbound to improve safety of vehicle movements.
- Extended the length of the left-hand lane and providing a zip merge lane on the departure of the eastern leg of the roundabout towards Nelson Bay.
- Extended the length of the left-hand lane on the departure of the eastern leg of the roundabout towards Nelson Bay.
- Provided off road cycle paths around the roundabout to allow cyclists to traverse the intersection safely.
- Provided footpath and kerb ramps to improve safety for pedestrians.
- Extended the existing culvert to allow road widening on Medowie Road.

The upgrading of the Nelson Bay Road / Lemon Tree Passage Road intersection is complete and included the following project features[17]:

- Providing an additional left turn lane into Lemon Tree Passage Road from Nelson Bay Road.
- Extending the eastbound merge lane on Nelson Bay Road. This includes adjusting driveways and associated drainage on the eastern side of the roundabout to accommodate road widening for the extended lane.
- Extending the two-lane approach to the roundabout on Lemon Tree Passage Road.
- Providing an additional westbound lane on Nelson Bay Road on approach to the roundabout.
- Providing off-road cycle paths around the roundabout to improve safety for cyclists.
- Providing footpath and kerb ramps to improve safety for pedestrians and cyclists.
- Removing and replacing concrete medians.
- Road resurfacing and new line marking.

The upgrade will improve accessibility to the proposed SAP development, including enhanced intersections which provide multiple route options to freight and general traffic.

[15] Source: https://www.rms.nsw.gov.au/projects/nelson-bay-road/index.html
[16] Source: https://www.rms.nsw.gov.au/projects/nelson-bay-road/nelson-bay-road-medowie-road-intersection.html
[17] Source: https://www.rms.nsw.gov.au/projects/nelson-bay-road/nelson-bay-road-and-lemon-tree-passage-road.html#

## 2.6.2 Cabbage Tree Road Upgrade

Roadworks were undertaken for a 600-metre section of Cabbage Tree Road at Williamtown, refer to Figure 2-10 below. The works addressed issues associated with the pavement coming to the end of its design life. The new works provided for a heavily bound pavement with a design life of around 20 to 30 years. The final wearing course is yet to be installed and will be placed in the near future.

The NSW Government funded the works which extended between Barrie Close and Nelson Bay Road. Port Stephens Council carried out the works on behalf of Transport for NSW.

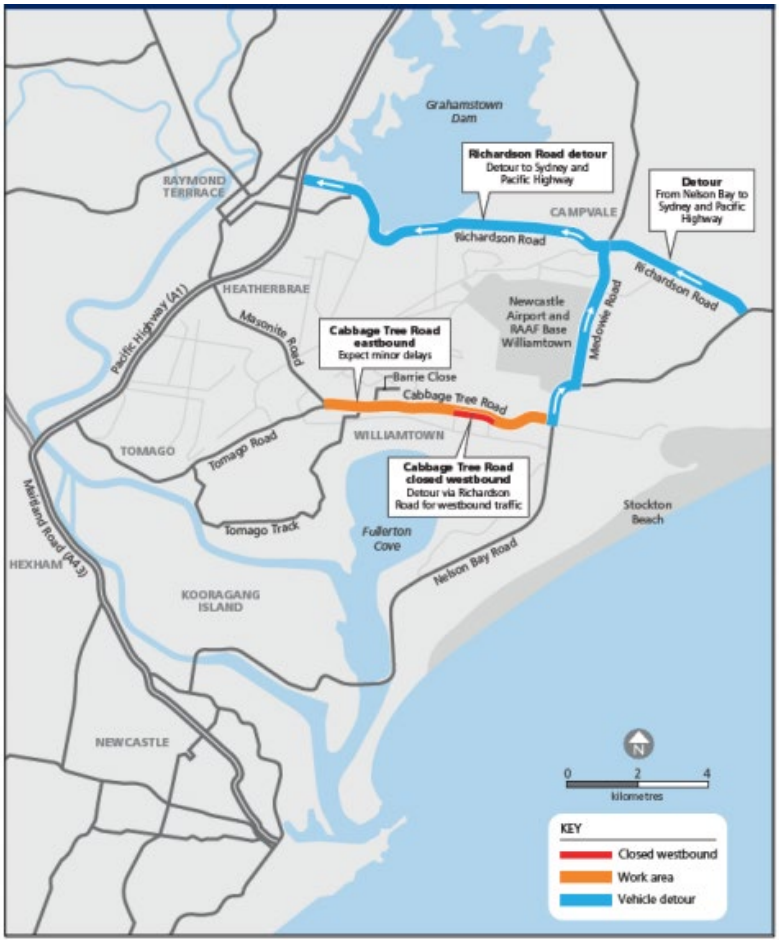



**Figure 2-10: Construction section along Cabbage Tree Road (Source: TfNSW Website[18])**

## 2.6.3 M1 to Raymond Terrace

Planning for the M1 Pacific Motorway extension to Raymond Terrace is progressing. The NSW Government has provided $7 million in 2016-17 to continue planning for a future extension of the M1 Pacific Motorway to the Pacific Highway at Raymond Terrace. The proposed upgrade involves building 15km of dual carriageway motorway with two lanes per direction, bypassing Hexham and Heatherbrae. Changes to the previous project design were displayed for community comment in August and September 2016. These changes include providing a motorway exit ramp south of Heatherbrae to improve access to businesses and a free-flowing interchange at Tomago to replace the previously proposed roundabout design.

Further design considerations (refer to Figure 2-11) were undertaken since 2016[19]:

- Improved direct access from the Pacific Highway in and out of the Hunter Region Botanic Gardens for motorists, pedestrians and cyclists.
- A centralised interchange located at Old Punt Road to improve connectivity, road transport efficiency and safety for all motorists, and minimise impact with the proposed AGL Power Plant infrastructure project.

[18] Source: https://www.rms.nsw.gov.au/projects/cabbage-tree-road-williamtown/index.html
[19] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf

- Improved access to the northbound M1 Motorway entry ramp at Tomago which allows motorists from Newcastle to access the M1 Motorway sooner (refer to Figure 2-12).

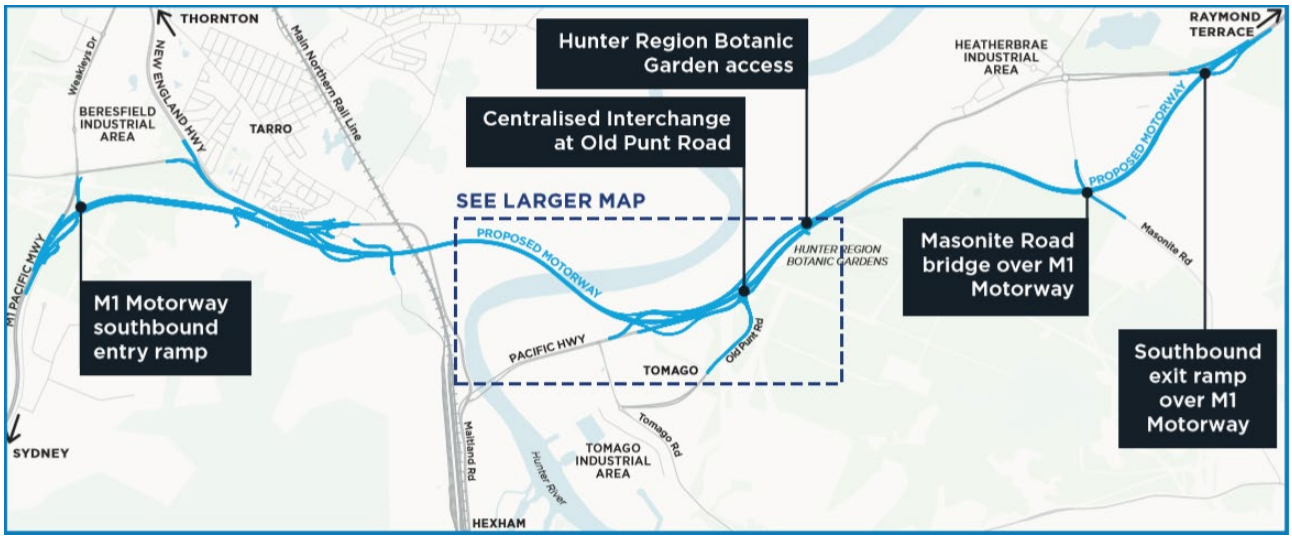



**Figure 2-11: M1 Pacific Motorway extension to Raymond Terrace project overview map (Source: TfNSW website[20])**

The project benefits include:

- Improved connection between the M1 Motorway and A1 Pacific Highway.
- Improved traffic flow for motorists and freight, more reliable travel times.
- Improved access to the surrounding road network; and
- Improved safety for all road users.

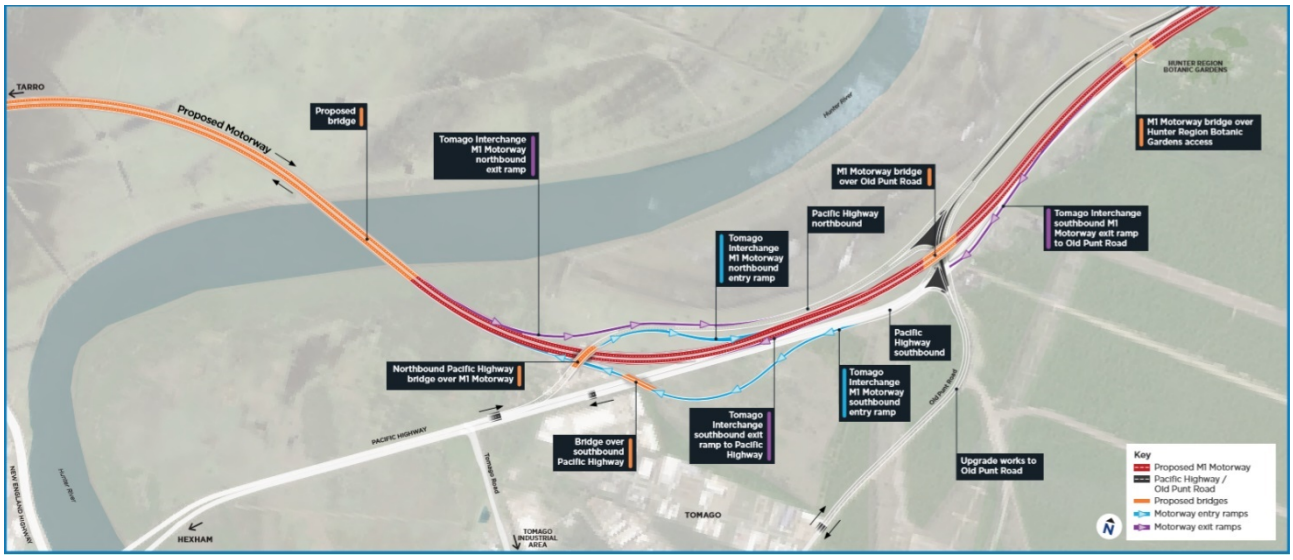



**Figure 2-12: Tomago Interchange (Source: TfNSW website[21])**

TfNSW is planning to finalise and publicly display the EIS for the M1 Extension to Raymond Terrace in 2021.

[20] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf
[21] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf

## 2.7 Existing Transport Infrastructure

This section details the transport context of the SAP investigation area in terms of existing road, public, active and freight transport infrastructure.

### 2.7.1 Arterial Road Network

The Arterial Road Network is explained and indicated in Table 2-4 and Figure 2-13. The Pacific Highway is the only National road located within the study area and three State-controlled roads, including Nelson Bay Road, Cabbage Tree Road and Richardson Road. Medowie Road and Lemon Passage Road are both regional roads. The Pacific Highway has a four-lane cross-section, all the other roads have a two-lane cross-section.

**Table 2-4: Arterial Road Numbers and Jurisdiction**

| Road | Road Nr | Control Jurisdiction |
|---|---|---|
| **Pacific Highway**<br>Four-land divided Highway<br>Permanent Counter 05001 – 2019 AADT – 48,564[22] (both directions) | HW10 | National |
| **Nelson Bay Road**<br>Two-lane undivided road<br>Permanent Counter 05191 – 2016 AADT - 24933[23] (both directions) | 108 | State |
| **Richardson Road**<br>Two-lane undivided road | 104 | State |
| **Cabbage Tree Road/Tomago Road**<br>Two-lane undivided road | 302 | State |
| **Medowie Road**<br>Two-lane undivided road | 518 | Regional |
| **Lemon Tree Passage Road**<br>Two-lane undivided road | 7765 | Regional |

[22] Source: TfNSW – Traffic Volume Viewer Station Id 05001
[23] Source: TfNSW – Traffic Volume Viewer Station Id 05191

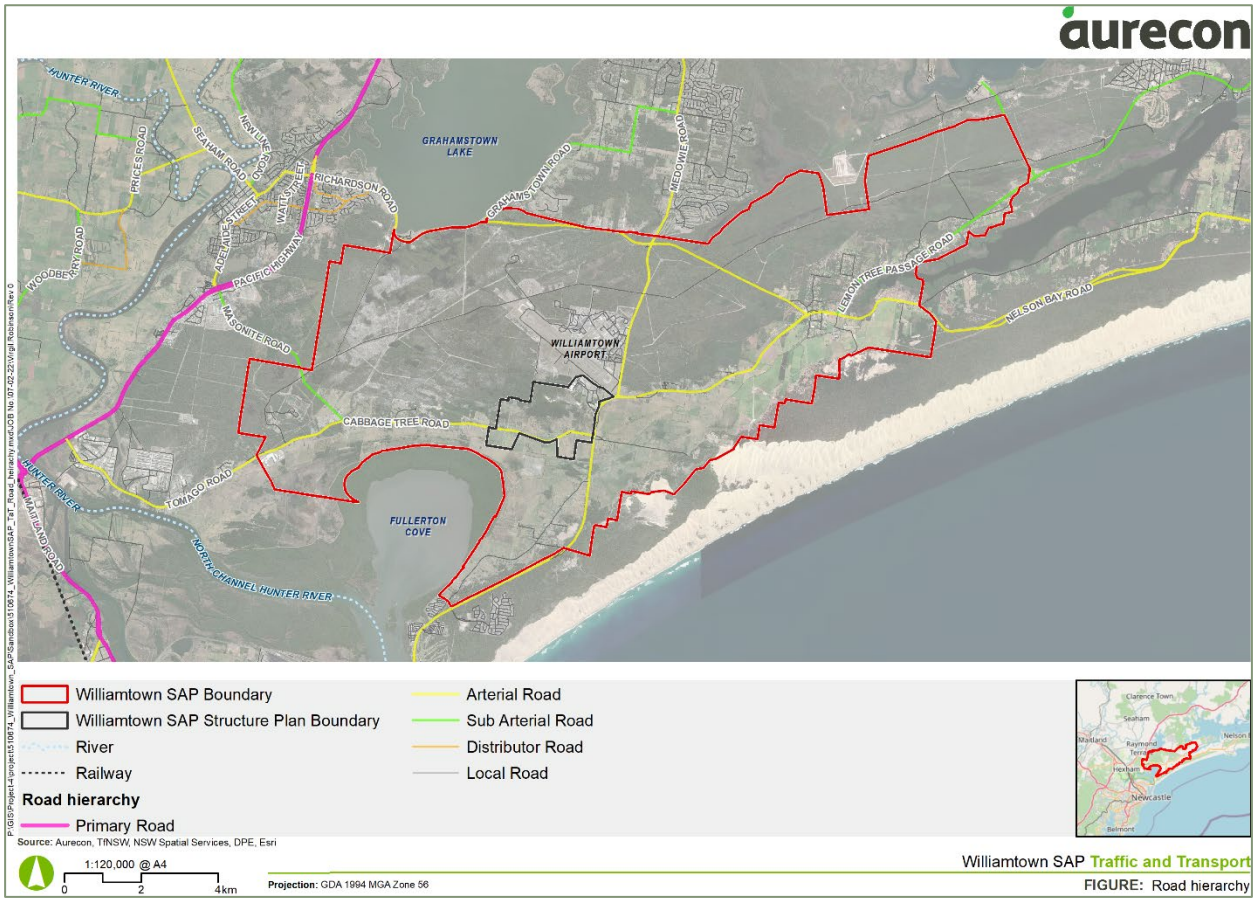



**Figure 2-13: Key road hierarchy in Williamtown**

## 2.7.2 Crash Statistics

Finalised crash data is available for the five-year period from 2015 to 2019. During this five-year period in Port Stephens, the following details are provided for Serious Injury and Fatal crashes (refer to Table 2-5 and Figure 2-14):

- Number of fatal crashes – 31
- Number of serious injury crashes – 234
- The 31 fatal crashes included 34 fatalities
- The 234 crashes with serious injuries involved 291 people being seriously injured

**Table 2-5: Crash and Casualty Summary for Port Stephens LGA (Source: TfNSW Centre for Road Safety)**

## Crash and Casualty Summary - Port Stephens

### Crashes

| | | 2015 | 2016 | 2017 | 2018 | 2019 | Total |
|---|---|---|---|---|---|---|---|
| Fatal | | 3 | 9 | 4 | 7 | 8 | 31 |
| Injury | Serious Injury | 47 | 37 | 54 | 53 | 43 | 234 |
| | Moderate Injury | 52 | 49 | 64 | 50 | 38 | 253 |
| | Minor/Other Injury | 27 | 22 | 25 | 20 | 17 | 111 |
| | | 126 | 108 | 143 | 123 | 98 | 598 |
| Non-casualty (towaway) | | 70 | 56 | 43 | 33 | 46 | 248 |
| Total | | 199 | 173 | 190 | 163 | 152 | 877 |

2015 2016 2017 2018 2019

### Casualties

| | | 2015 | 2016 | 2017 | 2018 | 2019 | Total |
|---|---|---|---|---|---|---|---|
| Killed | | 3 | 10 | 4 | 8 | 9 | 34 |
| Injured | Seriously Injured | 61 | 44 | 68 | 64 | 54 | 291 |
| | Moderately Injured | 77 | 65 | 94 | 64 | 53 | 353 |
| | Minor/Other Injured | 37 | 39 | 54 | 34 | 25 | 189 |
| | | 175 | 148 | 216 | 162 | 132 | 833 |
| Total | | 178 | 158 | 220 | 170 | 141 | 867 |

2015 2016 2017 2018 2019

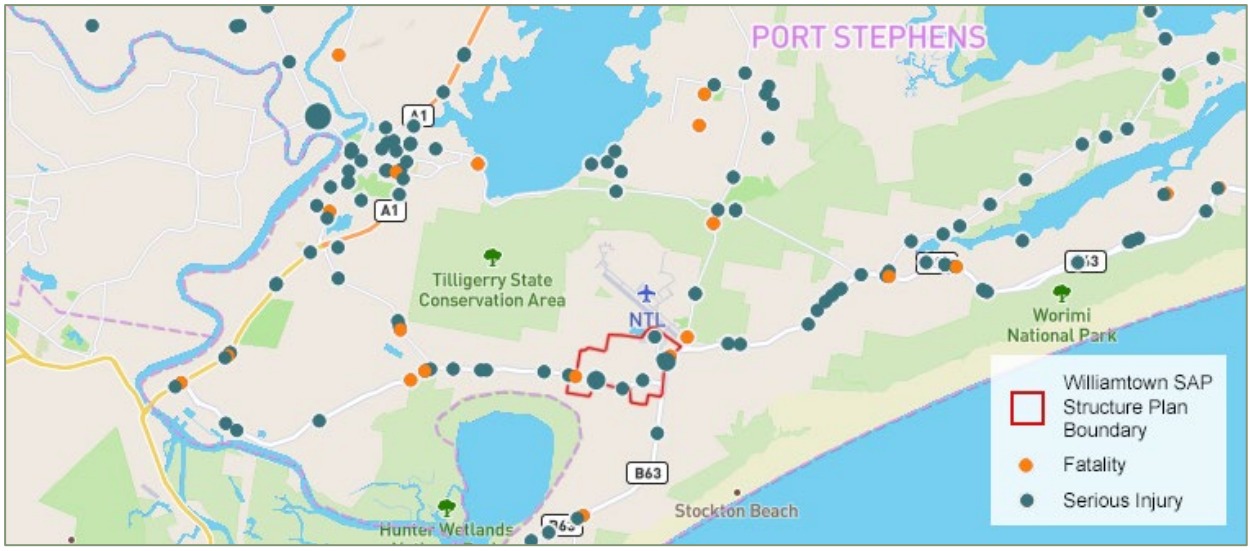



**Figure 2-14: Fatal and Serious Injury Crashes – Port Stephens LGA (2015-2019) (Source: TfNSW Centre for Road Safety)**

With reference to Figure 2-14, it is shown that the majority of the fatal and serious injury crashes occurred along Cabbage Tree Road and the Nelson Bay Road section from Cabbage Tree Road towards Tilligerry Creek. Figure 2-15 indicates how the Port Stephens LGA compared with the Hunter Region and the entire NSW in terms of crash severity. Port Stephens has a higher percentage of fatal and serious injury crashes than both the Hunter Region and the entire NSW. Mostly lower percentages for the other three categories (moderate injury, minor/other injury, non-casualty).

It is noted that following a review by TfNSW Centre for Road Safety conducted on August 2020, speed limits along Cabbage Tree Road and Tomago Road have both been reduced from 90km/h to 80km/h.

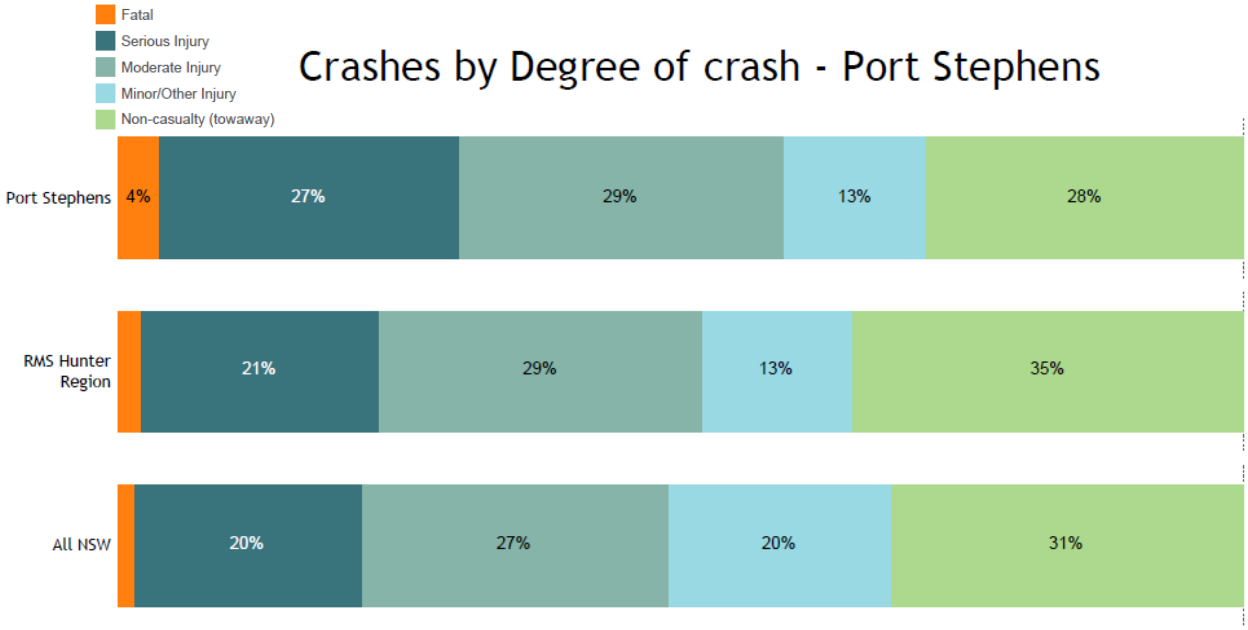



**Figure 2-15: Port Stephens Crash comparison with Hunter Region and all NSW (Source: TfNSW Centre for Road Safety)**

## 2.7.3 Public Transport Network

### 2.7.3.1 Bus Network

Two bus operators currently provide services in the Williamtown area which run multiple services daily. These operators are Hunter Valley Buses and Port Stephens Coaches. Currently there is no dedicated airport bus service. An overview of public transport in the area is provided in Figure 2-16.

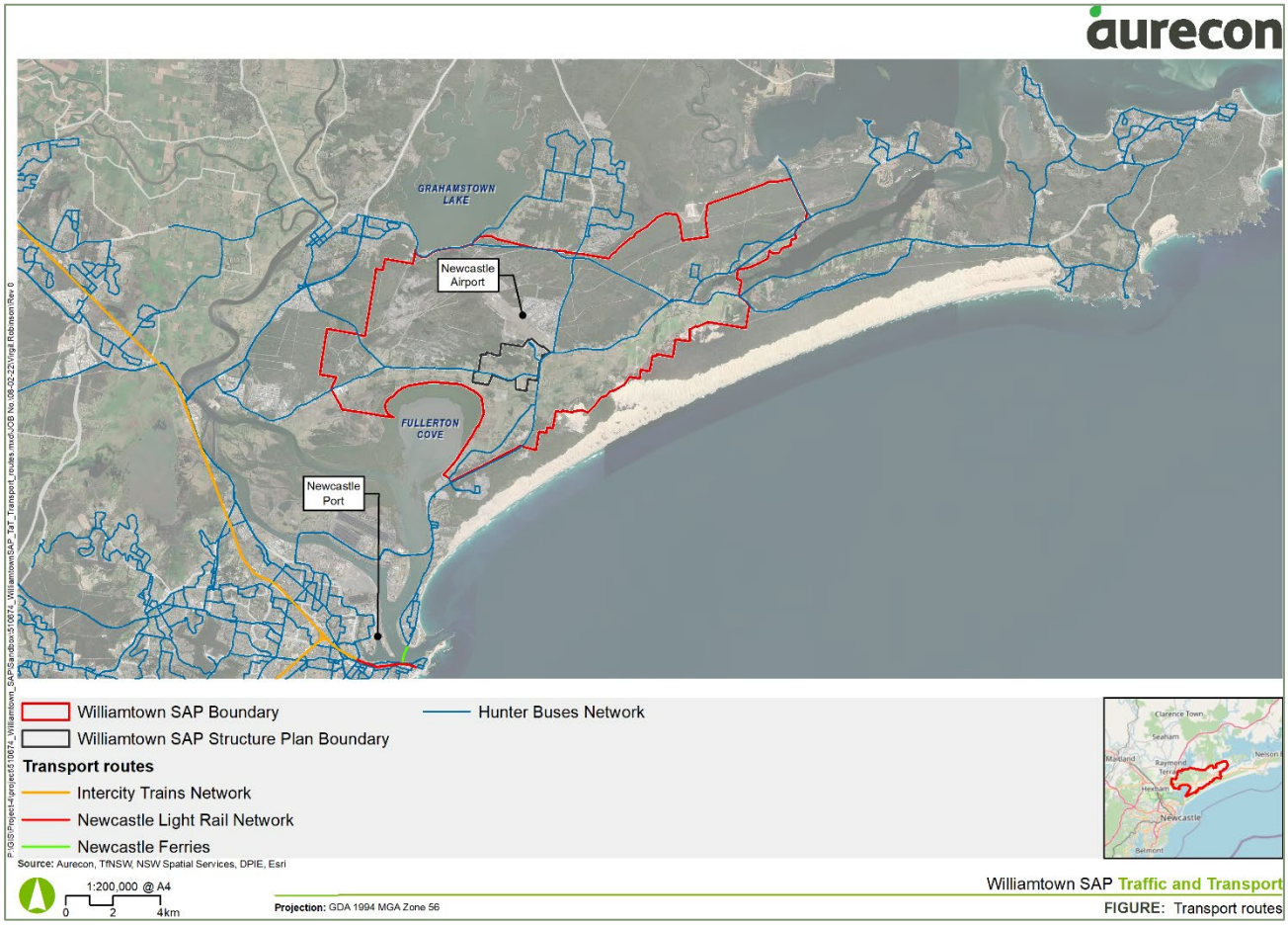



**Figure 2-16: Transport networks servicing Williamtown SAP and Greater Newcastle**

A number of bus routes are operated in the area including Routes 130 to 135 by Port Stephens Coaches and Routes 136, 138 and 145 by Hunter Valley Buses, as shown below in Figure 2-17. The relevant bus routes can be described as follows:

- Route 130 and 131 links Newcastle Interchange (including Newcastle Train Services and Newcastle Light Rail Services) with Newcastle Airport and carries on further eastbound to Nelson Bay. Frequencies include approximately one bus per hour per direction on weekdays, with a maximum of two buses per hour per direction between 4:36am and 10:19pm. Journey time between Newcastle Interchange and Newcastle airport takes about 30 minutes according to the bus route timetable.
- Routes 132 and 133 operate between Soldiers Point, Nelson Bay and Fingal Bay. These routes are more infrequent and are operated between 7:55am and 9:35pm on weekdays.
- Route 134 operates between Soldiers Point and Anna Bay. Fifteen bus routes per weekday operate along this route.
- Route 135 links Raymond Terrace with the Newcastle Airport precinct and carries on further to Nelson Bay, but no bus stop is located close to Newcastle Airport. Eight bus routes per weekday operate along this route.
- Route 136 connects Stockton with the Newcastle Airport precinct and departs from Stockton Wharf. This route carries on beyond the Newcastle Airport into Medowie and onwards to Raymond Terrace. Frequencies include approximately one bus per hour per direction on weekdays, with a maximum of two buses per hour per direction between 5:45am and 8:55pm. Journey time between Stockton Wharf and Raymond Terrace takes about one hour and 15 minutes according to the bus route timetable.
- Route 138 connects the Newcastle Interchange (including Newcastle Train Services and Newcastle Light Rail Services) with Newcastle Airport. This route carries on beyond Newcastle Airport along Nelson Bay Road and Lemon Tree Passage Road. Four bus routes per weekday operate along this route.
- Route 145 connects the Newcastle Airport with Raymond Terrace and carries on further to Stockland Greenhills. Buses depart on the hour from 6am to 6pm on weekdays.

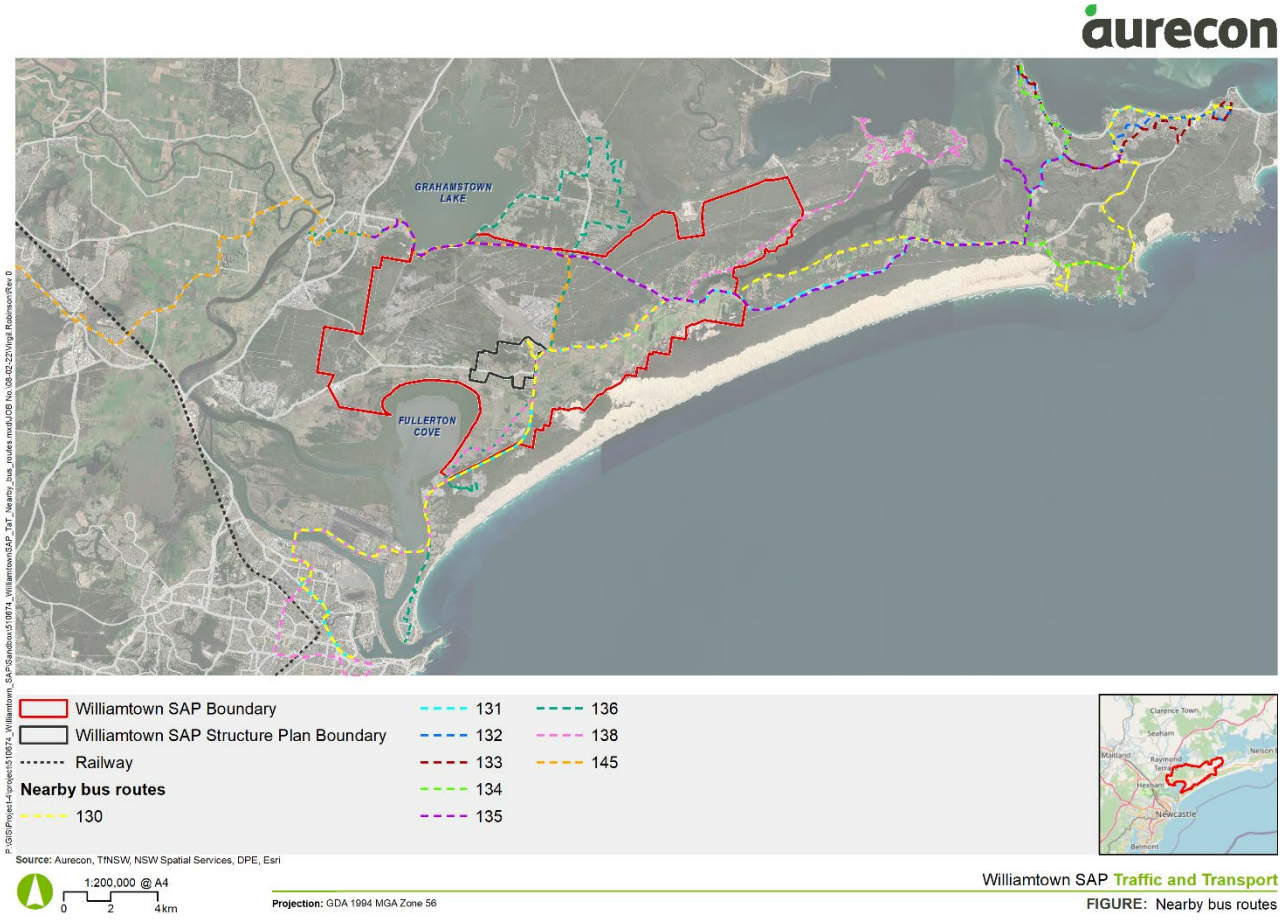



**Figure 2-17 Bus routes connecting to and surrounding Williamtown SAP**

Information from TfNSW has provided utilizations for all these bus routes for the month of November in the year 2019, from Table 2-6 it is noted that routes 136, 130 and 133 have the highest occupancies during this month. An analysis of the average utilization per route yielded results below 6% for all routes except 12% for route 131. Therefore, ample capacity is still available on all these routes and it shows that these services will be able to accommodate increased demand from potentially new Williamtown SAP users.

**Table 2-6: Bus route max occupation during November 2019 (Source: TfNSW data)**

| Bus route | Max # of occupants | Seating capacity | Max occupation % |
|---|---|---|---|
| 130 (Port Stephens Coaches) | 21 | 53 | 40% |
| 131 (Port Stephens Coaches) | 17 | 53 | 32% |
| 132 (Port Stephens Coaches) | 8 | 53 | 15% |
| 133 (Port Stephens Coaches) | 20 | 53 | 38% |
| 134 (Port Stephens Coaches) | 13 | 53 | 25% |
| 135 (Port Stephens Coaches) | 5 | 43 | 12% |
| 136 (Hunter Valley Buses) | 28 | 49 | 57% |
| 138 (Hunter Valley Buses) | 6 | 49 | 12% |
| 145 (Hunter Valley Buses) | 10 | 49 | 20% |

#### 2.7.3.2 On Demand Bus

The City of Newcastle received $5 million in grant funding through the Federal Government's Smart Cities and Suburbs Program for the award-winning Smart Moves Newcastle program[24]. The on-Demand transport service that was trialled in Newcastle is part of this program and carried on for a 12-month period until 30 October 2020. Bookings were made via an app with journeys costing a flat fare of $3.20.

The on-Demand trial supports the City's long-term planning and ambition for higher levels of public transport patronage and active travel creating a more pedestrian-friendly city centre. The on Demand Service trial operated in peak hours between 6.30am-9:00am and 3.30pm-6:00pm on weekdays, Monday to Friday. A total of 1395 customers used this service during the trial period[25].

#### 2.7.3.3 Rail Network

Several rail services are operated to/from Newcastle. These train services include the Intercity trains network and light rail services, shown above in Figure 2-16. The Intercity trains network include the Hunter Line that runs between the Newcastle Interchange and Scone in the northwest and Dungog north of Newcastle. The Central Coast & Newcastle Line runs between Newcastle and Central Coast and Sydney.

Newcastle light rail serves the area between the Newcastle Interchange and Newcastle Beach. As no rail facilities exist to/from the Newcastle Airport precinct, this area can be reached by the bus services described in section 2.7.3.1. Depending on growth and demand for rail services to and from the Williamtown SAP as it develops, consideration could be given to the future expansion of the intercity rail network to service the precinct, particularly linking it with the future Fast Rail connection into Newcastle.

In terms of the Hunter Line's two branches, Newcastle to Scone and Newcastle to Dungog, services usually run between Telarah and Newcastle at a frequency of two trains per hour. One train is express, skipping some stops in the core section between Maitland and Newcastle and the other train stops at all the stations.

In terms of the Central Coast & Newcastle Line, services usually run between Wyong and Central Station, Gosford and Central Station or Newcastle Interchange and Central Station at a frequency of one train per hour. Some trains run express, skipping several stops and provide a significant reduction in travel time and the other trains stop at all the stations.

[24] Source: https://www.newcastle.nsw.gov.au/council/news/latest-news/new-on-demand-transport-service-to-be-trialled-in
[25] Source: https://newcastleondemand.info/

**Future Fast or High-Speed Rail Opportunities**

According to the NSW Government website[26], in July 2018 the NSW government released a 20-Year Economic Vision for Regional NSW, which focuses on improving connections between cities, international gateways and regional nodes. Four potential routes were identified in this vision as a start to investigate a NSW fast rail network. The route that is relevant to this study is the Northern Corridor, which links Sydney to Gosford, and continues to Newcastle, Taree and Port Macquarie.

Potential opportunities for the SAP associated with a high-speed rail connection to Newcastle presents a significant opportunity for the region and provides increased accessibility to Newcastle and the SAP from the Central Coast and Sydney, expanding employment opportunities. Whilst the alignment is unlikely to service the SAP directly, the flow-on benefits from a station in Newcastle could be significant and provide increased transport opportunities to connect the airport and SAP.

## 2.7.4 Active Transport Network

### 2.7.4.1 Pedestrian Network

The Greater Newcastle Future Transport Plan indicates weekday and weekend mode shares, showing that, based on household travel surveys, 12% of travel is done by walking and cycling on a typical weekday and 14% by active transport on a weekend (refer to Figure 2-18), which indicates strong mode share. Over half of the trips made by Greater Newcastle's residents are short journeys under 5km, which further builds the case to focus on active transport in the area.

Results are also available for Port Stephens LGA from the Household Travel Survey for the 2018/2019 period. These results indicate quite a different situation with only 1.4% using walking as mode of transport (refer to Table 2-7), vehicle driver and passenger in combination taking up 96.7% of the mode share and public transport only being used by 0.8% of the Port Stephens residents[27].

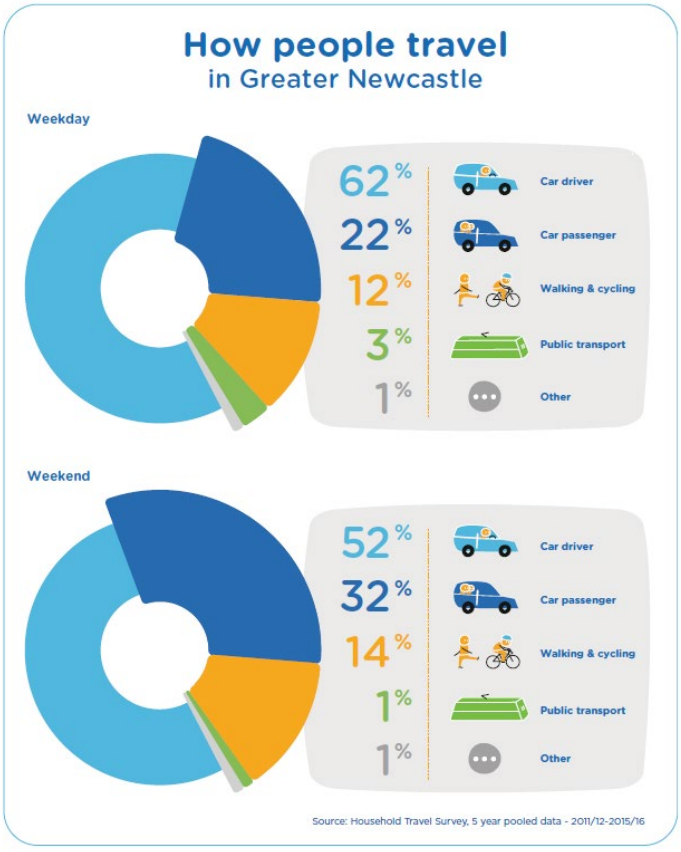



**Figure 2-18: Weekday and Weekend Mode Share (Source: Greater Newcastle Future Transport Plan, March 2018)**

[26] Source: https://www.nsw.gov.au/projects/a-fast-rail-future-for-nsw
[27] Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts/household-travel-survey-1

**Table 2-7: Mode Share for Port Stephens LGA (Source: Household Travel Survey)[28]**

**Travel by MODE, Port Stephens 2018/19**

| | Number of Trips | % of Total Trips | Mode Share %* |
|---|---|---|---|
| **Vehicle Driver** | 139K | 72.4 | 72.4 |
| **Vehicle Passenger** | 47K | 24.3 | 24.3 |
| **Bus** | 2K | 0.8 | 0.8 |
| **Walk Only** | 3K | 1.4 | 1.4 |
| **Other** | 2K | 1.1 | 1.1 |

*Mode figures are based on unlinked trips. See Glossary for Unlinked trips.*
*Mode Share is calculated excluding Walk Linked trips

### 2.7.4.2 Cycling Network

The existing regional cycle ways include a cycle route along Nelson Bay Road, as well as a section between Stockton and Fern Bay. Through Williamtown there is varying cyclist provision. Predominantly cycle facilities are on-road with some paths available at Salt Ash and nearer to Nelson Bay. Cycling within the area is uncommon and generally recreational. Dispersed communities and employment locations make commuter cycling less desirable. Williamtown is generally flat so the area could lend itself more to cycling if improved facilities were available. The Nelson Bay Road upgrade project will provide for some improvement to on-road cycle facilities.

As part of the Nelson Bay Road upgrade project discussed in Section 2.6, all three options include two lanes in each direction, improved intersection access, improved shoulders for cyclists and minimum 80km/h design. This project will therefore improve the cycling infrastructure along the upgraded section of Nelson Bay Road. It is noted that future cycleways are proposed along:

- The entire Nelson Bay Road
- Medowie Road between Nelson Bay Road and Richardson Road
- Richardson Road between Medowie Road and Raymond Terrace

A shared path has recently been completed within Medowie south to the new Catholic School, and there is an existing shared path connecting Medowie to Raymond Terrace.

## 2.7.5 Freight

This section will consider road freight, rail freight and air freight aspects.

### 2.7.5.1 Road Freight

The National Land Transport Network for roads in the study area includes the New England Highway and the Pacific Highway. The study area connects well with the National Land Transport Network including the Pacific Highway via Cabbage Tree Road/Tomago Road, Cabbage Tree Road and Masonite Road, Richardson Road and Medowie Road. Military freight including dangerous goods are to be transported to/from Salt Ash along Medowie Road, Richardson Road and Lemon Tree Passage Road.

[28] Source: https://www.transport.nsw.gov.au/data-and-research/passenger-travel/surveys/household-travel-survey-hts/household-travel-survey-1

The restricted access vehicle map is included in Figure 2-19. All the above-mentioned routes are gazetted as 25/26m B-double routes. Further to the previously mentioned routes, the study area is connected with the Newcastle Interchange via Nelson Bay Road, Cormorant Road, Industrial Drive and Hannell Street, also gazetted to allow 25/26m B-double vehicles. With respect to PBS (Performance Based Standard) routes for Level 2 Class A (≤ 26m in length), all these previously mentioned routes are gazetted to accommodate PBS Level 2 Class A vehicles.

In terms of Oversize Overmass (OSOM) Load Carrying Vehicles Network Approved roads, all of the above roads can accommodate OSOM vehicles except two restricted structures, railway level crossings, along Cormorant Road.

It has been confirmed that the majority of the freight destined for the Williamtown RAAF Base originates from the Defence Storage National Distribution Centre in Wattle Grove. Road freight will then be transported along the Pacific Highway, leave the Pacific Highway and turn right into Tomago Road, which becomes Cabbage Tree Road and turn left into Medowie Road to access the Williamtown RAAF base.

Two freight intermodal terminals are located close to the Williamtown SAP, one in Sandgate and one in Carrington which support IMEX container operations. The IMEX containers currently move through both terminals. An intermodal terminal at Walsh Point on Kooragang Island is currently non-operational.

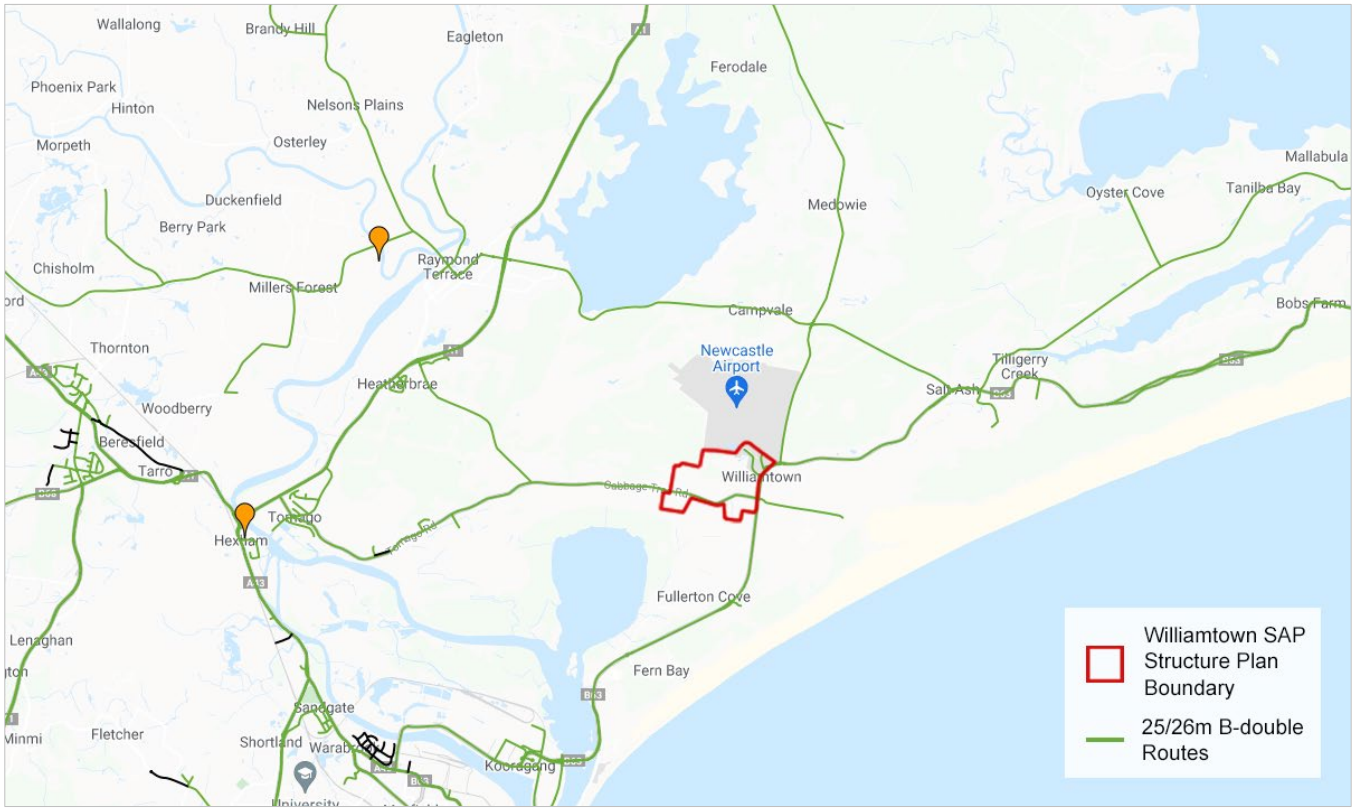



**Figure 2-19: Restricted Access Vehicle Map – 25/26m B-double Routes (Source: TfNSW Website[29])**

### 2.7.5.2 Rail Freight

The National Rail Network includes rail lines between Sydney and Brisbane via Newcastle and from Newcastle northwest to Narrabri. These national rail lines pass the Williamtown SAP on the western side, access to these rail lines are provided by road. The road distance between Newcastle Airport and the Newcastle Interchange is 25km. Sydney Trains operate between Sydney and Newcastle and Australian Rail Track Corporation operate north of Newcastle to Narrabri and towards Queensland via Taree, Coffs Harbour and Casino. As the Newcastle Airport vision for 2036 also calls for a rail link, it is recommended to consider further investigations into rail connecting directly into the Williamtown SAP as growth in travel demand increases with the development of the SAP.

[29] Source: https://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html

#### 2.7.5.3 Air Freight

Newcastle Airport handled approximately 100 tonnes of air freight per annum in 2016/17, all of which was transported via Regular Public Transport operations as belly freight[30]. Based on 2015/16 traffic on aircraft with freight capacity operating to/from Newcastle to Melbourne and Brisbane and adopting the national average per passenger carried, a more realistic annual target is about 1200 tonnes. Even though such a realistic target is far below the maximum capacity, there is still more potential for domestic belly freight to be carried into and out of Newcastle than has been the case. With the upgrade of the runway to Code E as part of the master plan, the airport will be able to accommodate larger aircraft and therefore increased air freight capacity.

### 2.7.6 Electric Vehicles

One of the programs led by the NSW Government includes co-investing in fast chargers on major regional corridors, in partnership with charging suppliers and councils. This program will work with councils, communities and commercial partners to target key regional routes and destinations where charging points are less likely to be provided on a fully commercial basis.

This will help regional residents and businesses to share in the cost savings and other benefits of EVs, improve access to regional NSW by EV owners including freight operators, and reinforces the regional tourism economy. It also supports local investment in regional centres, consistent with the 20-Year Economic Vision for Regional NSW.

Locations for regional fast chargers will be carefully chosen to complement (and not duplicate) current and proposed charger locations, as well as the significance of the route, availability of electricity supply and proximity to services. This project which includes target corridors will serve the Williamtown SAP well in terms of improving the sustainability of road transport along the Pacific Highway as well as the other Highways used by vehicles to/from the Williamtown SAP.

### 2.7.7 Port of Newcastle

The Port of Newcastle is 50% owned by The Infrastructure Fund and 50% owned by the China Merchants Port Holdings Company (CMPort). A total of 2,296 ships arrived in the port in 2019. Of these arrivals:

- 1% were cruise related
- 79% were coal
- 20% were diversified trade

With the strategic location of the Port and airport in close proximity, there may be opportunity for freight efficiencies, particularly for freight distribution across regional NSW, through enhanced connections between the port and the airport.

### 2.7.8 Emergency Services

The nearest hospitals to the Williamtown SAP include the John Hunter Hospital and the Calvary Mater in Newcastle. These hospitals are accessed via Stockton bridge. These provide two options in case of an emergency on one of these routes. Ambulance Stations are located in Stockton and in Raymond Terrace. One Fire and Rescue Station is located in Stockton that can serve the Williamtown SAP. Several other Fire and Rescue Stations are located around the Williamtown SAP and within Newcastle.

## 2.8 Transport Performance

This section details the transport performance of key midblock locations and intersections within the SAP investigation area.

[30] Source: https://www.infrastructure.gov.au/transport/freight/freight-supply-chain-submissions/Newcastle_Airport.pdf

### 2.8.1 Midblock Performance

An assessment of baseline midblock performance and capacity was conducted based on traffic count information obtained from TfNSW permanent counters and public planning reports.

#### 2.8.1.1 Traffic assumptions

The following assumptions were made for this assessment:

- A typical Passenger Car Unit (PCU) value of 1 for private vehicles, and 3 for heavy vehicles
- Typical traffic distribution in which 10% of daily traffic occurs during each peak hour
- Typical heavy vehicle percentage of 10% on midblock with no data
- Even split in volumes across north/south and east/west bound carriageways
- Capacity of unmanaged highway is 1,700 pcu/hr/lane, and capacity of managed highways is 2,100 pcu/hr/lane based on Roads and Maritime Motorway Design Guide – Capacity and Flow Analysis (2017)

#### 2.8.1.2 Midblock Volumes

Midblock volumes were based off TfNSW permanent traffic counters and intersection surveys undertaken by Matrix on Thursday, 13 February 2020 for key roads in an around the Williamtown SAP, including Cabbage Tree Road, Medowie Road, Nelson Bay Road, Lemmon Tree Passage Road, Richardson Road and Pacific Motorway.

It is noted that the permanent traffic counter does not provide AM and PM peak volumes, so a typical traffic distribution was assumed in which 10% of daily traffic occurs during each peak hour. Additionally, the Matrix survey was only conducted between 6:00 AM and 6:00 PM, and thus an average daily traffic could not be ascertained. The AM and PM peaks for the surveyed intersections showed slight variation but are approximately 7:00-8:00 AM and 15:30-16:30 PM.

The volumes of key midblock within the SAP precinct are summarised in Table 2-8.

**Table 2-8: Midblock Traffic Volumes at Key Routes around the SAP Precinct**

| Midblock | Direction | AADT | AM Peak | | | PM Peak | | |
|---|---|---|---|---|---|---|---|---|
| | | | LV | HV | PCUs | LV | HV | PCUs |
| **Pacific Highway** | **NB** | 52,542 | 2,364 | 263 | 3,153 | 2,364 | 263 | 3,153 |
| | **SB** | | 2,364 | 263 | 3,153 | 2,364 | 263 | 3,153 |
| **Nelson Bay Road north of Cabbage Tree Road** | **NB** | - | 1,295 | 82 | 1,541 | 1,415 | 51 | 1,568 |
| | **SB** | - | 1,219 | 81 | 1,462 | 1,216 | 40 | 1,336 |
| **Cabbage Tree Road** | **EB** | - | 378 | 47 | 519 | 543 | 20 | 603 |
| | **WB** | - | 323 | 31 | 416 | 336 | 27 | 417 |
| **Medowie Road** | **NB** | - | 774 | 41 | 897 | 516 | 20 | 576 |
| | **SB** | - | 526 | 38 | 640 | 799 | 12 | 835 |
| **Richardson Road** | **EB** | - | 292 | 19 | 349 | 550 | 14 | 592 |
| | **WB** | - | 406 | 18 | 460 | 411 | 19 | 468 |
| **Lemon Tree Passage Road** | **NB** | - | 180 | 23 | 249 | 494 | 16 | 542 |
| | **SB** | - | 465 | 26 | 543 | 250 | 11 | 283 |

#### 2.8.1.3 Midblock Capacity

A high-level capacity assessment was undertaken for key midblock identified in Table 2-8. The assessment measured the current utilisation and expected capacity based on the estimated capacity of different types of roads outlined in Roads and Maritime Motorway Design Guide – Capacity and Flow Analysis (2017). The results of the assessment are presented in Table 2-9.

**Table 2-9: Midblock Capacity Assessment**

| Midblock | Utilisation | Capacity |
|---|---|---|
| **Pacific Highway** | 75% | 25% |
| **Nelson Bay Road north of Cabbage Tree Road** | 44% | 56% |
| **Nelson Bay Road south of Cabbage Tree Road** | 74% | 26% |
| **Cabbage Tree Road** | 30% | 70% |
| **Medowie Road** | 45% | 55% |
| **Richardson Road** | 31% | 69% |
| **Lemon Tree Passage Road** | 24% | 76% |

The capacity assessment shows that at this stage of the project, key midblock within the SAP precinct have residual capacities between 55-76%, with the Pacific Highway having a lower residual capacity of 25%.

### 2.8.2 Intersection Performance

Key intersections within the SAP precinct were modelled on SIDRA to assess baseline intersection performance. Modelling volumes were based off traffic survey counts conducted by Matrix on Thursday 13th February 2020. The intersections at the future access points of the development were analysed as a signalised control intersection and not roundabout or priority control due to safety and efficiency considering the high number of traffic volumes and the percentage of heavy vehicles

Four intersections were modelled:

- Nelson Bay Road / Cabbage Tree Road
- Nelson Bay Road / Medowie Road
- Nelson Bay Road / Richardson Road
- Nelson Bay Road / Lemon Tree Passage Road

Results of the traffic modelling are presented in Table 2-10.

Table 2-10: SIDRA Intersection Modelling Results

| Intersection | Approach | Degree of Saturation | | Delay (s) | | Level of Service | | Queue (m) | |
|---|---|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | PM | AM | PM |
| Nelson Bay Road / Cabbage Tree Road | S | 0.56 | 0.56 | 7 | 7 | LOS A | LOS A | 35 | 35 |
| | E | 0.48 | 0.75 | 15 | 22 | LOS B | LOS C | 22 | 48 |
| | N | 0.65 | 0.63 | 6 | 6 | LOS A | LOS A | 47 | 44 |
| | W | 0.52 | 0.65 | 11 | 11 | LOS B | LOS B | 27 | 37 |
| | Total | 0.65 | 0.75 | 8 | 9 | LOS A | LOS A | 47 | 48 |
| Nelson Bay Road / Medowie Road | E | 0.50 | 0.27 | 7 | 7 | LOS A | LOS A | 26 | 10 |
| | N | 0.38 | 0.30 | 14 | 9 | LOS B | LOS A | 16 | 12 |
| | W | 0.46 | 0.60 | 4 | 4 | LOS A | LOS A | 31 | 64 |
| | Total | 0.50 | 0.60 | 7 | 7 | LOS A | LOS A | 31 | 64 |
| Nelson Bay Road / Richardson Road | S | 0.54 | 0.32 | 6 | 6 | LOS A | LOS A | 35 | 16 |
| | E | 0.13 | 0.39 | 11 | 12 | LOS B | LOS B | 5 | 18 |
| | N | 0.29 | 0.23 | 5 | 8 | LOS A | LOS A | 11 | 10 |
| | W | 0.40 | 0.76 | 11 | 14 | LOS B | LOS B | 19 | 70 |
| | Total | 0.54 | 0.76 | 7 | 10 | LOS A | LOS A | 35 | 70 |
| Nelson Bay Road / Lemon Tree Passage Road | S | 0.06 | 0.05 | 14 | 8 | LOS B | LOS A | 3 | 2 |
| | E | 0.52 | 0.27 | 7 | 6 | LOS A | LOS A | 29 | 13 |
| | N | 0.40 | 0.26 | 11 | 12 | LOS B | LOS B | 16 | 10 |
| | W | 0.23 | 0.40 | 4 | 4 | LOS A | LOS A | 12 | 22 |
| | Total | 0.52 | 0.40 | 7 | 6 | LOS A | LOS A | 29 | 22 |

The SIDRA results show that key intersections within the SAP study area precinct operate at an overall level of service A to B during the peak hours with a degree of saturation between 0.5 to 0.6. Based on this assessment, it is expected that these intersections will have some capacity to absorb future additional demand. More in-depth analysis would be required to determine an accurate review of the future performance of these intersections with additional Williamtown SAP traffic demands.

## 2.9 Constraints and Opportunities

In the Williamtown SAP design development process, all existing constraints identified in the baseline assessment were holistically evaluated to identify preferred elements which should be included in the structure plan, areas for further investigation and no-go zones. The constraints and opportunities identified from a traffic and transport perspective are identified below.

### 2.9.1 Constraints

In terms of the Williamtown SAP, after considering the Williamtown SAP traffic baseline analysis, the following constrains have been identified:

- The location of the Williamtown SAP, remote from the rail network, limits the site's ability to capitalise on the strategic advantage enabled through direct access to a railhead. However, the close proximity to road-rail intermodal facilities available in the Newcastle area could provide significant cost savings for the movement of freight on interstate routes or through Port Botany.
- Lack of public transport access to/from the Williamtown SAP (and the Newcastle Airport). This is seen as a constraint from a passenger transport perspective.
- The Nelson Bay Road Upgrade options and further possible infrastructure upgrade options will initially hinder movement through the SAP, but this is seen as a short-term constraint during construction. Over the long-term, it will benefit the movement through the SAP.

- Two restricted structures in the form of railway level crossings, are located along Cormorant Road in terms of the Oversize Overmass Load Carrying Vehicles Network Approved roads which might hinder the movement of OSOM vehicles through the SAP.
- A significant portion of the works to develop the SAP are related to earthworks, with significant construction phase traffic implications. With 4,500,000 cubic metres of imported fill to be delivered by 750,000 trucks for the ultimate SAP (delivered over several stages and several years), careful planning and consideration should be given to construction traffic management in future design stages. Stage 1 alone accounts for approximately 50% of the fill and comprises a preliminary programme of a 6-month delivery timeframe.
- Development within the SAP must not significantly impact road access and businesses in the region.
    - Nelson Bay Road, Cabbage Tree Road and Medowie Road provide key road access throughout the SAP precinct study area for commuters and freight operators, any development will need to limit the impact on the efficiency of these roads.
    - Currently operating businesses (e.g. sand mining, WesTrac, Tomago Aluminium) are significant employment and economic drivers. They will need to be consulted throughout development to minimise impact to their business.
    - Nelson Bay Road and Medowie Road support heavy vehicle transport of sand from Quarries, retail and industrial freight and operate as road links for freight supporting industry in Heatherbrae and Tomago. These critical roads cannot be undermined with incompatible land use developments. The road freight network needs to be protected as a minimum to support existing industry requirements. The current road network will be enhanced through any of the proposed three Nelson Bay Road upgrade alignments. Noting that the emphasis may shift with respect to final mile freight for each scenario in terms of road access, particularly near the airport.

After considering these constraints, opportunities have been identified that can possibly address these constraints and further improve the traffic efficiency of Williamtown SAP study area.

### 2.9.2 Opportunities

A number of opportunities exist to benefit the Williamtown SAP study area and the long-term development of the area. These include:

- The development of the Williamtown SAP will provide motivation for improved freight transport to/from the SAP. Strengthening of the freight connections will improve the economic development within the area and boost all the development already located within the SAP.
- As the Newcastle Airport Masterplan proposes a rail connection for its future vision, this connection will unlock transportation for the SAP. Increased frequency of bus services can be a possible interim suggestion accompanied by investigating where road network improvements can yield time savings and increase priority for bus services.
- With the construction work completed as part of the Nelson Bay Road upgrade project, cycling opportunities will improve and motivate further required active transport upgrade projects.
- As public transport provision is limited in the Williamtown SAP, the possibility to expand the on-demand public transport trial in Newcastle to include some of the major nodes inside the SAP e.g. Newcastle Airport, should be investigated. This opportunity will improve connections to/from the Airport precinct. As these services are expanded and patronage increases, it will pave the way for additional scheduled public transport services.
- Promoting ridesharing can be a first step towards fostering more sustainable travel choices which can lead to additional public transport offering for the SAP. Thereby targeting increased public transport usage via multi-dimensional strategies.
- As Port Stephens LGA has a higher percentage of fatal and serious injury crashes than the Hunter Region and the entire NSW, the improvement of road safety need to be prioritised as the Williamtown SAP is developed. The planned upgrade projects have already identified road safety as an important consideration. As further infrastructure is planned, this theme should be carried forward.

- As the transport offering is improved throughout the SAP, the existing tourism industry will also reap the benefits. It is an opportunity to include the tourism organisations as stakeholders to further guide and motivate the development within the SAP.
- Similarly, by increasing the connections to/from the SAP, the freight and distribution networks are benefitted. From an industry-employment perspective, employers are in a better position to attract employees from an increased employee talent pool.
- Investigate the possibility to reinstate the intermodal terminal at Walsh Point on Kooragang Island.
- Being in close vicinity and having access to a major trade gateway at Newcastle Port is a significant opportunity.
- Provision of public transport to and from the SAP would provide an efficient alternate access for employees. This would reduce the impact of light vehicle traffic on roads within both the SAP and the surrounding areas and would extend the lifespan of this infrastructure.
- On-demand bus services such as those currently being trialled in Newcastle could be integrated into the transport offering to align with changing customer needs over traditional bus services. The feasibility and appropriateness of such services would need to be considered as the SAP develops.
- Road corridor widths should accommodate for the provision of a shared path, where possible, to provide the option for active travel to and from the SAP and enable future public transport infrastructure such as bus stops to be implemented at different stages of development of the SAP, as necessary.
- Link cycleway along Medowie Road from the SAP to Medowie to connect future residential growth area to jobs in the precinct

# 3 Scenario Testing

The baseline investigations resulted in the development of a range of structure plan scenarios based on holistic themes which aimed to maximise certain regional opportunities. As part of the subsequent scenario testing phase of the Williamtown SAP, comparative assessments were conducted to explore the strengths, weaknesses, risk and opportunities of each development scenario.

A high-level comparison between the various scenarios was completed which considered both strategic transport planning aspects and traffic modelling outputs as well as planned infrastructure upgrades. A SWOT analysis was undertaken to assess the strengths, weaknesses, opportunities and threats of each option.

To complete the comparative assessment for the traffic and transport aspect of the Williamtown SAP, seven principles were utilised as a basis of comparison to ensure that the scenarios not only performed from a traffic and transport perspective, but that the scenarios also contributed to meeting the objectives of the precinct in its entirety.

These principles include:

- Equity – Stay and Play
- Identity – Design for Country and Community
- Greenery – Blue Green Grid
- Urbanity – More than an Airport
- Mobility – Movement and Place
- Wellness – Healthy City
- Resilience – An Innovative Ecosystem

The planned and proposed road and infrastructure upgrades were taken into account, and the outputs of the trip generation and traffic modelling were incorporated into the analysis. A qualitative SWOT analysis was also completed to accompany the quantitative analysis, the results of which can be found below.

The testing criteria used in the traffic and transport assessment ensures that the structure plan adequately considered the impact on the natural environment, movement functions within the SAP and surrounding area, and the economic opportunities of the SAP development, identifying opportunities to enhance active and public transport connections, ensure access to open/green space, and capitalise on the aspiration of creating a global destination to deliver appropriate transport infrastructure.

Following the individual specific technical assessments, several rounds of stakeholder review and multi-disciplinary workshops were conducted to explore all the technical findings, provide a holistically balanced approach to managing constraints and develop the Williamtown SAP structure plan.

## 3.1 Trip Generation Assumptions and Limitations

TfNSW were unable to provide an accurate EMME model for the precinct and therefore several assumptions about anticipated background traffic growth and traffic assignments have been made (further detailed in Section 3.2.1 Traffic Modelling Assumptions, below).

## 3.2 Traffic Modelling Process

Traffic modelling was undertaken to model the future transport performance of key intersections and midblocks and inform infrastructure upgrades required to accommodate any additional traffic generated. The following intersections and midblocks were modelled as part of this process:

**Intersections**

- Nelson Bay Road / Williamtown Drive
- Nelson Bay Road / Cabbage Tree Road

**Midblocks**

- Nelson Bay Road east of Medowie Road
- Nelson Bay Road between Medowie Road and Williamtown Drive
- Nelson Bay Road between Williamtown Drive and Cabbage Tree Road
- Nelson Bay Road South of Cabbage Tree Road
- Cabbage Tree Road west of Nelson Bay Road

Modelling was based on midblock and turn counts extracted from the VISSIM model for Nelson Bay Road Upgrade – Williamtown to Bobs Farm obtained from TfNSW on 9th March 2021. A total of 11 potential upgrade scenarios were modelled in VISSIM. It is noted that volumes extracted from VISSIM were for the future year 2045. These figures were conservatively applied to the SAP traffic generation for the 2041 design year.

### 3.2.1 Traffic Modelling Assumptions

The following assumptions were made to assist in the modelling process. The assumptions were presented to TfNSW during coordination meetings also the SIDRA model files were provided. The assumption are not formally approved at this point, however TfNSW representatives indicated acceptance verbally during meetings.

**Future year and growth**

- The future year modelled was 2041
- Midblock and turn count volumes were obtained from base and future VISSIM model for the future year 2045. They have been conservatively applied to the 2041 SAP generation without a reduction factor.

**Trip Generation**

- AM and PM peak hour periods account for 10% of average daily traffic
- 15% of trips generated by the SAP were assumed to be heavy vehicles
- The passenger car equivalent of heavy vehicles in the SAP precinct was assumed to be 3

**Trip Distribution**

- Traffic generated by and attracted to the SAP was assumed to be distributed along the wider road network according to the following ratios:
    - 40% to/from Pacific Highway via Tomago Road and Masonite Road
    - 50% to/from Newcastle via Nelson Bay Road
    - 10% to/from Nelson Bay via Nelson Bay Road
- The traffic split is assumed to be 80% incoming and 20% outgoing in the AM peak period, and inverse for the PM peak.

**Road Capacity**

- Capacity of unmanaged highway is 1,700 pcu/hr/lane, based on *Roads and Maritime Motorway Design Guide – Capacity and Flow Analysis (2017)*

### 3.2.2 Midblock Performance

A high-level capacity assessment of future midblock performance was conducted based on traffic growth, generation and distribution assumptions outlined above.

It was undertaken using the flow/capacity ratio method and estimated road capacities outlined in the *Roads and Maritime Motorway Design Guide: Capacity and Flow Analysis (2017)*, using the critical volume (maximum experienced in AM or PM peak) for each midblock and flow direction. According to the *Motorway Design Guide (2017)*, the maximum flow/capacity ratio of mainline traffic for sustainable operations is 100%, with a desirable ratio of 95%. Note that this method does not account for the loss of efficiency caused by intersections.

Based on these criteria, the midblock assessment provided an understanding of the 2045 Do Minimum scenario and the residual capacity of the major roads in the network to accommodate additional SAP development. Widening upgrades (i.e. additional lanes) would therefore be required if there are any instances of road segment capacity exceedance which is defined as flow capacity ratio above 95%. From this, the associated road infrastructure upgrades could be attributed to each scenario.

# 4 Structure Plan

## 4.1 Proposed Structure Plan

The Structure Plan refined by Roberts Day is centred around the existing Williamtown Airport Precinct, which includes Newcastle Airport, Williamtown RAAF base and Astra Aerolab. The proposed layout (refer to Figure 4-1) is compact which is a benefit, from a transport planning perspective, as destinations can easily be reached being within walking distance and the provision of public transport can be more justifiable from a density-perspective. The internal green space serves the surrounding land use well and increases health and recreation benefits.

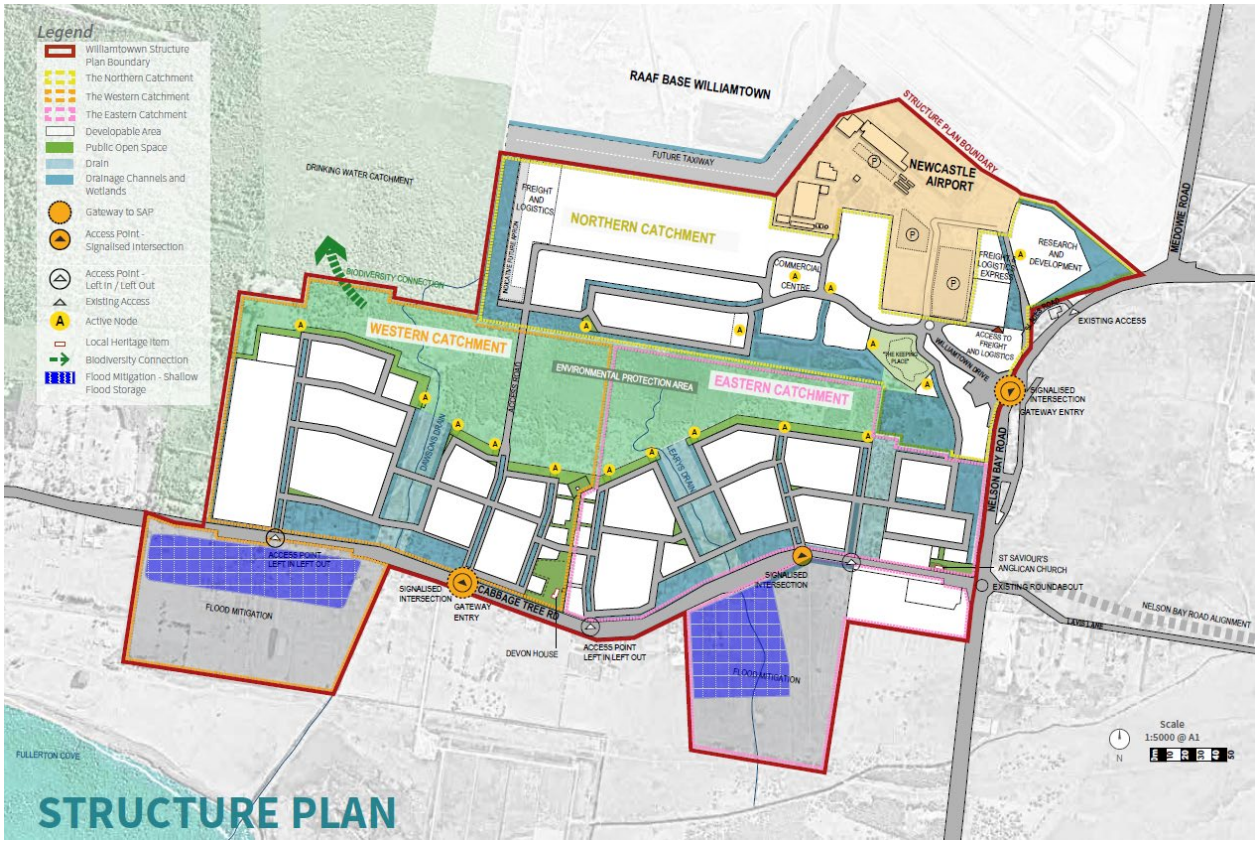



**Figure 4-1: Williamtown SAP Structure Plan**

The traffic and transport implications of this specific layout will be expanded upon in this chapter of the report. Traffic analysis is included to consider the impact of the new layout on the road network and qualitative commentary about the transport planning aspects is provided.

## 4.2 Transport Network

### 4.2.1 Overview

The objective of the development of a transport network for the SAP is aimed at optimising benefit to the SAP while minimising cost and maintaining functionality to the surrounding network. The SAP will be successful in its intent in terms of traffic and transport aspects with the road network functioning at acceptable performance levels, constituting a compact active transport network and good opportunities for public transport options that can operate at satisfactory frequencies and available capacity.

In terms of the road network, acceptable performance levels will have to be maintained to ensure that the effect of the SAP is not detrimental to the surrounding road network, as this will not work in favour of new users of the SAP.

Connectivity is related to the road network, the public transport network as well the active transport network.

Public transport status quo and recommendations are included in section 4.4.2 discussing the existing capacity on the services to/from the area and what is recommended for the establishment of the SAP.

Active Transport internal and external to the site is discussed in section 4.4.1, it is recommended to maximise opportunities presented by the Enviro Precinct to promote healthy living and provide opportunities to engage with nature and assist with mental health.

#### 4.2.1.1 Design principles

The following includes a discussion about the transport relationship between the Structure Plan and seven essential SAP elements:

- Equity (stay and play) – the Enviro Precinct will assist with the “play” aspect and contribute to the equity of the Williamtown SAP by being walkable, also leveraging the proximity of the Airport. The compact land use distribution around the Enviro Precinct provides good connection onto the Enviro Precinct. Good opportunities to interact with nature, sport and other SAP industries via the Enviro Precinct. These attributes will be able to attract a skilled workforce that will further activate the SAP.
- Identity (design for country and community) - Opportunities related to the improved movement network connections to the existing Dune Activities. Appreciation and education opportunities are identified as tourism prospects. High value cultural sites to be included into experiences of the area.
- Greenery (blue green grid) – Ecological corridor greatly enhances the offering of the SAP. The central green space provides good connections and opportunities to explore nature. The wetland system is linked to conservations lands. The blue green grid can be linked to potential future developments adjacent to the SAP.
- Urbanity (more than an airport) - Airport and defence uses are catalysts for an innovation precinct and a place for people. Incorporate a future-proof approach via staged development.
- Mobility (movement and place) – Well-connected road layout with four proposed accesses and a freight access point. Walkable with an approximate 5-minute walk connecting the various land uses.
- Wellness (healthy city) – The health loop is conducive to promoting healthy living, the bush walking trail is a good initiative, Indigenous stories from the area can be further incorporated into the trail. Healthy living supports mental wellbeing.
- Resilience (an innovative ecosystem) - the well-connected transport system serves active transport movements well, provides densities for public transport and a good number of road access points are proposed. Thus, resilience is built into the transport system. Presence of the enhanced wetland corridor further assist with resilience of the SAP.

### 4.2.2 Transport Authority Engagement

The Williamtown SAP traffic and transport report was developed in consultation with key local transport stakeholders, including TfNSW, Port Stephens Council (PSC). Stakeholder engagement meetings for Williamtown SAP were held on the following dates.

- 03 Nov 2020 - Meeting to discuss Williamtown SAP and base models (PSC)
- 10 Nov 2020 - Williamtown SAP - Regional Transport briefing by TFNSW
- 18 Nov 2020 - Williamtown SAP TfNSW: freight, service planning & active transport discussion
- 10-11 Feb 2021 - Williamtown SAP - Preliminary EBD (TfNSW & PSC)
- 03 Mar 2021 - Williamtown SAP modelling information (TfNSW)
- 27-30 Apr 2021 - Williamtown SAP - Final EBD (TfNSW & PSC)

The following key topic areas were discussed with TfNSW and Port Stephens Council:

- Traffic and transport needs in relation for the Williamtown SAP
- Baseline traffic and forecast data

- Nelson Bay Road upgrade/realignment options.
- M1 to Raymond Terrace project.
- Astra Aerolab development, including traffic assumptions, current construction and approval status of the various development stages

## 4.3 Traffic Analysis

### 4.3.1 Trip Generation Assessment

The number of trips generated by the SAP was calculated based on the number of jobs created within the proposed precinct. The anticipated number of jobs once the precinct is complete are 7,194jobs as per the Williamtown SAP Market Sounding and Economics Report (Deloitte 2021) which constitutes the ultimate development scenario. These projections are not definite and might not realise within 40 years.

#### 4.3.1.1 Assumptions

The following conservative assumptions been made in the process of developing the intersections and midblock traffic analysis:

- Trip generation factor of 2.2 trips per day per job
- Annual traffic growth factor - 1.5% per annum
- Heavy vehicle traffic constitutes 10% of the generated trips
- 10% of ADT occur during the AM and PM peak
- 70% of traffic counted as inbound toward the SAP during AM peak and outbound during PM peak

### 4.3.2 Current Transport Performance

The current and future transport performance were assessed at the locations shown on the map in Figure 4-2 which included the major intersections to access the SAP and other key intersections forming part of the wider road network.

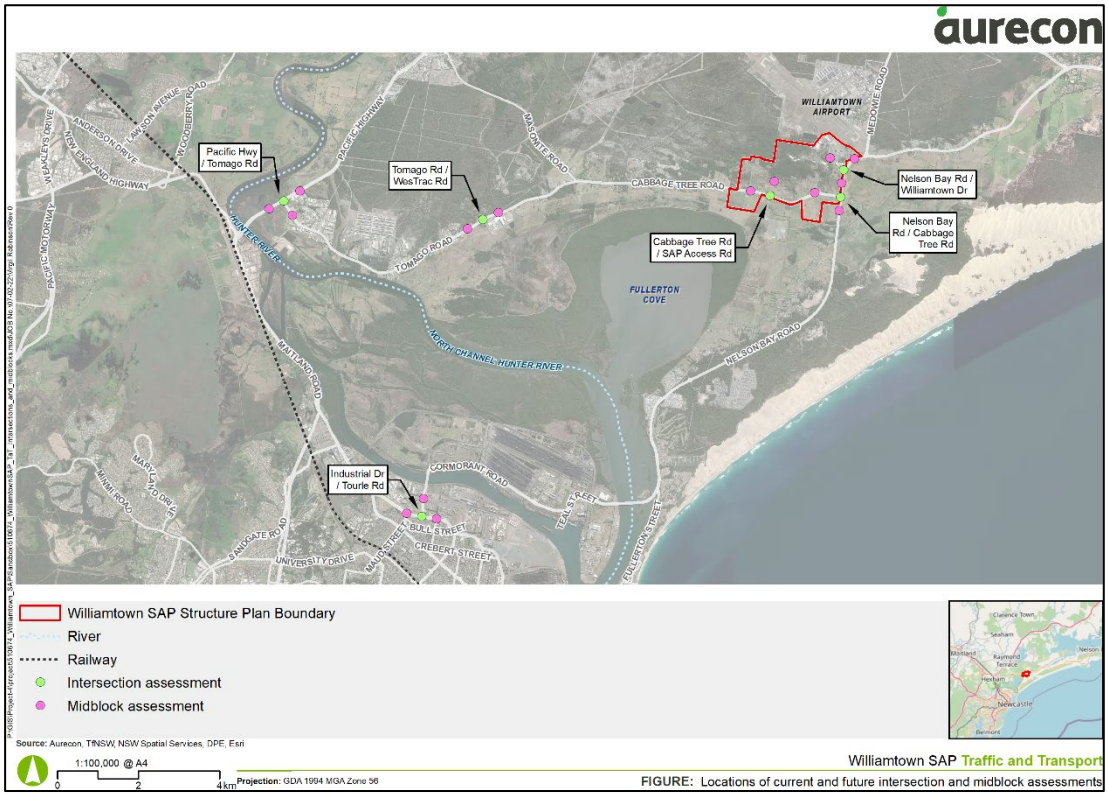



**Figure 4-2: Locations of current and future intersection and midblock assessments**

### 4.3.2.1 Midblock Performance

A capacity assessment of midblock performance was conducted based on the traffic volumes, road capacity, trip generation, trip distribution and the assumptions outlined in section 4.3.1.1. The most critical PCU volumes and capacity during the AM and PM peak hours are indicated in Table 4-1

**Table 4-1: 2020 base case midblock peak per direction PCU volumes and capacity**

| Intersection | Midblock | Direction | Lanes per Direction | Current Capacity | 2020 Critical Peak Volume | 2020 Flow/ Capacity Ratio |
|---|---|---|---|---|---|---|
| Nelson Bay Road / Williamtown Drive (Newcastle Airport) | Nelson Bay Rd north of Williamtown Dr | NB | 2 | 3,400 | 1,940 | 57% |
| | | SB | 2 | 3,400 | 1,770 | 52% |
| | Williamtown Dr west of Nelson Bay Rd | EB | 1 | 1,700 | 494 | 29% |
| | | WB | 1 | 1,700 | 313 | 18% |
| | Nelson Bay Rd south of Williamtown Dr | NB | 2 | 3,400 | 1,860 | 55% |
| | | SB | 2 | 3,400 | 1,745 | 51% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Rd north of Cabbage Tree Rd | NB | 2 | 3,400 | 1,756 | 52% |
| | | SB | 2 | 3,400 | 1,655 | 49% |
| | Cabbage Tree Rd west of Nelson Bay Rd | EB | 1 | 1,700 | 656 | 39% |
| | | WB | 1 | 1,700 | 438 | 26% |
| | Nelson Bay Rd south of Cabbage Tree Rd | NB | 1 | 1,700 | 1,376 | 81% |
| | | SB | 1 | 1,700 | 1,505 | 89% |
| | Lavis Lane east of Nelson Bay Rd | EB | 1 | 1,700 | 220 | 13% |
| | | WB | 1 | 1,700 | 402 | 24% |
| Tomago Road / WesTrac Drive | Tomago Rd east of WesTrac Dr | EB | 1 | 1,700 | 738 | 43% |
| | | WB | 1 | 1,700 | 493 | 29% |
| | WesTrac Dr south of Tomago Rd | NB | 2 | 3,400 | 280 | 8% |
| | | SB | 2 | 3,400 | 181 | 5% |
| | Tomago Rd west of WesTrac Dr | EB | 1 | 1,700 | 668 | 39% |
| | | WB | 1 | 1,700 | 576 | 34% |
| Pacific Highway / Tomago Road | Pacific Hwy east of Tomago Rd | EB | 2 | 3,400 | 2,057 | 60% |
| | | WB | 2 | 3,400 | 1,417 | 42% |
| | Tomago Rd south of Pacific Hwy | NB | 1 | 1,700 | 1,384 | 81% |
| | | SB | 1 | 1,700 | 988 | 58% |
| | Pacific Hwy west of Tomago Rd | EB | 2 | 3,400 | 2,701 | 79% |
| | | WB | 2 | 3,400 | 2,482 | 73% |
| Industrial Drive / Tourle Street | Industrial Dr east of Tourle St | EB | 2 | 3,400 | 2,651 | 78% |
| | | WB | 2 | 3,400 | 2,734 | 80% |
| | Tourle St north of Industrial Dr | NB | 2 | 3,400 | 1,876 | 55% |
| | | SB | 2 | 3,400 | 1,876 | 55% |
| | Industrial Dr west of Tourle St | EB | 2 | 3,400 | 2,681 | 79% |
| | | WB | 2 | 3,400 | 2,764 | 81% |

According to the *Motorway Design Guide (2017)*, the maximum flow/capacity ratio of mainline traffic for sustainable operations is 100%, with a desirable ratio of 95%. Note that this method does not account for the loss of efficiency due to the impact of intersections. Based on these criteria, the midblock assessment shows that the capacity of all major roads in the network might have residual capacity to accommodate future growth.

#### 4.3.2.2 Intersection Performance

The following six key intersections within and adjacent to the SAP precinct were modelled in SIDRA 9.0:

- Nelson Bay Road – Williamtown Drive (Newcastle Airport)
- Nelson Bay Road – Cabbage Tree Road
- Cabbage Tree Road – SAP Access Road (proposed)
- Tomago Road – WesTrac Access Road
- Pacific Highway – Tomago Road
- Industrial Drive – Tourle Street

For the first two intersections, the previous volumes modelled with VISSIM, were adopted. To conduct an assessment of the baseline intersection performance for the existing intersections 4 to 6, the modelled turn volumes were based on SCATS phasing and volumes received from TfNSW for the dates Monday 10th to Friday 14th February 2020. A heavy vehicle portion of 10% was assumed.

As the access road to the SAP via Cabbage Tree Road will only be required once the development has commenced, the base case of this intersection is modelled for the year 2025. This analysis included 1.5% annual growth in traffic volumes along Cabbage Tree Road and 25% of the SAP generated traffic.

The SIDRA analysis results for the six intersections, base case AM and PM peak hours, are shown per approach in the table below.

**Table 4-2: SIDRA analysis results for base case (2020)**

| Intersection | Approach | Degree of Saturation | | Delay [s] | | Level of Service | | | | Queue [m] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | | PM | | AM | PM |
| **Nelson Bay Rd / Williamtown Dr (Newcastle Airport)** | **S** | 0.87 | 0.82 | 29.9 | 24.4 | LOS C | LOS B | LOS C | LOS B | 249.6 | 241.6 |
| | **N** | 0.54 | 0.41 | 7.7 | 6.6 | LOS A | | LOS A | | 107.2 | 76.2 |
| | **NW** | 0.22 | 0.86 | 29.4 | 40.4 | LOS C | | LOS D | | 18.4 | 93.0 |
| **Nelson Bay Rd / Cabbage Tree Rd** | **S** | 0.58 | 0.56 | 7.4 | 7.3 | LOS A | LOS A | LOS A | LOS A | 36.8 | 34.7 |
| | **E** | 0.50 | 0.74 | 17.5 | 23.9 | LOS B | | LOS C | | 23.2 | 46.3 |
| | **N** | 0.68 | 0.64 | 7.1 | 7.0 | LOS A | | LOS A | | 50.1 | 44.8 |
| | **W** | 0.50 | 0.60 | 10.1 | 10.5 | LOS B | | LOS B | | 24.6 | 31.3 |
| **Cabbage Tree Rd / SAP Access Rd (proposed)** | **E** | 0.85 | 0.87 | 29.0 | 37.0 | LOS C | LOS C | LOS D | LOS D | 107.7 | 156.5 |
| | **N** | 0.78 | 0.87 | 39.4 | 33.9 | LOS D | | LOS C | | 34.2 | 45.8 |
| | **W** | 0.84 | 0.89 | 24.3 | 35.3 | LOS C | | LOS D | | 128.4 | 211.2 |
| **Tomago Rd / WesTrack Access Rd** | **S** | 0.03 | 0.34 | 21.8 | 19.6 | LOS C | LOS B | LOS B | LOS B | 1.4 | 17.0 |
| | **E** | 0.27 | 0.35 | 18.7 | 20.2 | LOS B | | LOS C | | 34.6 | 31.4 |
| | **W** | 0.19 | 0.23 | 7.7 | 5.0 | LOS A | | LOS A | | 13.6 | 24.9 |
| **Pacific Hwy / Tomago Rd** | **S** | 0.34 | 0.80 | 20.1 | 23.0 | LOS C | LOS B | LOS C | LOS B | 27.6 | 114.7 |
| | **E** | 0.76 | 0.82 | 15.5 | 22.5 | LOS B | | LOS C | | 108.6 | 99.6 |
| | **W** | 0.77 | 0.65 | 11.5 | 5.1 | LOS B | | LOS A | | 82.2 | 41.6 |
| **Industrial Dr / Tourle St** | **E** | 0.97 | 0.95 | 42.2 | 42.0 | LOS D | LOS D | LOS D | LOS D | 240.8 | 280.5 |
| | **N** | 0.94 | 0.95 | 45.9 | 52.0 | LOS D | | LOS D | | 218.3 | 291.1 |
| | **W** | 0.96 | 0.93 | 46.1 | 45.2 | LOS D | | LOS D | | 448.4 | 349.6 |

The SIDRA results show that all the intersections operate at or above LOS D during both the AM and PM peak hours.

## 4.3.3 Future Transport Performance

### 4.3.3.1 Midblock Performance

The capacity assessment of midblock performance was repeated based on the 2041 traffic volumes, capacity, trip generation, trip distribution and assumptions as outlined in section 4.1. The most critical PCU volumes and capacity during the AM and PM peak hours are represented in Table 4-3.

**Table 4-3: Future Midblock Peak Volumes in PCU and resultant Capacity**

| Intersection | Midblock | Dir. | Lanes per Dir. | Current Capacity | 2041 Crit. Peak Volume | 2041 Flow/ Capacity Ratio | Proposed Add. Lanes | New 2041 Flow/ Capacity Ratio |
|---|---|---|---|---|---|---|---|---|
| Nelson Bay Road / Williamtown Drive (Newcastle Airport) | Nelson Bay Rd north of Williamtown Dr | NB | 2 | 3,400 | 2,044 | 60% | | 60% |
| | | SB | 2 | 3,400 | 1,438 | 42% | | 42% |
| | Williamtown Dr west of Nelson Bay Rd | EB | 1 | 1,700 | 1,633 | 96% | | 96% |
| | | WB | 1 | 1,700 | 1,394 | 82% | | 82% |
| | Nelson Bay Rd south of Williamtown Dr | NB | 2 | 3,400 | 3,065 | 90% | | 90% |
| | | SB | 2 | 3,400 | 2,263 | 67% | | 67% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Rd north of Cabbage Tree Rd | NB | 2 | 3,400 | 2,798 | 82% | | 82% |
| | | SB | 2 | 3,400 | 2,071 | 61% | | 61% |
| | Cabbage Tree Rd west of Nelson Bay Rd | EB | 1 | 1,700 | 1,673 | 98% | 1 | 49% |
| | | WB | 1 | 1,700 | 1,685 | 99% | 1 | 50% |
| | Nelson Bay Rd south of Cabbage Tree Rd | NB | 1 | 1,700 | 2,992 | 176% | 1 | 88% |
| | | SB | 1 | 1,700 | 2,947 | 173% | 1 | 87% |
| | Lavis Lane east of Nelson Bay Rd | EB | 1 | 1,700 | 728 | 21% | | 21% |
| | | WB | 1 | 1,700 | 1,214 | 36% | | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Rd east of SAP Access Rd | EB | 1 | 1,700 | 1,895 | 111% | 1 | 56% |
| | | WB | 1 | 1,700 | 1,617 | 95% | 1 | 48% |
| | SAP Access Rd north of Cabbage Tree Rd | NB | 1 | 1,700 | 1,538 | 90% | | 90% |
| | | SB | 1 | 1,700 | 1,538 | 90% | | 90% |
| | Cabbage Tree Rd west of SAP Access Rd | EB | 1 | 1,700 | 1,654 | 97% | 1 | 49% |
| | | WB | 1 | 1,700 | 1,581 | 93% | 1 | 47% |
| Tomago Road / WesTrac Drive | Tomago Rd east of WesTrac Dr | EB | 1 | 1,700 | 1,520 | 89% | 1 | 45% |
| | | WB | 1 | 1,700 | 1,497 | 88% | 1 | 44% |
| | WesTrac Dr south of Tomago Rd | NB | 2 | 3,400 | 382 | 11% | | 11% |
| | | SB | 2 | 3,400 | 248 | 7% | | 7% |
| | Tomago Rd west of WesTrac Dr | EB | 1 | 1,700 | 1,686 | 99% | 1 | 50% |
| | | WB | 1 | 1,700 | 1,748 | 103% | 1 | 51% |
| Pacific Highway / Tomago Road | Pacific Hwy east of Tomago Rd | EB | 2 | 3,400 | 2,812 | 83% | | 83% |
| | | WB | 2 | 3,400 | 1,937 | 57% | | 57% |
| | Tomago Rd south of Pacific Hwy | NB | 1 | 1,700 | 2,852 | 168% | 1 | 84% |
| | | SB | 1 | 1,700 | 2,311 | 136% | 1 | 68% |
| | Pacific Hwy west of Tomago Rd | EB | 2 | 3,400 | 4,229 | 124% | | 124% |
| | | WB | 2 | 3,400 | 4,353 | 128% | | 128% |
| Industrial Drive / Tourle Street | Industrial Dr east of Tourle St | EB | 2 | 3,400 | 3,778 | 111% | 1 | 74% |
| | | WB | 2 | 3,400 | 3,891 | 114% | 1 | 76% |
| | Tourle St north of Industrial Dr | NB | 2 | 3,400 | 3,765 | 111% | | 111% |
| | | SB | 2 | 3,400 | 3,765 | 111% | | 111% |
| | Industrial Dr west of Tourle St | EB | 2 | 3,400 | 4,506 | 133% | 1 | 88% |
| | | WB | 2 | 3,400 | 4,619 | 136% | 1 | 91% |

According to the *Motorway Design Guide (2017)*, the maximum flow/capacity ratio of mainline traffic for sustainable operations is 100%, with a desirable ratio of 95%. Note that this method does not account for the loss of efficiency caused by intersections.

Based on these criteria, the midblock assessment shows that in 2041, without upgrade, some major roads in the network will be over capacity (highlighted in dark orange). In order to accommodate the traffic growth over the years and not due to the SAP development, Cabbage Tree / Tomago Road, a section of Nelson Bay Road will require widening upgrades (i.e. additional lanes as recommended in Table 4-3 above). Industrial drive will have marginally exceed the capacity and will benefit from road upgrade west of Turle St.

The midblock performance assessment was also undertaken for a 2041 scenario excluding the increased traffic due to the SAP development for each midblock and flow direction. The results of the assessment in comparison with the current and future flow/capacity ratios including the SAP traffic are presented in Appendix A.

Table 4-3 above shows that Williamtown Drive, as a single lane in each direction will be nearing capacity by 2041, particularly for the entry lane during the AM peak period. Consideration should be given to providing dual lanes here.

#### 4.3.3.2 Intersection Performance

To accommodate the background traffic in 2041 and the additional traffic generated by the SAP, all intersections will require upgrades in the form of adding additional lanes at the approaches to improve capacity. The proposed indicative intersection upgrades are shown in Appendix E, without the SAP trips and with the SAP trips.

Table 4-4 shows the AM and PM peak hour SIDRA analysis results per approach excluding the traffic generated by the SAP with the upgrades included as indicated in Appendix E. With the addition of these upgrades, the Nelson Bay Road / Williamtown Drive and the Tomago Road / WesTrac Access Road intersections are performing satisfactorily. However, all the other intersections are struggling to perform at acceptable traffic parameter levels (Degree of Saturation and Level of Service).

**Table 4-4: SIDRA analysis results for the year 2041 upgraded intersections excluding SAP generated traffic**

| Intersection | Approach | Degree of Saturation | | Delay [s] | | Level of Service | | | | Queue [m] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | | PM | | AM | PM |
| **Nelson Bay Rd / Williamtown Dr (Newcastle Airport)** | **S** | 0.84 | 0.89 | 22.3 | 41.5 | LOS C | LOS B | LOS D | LOS C | 333.8 | 362.2 |
| | **N** | 0.61 | 0.39 | 8.2 | 14.3 | LOS A | | LOS B | | 65.8 | 98.1 |
| | **NW** | 0.39 | 0.91 | 40.6 | 49.7 | LOS D | | LOS D | | 39.2 | 188.1 |
| **Nelson Bay Rd / Cabbage Tree Rd** | **S** | 0.92 | 1.06 | 55.7 | 67.5 | LOS D | LOS D | LOS E | LOS E | 309.0 | 369.0 |
| | **E** | 0.92 | 0.61 | 43.5 | 39.3 | LOS D | | LOS C | | 178.1 | 122.2 |
| | **N** | 0.86 | 1.05 | 39.6 | 83.8 | LOS C | | LOS F | | 247.2 | 510.1 |
| | **W** | 0.85 | 0.99 | 42.2 | 47.3 | LOS C | | LOS D | | 149.9 | 159.0 |
| **Cabbage Tree Rd / SAP Access Rd** | **E** | 0.81 | 0.98 | 25.8 | 58.0 | LOS C | LOS C | LOS E | LOS E | 95.3 | 213.0 |
| | **N** | 0.85 | 1.00 | 42.0 | 89.2 | LOS D | | LOS F | | 45.1 | 211.1 |
| | **W** | 0.84 | 1.02 | 22.7 | 70.9 | LOS C | | LOS E | | 120.9 | 329.2 |
| **Tomago Rd / WesTrac Access Rd** | **S** | 0.04 | 0.47 | 22.0 | 20.0 | LOS C | LOS B | LOS C | LOS B | 1.9 | 23.9 |
| | **E** | 0.38 | 0.47 | 19.6 | 21.1 | LOS B | | LOS C | | 49.6 | 44.8 |
| | **W** | 0.26 | 0.32 | 7.9 | 5.6 | LOS A | | LOS A | | 19.4 | 36.6 |
| **Pacific Hwy / Tomago Rd** | **S** | 0.40 | 0.96 | 33.0 | 62.3 | LOS C | LOS C | LOS E | LOS C | 77.2 | 422.0 |
| | **E** | 0.89 | 0.95 | 35.0 | 57.7 | LOS C | | LOS E | | 354.5 | 322.3 |
| | **W** | 0.90 | 0.77 | 23.7 | 6.5 | LOS C | | LOS A | | 275.2 | 91.6 |
| **Industrial Dr / Tourle St** | **E** | 0.99 | 0.99 | 44.1 | 45.8 | LOS D | LOS E | LOS D | LOS E | 367.2 | 449.6 |
| | **N** | 0.96 | 0.98 | 102 | 63.5 | LOS F | | LOS E | | 218.5 | 300.5 |
| | **W** | 0.98 | 0.97 | 61.7 | 61.0 | LOS E | | LOS E | | 458.1 | 373.9 |

The same six intersections were modelled in SIDRA for the year 2041, with the SAP generated traffic and the intersection upgrades shown in Appendix E. The SIDRA analysis results for AM and PM peak hours are shown per approach in the table below.

Table 4-5: SIDRA analysis results for the year 2041 upgraded intersections including SAP generated traffic

| Intersection | Approach | Degree of Saturation | | Delay [s] | | Level of Service | | | | Queue [m] | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | AM | PM | AM | PM | AM | | PM | | AM | PM |
| Nelson Bay Rd / Williamtown Dr (Newcastle Airport) | S | 0.71 | 0.75 | 15.4 | 20.8 | LOS B | LOS B | LOS A | LOS C | 122 | 118.8 |
| | N | 0.69 | 0.61 | 10.6 | 14.4 | LOS B | | LOS C | | 6.2.3 | 72.5 |
| | NW | 0.71 | 0.74 | 29.3 | 26.4 | LOS C | | LOS C | | 34.2 | 97.8 |
| Nelson Bay Rd / Cabbage Tree Rd | S | 0.86 | 0.80 | 21.5 | 32 | LOS B | LOS C | LOS C | LOS C | 100.2 | 114 |
| | E | 0.92 | 0.59 | 33.6 | 28.2 | LOS C | | LOS B | | 130.3 | 109.4 |
| | N | 0.86 | 0.80 | 48.1 | 34.2 | LOS D | | LOS C | | 151.6 | 158.8 |
| | W | 0.93 | 0.82 | 52 | 31.6 | LOS D | | LOS C | | 267.9 | 87.5 |
| Cabbage Tree Rd / SAP Access Rd | E | 0.75 | 0.85 | 21.9 | 31.3 | LOS C | LOS C | LOS C | LOS C | 95.8 | 87.3 |
| | N | 0.77 | 0.83 | 21.7 | 21.3 | LOS C | | LOS C | | 33.5 | 78.8 |
| | W | 0.75 | 0.83 | 22.6 | 26.3 | LOS C | | LOS C | | 83.8 | 100.8 |
| Tomago Rd / WesTrac Access Rd | S | 0.04 | 0.62 | 26.5 | 25.7 | LOS C | LOS B | LOS C | LOS B | 2.4 | 29.6 |
| | E | 0.43 | 0.65 | 18 | 19.5 | LOS B | | LOS B | | 72.4 | 101 |
| | W | 0.34 | 0.36 | 6.5 | 4.2 | LOS A | | LOS A | | 44.6 | 46.6 |
| Pacific Hwy / Tomago Rd | S | 0.25 | 0.85 | 19.3 | 27.7 | LOS B | LOS B | LOS C | LOS C | 47.6 | 245.2 |
| | E | 0.87 | 0.87 | 42.7 | 39.7 | LOS D | | LOS D | | 228.5 | 149.8 |
| | W | 0.88 | 0.79 | 19.8 | 5.7 | LOS B | | LOS A | | 324.9 | 87 |
| Industrial Dr / Tourle St | E | 0.91 | 0.97 | 32.2 | 39.3 | LOS C | LOS D | LOS D | LOS D | 336.3 | 385.6 |
| | N | 0.91 | 0.94 | 41.8 | 48.8 | LOS D | | LOS D | | 165.9 | 228.9 |
| | W | 0.90 | 0.94 | 40 | 46.6 | LOS D | | LOS D | | 272.8 | 221.9 |

The SIDRA results show that all intersections are performing in a level of service of D and above during the AM and/or PM peak hours, the analysis year is 20 years into the future.

## 4.4 Transport Considerations for Structure Plan

The following transport considerations regarding access to the Williamtown SAP and movement within the SAP have been explored and coordinated in preparation of the structure plan. Refer to Appendix F (prepared by Hatch Roberts Day 2022) for plans of the road hierarchy, mobility plan, pedestrian connection network and location of key focal points within the Williamtown SAP structure plan.

### 4.4.1 Active Transport

**Cycleways**

It is important to connect the proposed cycleway along Nelson Bay Road with the health loop internal to the SAP Structure Plan, thereby constituting a connected cycling network, and consideration could be given to extension of the cycleway linking Medowie to the SAP.

In terms of improving the provision of alternative transport mode infrastructure, separated cycling facilities should be incorporated into the Concept Design for review and approval by TfNSW and DPE. This would provide improved safety outcomes for bicycle riders in comparison to on-road facilities along busier arterial routes leading to the SAP that may comprise larger volumes of heavy vehicles. As on-road cycling facilities can be daunting for bicycle riders who may be interested but concerned, any new cycling infrastructure should cater to riders of all ages and abilities.

Refer to Appendix F which shows proposed regional cycle routes along Medowie Road and Nelson Bay Road, which should aim to connect with any internal SAP cycleways that are proposed at Concept Design stage. Alignment of any internal cycleways should focus around the environmental precinct, which ensures separation to the main freight routes (to and from the two Freight and Logistics hubs).

**Pedestrian network**

It is key for the development of the Williamtown SAP to have a well-connected walking network. The walkable internal green space will be the active space anchor within the SAP. This space will filter through the built-up areas surrounding the internal space. It is recommended to consider providing a walkway along Cabbage Tree Road as well as along Nelson Bay Road in the vicinity of the Williamtown SAP. It is also important to provide an adequate network of high amenity footpaths internally to the SAP. These high amenity footpaths should be at least 2m wide, include lighting for after dark travel, incorporate seats to allow pedestrians to rest, bins and drinking fountains. Considerations at crossing facilities should focus on safeguarding pedestrians to promote the use of this mode of travel.

Concept Design should focus on identifying key pedestrian access points and routes, particularly focusing on critical pedestrian movements such as those between the airport terminal, bus stop locations, car parking and employment areas. Refer to Appendix F, which shows key public places and pedestrian connections for consideration in Concept Design stage.

### 4.4.2 Public Transport

As discussed in Section 2.7.3, the following routes currently service the SAP area:

- Routes 130, 131 links Newcastle with Newcastle Airport and carries on further to Nelson Bay.
- Route 135 connects Raymond Terrace with Nelson Bay and passing the SAP along Cabbage Tree Road, no bus stop is located at the Newcastle Airport.
- Route 136 connects between Stockton Wharf, Medowie and Raymond Terrace, stopping at the Newcastle Airport.
- Route 138 connects the Newcastle Interchange with Newcastle Airport, carries on along Nelson Bay Road and Lemon Tree Passage Road.
- Route 145 connects the Newcastle Airport with Raymond Terrace and carries on further to Stockland Greenhills.

TfNSW provided information on the number of passengers boarding and alighting the various bus services for the month of November in the year 2019. Based on the assessment outputs provided in Table 2-6 and the analysis of the average utilisation per route yielding results below 6% for all routes except 12% for route 131, there is available capacity to accommodate potential increase in bus patronage.

With route 135 to/from Raymond Terrace not stopping at Newcastle Airport, it is recommended to consider bus stops along Cabbage Tree Road. The design of the bus stops will preferably accommodate seating, lighting, rubbish bins and real-time bus schedules. This would further encourage growth in the use of public transport, especially for employees at the Williamtown SAP. There are a few road safety concerns, primarily on the ability to safely allow pedestrians to cross the road to access the bus stops along Cabbage Tree Road. It is recommended to undertake further investigation to determine possible options for safe crossings. With route 145 already connecting Raymond Terrace with Newcastle Airport, this route will likely be able to facilitate the demand to/from Raymond Terrace, but for the longer-term it will provide better service delivery to have the option of two routes from Raymond Terrace (Routes 135 and 145) and have bus stops along Cabbage Tree Road.

It is recommended to provide ongoing monitoring of the usage of these services during the development horizons of the SAP, at least annually. Should bus service reliability and journey time be impacted, a review and consideration of additional services and increased frequencies can be undertaken.

Potential incentives to motivate a modal shift to public transport includes increased service frequencies and reduced fares. An option might be to run a period with reduced fares and test the effect, as trips in this area are typically undertaken by private car. Consider including bus-priority treatments at pinch points on the road

network. Further consider introducing differential pricing for parking to additionally motivate bus use. Practicality of modal shifts should be considered, as it may not be appropriate for some users (ie. logistics workers transport large goods, shift workers, etc) to transfer their journeys to alternate modes.

Another option involves extending the On Demand trial to also include the Newcastle Airport as a destination and monitor the uptake.

The public transport connections and bus stop locations within the SAP would be focused around key public places such as the Newcastle Airport terminal, Cabbage Tree Road main access points, the Northern Commercial Centre, Devon House and Gateway Park, St Saviour's Anglican Circle and the Keeping Circle shown in Appendix F. Refer to Appendix F for indicative bus stop locations. Specific bus stop locations and key public transport corridors will be determined in the subsequent design stages and in coordination with TfNSW.

### 4.4.3 Road Hierarchy and Network

The road network as indicated in the Structure Plan suggests three access points along Cabbage Tree Road and at the intersection of Nelson Bay Road/Williamtown Drive as well as a freight access point further north.

In terms of the road hierarchy, Cabbage Tree Road and Nelson Bay Road are indicated as higher order roads and the internal roads as lower order roads. The eastern access along Cabbage Tree Road has been analysed in the Traffic Analysis in Section 4.3 as well as the Nelson Bay Road/Williamtown Drive intersection operating at LOS E (AM peak hour) and LOS D (PM peak hour) respectively with the upgrades recommended in Section 4.3. (It was assumed that 60% of the SAP's generated traffic enters/exits at the new eastern access road along Cabbage Tree Road and 40% at the Williamtown Drive intersection.) The traffic analysis conservatively assumes that all traffic to/from the SAP can only enter/exit at these two intersections, although the proposed road network includes three access points along Cabbage Tree Road. The other two access points can assist with the traffic demands of the SAP.

The road layout has been purposely designed without a key east-west local distributor route through the southern section of the SAP to discourage vehicles using the SAP roads as a rat-run during peak hour traffic. East-west routes are designed to be maintained for local access only with Cabbage Tree Road used for the main regional traffic. Refer to Appendix F for more detail on proposed movement routes.

### 4.4.4 Freight Access

The Williamtown SAP Plan is well served by freight gazetted routes in all directions, including Medowie Road to the north, Tomago Road, Cabbage Tree Road and Masonite Road to the west and Nelson Bay Road to the east and south.

Key freight access points to the SAP include one along Cabbage Tree Road (at the site of the proposed signalised intersection) that would be used to access the north-west freight and logistics hub, and another point along Nelson Bay Road via Kindler Way that would be used to access the north-east freight and logistics hub. Movement between the two freight and logistics hubs would be along Local Distributor A. Timeline for the proposed signalised intersection would need to be determined during Concept Design stage.

It is important to ensure that PBS levels can be maintained for vehicles entering/exiting the SAP at this access point, as well as accommodate these vehicles *en route* as first mile/last mile to the respective origin/destination locations. Further investigations to consider the interface between the Freight and Logistics development and a possible new freight terminal/apron located Airside should be undertaken.

It will be beneficial in terms of the road function, related road geometry, impact on the adjacent land uses and potential road users to prioritise one access for freight off Cabbage Tree Road. Allowance for the oversize over mass (OSOM) vehicle movements should be considered at these key intersections. Prior to developing the design criteria of these intersections, further discussion with TfNSW to identify the level of OSOM appropriate for the land-use will be required in the development.

### 4.4.5 Possible airside access

Delivery operations and emergency vehicles need access to the airside. Currently delivery related access to the airside is provided east of the Newcastle Airport terminal area. It is recommended to safeguard for

another access point west of the terminal area as it may become necessary to access the airside from both sides. A number of considerations are at play:

- to prevent excessive vehicle movement on the apron system, contributing to airside congestion and delay
- potential differences in airside access types and needs - driven by dissimilar land uses (for example general freight in the east and specialised cargo in the west)
- general future capacity and redundancy

Secondary to the freight delivery access, a separate access point for emergency purposes is good practice. The emergency access point will not be frequently used, the main purpose being able to facilitate quick response times in an emergency situation to the airfield and apron. It is assumed that the RAAF Base Williamtown has measures in place for this type of access.

Future consideration could be given to autonomous logistics at the airside interface for greater efficiencies in both movement / sorting of goods as well as land take and general airport operations.

## 4.5 Integration of Transport Opportunities

### 4.5.1 Planned Transport Upgrades

TfNSW are investigating several road upgrade projects including future upgrades to Nelson Bay Road and the M1 to Raymond Terrace project. The planned roads upgrades benefit the SAP users and the wider road users. As shown in the midblock assessment of the existing roads, some sections will be at or exceed capacity due to the predicted traffic growth in the area and not related to the SAP. Making these upgrades essential for the future development of the area.

#### 4.5.1.1 Nelson Bay Road Upgrade

TfNSW ON 1 December 2021 committed $275 million to improve 43-kilometre-long Nelson Bay Road corridor provides a major road connection between Newcastle, Newcastle Airport, the Royal Australian Airforce (RAAF) base at Williamtown and Nelson Bay on the Tomaree Peninsula.

The upgrade of Nelson Bay Road is being delivered as a program of work. Early work on the project to upgrade the intersection of Nelson Bay Road and Medowie Road and the intersection of Nelson Bay Road and Lemon Tree Passage Road has been completed.

Construction is expected to start early 2022 Section 1 of the Nelson Bay Road upgrade, which involves duplicating Nelson Bay Road from 900 metres east of Marsh Road at Salt Ash to 1.9 kilometres east of Marsh Road at Bobs Farm, directly adjoining the already duplicated section of Nelson Bay Road through the sand hills. This section of work is not impacted by the route selection for the remainder of the project. Transport is currently planning to upgrade Nelson Bay Road from Williamtown to Bobs Farm as the next priority for the corridor and has developed a preferred route option. Shown in the figure below

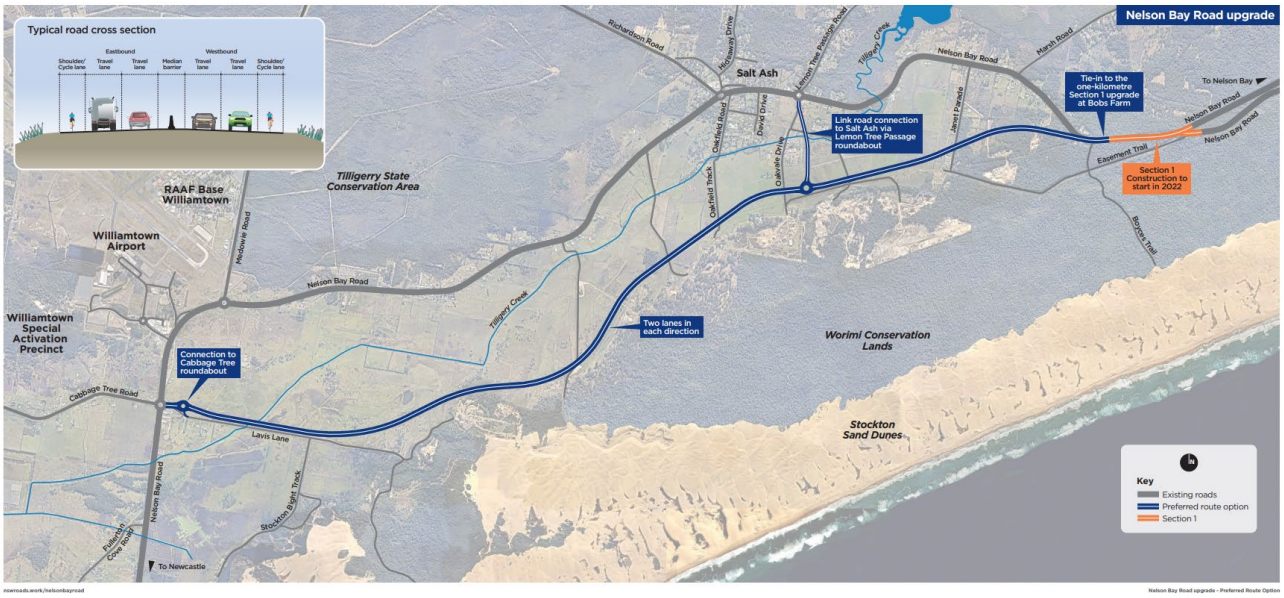



**Figure 3 Nelson Bay Road Preferred Option Source TfNSW**

The proposed Nelson Bay Road upgrade by TfNSW will benefit the wider Hunter Region community by improving safety and reducing travel time between Newcastle and Nelson Bay via Williamtown, Bobs Farm and Salt Ash. It will also enhance freight and general access to the SAP as the proposed Nelson Bay Road upgrade as an additional route which reduces through traffic on the existing roads adjacent to the SAP. Roads such as Cabbage Tree Road and Nelson Bay Road between Cabbage Tree Road and Meadowie Road are anticipated to have less congestion which extends the existing capacity of the road network.

#### 4.5.1.2 M1 to Raymond Terrace

The planning of the M1 Pacific Motorway extension to Raymond Terrace is progressing. The NSW Government has provided $7 million in the years 2016-17 to continue planning for a future extension of the M1 Pacific Motorway to the Pacific Highway at Raymond Terrace. The proposed upgrade involves building 15km of dual carriageway motorway with two lanes in each direction, bypassing Hexham and Heatherbrae. Changes to the previous project design were displayed for community comment in August and September 2016. These changes include providing a motorway exit ramp south of Heatherbrae to improve access to businesses and a free-flowing interchange at Tomago to replace the previously proposed roundabout design.

Further design considerations (refer to Figure 4-3) were undertaken since 2016[31]:

- Improved direct access from the Pacific Highway in and out of the Hunter Region Botanic Gardens for motorists, pedestrians and cyclists.
- A centralised interchange located at Old Punt Road to improve connectivity, road transport efficiency and safety for all motorists, and minimise impact with the proposed AGL Power Plant infrastructure project.
- Improved access to the northbound M1 Motorway entry ramp at Tomago which allows motorists from Newcastle to access the M1 Motorway sooner (refer to Figure 4-4).

[31] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf

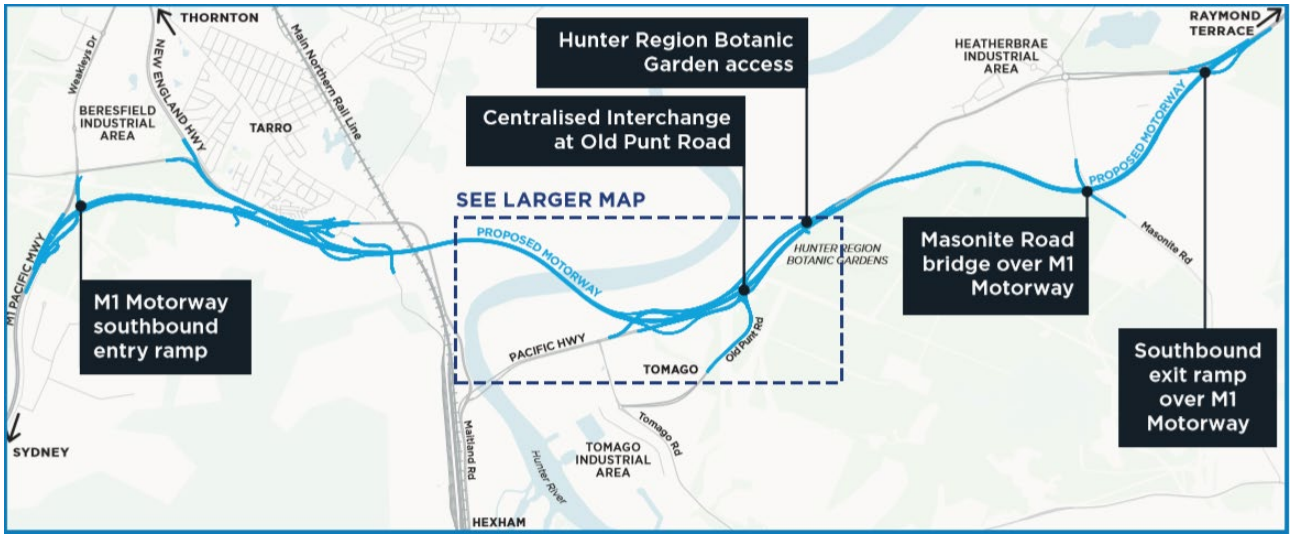



**Figure 4-4: M1 Pacific Motorway extension to Raymond Terrace project overview map (Source: TfNSW website[32])**

The project benefits include:

- Improved connection between the M1 Motorway and A1 Pacific Highway;
- Improved traffic flow for motorists and freight for more reliable travel times
- Improved access to the surrounding road network
- Improved safety for all road users

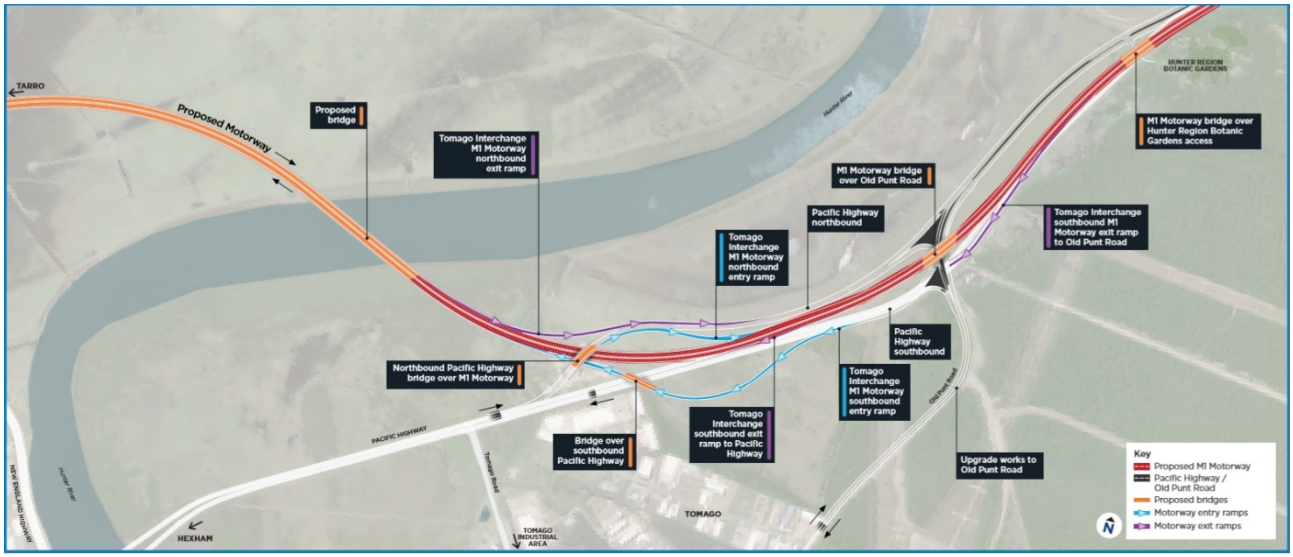



**Figure 4-5: Tomago Interchange (Source: TfNSW website[33])**

TfNSW is planning to finalise and publicly display the EIS for the M1 Extension to Raymond Terrace in 2021.

### 4.5.1.3 6 and 21 CT Rd at Cabbage Tree Road

The site located at 6 Cabbage Tree Road, 21 Cabbage Tree Road and 1801 Nelson Bay Road, Williamtown (effectively land on the western side at the corner of Cabbage Tree Road and Nelson Bay Road, 31 hectares) has received development approval, with site excavation now commenced. An additional intersection will be needed to accommodate access to the site via a future roundabout. Current approvals allow for a driveway access from Cabbage Tree Road, to be provided by the developer.

[32] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf
[33] Source: https://www.rms.nsw.gov.au/projects/01documents/raymond-terrace/m1-raymond-terrace-upgrade-community-update-oct-2020.pdf

### 4.5.2 Strategic Transport Opportunities

There are several strategic transport opportunities for roads connecting to or surrounding the SAP, including Tourle Street, Industrial Drive and A1 Pacific Highway:

- Tourle Street – encourage traffic to enter the precinct via Cabbage Tree Road by banning certain traffic movements and improving connectivity at desired access points
- Industrial Drive – will require upgrades by 2041 regardless of SAP development
- A1 Pacific Highway – may require upgrades as the SAP develops, depending on the outcome of the M1 Pacific Motorway to Raymond Terrace project

### 4.5.3 SAP Development Horizons

Consideration has been given to the following development horizons

- Horizon 1 – Indicative year 2026, total SAP generated jobs 2,427
- Horizon 2 – Indicative year 2036, total SAP generated jobs 4,617
- Horizon 3 – Indicative year 2041, total SAP generated jobs 7,194

### 4.5.4 Staging of transport infrastructure

#### 4.5.4.1 Horizon 1

A high-level midblock assessment was completed for the 2026 horizon as summarised below in Table 4-6. Based on the results, the Nelson Bay Road south of Cabbage Tree Road requires an upgrade in 2026 without SAP trips, with flow / capacity above 95%. The additional SAP trips in 2026 puts pressure on Tomago Road south of the Pacific Highway in the northbound direction.

**Table 4-6: Horizon 1 midblock assessment – Year 2026**

| Intersection | Midblock | Direction | Lanes per direction | 2026 Flow/ Capacity Ratio Excluding SAP | 2026 Flow/ Capacity Ratio Including SAP |
|---|---|---|---|---|---|
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown Drive | NB | 2 | 55% | 56% |
| | | SB | 2 | 41% | 42% |
| | Williamtown Drive west of Nelson Bay Road | EB | 1 | 36% | 47% |
| | | WB | 1 | 23% | 34% |
| | Nelson Bay Road south of Williamtown Drive | NB | 2 | 61% | 66% |
| | | SB | 2 | 42% | 47% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage Tree Road | NB | 2 | 52% | 58% |
| | | SB | 2 | 42% | 46% |
| | Cabbage Tree Road west of Nelson Bay | EB | 1 | 42% | 52% |
| | | WB | 1 | 28% | 41% |
| | Nelson Bay Road south of Cabbage Tree Road | NB | 1 | 97% | 111% |
| | | SB | 1 | 103% | 111% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 16% | 16% |
| | | WB | 2 | 27% | 27% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access | EB | 1 | 42% | 50% |
| | | WB | 1 | 29% | 37% |
| | SAP Access Road north of Cabbage Tree Road | NB | 1 | 4% | 16% |
| | | SB | 1 | 4% | 16% |
| | Cabbage Tree Road west of SAP Access | EB | 1 | 40% | 44% |
| | | WB | 1 | 29% | 37% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 47% | 52% |
| | | WB | 1 | 32% | 36% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 9% | 9% |
| | | SB | 2 | 6% | 6% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 43% | 48% |
| | | WB | 1 | 37% | 48% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 66% | 66% |
| | | WB | 2 | 46% | 46% |
| | Tomago Road south of Pacific Highway | NB | 1 | 89% | 100% |
| | | SB | 1 | 64% | 74% |
| | Pacific Highway west of Tomago Road | EB | 2 | 87% | 89% |
| | | WB | 2 | 80% | 85% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 85% | 86% |
| | | WB | 2 | 88% | 89% |
| | Tourle Street north of Industrial Drive | NB | 2 | 60% | 67% |
| | | SB | 2 | 60% | 67% |
| | Industrial Drive west of Tourle Street | EB | 2 | 86% | 91% |
| | | WB | 2 | 89% | 93% |

#### 4.5.4.2 Horizon 2

A high-level midblock assessment was next completed for the 2036 horizon as summarised below in Table 4-7. Based on the results it is indicated that the following road sections are under pressure:

- Nelson Bay Road south of Cabbage Tree Road, this assessment based on the assumption the road was not upgraded in Horizon 1
- Tomago Road south of Pacific Highway northbound direction, this assessment based on the assumption the road was not upgraded in Horizon 1
- Pacific Hwy west of Tomago Rd in the eastbound direction
- Industrial Drive east and west of Tourle Street in both direction
- However, all of these road sections are already above capacity excluding the SAP traffic. Therefore, it's recommended all these upgrades are necessary before the SAP is developed. Noting SAP trips in 2036 puts pressure on Pacific Hwy west of Tomago Rd in the westbound direction

**Table 4-7: Horizon 2 midblock assessment – Year 2036**

| Intersection | Midblock | Direction | Lanes per direction | 2036 Flow/ Capacity Ratio Excluding SAP | 2036 Flow/ Capacity Ratio Including SAP |
|---|---|---|---|---|---|
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown Drive | NB | 2 | 57% | 58% |
| | | SB | 2 | 35% | 38% |
| | Williamtown Drive west of Nelson Bay Road | EB | 1 | 40% | 60% |
| | | WB | 1 | 25% | 46% |
| | Nelson Bay Road south of Williamtown Drive | NB | 2 | 64% | 73% |
| | | SB | 2 | 40% | 50% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage Tree Road | NB | 2 | 54% | 64% |
| | | SB | 2 | 41% | 48% |
| | Cabbage Tree Road west of Nelson Bay Road | EB | 1 | 44% | 63% |
| | | WB | 1 | 28% | 54% |
| | Nelson Bay Road south of Cabbage Tree Road | NB | 1 | 105% | 130% |
| | | SB | 1 | 111% | 128% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 21% | 21% |
| | | WB | 2 | 36% | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access Road | EB | 1 | 52% | 67% |
| | | WB | 1 | 36% | 52% |
| | SAP Access Road north of Cabbage Tree Road | NB | 1 | 9% | 31% |
| | | SB | 1 | 9% | 31% |
| | Cabbage Tree Road west of SAP Access Road | EB | 1 | 48% | 55% |
| | | WB | 1 | 36% | 51% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 55% | 64% |
| | | WB | 1 | 37% | 49% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 10% | 10% |
| | | SB | 2 | 7% | 7% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 50% | 60% |
| | | WB | 1 | 43% | 63% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 77% | 77% |
| | | WB | 2 | 53% | 53% |
| | Tomago Road south of Pacific Highway | NB | 1 | 103% | 123% |
| | | SB | 1 | 74% | 94% |
| | Pacific Highway west of Tomago Road | EB | 2 | 101% | 105% |
| | | WB | 2 | 93% | 103% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 99% | 101% |
| | | WB | 2 | 102% | 104% |
| | Tourle Street north of Industrial Drive | NB | 2 | 70% | 83% |
| | | SB | 2 | 70% | 83% |
| | Industrial Drive west of Tourle Street | EB | 2 | 100% | 109% |
| | | WB | 2 | 103% | 112% |

#### 4.5.4.3 Horizon 3 - Ultimate

Horizon 3 represents the year where the development reaches the ultimate scenario. The required upgrades to accommodate the increase in traffic demand without the SAP includes:

- Nelson Bay Road south of Cabbage Tree Road
- Tomago Road east of Pacific Highway
- Pacific Hwy west of Tomago Rd in the eastbound direction
- Industrial Drive east and west of Tourle Street

The additional SAP trips in 2041 puts pressure on Tomago Road south of the Pacific Highway in the southbound direction. This assessment based on the assumption the road was not upgraded in Horizon 1&2. The structure plan offers an opportunity to complete some of the works as staged upgrades. This type of staging may be relevant for several of the intersections within the SAP, such as the Nelson Bay Road /

Cabbage Tree Road intersection, where several additional through lanes and turn lanes are proposed. There may be a benefit in adding additional lanes incrementally as demand increases over time associated with changes in land use.

**Table 4-8: Horizon 3 midblock assessment – Year 2041 (Ultimate)**

| Intersection | Midblock | Direction | Lanes per direction | 2020 Flow/ Capacity Ratio | 2041 Flow/ Capacity Ratio Excluding SAP | 2041 Flow/ Capacity Ratio Including SAP |
|---|---|---|---|---|---|---|
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown Drive | NB | 2 | 57% | 57% | 59% |
| | | SB | 2 | 52% | 35% | 39% |
| | Williamtown Drive west of Nelson Bay Road | EB | 1 | 29% | 40% | 71% |
| | | WB | 1 | 18% | 25% | 57% |
| | Nelson Bay Road south of Williamtown Drive | NB | 2 | 55% | 64% | 78% |
| | | SB | 2 | 51% | 40% | 55% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage Tree Road | NB | 2 | 52% | 54% | 70% |
| | | SB | 2 | 49% | 42% | 52% |
| | Cabbage Tree Road west of Nelson Bay Road | EB | 1 | 39% | 47% | 74% |
| | | WB | 1 | 26% | 28% | 68% |
| | Nelson Bay Road south of Cabbage Tree Road | NB | 1 | 81% | 105% | 144% |
| | | SB | 1 | 89% | 111% | 142% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 6% | 21% | 21% |
| | | WB | 2 | 12% | 36% | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access Road | EB | 1 | 47% | 59% | 84% |
| | | WB | 1 | 34% | 43% | 67% |
| | SAP Access Road north of Cabbage Tree Road | NB | 1 | 12% | 15% | 50% |
| | | SB | 1 | 12% | 15% | 50% |
| | Cabbage Tree Road west of SAP Access Road | EB | 1 | 42% | 53% | 70% |
| | | WB | 1 | 34% | 43% | 66% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 43% | 59% | 73% |
| | | WB | 1 | 29% | 40% | 63% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 8% | 11% | 11% |
| | | SB | 2 | 5% | 7% | 7% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 39% | 54% | 74% |
| | | WB | 1 | 34% | 46% | 78% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 60% | 83% | 83% |
| | | WB | 2 | 42% | 57% | 57% |
| | Tomago Road south of Pacific Highway | NB | 1 | 81% | 111% | 143% |
| | | SB | 1 | 58% | 79% | 111% |
| | Pacific Highway west of Tomago Road | EB | 2 | 79% | 109% | 115% |
| | | WB | 2 | 73% | 100% | 115% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 78% | 107% | 109% |
| | | WB | 2 | 80% | 110% | 112% |
| | Tourle Street north of Industrial Drive | NB | 2 | 55% | 75% | 95% |
| | | SB | 2 | 55% | 75% | 95% |
| | Industrial Drive west of Tourle Street | EB | 2 | 79% | 108% | 121% |
| | | WB | 2 | 81% | 111% | 125% |

### 4.5.5 Required Upgrades

**Cabbage Tree Road SAP intersections**

There are 5 proposed intersections along Cabbage Tree Road in the Structure Plan.

- This includes two major signalised intersections serving as the main entry points to the SAP. There are also two left in / left out intersections as minor entry points and to enable flood evacuation onto Cabbage Tree Road during a major event. The timing of these intersection upgrades are linked to the nearby SAP development and the need for the intersection as a site access point.
- Provision has been made for a temporary left in / left out to enable interim traffic access for early development in the eastern sub-precinct ahead of the remaining SAP. This temporary intersection will be decommissioned when the remaining SAP area is developed, and the nearby signalised intersection is online.
- The intersection of Cabbage Tree Road and Nelson Bay Road will be upgraded as part of the Nelson Bay Road upgrade works.

**Nelson Bay Road SAP intersections**

An upgraded signalised intersection is proposed at the intersection of Nelson Bay Road and Williamtown Drive to service the SAP as a main gateway entry point. The trigger of this upgrade is the traffic generated by development in the SAP's Northern Sub-precinct. Heavy vehicles accessing the northeast and logistics precinct will use Williamtown Drive and Kindler Way via Nelson Bay Road once intersection has been upgraded. Access via Slades Road will then be used by light vehicles only due to geometry constraints.

**Summary**

A summary of the required road infrastructure upgrades and the indicative timing is shown in Table 4-9.

Some infrastructures upgrades that are directly attributed SAP given they are not required if the Williamtown SAP were not to proceed. While some upgrades are required due to background growth regardless of the SAP timing, SAP related traffic will accelerate the requirement for these upgrades. As a result, funding contribution of the transport infrastructure upgrades is proposed to the extent that the SAP is responsible for the accelerated need for the upgrade. Indicative apportionment percentages for midblock section upgrades are proposed based on proximity to the SAP. Intersections are based on the SIDRA modelling layout results shown in Appendix E. Intersections performance assessed as Level of Service E or F are contributed to by the future growth traffic and the SAP development traffic based on its percentage of the total growth traffic (excluding existing traffic).

Apportionment percentages shown are indicative only and have not been assessed by TfNSW in detail. They are subject to further coordination, review and negotiations.

**Table 4-9: Summary of proposed upgrades and staging**

| Item | Driven directly by SAP related growth? | Description | Approximate timing | Apportionment Percentage |
|---|---|---|---|---|
| *External Roads* | | | | |
| Tomago Road (6 km) | Y | Additional lane on the NB direction | 2021-2026 | 100% |
| Nelson Bay Road south of Cabbage Tree Road (8 km) | N | Additional lane on both directions | 2021-2026 | 10% |
| Industrial Drive east and west of Tourle Street (2.5 km) | N | Additional lane on both directions | 2026-2036 | 5% |
| Tomago Road (6 km) | Y | Additional lane on the SB direction | 2036-2041 | 100% |
| *Intersections* | | | | |
| Signalised Cabbage Tree Road intersection | Y | Additional signalised intersection required to service Western Sub-precinct. Approximate timing based on delivery of Western Sub-precinct | 2021-2026 | 100% |
| Signalised Cabbage Tree Road intersection | Y | Additional signalised intersection required to service Eastern Sub-precinct. Approximate timing based on delivery of Eastern Sub-precinct | 2036-2041 | 100% |



| | | | | |
|---|---|---|---|---|
| Unsignalised Cabbage Tree Road intersection | Y | Provision of a left in / left out intersection required to service Western Sub-precinct. Approximate timing based on delivery of Western Sub-precinct | 2021-2026 | 100% |
| Unsignalised Cabbage Tree Road intersection | Y | Provision of a left in / left out intersection required to service Eastern Sub-precinct. Approximate timing based on delivery of Eastern Sub-precinct | 2036-2041 | 100% |
| Temporary Unsignalised intersection | Y | Provision of a left in / left out intersection to be decommission during delivery of Eastern Sub-precinct. | 2021-2026 | 100% |
| Upgrade Nelson Bay Road and Williamtown Drive intersection | Y | An upgraded signalised intersection to service the SAP | 2021-2026 | 100% |
| Upgrade Nelson Bay Road and Cabbage Tree Road intersection | N | Upgrade existing intersection to connect two sections of upgraded Nelson Bay Road | 2021-2026 | 100% |
| Upgrade Tomago Road / WesTrac access road intersection | Y | An upgraded signalised intersection to accommodate midblock upgrades | 2021-2026 | 100% |
| Upgrade Industrial Drive/ Tourle Street intersection | N | Upgrade existing intersection to connect two sections of upgraded Industrial Drive. | 2026-2036 | 50% |

*Note: All timings are approximate and require further assessment. All upgrades subject to further review, analysis and planning in the future by TfNSW.*

The following roads upgrades maybe included as part of the future strategic plans of the road authority. It is demonstrated in the midblock assessment these roads will exceed capacity solely due to the growth in the area and not due to the impact of the SAP

- Duplication of Nelson Bay Road between Williamtown and Bobs Farm
- Upgrade intersection at Nelson Bay Road / Lemon Tree Passage Road (complete)
- Upgrade intersection at Nelson Bay Road / Medowie Road (complete)
- Upgrade Cabbage Tree Road
- Extension of M1 Pacific Motorway to Raymond Terrace
  Upgrade Stockton Bridge

There may also be staging opportunities for roads such as Nelson Bay Road, south of Cabbage Tree Road. Where upgrades are staged, consideration should be given to the additional disruption to community/traffic and potential additional construction cost of completing the works incrementally.

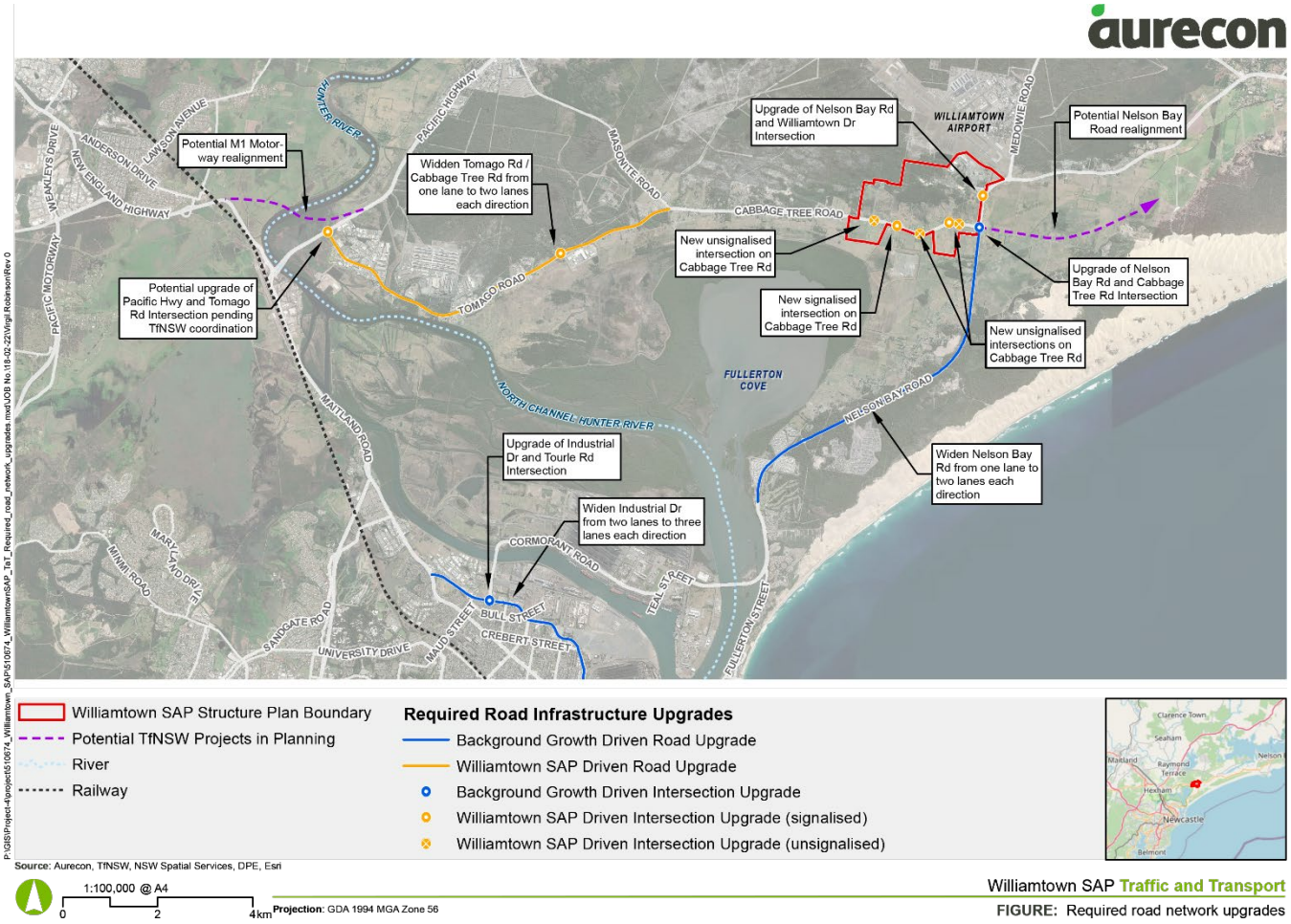



**Figure 4-6: Required Road Network Upgrades**

## 4.5.6 Indicative Road Cross Sections

### 4.5.6.1 Collector Road

The width of a local collector road within the SAP will generally achieve a travel lane in each direction.

Design considerations of a local collector road within the SAP are listed below:

- To guide the geometric road design, a lower posted speed limit (e.g. of up to 60 km/h) for efficient and safer operations of the road network. Lower posted speed limit may be considered in high-activity areas with the aid of more constrained road geometry and/or traffic calming devices.
- Traffic lane widths to be suitable to accommodate high productivity vehicles (HPV) as per Austroads Guide to Road Design.
- On-street parking to be considered in high-activity areas (i.e. commercial locations).
- For safety reasons, consider providing minimum turning radii into access driveways or side streets to manage entry/exit speed and conflict at footpaths/shared paths.
- Consideration of verge width to provide suitable space for ancillary facilities (i.e. footpaths and/or shared paths, bus stops, road furniture).
- Consideration to oversize over mass vehicles

To safeguard future road network capacity requirements, wider road widths suitable to accommodate future lane quantity needs are advisable at locations that are likely to be highly trafficable (e.g. at entry points to the proposed SAP).

Typical cross sections of a local collector road are shown in Figure 4-7, Figure 4-8, Figure 4-9, and Figure 4-10 below. The provision of a channelised right turn bay, or parking kerbside lanes on either side of the travel lanes will depend on the type of land uses, associated parking, access and operational needs (i.e. manoeuvrability of

vehicles required to service the developments). These details will need to be addressed in concept/detailed design stage.

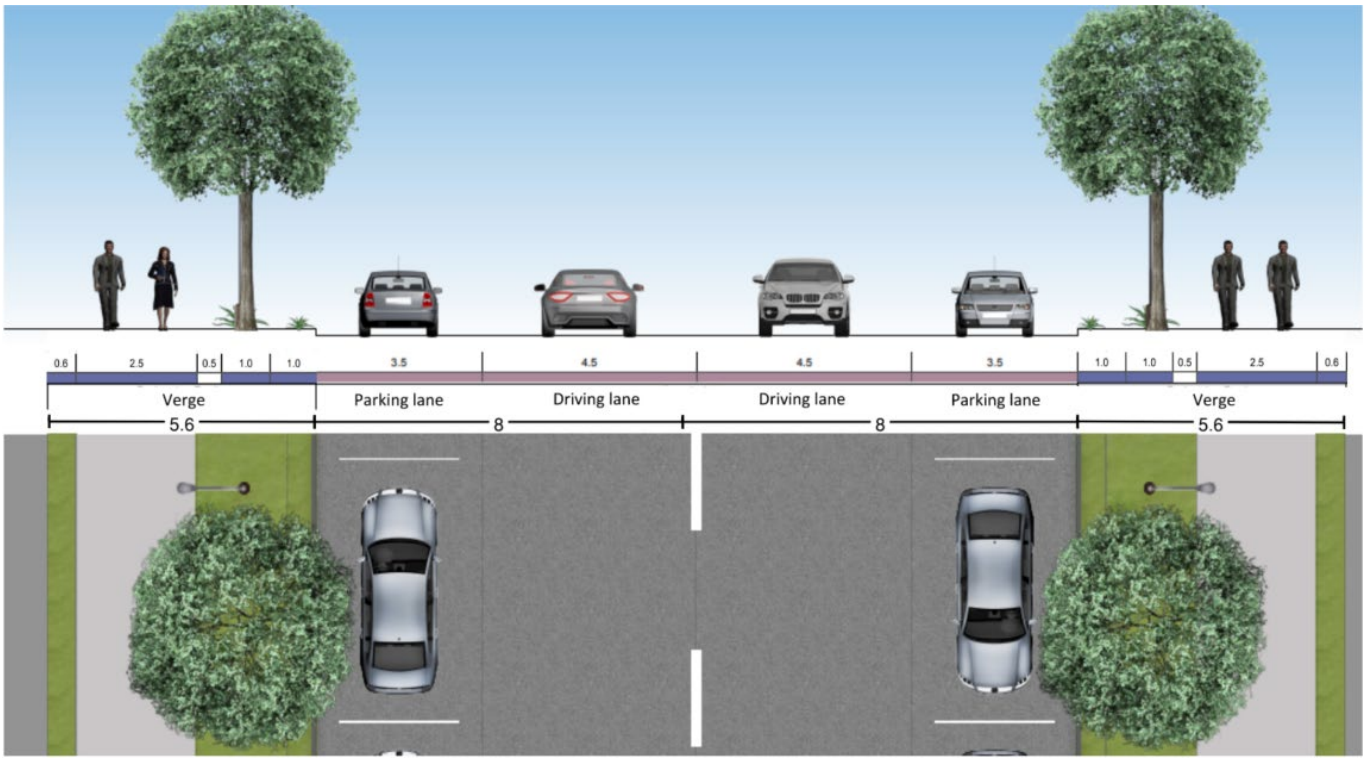



**Figure 4-7 Collector Road typical cross section, Phase 1 (27.2m)**

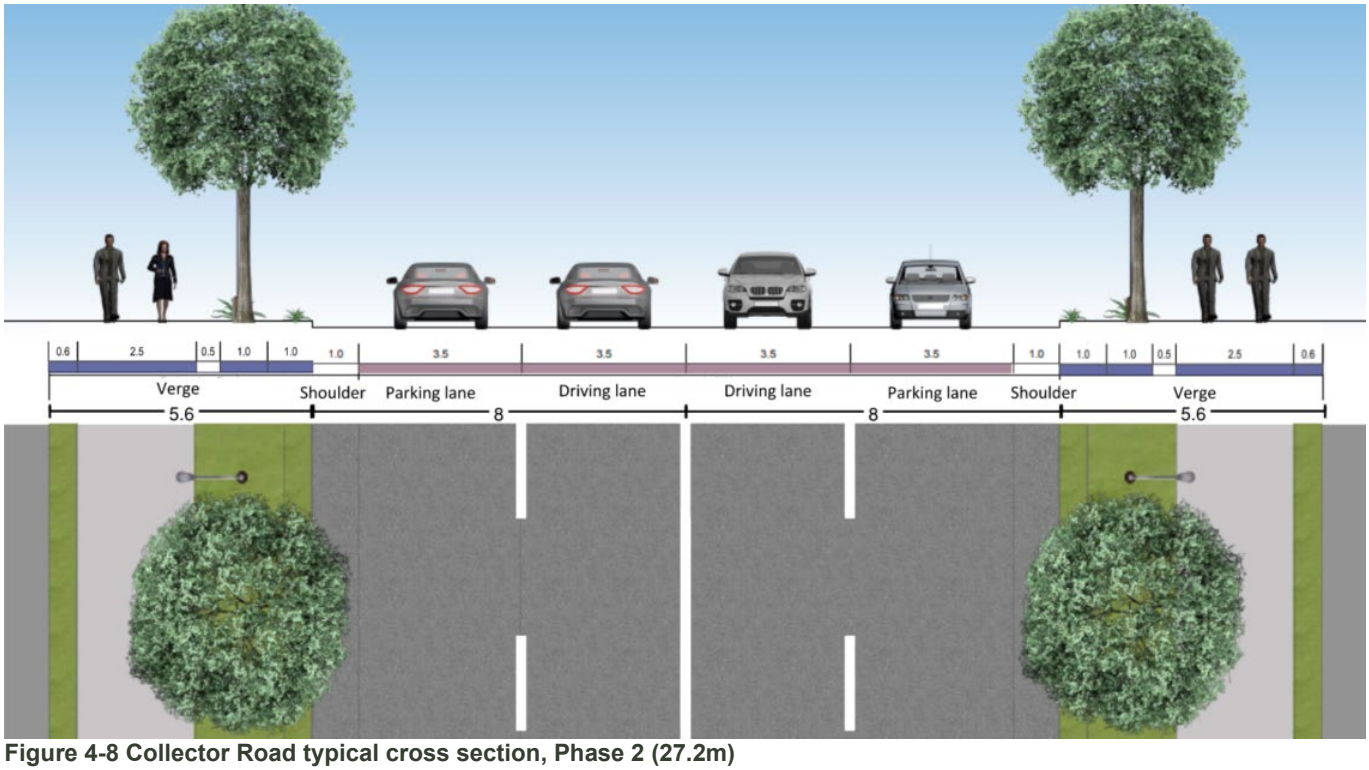



**Figure 4-8 Collector Road typical cross section, Phase 2 (27.2m)**

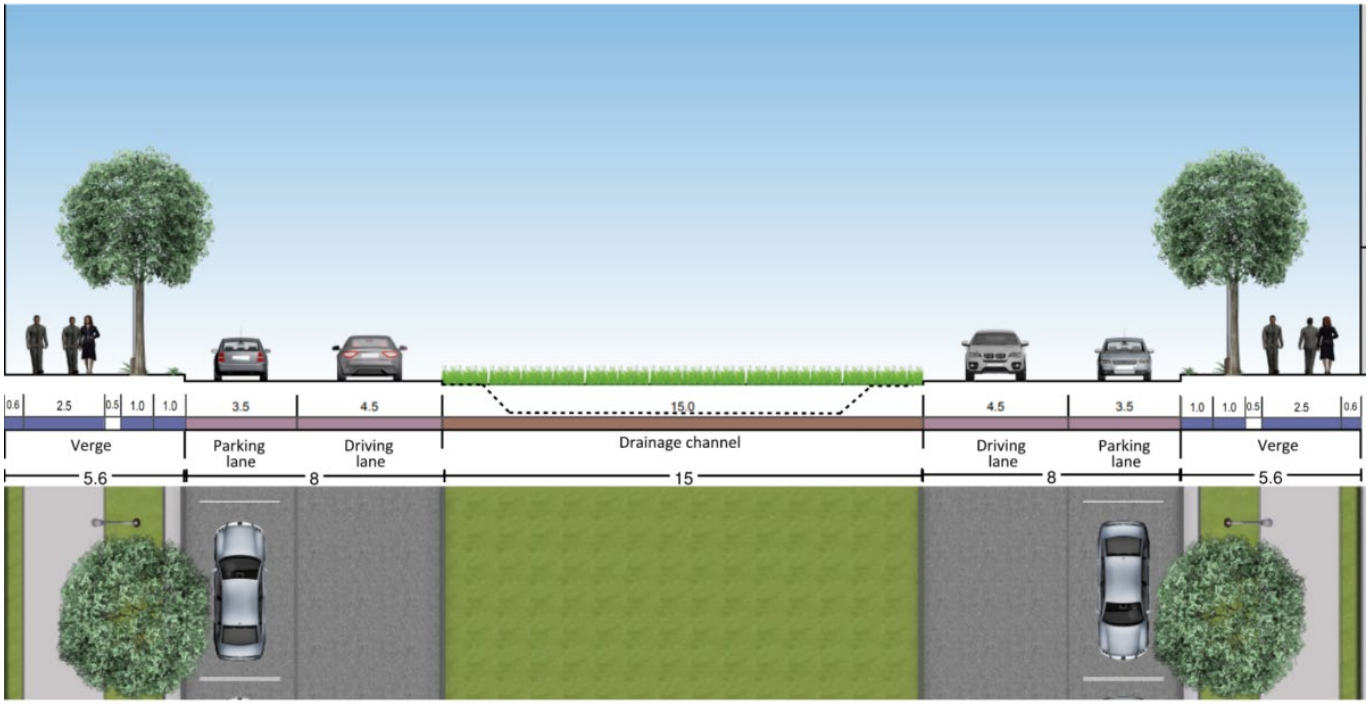



**Figure 4-9 Collector Road with drainage swale typical cross section, Phase 1 (42.2m)**

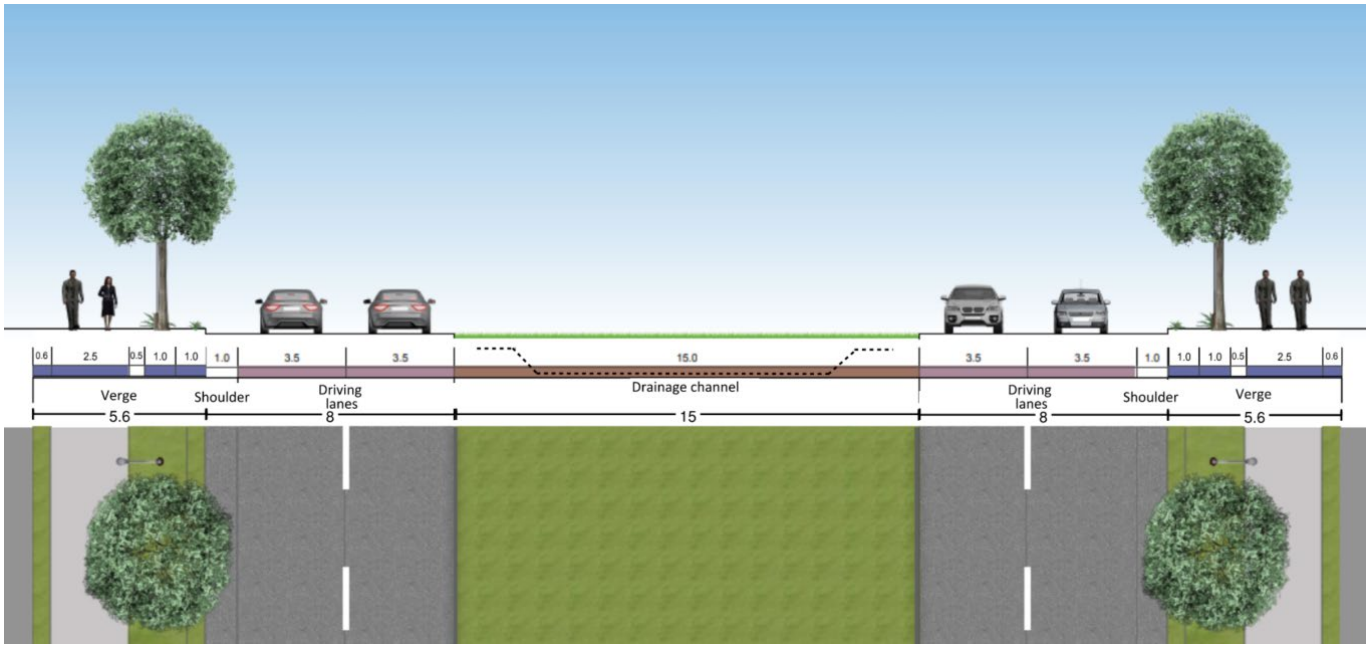



**Figure 4-10 Collector Road with drainage swale typical cross section, Phase 2 (42.2m)**

### 4.5.6.2 Local Industrial Road

The width of a local industrial road within the SAP will generally achieve a travel lane in each direction. Design considerations of a local industrial road within the SAP are the same as those listed above for the collector roads.

To safeguard future road network capacity requirements, wider road widths suitable to accommodate future lane quantity needs are advisable at locations that are likely to be highly trafficable (e.g. at entry points to the proposed SAP).

Typical cross sections of a local industrial road are shown in Figure 4-11 and Figure 4-12 below. The provision of a channelised right turn bay, or parking kerbside lanes on either side of the travel lanes will depend on the type of land uses, associated parking, access and operational needs (i.e. manoeuvrability of vehicles required to service the developments). These details will need to be addressed in concept/detailed design stage.

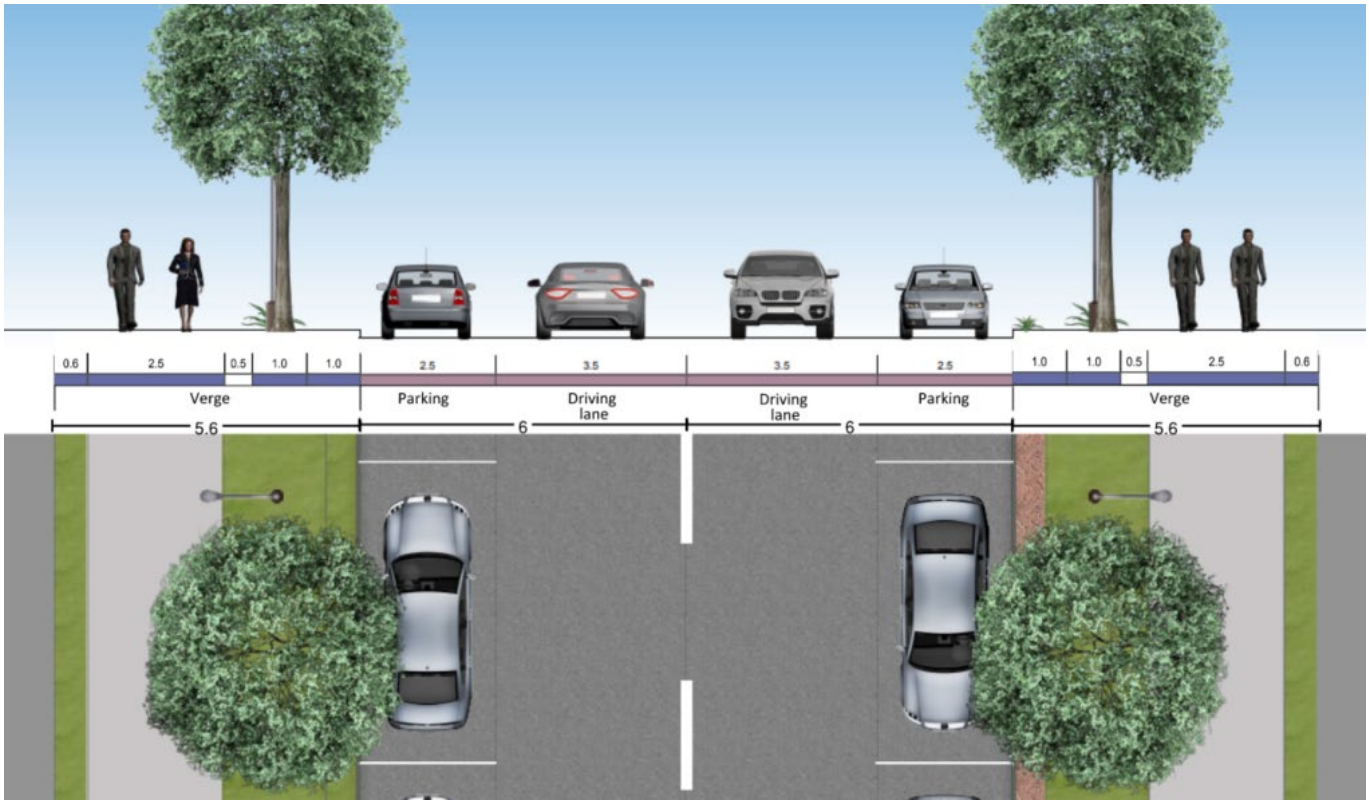



**Figure 4-11 Local Industrial Road typical cross section (23.2m)**

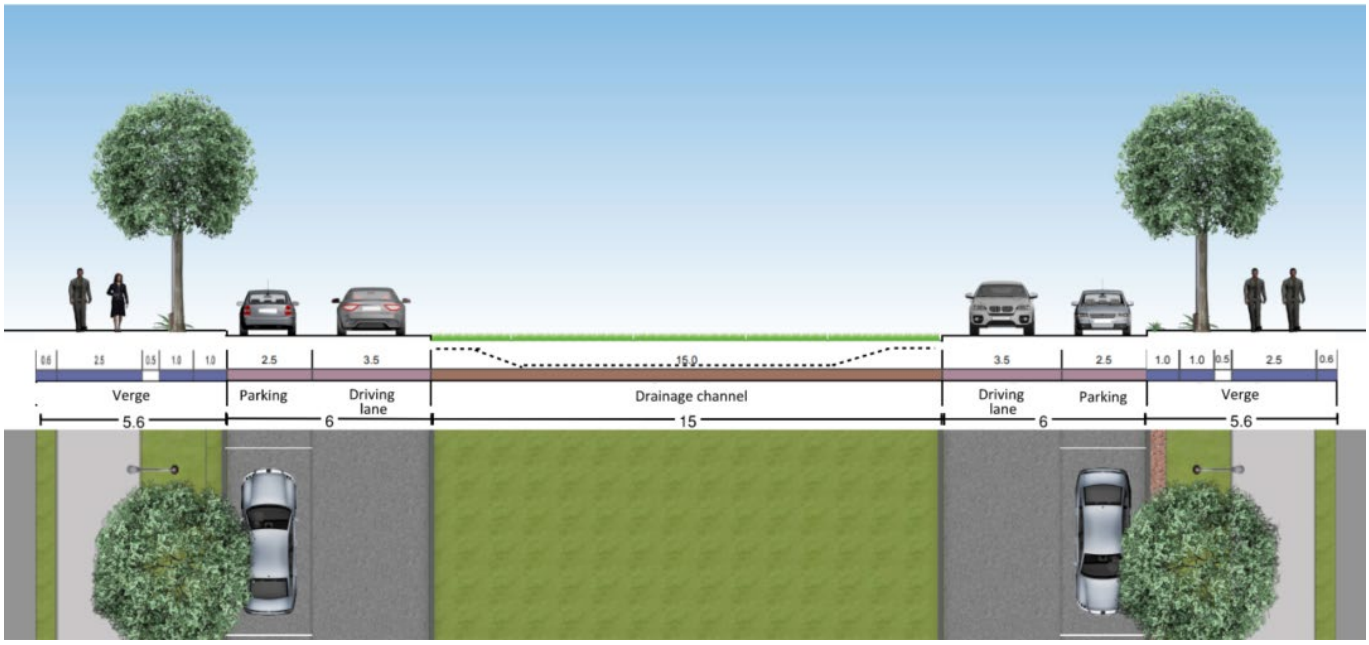



**Figure 4-12 Local Industrial Road with drainage swale typical cross section (38.2m)**

Utilities allocation with verge is shown in Figure 4-13 and Table 2-1 below.

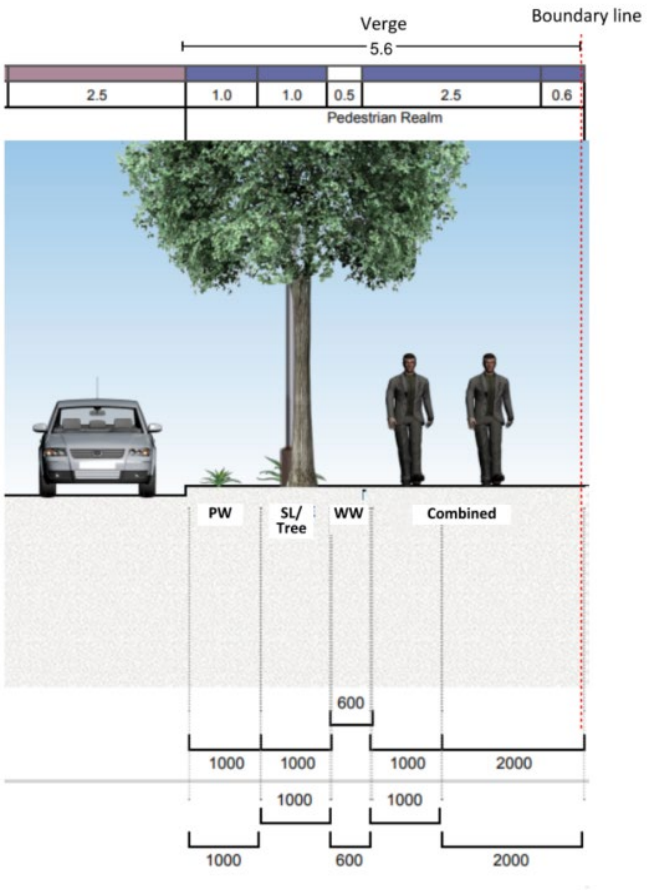



**Figure 4-13 Utilities allocation with verge typical cross section**

**Table 4-10 Utilities allocation with verge (mm)**

| Abbreviation | Utility | Allocation |
|---|---|---|
| PW | Potable Water | 1000mm |
| SL/Tree | Street lighting/ Trees | 1000mm |
| WW | WasteWater | 600mm |
| Combined | Combined Trench (Gas, Electrical, NBN and other communications) and Pillar | 3000mm |

## 4.6 Conclusions

Based on the Structure Plan developed, and the predicted economic opportunity of the Williamtown SAP, it is predicted that around 7,194 jobs may be created by the SAP in the ultimate horizon as per the Williamtown SAP Market Sounding and Economics Report (Deloitte 2021).

Given the current baseline traffic volumes, predicted regional growth and predicted traffic generated by the SAP, certain roads and intersections in the region are likely to have insufficient capacity to meet traffic demands in the future. Our analysis also suggests construction or upgrade of the following roads and intersections are required by 2041 due to traffic directly driven by the SAP development.

- Tomago Road. The timing of the required north and south bound lane upgrades is Horizon 1 (2021-2026) and Horizon 3 (2036-2041) respectively
- Various additional signalised and unsignalized intersections on Cabbage Tree roads (as SAP access points).
- Upgrade of the existing Nelson Bay Road – Williamtown Drive intersection
- Upgrade of the existing Tomago Road - WesTrac access road intersection

It is noted that even without the additional traffic generated by the SAP, the roads and intersections below are likely to require upgrade by 2041 based on predicted general traffic growth for the area, irrespective of the SAP development. For these items, the SAP's traffic impacts accelerate but not drive the need for these infrastructure upgrades. Funding apportionments percentages are suggested to the extent that the SAP is responsible for the accelerated need for the upgrade.

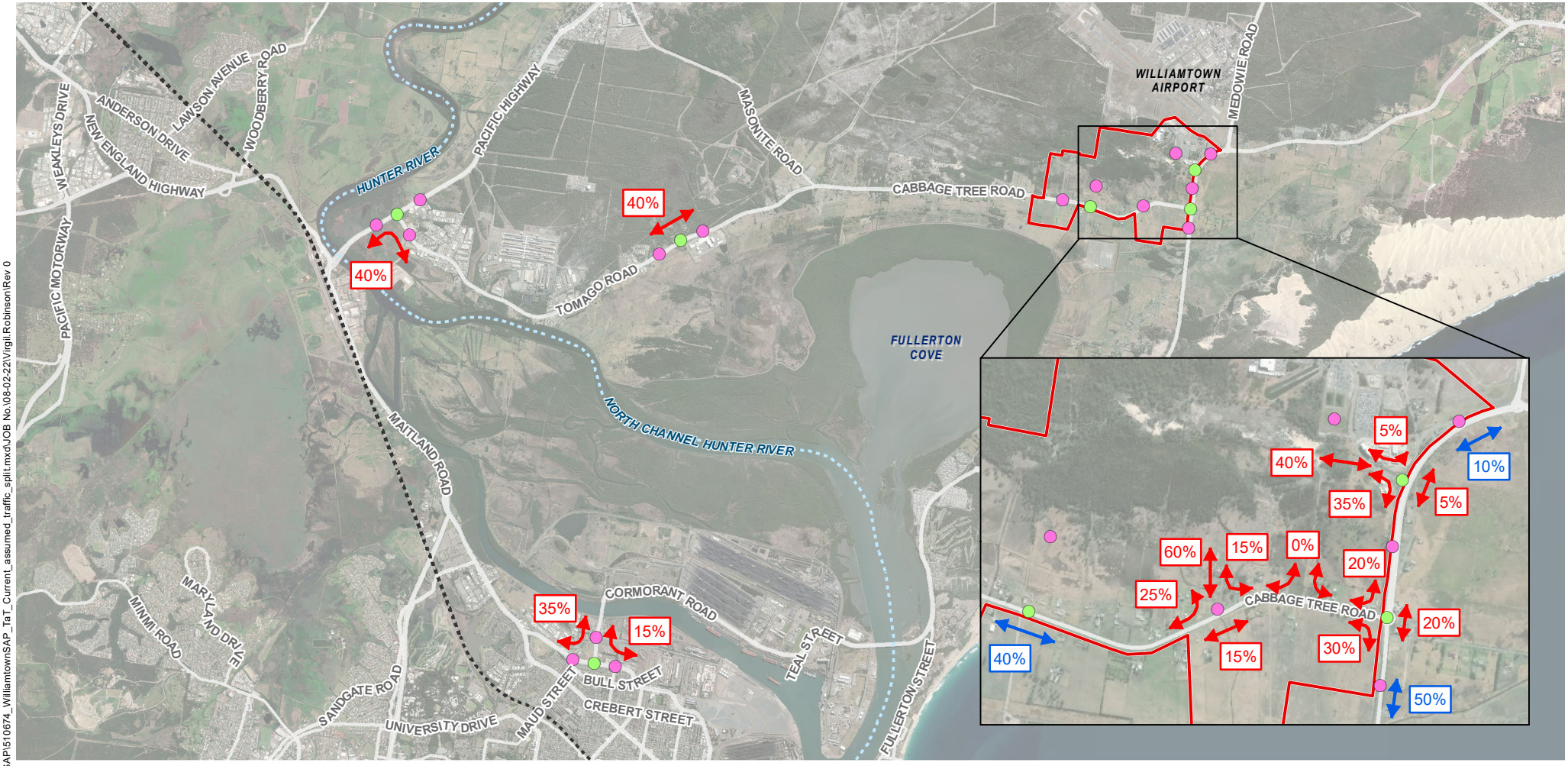
- Nelson Bay Road south of Cabbage Tree Road
- Industrial Drive east and west of Tourle Street
- Upgrade existing Nelson Bay Road - Cabbage Tree Road intersection, this upgrade is part of TfNSW commitment to upgrade Nelson Bay Road announced in December 2021
- Upgrade existing Industrial Drive - Tourle Street intersection

During subsequent design development of the SAP, further consideration could be given to the internal layout of the SAP and opportunities to encourage traffic from the Newcastle City Centre to the site via Tomago / Cabbage Tree Road. This route is generally considered to have more residual traffic capacity than via Stockton Bridge, Fern Bay and Nelson Bay Road. The utilisation of existing residual capacity would therefore maximise outcomes for the regional road network.

In addition, opportunities should be sought to maximise public and active transport usage within and to the Williamtown SAP to encourage mode shift, where appropriate, and provide increased transport options. Future connections to the SAP via rail link should be explored, particularly in the later stages of SAP development when travel demand is likely to be higher due to increased jobs and activity in the area. Walkability will be integral to the success of the SAP, and ample road space should be allocated to pedestrians and bicycle riders to enable sustainable journeys while simultaneously creating a connected network.

# Appendix A
# Assumed Traffic Split





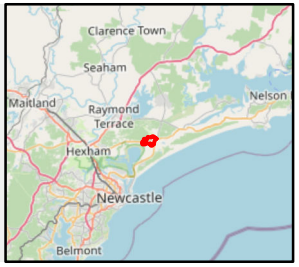

Williamtown SAP Structure Plan Boundary

River

Railway

Intersection assessment

Midblock assessment




**Source:** Aurecon, TfNSW, NSW Spatial Services, DPE, Esri

1:100,000 @ A4

0 2 4km

**Projection:** GDA 1994 MGA Zone 56

Williamtown SAP **Traffic and Transport**

**FIGURE:** Current assumed traffic split

P:\GIS\Project-4\project\510674_Williamtown_SAP\510674_WilliamtownSAP_TaT_Current_assumed_traffic_split.mxd\JOB No.\08-02-22\Virgil.Robinson\Rev 0

# Appendix B
# Midblock Traffic Results



| | | | | | 2020 Base Case | | | | | | 2026 Excluding SAP Traffic | | | | | | 2026 Including SAP Traffic | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Midblock | Direction | Lanes per directio | Current Capacity | 2020 AM Total Volume | 2020 PM Total | 2020 AM PCUs | 2020 PM PCUs | 2020 Critical Peak Volume | 2020 Flow/ Capacity | 2026 AM Total Volume | 2026 PM Total Volume | 2026 AM PCUs | 2026 PM PCUs | 2026 Critical Peak Volume | 2026 Flow/ Capacity Ratio Excluding SAP | 2026 AM Total Volume | 2026 PM Total Volume | 2026 AM PCUs | 2026 PM PCUs | 2026 Critical Peak | 2026 Flow/ Capacity Ratio Including SAP | 2026 Lanes Required | Proposed Additional Lanes | New Capacity | New 2026 Flow/ Capacity Ratio |
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown | NB | 2 | 3,400 | 1,411 | 1,617 | 1,693 | 1,940 | 1,940 | 57% | 1,551 | 1,540 | 1,861 | 1,848 | 1,861 | 55% | 1,566 | 1,577 | 1,880 | 1,893 | 1,893 | 56% | 2 | - | 3,400 | 56% |
| | | SB | 2 | 3,400 | 1,475 | 1,143 | 1,770 | 1,372 | 1,770 | 52% | 1,153 | 950 | 1,384 | 1,140 | 1,384 | 41% | 1,190 | 966 | 1,429 | 1,159 | 1,429 | 42% | 2 | - | 3,400 | 42% |
| | Williamtown Drive west of Nelson Bay | EB | 1 | 1,700 | 111 | 412 | 133 | 494 | 494 | 29% | 148 | 512 | 178 | 614 | 614 | 36% | 212 | 661 | 255 | 794 | 794 | 47% | 1 | - | 1,700 | 47% |
| | | WB | 1 | 1,700 | 261 | 157 | 313 | 188 | 313 | 18% | 328 | 207 | 394 | 248 | 394 | 23% | 478 | 271 | 574 | 325 | 574 | 34% | 1 | - | 1,700 | 34% |
| | Nelson Bay Road south of Williamtown | NB | 2 | 3,400 | 1,540 | 1,550 | 1,848 | 1,860 | 1,860 | 55% | 1,725 | 1,488 | 2,070 | 1,786 | 2,070 | 61% | 1,863 | 1,563 | 2,236 | 1,876 | 2,236 | 66% | 2 | - | 3,400 | 66% |
| | | SB | 2 | 3,400 | 1,454 | 1,331 | 1,745 | 1,598 | 1,745 | 51% | 1,147 | 1,204 | 1,376 | 1,444 | 1,444 | 42% | 1,222 | 1,342 | 1,466 | 1,611 | 1,611 | 47% | 2 | - | 3,400 | 47% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage | NB | 2 | 3,400 | 1,391 | 1,463 | 1,669 | 1,756 | 1,756 | 52% | 1,485 | 1,328 | 1,783 | 1,594 | 1,783 | 52% | 1,635 | 1,392 | 1,962 | 1,671 | 1,962 | 58% | 2 | - | 3,400 | 58% |
| | | SB | 2 | 3,400 | 1,379 | 1,286 | 1,655 | 1,543 | 1,655 | 49% | 1,040 | 1,197 | 1,248 | 1,436 | 1,436 | 42% | 1,147 | 1,304 | 1,377 | 1,564 | 1,564 | 46% | 2 | - | 3,400 | 46% |
| | Cabbage Tree Road west of Nelson Bay | EB | 1 | 1,700 | 413 | 547 | 496 | 656 | 656 | 39% | 514 | 598 | 616 | 717 | 717 | 42% | 636 | 742 | 764 | 890 | 890 | 52% | 1 | - | 1,700 | 52% |
| | | WB | 1 | 1,700 | 364 | 365 | 437 | 438 | 438 | 26% | 390 | 363 | 468 | 436 | 468 | 28% | 577 | 443 | 693 | 532 | 693 | 41% | 1 | - | 1,700 | 41% |
| | Nelson Bay Road south of Cabbage | NB | 1 | 1,700 | 1,147 | 1,082 | 1,376 | 1,298 | 1,376 | 81% | 1,380 | 1,249 | 1,656 | 1,499 | 1,656 | 97% | 1,567 | 1,329 | 1,880 | 1,595 | 1,880 | 111% | 2 | 1 | 3,400 | 55% |
| | | SB | 1 | 1,700 | 1,216 | 1,254 | 1,459 | 1,505 | 1,505 | 89% | 1,452 | 1,390 | 1,743 | 1,668 | 1,743 | 103% | 1,532 | 1,576 | 1,839 | 1,892 | 1,892 | 111% | 2 | 1 | 3,400 | 56% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 3,400 | 183 | 168 | 220 | 202 | 220 | 6% | 358 | 464 | 430 | 557 | 557 | 16% | 358 | 464 | 430 | 557 | 557 | 16% | 2 | - | 3,400 | 16% |
| | | WB | 2 | 3,400 | 215 | 335 | 258 | 402 | 402 | 12% | 753 | 501 | 903 | 601 | 903 | 27% | 753 | 501 | 903 | 601 | 903 | 27% | 2 | - | 3,400 | 27% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access | EB | 1 | 1,700 | 441 | 586 | 529 | 703 | 703 | 41% | 448 | 594 | 537 | 713 | 713 | 42% | 532 | 711 | 638 | 853 | 853 | 50% | 1 | - | 1,700 | 50% |
| | | WB | 1 | 1,700 | 403 | 393 | 483 | 472 | 483 | 28% | 409 | 399 | 491 | 479 | 491 | 29% | 525 | 483 | 630 | 580 | 630 | 37% | 1 | - | 1,700 | 37% |
| | SAP Access Road north of Cabbage | NB | 1 | 1,700 | 56 | 24 | 67 | 29 | 67 | 4% | 57 | 24 | 68 | 29 | 68 | 4% | 225 | 96 | 270 | 116 | 270 | 16% | 1 | - | 1,700 | 16% |
| | | SB | 1 | 1,700 | 24 | 56 | 29 | 67 | 67 | 4% | 24 | 57 | 29 | 68 | 68 | 4% | 96 | 225 | 116 | 270 | 270 | 16% | 1 | - | 1,700 | 16% |
| | Cabbage Tree Road west of SAP Access | EB | 1 | 1,700 | 450 | 563 | 540 | 676 | 676 | 40% | 457 | 571 | 549 | 686 | 686 | 40% | 569 | 620 | 683 | 743 | 743 | 44% | 1 | - | 1,700 | 44% |
| | | WB | 1 | 1,700 | 380 | 402 | 456 | 483 | 483 | 28% | 386 | 408 | 463 | 490 | 490 | 29% | 434 | 521 | 521 | 625 | 625 | 37% | 1 | - | 1,700 | 37% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 1,700 | 341 | 615 | 409 | 738 | 738 | 43% | 373 | 672 | 447 | 807 | 807 | 47% | 522 | 737 | 627 | 884 | 884 | 52% | 1 | - | 1,700 | 52% |
| | | WB | 1 | 1,700 | 411 | 327 | 493 | 392 | 493 | 29% | 449 | 358 | 539 | 429 | 539 | 32% | 513 | 507 | 616 | 608 | 616 | 36% | 1 | - | 1,700 | 36% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 3,400 | 23 | 233 | 28 | 280 | 280 | 8% | 25 | 255 | 30 | 306 | 306 | 9% | 25 | 255 | 30 | 306 | 306 | 9% | 2 | - | 3,400 | 9% |
| | | SB | 2 | 3,400 | 151 | 22 | 181 | 26 | 181 | 5% | 165 | 24 | 198 | 29 | 198 | 6% | 165 | 24 | 198 | 29 | 198 | 6% | 2 | - | 3,400 | 6% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 1,700 | 442 | 557 | 530 | 668 | 668 | 39% | 483 | 609 | 580 | 731 | 731 | 43% | 633 | 673 | 759 | 808 | 808 | 48% | 1 | - | 1,700 | 48% |
| | | WB | 1 | 1,700 | 384 | 480 | 461 | 576 | 576 | 34% | 420 | 525 | 504 | 630 | 630 | 37% | 484 | 674 | 581 | 809 | 809 | 48% | 1 | - | 1,700 | 48% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 3,400 | 1,181 | 1,714 | 1,417 | 2,057 | 2,057 | 60% | 1,291 | 1,874 | 1,550 | 2,249 | 2,249 | 66% | 1,291 | 1,874 | 1,550 | 2,249 | 2,249 | 66% | 2 | - | 3,400 | 66% |
| | | WB | 2 | 3,400 | 1,181 | 926 | 1,417 | 1,111 | 1,417 | 42% | 1,291 | 1,013 | 1,550 | 1,215 | 1,550 | 46% | 1,291 | 1,013 | 1,550 | 1,215 | 1,550 | 46% | 2 | - | 3,400 | 46% |
| | Tomago Road south of Pacific Highway | NB | 1 | 1,700 | 358 | 1,153 | 430 | 1,384 | 1,384 | 81% | 391 | 1,261 | 470 | 1,513 | 1,513 | 89% | 456 | 1,410 | 547 | 1,692 | 1,692 | 100% | 2 | 1 | 3,400 | 50% |
| | | SB | 1 | 1,700 | 823 | 548 | 988 | 658 | 988 | 58% | 900 | 599 | 1,080 | 719 | 1,080 | 64% | 1,049 | 663 | 1,259 | 796 | 1,259 | 74% | 1 | - | 1,700 | 74% |
| | Pacific Highway west of Tomago Road | EB | 2 | 3,400 | 1,992 | 2,251 | 2,390 | 2,701 | 2,701 | 79% | 2,178 | 2,461 | 2,614 | 2,954 | 2,954 | 87% | 2,328 | 2,525 | 2,793 | 3,030 | 3,030 | 89% | 2 | - | 3,400 | 89% |
| | | WB | 2 | 3,400 | 1,527 | 2,068 | 1,832 | 2,482 | 2,482 | 73% | 1,670 | 2,261 | 2,004 | 2,713 | 2,713 | 80% | 1,734 | 2,411 | 2,081 | 2,893 | 2,893 | 85% | 2 | - | 3,400 | 85% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 3,400 | 2,209 | 1,800 | 2,651 | 2,160 | 2,651 | 78% | 2,415 | 1,968 | 2,898 | 2,362 | 2,898 | 85% | 2,439 | 2,024 | 2,927 | 2,429 | 2,927 | 86% | 2 | - | 3,400 | 86% |
| | | WB | 2 | 3,400 | 1,890 | 2,278 | 2,268 | 2,734 | 2,734 | 80% | 2,067 | 2,491 | 2,480 | 2,989 | 2,989 | 88% | 2,123 | 2,515 | 2,547 | 3,018 | 3,018 | 89% | 2 | - | 3,400 | 89% |
| | Tourle Street north of Industrial Drive | NB | 2 | 3,400 | 1,563 | 1,517 | 1,876 | 1,820 | 1,876 | 55% | 1,709 | 1,659 | 2,051 | 1,991 | 2,051 | 60% | 1,896 | 1,739 | 2,275 | 2,087 | 2,275 | 67% | 2 | - | 3,400 | 67% |
| | | SB | 2 | 3,400 | 1,517 | 1,563 | 1,820 | 1,876 | 1,876 | 55% | 1,659 | 1,709 | 1,991 | 2,051 | 2,051 | 60% | 1,739 | 1,896 | 2,087 | 2,275 | 2,275 | 67% | 2 | - | 3,400 | 67% |
| | Industrial Drive west of Tourle Street | EB | 2 | 3,400 | 2,234 | 1,779 | 2,681 | 2,135 | 2,681 | 79% | 2,443 | 1,945 | 2,931 | 2,334 | 2,931 | 86% | 2,574 | 2,001 | 3,088 | 2,402 | 3,088 | 91% | 2 | - | 3,400 | 91% |
| | | WB | 2 | 3,400 | 1,869 | 2,303 | 2,243 | 2,764 | 2,764 | 81% | 2,044 | 2,518 | 2,452 | 3,022 | 3,022 | 89% | 2,100 | 2,649 | 2,520 | 3,179 | 3,179 | 93% | 2 | - | 3,400 | 93% |

| | | | | | 2020 Base Case | | | | | | 2036 Excluding SAP Traffic | | | | | | 2036 Including SAP Traffic | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Intersection | Midblock | Direction | Lanes per direction | Current Capacity | 2020 AM Total | 2020 PM Total | 2020 AM PCUs | 2020 PM PCUs | 2020 Critical Peak | 2020 Flow/ Capacity | 2036 AM Total | 2036 PM Total | 2036 AM PCUs | 2036 PM PCUs | 2036 Critical Peak | 2036 Flow/ Capacity Ratio Excluding SAP | 2036 AM Total | 2036 PM Total | 2036 AM PCUs | 2036 PM PCUs | 2036 Critical Peak | 2036 Flow/ Capacity Ratio Including SAP | 2036 Lanes Required | Proposed Additional | New Capacity | New 2036 Flow/ |
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown Drive | NB | 2 | 3,400 | 1,411 | 1,617 | 1,693 | 1,940 | 1,940 | 57% | 1,619 | 1,503 | 1,942 | 1,803 | 1,942 | 57% | 1,648 | 1,574 | 1,977 | 1,889 | 1,977 | 58% | 2 | - | 3,400 | 58% |
| | | SB | 2 | 3,400 | 1,475 | 1,143 | 1,770 | 1,372 | 1,770 | 52% | 998 | 857 | 1,197 | 1,029 | 1,197 | 35% | 1,069 | 888 | 1,283 | 1,065 | 1,283 | 38% | 2 | - | 3,400 | 38% |
| | Williamtown Drive west of Nelson Bay Road | EB | 1 | 1,700 | 111 | 412 | 133 | 494 | 494 | 29% | 166 | 560 | 199 | 672 | 672 | 40% | 288 | 844 | 345 | 1,013 | 1,013 | 60% | 1 | - | 1,700 | 60% |
| | | WB | 1 | 1,700 | 261 | 157 | 313 | 188 | 313 | 18% | 361 | 231 | 433 | 277 | 433 | 25% | 645 | 353 | 774 | 423 | 774 | 46% | 1 | - | 1,700 | 46% |
| | Nelson Bay Road south of Williamtown Drive | NB | 2 | 3,400 | 1,540 | 1,550 | 1,848 | 1,860 | 1,860 | 55% | 1,815 | 1,459 | 2,178 | 1,751 | 2,178 | 64% | 2,077 | 1,601 | 2,493 | 1,921 | 2,493 | 73% | 2 | - | 3,400 | 73% |
| | | SB | 2 | 3,400 | 1,454 | 1,331 | 1,745 | 1,598 | 1,745 | 51% | 999 | 1,142 | 1,199 | 1,371 | 1,371 | 40% | 1,141 | 1,406 | 1,369 | 1,687 | 1,687 | 50% | 2 | - | 3,400 | 50% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage Tree Road | NB | 2 | 3,400 | 1,391 | 1,463 | 1,669 | 1,756 | 1,756 | 52% | 1,531 | 1,263 | 1,837 | 1,516 | 1,837 | 54% | 1,815 | 1,385 | 2,178 | 1,662 | 2,178 | 64% | 2 | - | 3,400 | 64% |
| | | SB | 2 | 3,400 | 1,379 | 1,286 | 1,655 | 1,543 | 1,655 | 49% | 877 | 1,154 | 1,052 | 1,385 | 1,385 | 41% | 1,080 | 1,357 | 1,296 | 1,629 | 1,629 | 48% | 2 | - | 3,400 | 48% |
| | Cabbage Tree Road west of Nelson Bay Road | EB | 1 | 1,700 | 413 | 547 | 496 | 656 | 656 | 39% | 562 | 622 | 674 | 746 | 746 | 44% | 796 | 896 | 955 | 1,075 | 1,075 | 63% | 1 | - | 1,700 | 63% |
| | | WB | 1 | 1,700 | 364 | 365 | 437 | 438 | 438 | 26% | 403 | 362 | 484 | 434 | 484 | 28% | 759 | 514 | 910 | 617 | 910 | 54% | 1 | - | 1,700 | 54% |
| | Nelson Bay Road south of Cabbage Tree Road | NB | 1 | 1,700 | 1,147 | 1,082 | 1,376 | 1,298 | 1,376 | 81% | 1,492 | 1,330 | 1,790 | 1,596 | 1,790 | 105% | 1,847 | 1,482 | 2,217 | 1,779 | 2,217 | 130% | 2 | 1 | 3,400 | 65% |
| | | SB | 1 | 1,700 | 1,216 | 1,254 | 1,459 | 1,505 | 1,505 | 89% | 1,566 | 1,455 | 1,879 | 1,746 | 1,879 | 111% | 1,718 | 1,810 | 2,062 | 2,173 | 2,173 | 128% | 2 | 1 | 3,400 | 64% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 3,400 | 183 | 168 | 220 | 202 | 220 | 6% | 443 | 607 | 532 | 728 | 728 | 21% | 443 | 607 | 532 | 728 | 728 | 21% | 2 | - | 3,400 | 21% |
| | | WB | 2 | 3,400 | 215 | 335 | 258 | 402 | 402 | 12% | 1,012 | 581 | 1,214 | 697 | 1,214 | 36% | 1,012 | 581 | 1,214 | 697 | 1,214 | 36% | 2 | - | 3,400 | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access Road | EB | 1 | 1,700 | 466 | 621 | 560 | 745 | 745 | 44% | 549 | 731 | 659 | 877 | 877 | 52% | 709 | 952 | 851 | 1,142 | 1,142 | 67% | 1 | - | 1,700 | 67% |
| | | WB | 1 | 1,700 | 438 | 418 | 525 | 502 | 525 | 31% | 516 | 493 | 619 | 591 | 619 | 36% | 736 | 653 | 884 | 783 | 884 | 52% | 1 | - | 1,700 | 52% |
| | SAP Access Road north of Cabbage Tree Road | NB | 1 | 1,700 | 107 | 46 | 128 | 55 | 128 | 8% | 126 | 54 | 151 | 65 | 151 | 9% | 446 | 191 | 535 | 229 | 535 | 31% | 1 | - | 1,700 | 31% |
| | | SB | 1 | 1,700 | 46 | 107 | 55 | 128 | 128 | 8% | 54 | 126 | 65 | 151 | 151 | 9% | 191 | 446 | 229 | 535 | 535 | 31% | 1 | - | 1,700 | 31% |
| | Cabbage Tree Road west of SAP Access Road | EB | 1 | 1,700 | 484 | 577 | 581 | 693 | 693 | 41% | 570 | 680 | 684 | 816 | 816 | 48% | 784 | 772 | 940 | 926 | 940 | 55% | 1 | - | 1,700 | 55% |
| | | WB | 1 | 1,700 | 394 | 436 | 473 | 523 | 523 | 31% | 465 | 514 | 558 | 616 | 616 | 36% | 556 | 727 | 667 | 872 | 872 | 51% | 1 | - | 1,700 | 51% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 1,700 | 341 | 615 | 409 | 738 | 738 | 43% | 433 | 780 | 519 | 937 | 937 | 55% | 717 | 902 | 861 | 1,083 | 1,083 | 64% | 1 | - | 1,700 | 64% |
| | | WB | 1 | 1,700 | 411 | 327 | 493 | 392 | 493 | 29% | 522 | 415 | 626 | 498 | 626 | 37% | 643 | 699 | 772 | 839 | 839 | 49% | 1 | - | 1,700 | 49% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 3,400 | 23 | 233 | 28 | 280 | 280 | 8% | 29 | 296 | 35 | 355 | 355 | 10% | 29 | 296 | 35 | 355 | 355 | 10% | 2 | - | 3,400 | 10% |
| | | SB | 2 | 3,400 | 151 | 22 | 181 | 26 | 181 | 5% | 192 | 28 | 230 | 34 | 230 | 7% | 192 | 28 | 230 | 34 | 230 | 7% | 2 | - | 3,400 | 7% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 1,700 | 442 | 557 | 530 | 668 | 668 | 39% | 561 | 707 | 673 | 848 | 848 | 50% | 845 | 829 | 1,014 | 994 | 1,014 | 60% | 1 | - | 1,700 | 60% |
| | | WB | 1 | 1,700 | 384 | 480 | 461 | 576 | 576 | 34% | 487 | 609 | 585 | 731 | 731 | 43% | 609 | 894 | 731 | 1,072 | 1,072 | 63% | 1 | - | 1,700 | 63% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 3,400 | 1,181 | 1,714 | 1,417 | 2,057 | 2,057 | 60% | 1,499 | 2,175 | 1,798 | 2,610 | 2,610 | 77% | 1,499 | 2,175 | 1,798 | 2,610 | 2,610 | 77% | 2 | - | 3,400 | 77% |
| | | WB | 2 | 3,400 | 1,181 | 926 | 1,417 | 1,111 | 1,417 | 42% | 1,499 | 1,175 | 1,798 | 1,410 | 1,798 | 53% | 1,499 | 1,175 | 1,798 | 1,410 | 1,798 | 53% | 2 | - | 3,400 | 53% |
| | Tomago Road south of Pacific Highway | NB | 1 | 1,700 | 358 | 1,153 | 430 | 1,384 | 1,384 | 81% | 454 | 1,463 | 545 | 1,756 | 1,756 | 103% | 576 | 1,748 | 691 | 2,097 | 2,097 | 123% | 2 | 1 | 3,400 | 62% |
| | | SB | 1 | 1,700 | 823 | 548 | 988 | 658 | 988 | 58% | 1,044 | 695 | 1,253 | 834 | 1,253 | 74% | 1,329 | 817 | 1,595 | 981 | 1,595 | 94% | 1 | - | 1,700 | 94% |
| | Pacific Highway west of Tomago Road | EB | 2 | 3,400 | 1,992 | 2,251 | 2,390 | 2,701 | 2,701 | 79% | 2,528 | 2,856 | 3,033 | 3,428 | 3,428 | 101% | 2,812 | 2,978 | 3,375 | 3,574 | 3,574 | 105% | 2 | - | 3,400 | 105% |
| | | WB | 2 | 3,400 | 1,527 | 2,068 | 1,832 | 2,482 | 2,482 | 73% | 1,938 | 2,624 | 2,325 | 3,149 | 3,149 | 93% | 2,060 | 2,909 | 2,472 | 3,490 | 3,490 | 103% | 2 | - | 3,400 | 103% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 3,400 | 2,209 | 1,800 | 2,651 | 2,160 | 2,651 | 78% | 2,803 | 2,284 | 3,364 | 2,741 | 3,364 | 99% | 2,849 | 2,391 | 3,419 | 2,869 | 3,419 | 101% | 2 | - | 3,400 | 101% |
| | | WB | 2 | 3,400 | 1,890 | 2,278 | 2,268 | 2,734 | 2,734 | 80% | 2,398 | 2,891 | 2,878 | 3,469 | 3,469 | 102% | 2,505 | 2,936 | 3,006 | 3,524 | 3,524 | 104% | 2 | - | 3,400 | 104% |
| | Tourle Street north of Industrial Drive | NB | 2 | 3,400 | 1,563 | 1,517 | 1,876 | 1,820 | 1,876 | 55% | 1,983 | 1,925 | 2,380 | 2,310 | 2,380 | 70% | 2,339 | 2,077 | 2,807 | 2,493 | 2,807 | 83% | 2 | - | 3,400 | 83% |
| | | SB | 2 | 3,400 | 1,517 | 1,563 | 1,820 | 1,876 | 1,876 | 55% | 1,925 | 1,983 | 2,310 | 2,380 | 2,380 | 70% | 2,077 | 2,339 | 2,493 | 2,807 | 2,807 | 83% | 2 | - | 3,400 | 83% |
| | Industrial Drive west of Tourle Street | EB | 2 | 3,400 | 2,234 | 1,779 | 2,681 | 2,135 | 2,681 | 79% | 2,835 | 2,258 | 3,402 | 2,709 | 3,402 | 100% | 3,084 | 2,364 | 3,701 | 2,837 | 3,701 | 109% | 2 | - | 3,400 | 109% |
| | | WB | 2 | 3,400 | 1,869 | 2,303 | 2,243 | 2,764 | 2,764 | 81% | 2,372 | 2,922 | 2,846 | 3,507 | 3,507 | 103% | 2,478 | 3,171 | 2,974 | 3,806 | 3,806 | 112% | 2 | - | 3,400 | 112% |

| | | | | 2020 Base Case | | | | | | 2041 Excluding SAP Traffic | | | | | | 2041 Including SAP Traffic | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Intersection** | **Midblock** | **Direction** | **Lanes per direction** | **Current Capacity** | **2020 AM Total Volume** | **2020 PM Total Volume** | **2020 AM PCUs** | **2020 PM PCUs** | **2020 Critical Peak Volume [PCU]** | **2020 Flow/ Capacity Ratio** | **2041 AM Total Volume** | **2041 PM Total Volume** | **2041 AM PCUs** | **2041 PM PCUs** | **2041 Critical Peak Volume [PCU]** | **2041 Flow/ Capacity Ratio Excluding SAP** | **2041 AM Total Volume** | **2041 PM Total Volume** | **2041 AM PCUs** | **2041 PM PCUs** | **2041 Critical Peak Volume [PCU]** | **2041 Flow/ Capacity Ratio Including SAP** |
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of Williamtown Drive | NB | 2 | 3,400 | 1,411 | 1,617 | 1,693 | 1,940 | 1,940 | 57% | 1,619 | 1,503 | 1,942 | 1,803 | 1,942 | 57% | 1,664 | 1,614 | 1,996 | 1,936 | 1,996 | 59% |
| | | SB | 2 | 3,400 | 1,475 | 1,143 | 1,770 | 1,372 | 1,770 | 52% | 998 | 889 | 1,197 | 1,067 | 1,197 | 35% | 1,109 | 905 | 1,330 | 1,085 | 1,330 | 39% |
| | Williamtown Drive west of Nelson Bay Road | EB | 1 | 1,700 | 111 | 412 | 133 | 494 | 494 | 29% | 166 | 568 | 199 | 682 | 682 | 40% | 356 | 1,003 | 427 | 1,204 | 1,204 | 71% |
| | | WB | 1 | 1,700 | 261 | 157 | 313 | 188 | 313 | 18% | 361 | 231 | 433 | 277 | 433 | 25% | 804 | 421 | 965 | 505 | 965 | 57% |
| | Nelson Bay Road south of Williamtown Drive | NB | 2 | 3,400 | 1,540 | 1,550 | 1,848 | 1,860 | 1,860 | 55% | 1,815 | 1,515 | 2,178 | 1,818 | 2,178 | 64% | 2,224 | 1,680 | 2,669 | 2,016 | 2,669 | 78% |
| | | SB | 2 | 3,400 | 1,454 | 1,331 | 1,745 | 1,598 | 1,745 | 51% | 999 | 1,142 | 1,199 | 1,370 | 1,370 | 40% | 1,220 | 1,554 | 1,465 | 1,864 | 1,864 | 55% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage Tree Road | NB | 2 | 3,400 | 1,391 | 1,463 | 1,669 | 1,756 | 1,756 | 52% | 1,531 | 1,263 | 1,837 | 1,516 | 1,837 | 54% | 1,974 | 1,453 | 2,369 | 1,744 | 2,369 | 70% |
| | | SB | 2 | 3,400 | 1,379 | 1,286 | 1,655 | 1,543 | 1,655 | 49% | 877 | 1,192 | 1,052 | 1,430 | 1,430 | 42% | 1,194 | 1,471 | 1,432 | 1,765 | 1,765 | 52% |
| | Cabbage Tree Road west of Nelson Bay Road | EB | 1 | 1,700 | 413 | 547 | 496 | 656 | 656 | 39% | 562 | 662 | 674 | 794 | 794 | 47% | 926 | 1,049 | 1,111 | 1,259 | 1,259 | 74% |
| | | WB | 1 | 1,700 | 364 | 365 | 437 | 438 | 438 | 26% | 403 | 362 | 484 | 434 | 484 | 28% | 957 | 599 | 1,148 | 719 | 1,148 | 68% |
| | Nelson Bay Road south of Cabbage Tree Road | NB | 1 | 1,700 | 1,147 | 1,082 | 1,376 | 1,298 | 1,376 | 81% | 1,492 | 1,370 | 1,790 | 1,644 | 1,790 | 105% | 2,046 | 1,567 | 2,455 | 1,881 | 2,455 | 144% |
| | | SB | 1 | 1,700 | 1,216 | 1,254 | 1,459 | 1,505 | 1,505 | 89% | 1,566 | 1,455 | 1,879 | 1,746 | 1,879 | 111% | 1,803 | 2,009 | 2,164 | 2,411 | 2,411 | 142% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 3,400 | 183 | 168 | 220 | 202 | 220 | 6% | 443 | 607 | 532 | 728 | 728 | 21% | 443 | 607 | 532 | 728 | 728 | 21% |
| | | WB | 2 | 3,400 | 215 | 335 | 258 | 402 | 402 | 12% | 1,012 | 614 | 1,214 | 737 | 1,214 | 36% | 1,012 | 581 | 1,214 | 697 | 1,214 | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access Road | EB | 1 | 1,700 | 496 | 662 | 595 | 794 | 794 | 47% | 630 | 840 | 755 | 1,008 | 1,008 | 59% | 879 | 1,184 | 1,055 | 1,421 | 1,421 | 84% |
| | | WB | 1 | 1,700 | 479 | 448 | 574 | 538 | 574 | 34% | 608 | 569 | 729 | 682 | 729 | 43% | 952 | 818 | 1,142 | 981 | 1,142 | 67% |
| | SAP Access Road north of Cabbage Tree Road | NB | 1 | 1,700 | 166 | 71 | 199 | 85 | 199 | 12% | 211 | 90 | 253 | 108 | 253 | 15% | 709 | 304 | 851 | 365 | 851 | 50% |
| | | SB | 1 | 1,700 | 71 | 166 | 85 | 199 | 199 | 12% | 90 | 211 | 108 | 253 | 253 | 15% | 304 | 709 | 365 | 851 | 851 | 50% |
| | Cabbage Tree Road west of SAP Access Road | EB | 1 | 1,700 | 524 | 594 | 629 | 713 | 713 | 42% | 665 | 754 | 798 | 905 | 905 | 53% | 997 | 897 | 1,196 | 1,076 | 1,196 | 70% |
| | | WB | 1 | 1,700 | 411 | 476 | 494 | 571 | 571 | 34% | 522 | 604 | 627 | 725 | 725 | 43% | 665 | 936 | 798 | 1,123 | 1,123 | 66% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 1,700 | 341 | 615 | 409 | 738 | 738 | 43% | 466 | 841 | 559 | 1,009 | 1,009 | 59% | 909 | 1,031 | 1,091 | 1,237 | 1,237 | 73% |
| | | WB | 1 | 1,700 | 411 | 327 | 493 | 392 | 493 | 29% | 562 | 447 | 674 | 536 | 674 | 40% | 752 | 890 | 902 | 1,068 | 1,068 | 63% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 3,400 | 23 | 233 | 28 | 280 | 280 | 8% | 31 | 319 | 38 | 382 | 382 | 11% | 31 | 319 | 38 | 382 | 382 | 11% |
| | | SB | 2 | 3,400 | 151 | 22 | 181 | 26 | 181 | 5% | 206 | 30 | 248 | 36 | 248 | 7% | 206 | 30 | 248 | 36 | 248 | 7% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 1,700 | 442 | 557 | 530 | 668 | 668 | 39% | 604 | 761 | 725 | 914 | 914 | 54% | 1,047 | 951 | 1,257 | 1,142 | 1,257 | 74% |
| | | WB | 1 | 1,700 | 384 | 480 | 461 | 576 | 576 | 34% | 525 | 656 | 630 | 787 | 787 | 46% | 715 | 1,099 | 858 | 1,319 | 1,319 | 78% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 3,400 | 1,181 | 1,714 | 1,417 | 2,057 | 2,057 | 60% | 1,614 | 2,343 | 1,937 | 2,812 | 2,812 | 83% | 1,614 | 2,343 | 1,937 | 2,812 | 2,812 | 83% |
| | | WB | 2 | 3,400 | 1,181 | 926 | 1,417 | 1,111 | 1,417 | 42% | 1,614 | 1,266 | 1,937 | 1,519 | 1,937 | 57% | 1,614 | 1,266 | 1,937 | 1,519 | 1,937 | 57% |
| | Tomago Road south of Pacific Highway | NB | 1 | 1,700 | 358 | 1,153 | 430 | 1,384 | 1,384 | 81% | 489 | 1,576 | 587 | 1,891 | 1,891 | 111% | 679 | 2,019 | 815 | 2,423 | 2,423 | 143% |
| | | SB | 1 | 1,700 | 823 | 548 | 988 | 658 | 988 | 58% | 1,125 | 749 | 1,350 | 899 | 1,350 | 79% | 1,568 | 939 | 1,882 | 1,127 | 1,882 | 111% |
| | Pacific Highway west of Tomago Road | EB | 2 | 3,400 | 1,992 | 2,251 | 2,390 | 2,701 | 2,701 | 79% | 2,723 | 3,077 | 3,268 | 3,693 | 3,693 | 109% | 3,166 | 3,267 | 3,800 | 3,921 | 3,921 | 115% |
| | | WB | 2 | 3,400 | 1,527 | 2,068 | 1,832 | 2,482 | 2,482 | 73% | 2,087 | 2,827 | 2,505 | 3,392 | 3,392 | 100% | 2,277 | 3,270 | 2,733 | 3,924 | 3,924 | 115% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 3,400 | 2,209 | 1,800 | 2,651 | 2,160 | 2,651 | 78% | 3,020 | 2,461 | 3,624 | 2,953 | 3,624 | 107% | 3,091 | 2,627 | 3,709 | 3,152 | 3,709 | 109% |
| | | WB | 2 | 3,400 | 1,890 | 2,278 | 2,268 | 2,734 | 2,734 | 80% | 2,584 | 3,114 | 3,100 | 3,737 | 3,737 | 110% | 2,750 | 3,185 | 3,300 | 3,822 | 3,822 | 112% |
| | Tourle Street north of Industrial Drive | NB | 2 | 3,400 | 1,563 | 1,517 | 1,876 | 1,820 | 1,876 | 55% | 2,137 | 2,074 | 2,564 | 2,489 | 2,564 | 75% | 2,691 | 2,311 | 3,229 | 2,773 | 3,229 | 95% |
| | | SB | 2 | 3,400 | 1,517 | 1,563 | 1,820 | 1,876 | 1,876 | 55% | 2,074 | 2,137 | 2,489 | 2,564 | 2,564 | 75% | 2,311 | 2,691 | 2,773 | 3,229 | 3,229 | 95% |
| | Industrial Drive west of Tourle Street | EB | 2 | 3,400 | 2,234 | 1,779 | 2,681 | 2,135 | 2,681 | 79% | 3,054 | 2,432 | 3,665 | 2,918 | 3,665 | 108% | 3,442 | 2,598 | 4,130 | 3,118 | 4,130 | 121% |
| | | WB | 2 | 3,400 | 1,869 | 2,303 | 2,243 | 2,764 | 2,764 | 81% | 2,555 | 3,148 | 3,066 | 3,778 | 3,778 | 111% | 2,721 | 3,536 | 3,265 | 4,243 | 4,243 | 125% |

# Appendix C
# SIDRA Intersection Traffic Results



# MOVEMENT SUMMARY

## Site: Ind-Tou [PM | Industrial Dr - Tourle St | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 150 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1589 | 10.0 | 1673 | 10.0 | 0.737 | 21.0 | LOS C | 41.9 | 318.6 | 0.76 | 0.71 | 0.76 | 44.7 |
| 6 | R2 | 926 | 10.0 | 975 | 10.0 | * 1.081 | 168.2 | LOS F | 60.4 | 458.7 | 1.00 | 1.24 | 1.79 | 15.6 |
| Approach | | 2515 | 10.0 | 2647 | 10.0 | 1.081 | 75.2 | LOS E | 60.4 | 458.7 | 0.85 | 0.90 | 1.14 | 26.5 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 836 | 10.0 | 880 | 10.0 | 0.508 | 10.5 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 9 | R2 | 1060 | 10.0 | 1116 | 10.0 | * 1.073 | 160.1 | LOS F | 68.1 | 517.9 | 1.00 | 1.22 | 1.74 | 16.2 |
| Approach | | 1896 | 10.0 | 1996 | 10.0 | 1.073 | 94.1 | LOS F | 68.1 | 517.9 | 0.56 | 0.91 | 0.97 | 23.5 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 813 | 10.0 | 856 | 10.0 | 0.494 | 8.7 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 11 | T1 | 1189 | 10.0 | 1252 | 10.0 | * 1.068 | 148.8 | LOS F | 75.4 | 573.3 | 1.00 | 1.45 | 1.70 | 17.2 |
| Approach | | 2002 | 10.0 | 2107 | 10.0 | 1.068 | 91.9 | LOS F | 75.4 | 573.3 | 0.59 | 1.07 | 1.01 | 23.9 |
| All Vehicles | | 6413 | 10.0 | 6751 | 10.0 | 1.081 | 86.0 | LOS F | 75.4 | 573.3 | 0.68 | 0.96 | 1.05 | 24.7 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Wil-Nel [AM | Williamtown Dr - Nelson Bay Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Williamtown Dr - Nelson Bay Rd | 2045 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 661 | 10.0 | 696 | 10.0 | 0.553 | 7.2 | LOS A | 7.6 | 57.9 | 0.48 | 0.72 | 0.48 | 51.8 |
| 2 | T1 | 1563 | 10.0 | 1645 | 10.0 | * 0.710 | 18.8 | LOS B | 16.1 | 122.0 | 0.87 | 0.78 | 0.89 | 46.2 |
| Approach | | 2224 | 10.0 | 2341 | 10.0 | 0.710 | 15.4 | LOS B | 16.1 | 122.0 | 0.76 | 0.76 | 0.77 | 47.8 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 965 | 10.0 | 1016 | 10.0 | 0.422 | 6.1 | LOS A | 8.2 | 62.3 | 0.51 | 0.45 | 0.51 | 54.5 |
| 9b | R3 | 143 | 10.0 | 151 | 10.0 | * 0.691 | 40.9 | LOS D | 5.4 | 41.1 | 1.00 | 0.87 | 1.15 | 35.5 |
| Approach | | 1108 | 10.0 | 1166 | 10.0 | 0.691 | 10.6 | LOS B | 8.2 | 62.3 | 0.57 | 0.51 | 0.59 | 50.9 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 101 | 10.0 | 106 | 10.0 | 0.150 | 11.8 | LOS B | 1.4 | 10.3 | 0.48 | 0.69 | 0.48 | 50.0 |
| 29a | R1 | 255 | 10.0 | 268 | 10.0 | * 0.526 | 36.2 | LOS D | 4.5 | 34.2 | 0.97 | 0.79 | 0.97 | 37.0 |
| Approach | | 356 | 10.0 | 375 | 10.0 | 0.526 | 29.3 | LOS C | 4.5 | 34.2 | 0.83 | 0.76 | 0.83 | 40.0 |
| All Vehicles | | 3688 | 10.0 | 3882 | 10.0 | 0.710 | 15.3 | LOS B | 16.1 | 122.0 | 0.71 | 0.69 | 0.72 | 47.8 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 60.5 | 40.5 | 0.67 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 63.0 | 43.8 | 0.70 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 53.9 | 31.9 | 0.59 |
| All Pedestrians | | 150 | 158 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 59.1 | 38.7 | 0.66 |

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

# MOVEMENT SUMMARY

## Site: Wil-Nel [PM | Williamtown Dr - Nelson Bay Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Williamtown Dr - Nelson Bay Rd | 2045 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 345 | 10.0 | 363 | 10.0 | 0.281 | 5.9 | LOS A | 2.1 | 16.1 | 0.29 | 0.65 | 0.29 | 52.8 |
| 2 | T1 | 1335 | 10.0 | 1405 | 10.0 | * 0.758 | 24.7 | LOS C | 15.6 | 118.8 | 0.94 | 0.88 | 1.02 | 42.9 |
| Approach | | 1680 | 10.0 | 1768 | 10.0 | 0.758 | 20.8 | LOS C | 15.6 | 118.8 | 0.81 | 0.83 | 0.87 | 44.6 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 829 | 10.0 | 873 | 10.0 | 0.463 | 11.7 | LOS B | 9.5 | 72.5 | 0.68 | 0.60 | 0.68 | 50.3 |
| 9b | R3 | 76 | 10.0 | 80 | 10.0 | * 0.612 | 43.8 | LOS D | 2.9 | 22.4 | 1.00 | 0.81 | 1.12 | 34.5 |
| Approach | | 905 | 10.0 | 953 | 10.0 | 0.612 | 14.4 | LOS B | 9.5 | 72.5 | 0.71 | 0.62 | 0.72 | 48.4 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 278 | 10.0 | 293 | 10.0 | 0.349 | 12.3 | LOS B | 4.3 | 32.7 | 0.55 | 0.73 | 0.55 | 49.7 |
| 29a | R1 | 725 | 10.0 | 763 | 10.0 | * 0.747 | 31.8 | LOS C | 12.9 | 97.8 | 0.97 | 0.90 | 1.07 | 38.7 |
| Approach | | 1003 | 10.0 | 1056 | 10.0 | 0.747 | 26.4 | LOS C | 12.9 | 97.8 | 0.85 | 0.85 | 0.93 | 41.3 |
| All Vehicles | | 3588 | 10.0 | 3777 | 10.0 | 0.758 | 20.8 | LOS C | 15.6 | 118.8 | 0.80 | 0.78 | 0.85 | 44.5 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 60.5 | 40.5 | 0.67 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 63.0 | 43.8 | 0.70 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 53.9 | 31.9 | 0.59 |
| All Pedestrians | | 150 | 158 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 59.1 | 38.7 | 0.66 |

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

# MOVEMENT SUMMARY

## Site: Nel-Cab [AM | Nelson Bay Rd - Cabbage Tree Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Nelson Bay Rd - Cabbage Tree Rd | 2045 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 419 | 10.0 | 441 | 10.0 | 0.348 | 9.2 | LOS A | 6.1 | 46.3 | 0.39 | 0.67 | 0.39 | 51.2 |
| 2 | T1 | 1258 | 10.0 | 1324 | 10.0 | * 0.718 | 13.9 | LOS A | 13.2 | 100.2 | 0.86 | 0.75 | 0.86 | 49.4 |
| 3 | R2 | 369 | 10.0 | 388 | 10.0 | * 0.862 | 61.4 | LOS E | 10.7 | 81.6 | 1.00 | 0.98 | 1.36 | 29.7 |
| Approach | | 2046 | 10.0 | 2154 | 10.0 | 0.862 | 21.5 | LOS B | 13.2 | 100.2 | 0.79 | 0.77 | 0.85 | 44.4 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 723 | 10.0 | 761 | 10.0 | 0.702 | 21.8 | LOS B | 17.1 | 130.3 | 0.72 | 0.88 | 0.72 | 45.6 |
| 5 | T1 | 224 | 10.0 | 236 | 10.0 | * 0.920 | 64.9 | LOS E | 6.9 | 52.7 | 1.00 | 1.04 | 1.63 | 29.3 |
| 6 | R2 | 65 | 10.0 | 68 | 10.0 | 0.493 | 56.3 | LOS D | 3.4 | 25.9 | 1.00 | 0.76 | 1.00 | 31.2 |
| Approach | | 1012 | 10.0 | 1065 | 10.0 | 0.920 | 33.6 | LOS C | 17.1 | 130.3 | 0.80 | 0.91 | 0.94 | 39.5 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 47 | 10.0 | 49 | 10.0 | 0.038 | 7.7 | LOS A | 0.4 | 3.4 | 0.26 | 0.60 | 0.26 | 52.3 |
| 8 | T1 | 833 | 10.0 | 877 | 10.0 | * 0.868 | 47.9 | LOS D | 19.9 | 151.6 | 0.98 | 0.98 | 1.19 | 33.9 |
| 9 | R2 | 314 | 10.0 | 331 | 10.0 | 0.733 | 54.8 | LOS D | 8.4 | 63.6 | 1.00 | 0.87 | 1.14 | 31.4 |
| Approach | | 1194 | 10.0 | 1257 | 10.0 | 0.868 | 48.1 | LOS D | 19.9 | 151.6 | 0.96 | 0.94 | 1.14 | 33.7 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 652 | 10.0 | 686 | 10.0 | 0.895 | 43.7 | LOS D | 35.3 | 267.9 | 0.97 | 1.00 | 1.18 | 36.1 |
| 11 | T1 | 27 | 10.0 | 28 | 10.0 | 0.222 | 50.1 | LOS D | 1.4 | 10.5 | 0.98 | 0.70 | 0.98 | 33.2 |
| 12 | R2 | 247 | 10.0 | 260 | 10.0 | * 0.937 | 74.0 | LOS F | 7.9 | 60.2 | 1.00 | 1.08 | 1.69 | 27.1 |
| Approach | | 926 | 10.0 | 975 | 10.0 | 0.937 | 52.0 | LOS D | 35.3 | 267.9 | 0.98 | 1.01 | 1.31 | 33.1 |
| All Vehicles | | 5178 | 10.0 | 5451 | 10.0 | 0.937 | 35.4 | LOS C | 35.3 | 267.9 | 0.86 | 0.88 | 1.02 | 38.3 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Nel-Cab [PM | Nelson Bay Rd - Cabbage Tree Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Nelson Bay Rd - Cabbage Tree Rd | 2045 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 209 | 10.0 | 220 | 10.0 | 0.170 | 7.6 | LOS A | 1.9 | 14.7 | 0.29 | 0.63 | 0.29 | 52.4 |
| 2 | T1 | 885 | 10.0 | 932 | 10.0 | 0.664 | 28.2 | LOS B | 15.0 | 114.0 | 0.90 | 0.77 | 0.90 | 41.3 |
| 3 | R2 | 473 | 10.0 | 498 | 10.0 | * 0.808 | 49.9 | LOS D | 11.7 | 89.3 | 1.00 | 0.94 | 1.22 | 32.7 |
| Approach | | 1567 | 10.0 | 1649 | 10.0 | 0.808 | 32.0 | LOS C | 15.0 | 114.0 | 0.85 | 0.80 | 0.91 | 39.3 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 477 | 10.0 | 502 | 10.0 | 0.595 | 24.5 | LOS B | 14.4 | 109.4 | 0.77 | 0.81 | 0.77 | 44.5 |
| 5 | T1 | 80 | 10.0 | 84 | 10.0 | 0.345 | 46.4 | LOS D | 1.9 | 14.4 | 0.99 | 0.73 | 0.99 | 34.3 |
| 6 | R2 | 24 | 10.0 | 25 | 10.0 | 0.087 | 40.5 | LOS C | 1.0 | 7.3 | 0.88 | 0.70 | 0.88 | 35.9 |
| Approach | | 581 | 10.0 | 612 | 10.0 | 0.595 | 28.2 | LOS B | 14.4 | 109.4 | 0.81 | 0.79 | 0.81 | 42.4 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 83 | 10.0 | 87 | 10.0 | 0.072 | 8.6 | LOS A | 0.9 | 7.1 | 0.32 | 0.62 | 0.32 | 51.7 |
| 8 | T1 | 1078 | 10.0 | 1135 | 10.0 | * 0.805 | 33.5 | LOS C | 20.9 | 158.8 | 0.95 | 0.89 | 1.04 | 39.1 |
| 9 | R2 | 310 | 10.0 | 326 | 10.0 | 0.529 | 43.1 | LOS D | 6.7 | 51.1 | 0.96 | 0.80 | 0.96 | 34.8 |
| Approach | | 1471 | 10.0 | 1548 | 10.0 | 0.805 | 34.2 | LOS C | 20.9 | 158.8 | 0.91 | 0.86 | 0.98 | 38.6 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 544 | 10.0 | 573 | 10.0 | 0.548 | 13.4 | LOS A | 11.3 | 85.6 | 0.58 | 0.74 | 0.58 | 49.5 |
| 11 | T1 | 51 | 10.0 | 54 | 10.0 | * 0.440 | 46.9 | LOS D | 2.4 | 18.6 | 1.00 | 0.74 | 1.00 | 34.2 |
| 12 | R2 | 454 | 10.0 | 478 | 10.0 | * 0.827 | 51.8 | LOS D | 11.5 | 87.5 | 1.00 | 0.96 | 1.26 | 32.4 |
| Approach | | 1049 | 10.0 | 1104 | 10.0 | 0.827 | 31.6 | LOS C | 11.5 | 87.5 | 0.78 | 0.84 | 0.90 | 39.6 |
| All Vehicles | | 4668 | 10.0 | 4914 | 10.0 | 0.827 | 32.1 | LOS C | 20.9 | 158.8 | 0.85 | 0.83 | 0.92 | 39.5 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Cab-SAP [AM | Cabbage Tree Rd - SAP | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Cabbage Tree Rd - SAP | 2041 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 538 | 10.0 | 566 | 10.0 | 0.464 | 17.4 | LOS B | 6.7 | 51.0 | 0.84 | 0.71 | 0.84 | 46.6 |
| 6 | R2 | 414 | 10.0 | 436 | 10.0 | * 0.754 | 27.8 | LOS C | 12.6 | 95.8 | 0.95 | 0.90 | 1.07 | 40.2 |
| Approach | | 952 | 10.0 | 1002 | 10.0 | 0.754 | 21.9 | LOS C | 12.6 | 95.8 | 0.89 | 0.79 | 0.94 | 43.6 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 177 | 10.0 | 186 | 10.0 | 0.171 | 9.2 | LOS A | 1.9 | 14.3 | 0.45 | 0.66 | 0.45 | 51.1 |
| 9 | R2 | 127 | 10.0 | 134 | 10.0 | * 0.771 | 39.1 | LOS D | 4.4 | 33.5 | 1.00 | 0.92 | 1.34 | 35.8 |
| Approach | | 304 | 10.0 | 320 | 10.0 | 0.771 | 21.7 | LOS C | 4.4 | 33.5 | 0.68 | 0.77 | 0.82 | 43.4 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 296 | 10.0 | 312 | 10.0 | 0.385 | 17.0 | LOS B | 6.0 | 45.7 | 0.69 | 0.77 | 0.69 | 45.7 |
| 11 | T1 | 701 | 10.0 | 738 | 10.0 | * 0.756 | 25.0 | LOS C | 11.0 | 83.8 | 0.98 | 0.92 | 1.12 | 42.5 |
| Approach | | 997 | 10.0 | 1049 | 10.0 | 0.756 | 22.6 | LOS C | 11.0 | 83.8 | 0.89 | 0.87 | 0.99 | 43.4 |
| All Vehicles | | 2253 | 10.0 | 2372 | 10.0 | 0.771 | 22.2 | LOS C | 12.6 | 95.8 | 0.86 | 0.82 | 0.95 | 43.5 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |
| All Pedestrians | | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |

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

# MOVEMENT SUMMARY

## Site: Cab-SAP [PM | Cabbage Tree Rd - SAP | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Cabbage Tree Rd - SAP | 2041 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 641 | 10.0 | 675 | 10.0 | * 0.850 | 32.0 | LOS C | 11.5 | 87.3 | 1.00 | 1.04 | 1.37 | 39.3 |
| 6 | R2 | 177 | 10.0 | 186 | 10.0 | 0.496 | 28.9 | LOS C | 5.0 | 38.1 | 0.92 | 0.80 | 0.92 | 39.7 |
| Approach | | 818 | 10.0 | 861 | 10.0 | 0.850 | 31.3 | LOS C | 11.5 | 87.3 | 0.98 | 0.99 | 1.27 | 39.4 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 414 | 10.0 | 436 | 10.0 | 0.406 | 10.4 | LOS B | 5.3 | 40.1 | 0.54 | 0.72 | 0.54 | 50.3 |
| 9 | R2 | 296 | 10.0 | 312 | 10.0 | * 0.830 | 36.5 | LOS D | 10.4 | 78.8 | 1.00 | 0.98 | 1.33 | 36.8 |
| Approach | | 710 | 10.0 | 747 | 10.0 | 0.830 | 21.3 | LOS C | 10.4 | 78.8 | 0.73 | 0.82 | 0.87 | 43.6 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 127 | 10.0 | 134 | 10.0 | 0.132 | 11.7 | LOS B | 1.8 | 13.4 | 0.48 | 0.69 | 0.48 | 48.9 |
| 11 | T1 | 770 | 10.0 | 811 | 10.0 | * 0.830 | 28.7 | LOS C | 13.3 | 100.8 | 1.00 | 1.02 | 1.28 | 40.8 |
| Approach | | 897 | 10.0 | 944 | 10.0 | 0.830 | 26.3 | LOS C | 13.3 | 100.8 | 0.93 | 0.97 | 1.16 | 41.8 |
| All Vehicles | | 2425 | 10.0 | 2553 | 10.0 | 0.850 | 26.5 | LOS C | 13.3 | 100.8 | 0.89 | 0.93 | 1.11 | 41.4 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |
| All Pedestrians | | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |

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

# MOVEMENT SUMMARY

## Site: Tom-Wes [AM | Tomago Rd - WesTrack | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Tomago Rd - WesTrack | 2041 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 25 | 10.0 | 26 | 10.0 | 0.020 | 21.7 | LOS C | 0.3 | 2.4 | 0.64 | 0.66 | 0.64 | 43.1 |
| 3 | R2 | 7 | 10.0 | 7 | 10.0 | 0.049 | 43.4 | LOS D | 0.3 | 2.1 | 0.94 | 0.66 | 0.94 | 34.5 |
| Approach | | 32 | 10.0 | 34 | 10.0 | 0.049 | 26.5 | LOS C | 0.3 | 2.4 | 0.70 | 0.66 | 0.70 | 40.9 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 62 | 10.0 | 65 | 10.0 | * 0.430 | 45.7 | LOS D | 2.6 | 19.7 | 0.99 | 0.76 | 0.99 | 33.6 |
| 5 | T1 | 690 | 10.0 | 726 | 10.0 | * 0.429 | 15.5 | LOS B | 9.5 | 72.4 | 0.72 | 0.62 | 0.72 | 47.8 |
| Approach | | 752 | 10.0 | 792 | 10.0 | 0.430 | 18.0 | LOS B | 9.5 | 72.4 | 0.74 | 0.63 | 0.74 | 46.2 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 902 | 10.0 | 949 | 10.0 | 0.340 | 3.2 | LOS A | 5.9 | 44.6 | 0.34 | 0.31 | 0.34 | 57.0 |
| 12 | R2 | 145 | 10.0 | 153 | 10.0 | * 0.293 | 26.9 | LOS C | 2.1 | 15.8 | 0.93 | 0.75 | 0.93 | 40.8 |
| Approach | | 1047 | 10.0 | 1102 | 10.0 | 0.340 | 6.5 | LOS A | 5.9 | 44.6 | 0.43 | 0.37 | 0.43 | 54.0 |
| All Vehicles | | 1831 | 10.0 | 1927 | 10.0 | 0.430 | 11.6 | LOS B | 9.5 | 72.4 | 0.56 | 0.48 | 0.56 | 50.3 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Tom-Wes [PM | Tomago Rd - WesTrack | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Tomago Rd - WesTrack | 2041 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 216 | 10.0 | 227 | 10.0 | 0.148 | 18.2 | LOS B | 2.3 | 17.6 | 0.63 | 0.72 | 0.63 | 45.0 |
| 3 | R2 | 103 | 10.0 | 108 | 10.0 | * 0.625 | 41.5 | LOS D | 3.9 | 29.6 | 1.00 | 0.82 | 1.10 | 35.1 |
| Approach | | 319 | 10.0 | 336 | 10.0 | 0.625 | 25.7 | LOS C | 3.9 | 29.6 | 0.75 | 0.75 | 0.78 | 41.2 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 7 | 10.0 | 7 | 10.0 | 0.043 | 37.7 | LOS D | 0.2 | 1.8 | 0.93 | 0.66 | 0.93 | 36.3 |
| 5 | T1 | 883 | 10.0 | 929 | 10.0 | * 0.658 | 19.4 | LOS B | 13.3 | 101.0 | 0.88 | 0.77 | 0.88 | 45.6 |
| Approach | | 890 | 10.0 | 937 | 10.0 | 0.658 | 19.5 | LOS B | 13.3 | 101.0 | 0.88 | 0.77 | 0.88 | 45.5 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 928 | 10.0 | 977 | 10.0 | 0.366 | 3.8 | LOS A | 6.1 | 46.6 | 0.40 | 0.35 | 0.40 | 56.5 |
| 12 | R2 | 23 | 10.0 | 24 | 10.0 | * 0.041 | 21.2 | LOS C | 0.2 | 1.9 | 0.86 | 0.67 | 0.86 | 43.6 |
| Approach | | 951 | 10.0 | 1001 | 10.0 | 0.366 | 4.2 | LOS A | 6.1 | 46.6 | 0.41 | 0.36 | 0.41 | 56.1 |
| All Vehicles | | 2160 | 10.0 | 2274 | 10.0 | 0.658 | 13.7 | LOS B | 13.3 | 101.0 | 0.65 | 0.59 | 0.66 | 48.8 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [AM | Pacific Hwy - Tomago Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Pacific Hwy - Tomago Rd | 2041 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 679 | 10.0 | 715 | 10.0 | 0.259 | 19.3 | LOS B | 6.3 | 47.6 | 0.58 | 0.74 | 0.58 | 44.4 |
| Approach | | 679 | 10.0 | 715 | 10.0 | 0.259 | 19.3 | LOS B | 6.3 | 47.6 | 0.58 | 0.74 | 0.58 | 44.4 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 16 | 10.0 | 17 | 10.0 | 0.028 | 28.3 | LOS C | 0.5 | 4.0 | 0.68 | 0.67 | 0.68 | 40.0 |
| 5 | T1 | 1598 | 10.0 | 1682 | 10.0 | * 0.875 | 42.9 | LOS D | 30.1 | 228.5 | 1.00 | 1.04 | 1.19 | 35.3 |
| Approach | | 1614 | 10.0 | 1699 | 10.0 | 0.875 | 42.7 | LOS D | 30.1 | 228.5 | 1.00 | 1.04 | 1.19 | 35.3 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1614 | 10.0 | 1699 | 10.0 | 0.527 | 0.7 | LOS A | 4.7 | 35.6 | 0.24 | 0.15 | 0.24 | 58.9 |
| 12 | R2 | 1552 | 10.0 | 1634 | 10.0 | * 0.889 | 39.7 | LOS D | 42.8 | 324.9 | 0.96 | 0.97 | 1.12 | 35.9 |
| Approach | | 3166 | 10.0 | 3333 | 10.0 | 0.889 | 19.8 | LOS B | 42.8 | 324.9 | 0.60 | 0.55 | 0.67 | 44.8 |
| All Vehicles | | 5459 | 10.0 | 5746 | 10.0 | 0.889 | 26.5 | LOS C | 42.8 | 324.9 | 0.71 | 0.72 | 0.81 | 41.4 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [PM | Pacific Hwy - Tomago Rd | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Pacific Hwy - Tomago Rd | 2041 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 2019 | 10.0 | 2125 | 10.0 | * 0.850 | 27.7 | LOS C | 32.3 | 245.2 | 0.80 | 0.90 | 0.95 | 40.3 |
| Approach | | 2019 | 10.0 | 2125 | 10.0 | 0.850 | 27.7 | LOS C | 32.3 | 245.2 | 0.80 | 0.90 | 0.95 | 40.3 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 15 | 10.0 | 16 | 10.0 | 0.033 | 28.5 | LOS C | 0.5 | 3.4 | 0.76 | 0.68 | 0.76 | 39.9 |
| 5 | T1 | 1251 | 10.0 | 1317 | 10.0 | 0.872 | 39.8 | LOS D | 19.7 | 149.8 | 1.00 | 1.06 | 1.29 | 36.3 |
| Approach | | 1266 | 10.0 | 1333 | 10.0 | 0.872 | 39.7 | LOS D | 19.7 | 149.8 | 1.00 | 1.05 | 1.29 | 36.4 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 2343 | 10.0 | 2466 | 10.0 | * 0.792 | 1.5 | LOS A | 11.5 | 87.0 | 0.50 | 0.31 | 0.50 | 57.7 |
| 12 | R2 | 924 | 10.0 | 973 | 10.0 | 0.488 | 16.5 | LOS B | 11.2 | 85.1 | 0.63 | 0.77 | 0.63 | 46.3 |
| Approach | | 3267 | 10.0 | 3439 | 10.0 | 0.792 | 5.7 | LOS A | 11.5 | 87.0 | 0.54 | 0.44 | 0.54 | 54.0 |
| All Vehicles | | 6552 | 10.0 | 6897 | 10.0 | 0.872 | 19.1 | LOS B | 32.3 | 245.2 | 0.71 | 0.70 | 0.81 | 45.1 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [AM | Industrial Dr - Tourle St | 2041 With SAP (Site Folder: 2041 With SAP)]

AM | Industrial Dr - Tourle St | 2041 SAP 100% - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1609 | 10.0 | 1694 | 10.0 | * 0.426 | 7.6 | LOS A | 14.0 | 106.4 | 0.43 | 0.39 | 0.43 | 53.5 |
| 6 | R2 | 1141 | 10.0 | 1201 | 10.0 | 0.919 | 67.0 | LOS E | 44.3 | 336.3 | 1.00 | 1.01 | 1.22 | 29.0 |
| Approach | | 2750 | 10.0 | 2895 | 10.0 | 0.919 | 32.2 | LOS C | 44.3 | 336.3 | 0.67 | 0.65 | 0.76 | 39.6 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 1199 | 10.0 | 1262 | 10.0 | 0.728 | 6.2 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.8 |
| 9 | R2 | 1112 | 10.0 | 1171 | 10.0 | * 0.914 | 80.2 | LOS F | 21.8 | 165.9 | 1.00 | 1.03 | 1.34 | 26.2 |
| Approach | | 2311 | 10.0 | 2433 | 10.0 | 0.914 | 41.8 | LOS D | 21.8 | 165.9 | 0.48 | 0.76 | 0.65 | 35.7 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 1550 | 10.0 | 1632 | 10.0 | 0.471 | 11.2 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 11 | T1 | 1892 | 10.0 | 1992 | 10.0 | 0.906 | 63.5 | LOS E | 35.9 | 272.8 | 1.00 | 1.06 | 1.23 | 29.9 |
| Approach | | 3442 | 10.0 | 3623 | 10.0 | 0.906 | 40.0 | LOS D | 35.9 | 272.8 | 0.55 | 0.82 | 0.67 | 37.5 |
| All Vehicles | | 8503 | 10.0 | 8951 | 10.0 | 0.919 | 38.0 | LOS D | 44.3 | 336.3 | 0.57 | 0.75 | 0.69 | 37.7 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [PM | Industrial Dr - Tourle St | 2041 With SAP (Site Folder: 2041 With SAP)]

PM | Industrial Dr - Tourle St | 2041 SAP 100% - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1986 | 10.0 | 2091 | 10.0 | * 0.586 | 12.6 | LOS B | 22.7 | 172.2 | 0.61 | 0.56 | 0.61 | 49.9 |
| 6 | R2 | 1199 | 10.0 | 1262 | 10.0 | 0.971 | 83.7 | LOS F | 50.7 | 385.6 | 1.00 | 1.11 | 1.41 | 25.7 |
| Approach | | 3185 | 10.0 | 3353 | 10.0 | 0.971 | 39.3 | LOS D | 50.7 | 385.6 | 0.76 | 0.77 | 0.91 | 36.9 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 1141 | 10.0 | 1201 | 10.0 | 0.693 | 6.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.0 |
| 9 | R2 | 1550 | 10.0 | 1632 | 10.0 | * 0.941 | 80.2 | LOS F | 30.1 | 228.9 | 1.00 | 1.07 | 1.39 | 26.5 |
| Approach | | 2691 | 10.0 | 2833 | 10.0 | 0.941 | 48.8 | LOS D | 30.1 | 228.9 | 0.58 | 0.84 | 0.80 | 33.8 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 1112 | 10.0 | 1171 | 10.0 | 0.338 | 7.1 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.4 |
| 11 | T1 | 1486 | 10.0 | 1564 | 10.0 | 0.949 | 76.2 | LOS E | 29.2 | 221.9 | 1.00 | 1.17 | 1.43 | 27.1 |
| Approach | | 2598 | 10.0 | 2735 | 10.0 | 0.949 | 46.6 | LOS D | 29.2 | 221.9 | 0.57 | 0.89 | 0.82 | 34.5 |
| All Vehicles | | 8474 | 10.0 | 8920 | 10.0 | 0.971 | 44.6 | LOS D | 50.7 | 385.6 | 0.64 | 0.83 | 0.85 | 35.1 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Wil-Nel [AM | Williamtown Dr - Nelson Bay Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Williamtown Dr - Nelson Bay Rd | 2045 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 273 | 10.0 | 287 | 10.0 | 0.189 | 6.1 | LOS A | 2.0 | 15.3 | 0.19 | 0.63 | 0.19 | 52.5 |
| 2 | T1 | 1542 | 10.0 | 1623 | 10.0 | * 0.843 | 25.1 | LOS C | 43.9 | 333.8 | 0.85 | 0.81 | 0.89 | 42.4 |
| Approach | | 1815 | 10.0 | 1911 | 10.0 | 0.843 | 22.3 | LOS C | 43.9 | 333.8 | 0.75 | 0.79 | 0.79 | 43.7 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 910 | 10.0 | 958 | 10.0 | 0.341 | 4.7 | LOS A | 8.7 | 65.8 | 0.34 | 0.31 | 0.34 | 55.7 |
| 9b | R3 | 88 | 10.0 | 93 | 10.0 | * 0.607 | 44.7 | LOS D | 4.3 | 32.6 | 1.00 | 0.79 | 1.04 | 33.9 |
| Approach | | 998 | 10.0 | 1051 | 10.0 | 0.607 | 8.2 | LOS A | 8.7 | 65.8 | 0.40 | 0.35 | 0.40 | 52.7 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 77 | 10.0 | 81 | 10.0 | 0.140 | 21.5 | LOS C | 2.4 | 18.4 | 0.57 | 0.72 | 0.57 | 44.3 |
| 29a | R1 | 89 | 10.0 | 94 | 10.0 | * 0.393 | 57.2 | LOS E | 5.2 | 39.2 | 0.96 | 0.78 | 0.96 | 30.4 |
| Approach | | 166 | 10.0 | 175 | 10.0 | 0.393 | 40.6 | LOS D | 5.2 | 39.2 | 0.78 | 0.75 | 0.78 | 35.6 |
| All Vehicles | | 2979 | 10.0 | 3136 | 10.0 | 0.843 | 18.6 | LOS B | 43.9 | 333.8 | 0.64 | 0.64 | 0.66 | 45.7 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 82.9 | 37.2 | 0.45 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 85.4 | 40.5 | 0.47 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 76.3 | 28.6 | 0.37 |
| All Pedestrians | | 150 | 158 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 81.5 | 35.4 | 0.43 |

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: Wil-Nel [PM | Williamtown Dr - Nelson Bay Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Williamtown Dr - Nelson Bay Rd | 2045 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 130 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 179 | 10.0 | 188 | 10.0 | 0.120 | 5.7 | LOS A | 1.0 | 7.7 | 0.15 | 0.61 | 0.15 | 52.8 |
| 2 | T1 | 1280 | 10.0 | 1347 | 10.0 | * 0.892 | 46.5 | LOS D | 47.7 | 362.2 | 0.96 | 0.98 | 1.10 | 34.0 |
| Approach | | 1459 | 10.0 | 1536 | 10.0 | 0.892 | 41.5 | LOS D | 47.7 | 362.2 | 0.86 | 0.94 | 0.98 | 35.5 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 805 | 10.0 | 847 | 10.0 | 0.371 | 12.7 | LOS B | 12.9 | 98.1 | 0.53 | 0.47 | 0.53 | 49.6 |
| 9b | R3 | 52 | 10.0 | 55 | 10.0 | * 0.389 | 40.1 | LOS D | 2.1 | 15.9 | 0.98 | 0.75 | 0.98 | 35.4 |
| Approach | | 857 | 10.0 | 902 | 10.0 | 0.389 | 14.3 | LOS B | 12.9 | 98.1 | 0.55 | 0.49 | 0.55 | 48.4 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 223 | 10.0 | 235 | 10.0 | 0.304 | 21.8 | LOS C | 7.9 | 60.1 | 0.60 | 0.74 | 0.60 | 44.1 |
| 29a | R1 | 337 | 10.0 | 355 | 10.0 | * 0.905 | 68.1 | LOS E | 24.7 | 188.1 | 0.95 | 0.98 | 1.25 | 27.9 |
| Approach | | 560 | 10.0 | 589 | 10.0 | 0.905 | 49.7 | LOS D | 24.7 | 188.1 | 0.81 | 0.89 | 0.99 | 32.7 |
| All Vehicles | | 2876 | 10.0 | 3027 | 10.0 | 0.905 | 35.0 | LOS C | 47.7 | 362.2 | 0.76 | 0.79 | 0.86 | 37.9 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 59.3 | LOS E | 0.2 | 0.2 | 0.96 | 0.96 | 87.9 | 37.2 | 0.42 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 59.3 | LOS E | 0.2 | 0.2 | 0.96 | 0.96 | 90.4 | 40.5 | 0.45 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 59.3 | LOS E | 0.2 | 0.2 | 0.96 | 0.96 | 81.3 | 28.6 | 0.35 |
| All Pedestrians | | 150 | 158 | 59.3 | LOS E | 0.2 | 0.2 | 0.96 | 0.96 | 86.5 | 35.4 | 0.41 |

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: Nel-Cab [AM | Nelson Bay Rd - Cabbage Tree Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Nelson Bay Rd - Cabbage Tree Rd | 2045 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 87 | 10.0 | 92 | 10.0 | *0.916 | 57.7 | LOS E | 40.7 | 309.0 | 1.00 | 1.08 | 1.25 | 31.7 |
| 2 | T1 | 1036 | 10.0 | 1091 | 10.0 | 0.916 | 51.7 | LOS D | 40.7 | 309.0 | 0.97 | 1.08 | 1.24 | 32.5 |
| 3 | R2 | 369 | 10.0 | 388 | 10.0 | *0.913 | 66.5 | LOS E | 25.0 | 190.3 | 1.00 | 1.02 | 1.34 | 28.5 |
| Approach | | 1492 | 10.0 | 1571 | 10.0 | 0.916 | 55.7 | LOS D | 40.7 | 309.0 | 0.98 | 1.06 | 1.27 | 31.3 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 723 | 10.0 | 761 | 10.0 | 0.789 | 34.9 | LOS C | 23.4 | 178.1 | 0.85 | 0.94 | 0.85 | 42.0 |
| 5 | T1 | 224 | 10.0 | 236 | 10.0 | *0.921 | 64.5 | LOS E | 10.9 | 82.6 | 0.99 | 0.97 | 1.37 | 29.3 |
| 6 | R2 | 65 | 10.0 | 68 | 10.0 | 0.724 | 67.1 | LOS E | 4.0 | 30.4 | 1.00 | 0.84 | 1.22 | 28.3 |
| Approach | | 1012 | 10.0 | 1065 | 10.0 | 0.921 | 43.5 | LOS D | 23.4 | 178.1 | 0.89 | 0.94 | 0.99 | 37.3 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 47 | 10.0 | 49 | 10.0 | 0.344 | 30.9 | LOS C | 9.0 | 68.6 | 0.75 | 0.67 | 0.75 | 40.9 |
| 8 | T1 | 738 | 10.0 | 777 | 10.0 | 0.863 | 40.0 | LOS C | 32.5 | 247.2 | 0.92 | 0.91 | 1.03 | 37.1 |
| 9 | R2 | 92 | 10.0 | 97 | 10.0 | 0.164 | 40.8 | LOS C | 3.0 | 22.4 | 0.82 | 0.73 | 0.82 | 35.6 |
| Approach | | 877 | 10.0 | 923 | 10.0 | 0.863 | 39.6 | LOS C | 32.5 | 247.2 | 0.90 | 0.88 | 0.99 | 37.1 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 430 | 10.0 | 453 | 10.0 | 0.677 | 34.5 | LOS C | 19.7 | 149.9 | 0.87 | 0.84 | 0.87 | 37.5 |
| 11 | T1 | 27 | 10.0 | 28 | 10.0 | 0.155 | 50.3 | LOS D | 1.4 | 10.9 | 0.95 | 0.69 | 0.95 | 33.0 |
| 12 | R2 | 105 | 10.0 | 111 | 10.0 | 0.849 | 71.7 | LOS F | 4.9 | 37.2 | 1.00 | 0.87 | 1.32 | 27.8 |
| Approach | | 562 | 10.0 | 592 | 10.0 | 0.849 | 42.2 | LOS C | 19.7 | 149.9 | 0.90 | 0.84 | 0.96 | 35.0 |
| All Vehicles | | 3943 | 10.0 | 4151 | 10.0 | 0.921 | 47.1 | LOS D | 40.7 | 309.0 | 0.93 | 0.96 | 1.09 | 34.4 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Nel-Cab [PM | Nelson Bay Rd - Cabbage Tree Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Nelson Bay Rd - Cabbage Tree Rd | 2045 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 67 | 10.0 | 71 | 10.0 | 0.645 | 35.4 | LOS C | 19.7 | 149.7 | 0.87 | 0.78 | 0.87 | 39.2 |
| 2 | T1 | 790 | 10.0 | 832 | 10.0 | 0.645 | 29.7 | LOS C | 19.8 | 150.8 | 0.88 | 0.78 | 0.88 | 40.3 |
| 3 | R2 | 473 | 10.0 | 498 | 10.0 | * 1.059 | 135.1 | LOS F | 48.6 | 369.0 | 1.00 | 1.30 | 1.93 | 18.4 |
| Approach | | 1330 | 10.0 | 1400 | 10.0 | 1.059 | 67.5 | LOS E | 48.6 | 369.0 | 0.92 | 0.96 | 1.25 | 28.3 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 477 | 10.0 | 502 | 10.0 | 0.612 | 34.8 | LOS C | 16.1 | 122.2 | 0.79 | 0.93 | 0.79 | 40.2 |
| 5 | T1 | 80 | 10.0 | 84 | 10.0 | * 0.603 | 59.0 | LOS E | 3.4 | 26.1 | 1.00 | 0.76 | 1.06 | 30.6 |
| 6 | R2 | 24 | 10.0 | 25 | 10.0 | 0.267 | 63.3 | LOS E | 1.4 | 10.6 | 0.99 | 0.71 | 0.99 | 29.2 |
| Approach | | 581 | 10.0 | 612 | 10.0 | 0.612 | 39.3 | LOS C | 16.1 | 122.2 | 0.83 | 0.90 | 0.84 | 38.0 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 83 | 10.0 | 87 | 10.0 | 0.419 | 31.8 | LOS C | 11.4 | 86.9 | 0.78 | 0.71 | 0.78 | 40.3 |
| 8 | T1 | 856 | 10.0 | 901 | 10.0 | * 1.052 | 100.3 | LOS F | 67.1 | 510.1 | 0.95 | 1.37 | 1.59 | 22.7 |
| 9 | R2 | 215 | 10.0 | 226 | 10.0 | 0.323 | 38.2 | LOS C | 6.9 | 52.2 | 0.81 | 0.76 | 0.81 | 36.5 |
| Approach | | 1154 | 10.0 | 1215 | 10.0 | 1.052 | 83.8 | LOS F | 67.1 | 510.1 | 0.91 | 1.21 | 1.39 | 25.3 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 449 | 10.0 | 473 | 10.0 | 0.726 | 35.0 | LOS C | 20.9 | 159.0 | 0.89 | 0.85 | 0.89 | 37.3 |
| 11 | T1 | 51 | 10.0 | 54 | 10.0 | 0.538 | 58.9 | LOS E | 3.0 | 23.0 | 1.00 | 0.76 | 1.03 | 30.6 |
| 12 | R2 | 122 | 10.0 | 128 | 10.0 | * 0.986 | 87.7 | LOS F | 6.8 | 51.4 | 1.00 | 1.00 | 1.65 | 24.6 |
| Approach | | 622 | 10.0 | 655 | 10.0 | 0.986 | 47.3 | LOS D | 20.9 | 159.0 | 0.92 | 0.87 | 1.05 | 33.3 |
| All Vehicles | | 3687 | 10.0 | 3881 | 10.0 | 1.059 | 64.7 | LOS E | 67.1 | 510.1 | 0.90 | 1.01 | 1.20 | 29.1 |

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Cab-SAP [AM | Cabbage Tree Rd - SAP | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Cabbage Tree Rd - SAP | 2041 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 485 | 10.0 | 511 | 10.0 | * 0.780 | 24.4 | LOS C | 11.7 | 88.7 | 0.94 | 0.87 | 1.08 | 42.9 |
| 6 | R2 | 123 | 10.0 | 129 | 10.0 | 0.280 | 25.0 | LOS C | 3.1 | 23.6 | 0.83 | 0.77 | 0.83 | 41.3 |
| Approach | | 608 | 10.0 | 640 | 10.0 | 0.780 | 24.6 | LOS C | 11.7 | 88.7 | 0.92 | 0.85 | 1.03 | 42.5 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 53 | 10.0 | 56 | 10.0 | 0.553 | 37.1 | LOS D | 2.9 | 22.3 | 0.99 | 0.79 | 1.05 | 36.9 |
| 9 | R2 | 38 | 10.0 | 40 | 10.0 | * 0.553 | 36.1 | LOS D | 2.9 | 22.3 | 0.99 | 0.79 | 1.05 | 36.9 |
| Approach | | 91 | 10.0 | 96 | 10.0 | 0.553 | 36.7 | LOS D | 2.9 | 22.3 | 0.99 | 0.79 | 1.05 | 36.9 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 88 | 10.0 | 93 | 10.0 | 0.100 | 13.1 | LOS B | 1.3 | 10.2 | 0.52 | 0.69 | 0.52 | 48.0 |
| 11 | T1 | 577 | 10.0 | 607 | 10.0 | * 0.742 | 20.4 | LOS C | 12.8 | 97.5 | 0.90 | 0.82 | 0.97 | 45.1 |
| Approach | | 665 | 10.0 | 700 | 10.0 | 0.742 | 19.4 | LOS B | 12.8 | 97.5 | 0.85 | 0.80 | 0.91 | 45.4 |
| All Vehicles | | 1364 | 10.0 | 1436 | 10.0 | 0.780 | 22.9 | LOS C | 12.8 | 97.5 | 0.89 | 0.82 | 0.97 | 43.4 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |
| All Pedestrians | | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |

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

# MOVEMENT SUMMARY

## Site: Cab-SAP [PM | Cabbage Tree Rd - SAP | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Cabbage Tree Rd - SAP | 2041 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 516 | 10.0 | 543 | 10.0 | * 0.885 | 31.0 | LOS C | 14.6 | 111.3 | 0.96 | 1.00 | 1.30 | 39.8 |
| 6 | R2 | 53 | 10.0 | 56 | 10.0 | 0.129 | 24.9 | LOS C | 1.3 | 9.9 | 0.81 | 0.73 | 0.81 | 41.4 |
| Approach | | 569 | 10.0 | 599 | 10.0 | 0.885 | 30.4 | LOS C | 14.6 | 111.3 | 0.95 | 0.97 | 1.25 | 40.0 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 123 | 10.0 | 129 | 10.0 | 0.865 | 42.9 | LOS D | 7.8 | 59.4 | 1.00 | 1.03 | 1.52 | 35.0 |
| 9 | R2 | 88 | 10.0 | 93 | 10.0 | * 0.865 | 41.4 | LOS D | 7.8 | 59.4 | 1.00 | 1.03 | 1.52 | 35.0 |
| Approach | | 211 | 10.0 | 222 | 10.0 | 0.865 | 42.3 | LOS D | 7.8 | 59.4 | 1.00 | 1.03 | 1.52 | 35.0 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 38 | 10.0 | 40 | 10.0 | 0.042 | 12.3 | LOS B | 0.5 | 4.1 | 0.48 | 0.66 | 0.48 | 48.5 |
| 11 | T1 | 717 | 10.0 | 755 | 10.0 | * 0.903 | 29.5 | LOS C | 20.9 | 158.9 | 0.94 | 1.02 | 1.27 | 40.5 |
| Approach | | 755 | 10.0 | 795 | 10.0 | 0.903 | 28.7 | LOS C | 20.9 | 158.9 | 0.92 | 1.01 | 1.23 | 40.9 |
| All Vehicles | | 1535 | 10.0 | 1616 | 10.0 | 0.903 | 31.2 | LOS C | 20.9 | 158.9 | 0.94 | 1.00 | 1.28 | 39.6 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |
| All Pedestrians | | 50 | 53 | 24.4 | LOS C | 0.1 | 0.1 | 0.90 | 0.90 | 46.4 | 28.6 | 0.62 |

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

# MOVEMENT SUMMARY

## Site: Tom-Wes [AM | Tomago Rd - WesTrack | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Tomago Rd - WesTrack | 2041 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 25 | 10.0 | 26 | 10.0 | 0.017 | 17.6 | LOS B | 0.2 | 1.9 | 0.58 | 0.65 | 0.58 | 45.5 |
| 3 | R2 | 7 | 10.0 | 7 | 10.0 | 0.043 | 37.7 | LOS D | 0.2 | 1.8 | 0.93 | 0.66 | 0.93 | 36.4 |
| Approach | | 32 | 10.0 | 34 | 10.0 | 0.043 | 22.0 | LOS C | 0.2 | 1.9 | 0.66 | 0.65 | 0.66 | 43.1 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 62 | 10.0 | 65 | 10.0 | * 0.376 | 39.7 | LOS D | 2.2 | 17.0 | 0.97 | 0.75 | 0.97 | 35.6 |
| 5 | T1 | 500 | 10.0 | 526 | 10.0 | * 0.373 | 17.1 | LOS B | 6.5 | 49.6 | 0.76 | 0.64 | 0.76 | 47.1 |
| Approach | | 562 | 10.0 | 592 | 10.0 | 0.376 | 19.6 | LOS B | 6.5 | 49.6 | 0.79 | 0.66 | 0.79 | 45.5 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 459 | 10.0 | 483 | 10.0 | 0.181 | 3.4 | LOS A | 2.6 | 19.4 | 0.33 | 0.28 | 0.33 | 57.1 |
| 12 | R2 | 145 | 10.0 | 153 | 10.0 | * 0.257 | 22.2 | LOS C | 1.7 | 12.6 | 0.90 | 0.74 | 0.90 | 43.1 |
| Approach | | 604 | 10.0 | 636 | 10.0 | 0.257 | 7.9 | LOS A | 2.6 | 19.4 | 0.47 | 0.39 | 0.47 | 52.9 |
| All Vehicles | | 1198 | 10.0 | 1261 | 10.0 | 0.376 | 13.8 | LOS B | 6.5 | 49.6 | 0.62 | 0.52 | 0.62 | 48.9 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Tom-Wes [PM | Tomago Rd - WesTrack | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Tomago Rd - WesTrack | 2041 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 216 | 10.0 | 227 | 10.0 | 0.123 | 13.6 | LOS B | 1.7 | 12.6 | 0.53 | 0.70 | 0.53 | 47.9 |
| 3 | R2 | 103 | 10.0 | 108 | 10.0 | * 0.469 | 33.4 | LOS C | 3.1 | 23.9 | 0.97 | 0.78 | 0.97 | 38.0 |
| Approach | | 319 | 10.0 | 336 | 10.0 | 0.469 | 20.0 | LOS C | 3.1 | 23.9 | 0.67 | 0.72 | 0.67 | 44.2 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 7 | 10.0 | 7 | 10.0 | 0.032 | 31.0 | LOS C | 0.2 | 1.5 | 0.89 | 0.66 | 0.89 | 38.9 |
| 5 | T1 | 440 | 10.0 | 463 | 10.0 | * 0.474 | 21.0 | LOS C | 5.9 | 44.8 | 0.89 | 0.74 | 0.89 | 44.9 |
| Approach | | 447 | 10.0 | 471 | 10.0 | 0.474 | 21.1 | LOS C | 5.9 | 44.8 | 0.89 | 0.73 | 0.89 | 44.8 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 738 | 10.0 | 777 | 10.0 | 0.318 | 5.3 | LOS A | 4.8 | 36.6 | 0.45 | 0.39 | 0.45 | 55.8 |
| 12 | R2 | 23 | 10.0 | 24 | 10.0 | * 0.035 | 17.0 | LOS B | 0.2 | 1.3 | 0.83 | 0.66 | 0.83 | 45.8 |
| Approach | | 761 | 10.0 | 801 | 10.0 | 0.318 | 5.6 | LOS A | 4.8 | 36.6 | 0.46 | 0.40 | 0.46 | 55.5 |
| All Vehicles | | 1527 | 10.0 | 1607 | 10.0 | 0.474 | 13.2 | LOS B | 5.9 | 44.8 | 0.63 | 0.57 | 0.63 | 49.4 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [AM | Pacific Hwy - Tomago Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Pacific Hwy - Tomago Rd | 2041 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 489 | 10.0 | 515 | 10.0 | 0.398 | 33.0 | LOS C | 10.2 | 77.2 | 0.78 | 0.79 | 0.78 | 38.1 |
| Approach | | 489 | 10.0 | 515 | 10.0 | 0.398 | 33.0 | LOS C | 10.2 | 77.2 | 0.78 | 0.79 | 0.78 | 38.1 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 16 | 10.0 | 17 | 10.0 | 0.019 | 21.9 | LOS C | 0.4 | 3.3 | 0.51 | 0.65 | 0.51 | 44.5 |
| 5 | T1 | 1598 | 10.0 | 1682 | 10.0 | * 0.887 | 35.1 | LOS D | 46.7 | 354.5 | 0.97 | 0.98 | 1.09 | 38.1 |
| Approach | | 1614 | 10.0 | 1699 | 10.0 | 0.887 | 35.0 | LOS C | 46.7 | 354.5 | 0.96 | 0.98 | 1.08 | 38.1 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1614 | 10.0 | 1699 | 10.0 | 0.521 | 0.7 | LOS A | 4.7 | 35.4 | 0.22 | 0.14 | 0.22 | 59.0 |
| 12 | R2 | 1109 | 10.0 | 1167 | 10.0 | * 0.903 | 57.3 | LOS E | 36.2 | 275.2 | 1.00 | 0.99 | 1.23 | 30.7 |
| Approach | | 2723 | 10.0 | 2866 | 10.0 | 0.903 | 23.7 | LOS C | 36.2 | 275.2 | 0.54 | 0.48 | 0.63 | 42.9 |
| All Vehicles | | 4826 | 10.0 | 5080 | 10.0 | 0.903 | 28.4 | LOS C | 46.7 | 354.5 | 0.70 | 0.68 | 0.80 | 40.7 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [PM | Pacific Hwy - Tomago Rd | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Pacific Hwy - Tomago Rd | 2041 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 1576 | 10.0 | 1659 | 10.0 | * 0.957 | 62.3 | LOS E | 55.5 | 422.0 | 1.00 | 1.07 | 1.37 | 29.2 |
| Approach | | 1576 | 10.0 | 1659 | 10.0 | 0.957 | 62.3 | LOS E | 55.5 | 422.0 | 1.00 | 1.07 | 1.37 | 29.2 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 15 | 10.0 | 16 | 10.0 | 0.024 | 27.2 | LOS C | 0.5 | 3.6 | 0.65 | 0.67 | 0.65 | 41.0 |
| 5 | T1 | 1251 | 10.0 | 1317 | 10.0 | * 0.946 | 58.1 | LOS E | 42.4 | 322.3 | 1.00 | 1.20 | 1.38 | 30.7 |
| Approach | | 1266 | 10.0 | 1333 | 10.0 | 0.946 | 57.7 | LOS E | 42.4 | 322.3 | 1.00 | 1.19 | 1.37 | 30.8 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 2343 | 10.0 | 2466 | 10.0 | 0.765 | 1.2 | LOS A | 11.2 | 84.9 | 0.40 | 0.25 | 0.40 | 58.2 |
| 12 | R2 | 734 | 10.0 | 773 | 10.0 | 0.446 | 23.4 | LOS C | 12.1 | 91.6 | 0.69 | 0.78 | 0.69 | 42.5 |
| Approach | | 3077 | 10.0 | 3239 | 10.0 | 0.765 | 6.5 | LOS A | 12.1 | 91.6 | 0.47 | 0.38 | 0.47 | 53.5 |
| All Vehicles | | 5919 | 10.0 | 6231 | 10.0 | 0.957 | 32.3 | LOS C | 55.5 | 422.0 | 0.72 | 0.74 | 0.90 | 38.8 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [AM | Industrial Dr - Tourle St | 2041 No SAP (Site Folder: 2041 No SAP)]

AM | Industrial Dr - Tourle St | 2041 no SAP - New Assumptions
Site Category: 2041 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 140 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1609 | 10.0 | 1694 | 10.0 | 0.432 | 8.7 | LOS A | 15.5 | 118.1 | 0.45 | 0.41 | 0.45 | 52.6 |
| 6 | R2 | 975 | 10.0 | 1026 | 10.0 | * 0.987 | 102.5 | LOS F | 48.3 | 367.2 | 1.00 | 1.10 | 1.45 | 22.4 |
| Approach | | 2584 | 10.0 | 2720 | 10.0 | 0.987 | 44.1 | LOS D | 48.3 | 367.2 | 0.66 | 0.67 | 0.82 | 34.8 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 1128 | 10.0 | 1187 | 10.0 | 0.685 | 107.6 | LOS F | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.0 |
| 9 | R2 | 946 | 10.0 | 996 | 10.0 | * 0.957 | 95.4 | LOS F | 28.8 | 218.5 | 1.00 | 1.06 | 1.43 | 23.3 |
| Approach | | 2074 | 10.0 | 2183 | 10.0 | 0.957 | 102.0 | LOS F | 28.8 | 218.5 | 0.46 | 0.76 | 0.65 | 33.8 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 1162 | 10.0 | 1223 | 10.0 | 0.706 | 24.4 | LOS C | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.9 |
| 11 | T1 | 1892 | 10.0 | 1992 | 10.0 | * 0.976 | 84.7 | LOS F | 60.3 | 458.1 | 1.00 | 1.19 | 1.36 | 25.3 |
| Approach | | 3054 | 10.0 | 3215 | 10.0 | 0.976 | 61.7 | LOS E | 60.3 | 458.1 | 0.62 | 0.93 | 0.84 | 31.7 |
| All Vehicles | | 7712 | 10.0 | 8118 | 10.0 | 0.987 | 66.7 | LOS E | 60.3 | 458.1 | 0.59 | 0.80 | 0.78 | 33.3 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [PM | Industrial Dr - Tourle St | 2041 No SAP (Site Folder: 2041 No SAP)]

PM | Industrial Dr - Tourle St | 2041 no SAP - New Assumptions
Site Category: 2041 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 150 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1986 | 10.0 | 2091 | 10.0 | 0.560 | 13.0 | LOS B | 25.7 | 195.4 | 0.56 | 0.52 | 0.56 | 49.5 |
| 6 | R2 | 1128 | 10.0 | 1187 | 10.0 | * 0.988 | 103.4 | LOS F | 59.2 | 449.6 | 1.00 | 1.09 | 1.40 | 22.3 |
| Approach | | 3114 | 10.0 | 3278 | 10.0 | 0.988 | 45.8 | LOS D | 59.2 | 449.6 | 0.72 | 0.72 | 0.86 | 34.3 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 975 | 10.0 | 1026 | 10.0 | 0.592 | 11.4 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.2 |
| 9 | R2 | 1162 | 10.0 | 1223 | 10.0 | * 0.980 | 107.2 | LOS F | 39.5 | 300.5 | 1.00 | 1.08 | 1.44 | 21.7 |
| Approach | | 2137 | 10.0 | 2249 | 10.0 | 0.980 | 63.5 | LOS E | 39.5 | 300.5 | 0.54 | 0.82 | 0.78 | 29.9 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 946 | 10.0 | 996 | 10.0 | 0.574 | 12.7 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.2 |
| 11 | T1 | 1486 | 10.0 | 1564 | 10.0 | * 0.971 | 91.8 | LOS F | 49.2 | 373.9 | 1.00 | 1.17 | 1.36 | 24.1 |
| Approach | | 2432 | 10.0 | 2560 | 10.0 | 0.971 | 61.0 | LOS E | 49.2 | 373.9 | 0.61 | 0.92 | 0.83 | 30.8 |
| All Vehicles | | 7683 | 10.0 | 8087 | 10.0 | 0.988 | 55.5 | LOS E | 59.2 | 449.6 | 0.64 | 0.81 | 0.83 | 31.8 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Wil-Nel [AM | Williamtown Dr - Nelson Bay Rd | 2020 Base (Site Folder: 2020 Base Year)]

AM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 90 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 181 | 1 | 191 | 0.6 | 0.122 | 5.9 | LOS A | 1.0 | 7.3 | 0.21 | 0.62 | 0.21 | 52.9 |
| 2 | T1 | 1359 | 56 | 1431 | 4.1 | * 0.871 | 33.1 | LOS C | 34.4 | 249.6 | 0.96 | 1.00 | 1.13 | 38.8 |
| Approach | | 1540 | 57 | 1621 | 3.7 | 0.871 | 29.9 | LOS C | 34.4 | 249.6 | 0.87 | 0.95 | 1.02 | 40.1 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 1395 | 43 | 1468 | 3.1 | 0.540 | 6.5 | LOS A | 14.9 | 107.2 | 0.51 | 0.46 | 0.51 | 54.2 |
| 9b | R3 | 80 | 0 | 84 | 0.0 | * 0.389 | 29.7 | LOS C | 2.5 | 17.3 | 0.95 | 0.76 | 0.95 | 39.6 |
| Approach | | 1475 | 43 | 1553 | 2.9 | 0.540 | 7.7 | LOS A | 14.9 | 107.2 | 0.53 | 0.48 | 0.53 | 53.1 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 52 | 0 | 55 | 0.0 | 0.072 | 15.7 | LOS B | 1.1 | 7.4 | 0.52 | 0.69 | 0.52 | 47.7 |
| 29a | R1 | 59 | 5 | 62 | 8.5 | * 0.221 | 41.4 | LOS D | 2.5 | 18.4 | 0.91 | 0.74 | 0.91 | 35.0 |
| Approach | | 111 | 5 | 117 | 4.5 | 0.221 | 29.4 | LOS C | 2.5 | 18.4 | 0.73 | 0.72 | 0.73 | 40.1 |
| All Vehicles | | 3126 | 105 | 3291 | 3.4 | 0.871 | 19.4 | LOS B | 34.4 | 249.6 | 0.71 | 0.72 | 0.78 | 45.3 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 67.9 | 37.2 | 0.55 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 70.4 | 40.5 | 0.57 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 61.3 | 28.6 | 0.47 |
| All Pedestrians | | 150 | 158 | 39.3 | LOS D | 0.1 | 0.1 | 0.94 | 0.94 | 66.5 | 35.4 | 0.53 |

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: Wil-Nel [PM | Williamtown Dr - Nelson Bay Rd | 2020 Base (Site Folder: 2020 Base Year)]

PM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 100 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 112 | 5 | 118 | 4.5 | 0.075 | 5.6 | LOS A | 0.5 | 3.6 | 0.16 | 0.61 | 0.16 | 53.0 |
| 2 | T1 | 1438 | 28 | 1514 | 1.9 | * 0.820 | 25.9 | LOS C | 33.9 | 241.6 | 0.91 | 0.86 | 0.96 | 42.0 |
| Approach | | 1550 | 33 | 1632 | 2.1 | 0.820 | 24.4 | LOS C | 33.9 | 241.6 | 0.85 | 0.85 | 0.90 | 42.7 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 1098 | 24 | 1156 | 2.2 | 0.412 | 5.5 | LOS A | 10.7 | 76.2 | 0.42 | 0.38 | 0.42 | 55.0 |
| 9b | R3 | 45 | 0 | 47 | 0.0 | * 0.243 | 33.1 | LOS C | 1.6 | 11.1 | 0.94 | 0.74 | 0.94 | 38.2 |
| Approach | | 1143 | 24 | 1203 | 2.1 | 0.412 | 6.6 | LOS A | 10.7 | 76.2 | 0.44 | 0.39 | 0.44 | 54.1 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 179 | 1 | 188 | 0.6 | 0.263 | 17.9 | LOS B | 4.7 | 32.9 | 0.59 | 0.74 | 0.59 | 46.4 |
| 29a | R1 | 233 | 0 | 245 | 0.0 | * 0.855 | 57.6 | LOS E | 13.3 | 93.0 | 1.00 | 0.97 | 1.29 | 30.4 |
| Approach | | 412 | 1 | 434 | 0.2 | 0.855 | 40.4 | LOS D | 13.3 | 93.0 | 0.82 | 0.87 | 0.99 | 35.8 |
| All Vehicles | | 3105 | 58 | 3268 | 1.9 | 0.855 | 20.0 | LOS B | 33.9 | 241.6 | 0.70 | 0.68 | 0.74 | 45.0 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 72.9 | 37.2 | 0.51 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 75.4 | 40.5 | 0.54 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 66.3 | 28.6 | 0.43 |
| All Pedestrians | | 150 | 158 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 71.5 | 35.4 | 0.50 |

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: Nel-Cab [AM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base (Site Folder: 2020 Base Year)]

AM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 AM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 63 | 4 | 66 | 6.3 | 0.577 | 6.8 | LOS A | 5.1 | 36.8 | 0.73 | 0.69 | 0.78 | 52.8 |
| 2 | T1 | 1011 | 31 | 1064 | 3.1 | 0.577 | 7.0 | LOS A | 5.1 | 36.8 | 0.74 | 0.73 | 0.80 | 54.2 |
| 3 | R2 | 73 | 0 | 77 | 0.0 | 0.577 | 13.0 | LOS B | 5.1 | 36.2 | 0.75 | 0.77 | 0.82 | 54.3 |
| Approach | | 1147 | 35 | 1207 | 3.1 | 0.577 | 7.4 | LOS A | 5.1 | 36.8 | 0.74 | 0.73 | 0.80 | 54.2 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 79 | 0 | 83 | 0.0 | 0.503 | 17.9 | LOS B | 3.3 | 23.2 | 0.90 | 1.03 | 1.16 | 47.6 |
| 5 | T1 | 70 | 0 | 74 | 0.0 | 0.503 | 14.5 | LOS B | 3.3 | 23.2 | 0.90 | 1.03 | 1.16 | 48.9 |
| 6 | R2 | 66 | 0 | 69 | 0.0 | 0.503 | 20.2 | LOS C | 3.3 | 23.2 | 0.90 | 1.03 | 1.16 | 49.2 |
| Approach | | 215 | 0 | 226 | 0.0 | 0.503 | 17.5 | LOS B | 3.3 | 23.2 | 0.90 | 1.03 | 1.16 | 48.5 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 84 | 0 | 88 | 0.0 | 0.481 | 5.0 | LOS A | 3.6 | 26.0 | 0.52 | 0.50 | 0.52 | 54.0 |
| 8 | T1 | 1064 | 35 | 1120 | 3.3 | 0.676 | 6.4 | LOS A | 6.9 | 50.1 | 0.59 | 0.53 | 0.59 | 54.8 |
| 9 | R2 | 231 | 13 | 243 | 5.6 | 0.676 | 10.8 | LOS B | 6.9 | 50.1 | 0.63 | 0.55 | 0.63 | 54.5 |
| Approach | | 1379 | 48 | 1452 | 3.5 | 0.676 | 7.1 | LOS A | 6.9 | 50.1 | 0.59 | 0.53 | 0.59 | 54.7 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 314 | 26 | 331 | 8.3 | 0.500 | 9.2 | LOS A | 3.3 | 24.6 | 0.86 | 0.98 | 1.02 | 51.9 |
| 11 | T1 | 26 | 2 | 27 | 7.7 | 0.232 | 9.5 | LOS A | 1.1 | 7.9 | 0.78 | 0.91 | 0.78 | 50.8 |
| 12 | R2 | 73 | 0 | 77 | 0.0 | 0.232 | 14.7 | LOS B | 1.1 | 7.9 | 0.78 | 0.91 | 0.78 | 51.3 |
| Approach | | 413 | 28 | 435 | 6.8 | 0.500 | 10.1 | LOS B | 3.3 | 24.6 | 0.84 | 0.96 | 0.96 | 51.7 |
| All Vehicles | | 3154 | 111 | 3320 | 3.5 | 0.676 | 8.3 | LOS A | 6.9 | 50.1 | 0.70 | 0.69 | 0.76 | 53.7 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: Nel-Cab [PM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base (Site Folder: 2020 Base Year)]

PM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 PM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] veh/h | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 51 | 4 | 54 | 7.8 | 0.558 | 6.9 | LOS A | 4.8 | 34.7 | 0.74 | 0.69 | 0.79 | 52.7 |
| 2 | T1 | 980 | 26 | 1032 | 2.7 | 0.558 | 7.1 | LOS A | 4.8 | 34.7 | 0.75 | 0.73 | 0.80 | 54.3 |
| 3 | R2 | 51 | 0 | 54 | 0.0 | 0.558 | 13.0 | LOS B | 4.8 | 34.0 | 0.75 | 0.77 | 0.82 | 54.4 |
| Approach | | 1082 | 30 | 1139 | 2.8 | 0.558 | 7.3 | LOS A | 4.8 | 34.7 | 0.75 | 0.73 | 0.80 | 54.2 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 144 | 0 | 152 | 0.0 | 0.741 | 24.7 | LOS C | 6.6 | 46.3 | 0.96 | 1.20 | 1.63 | 44.2 |
| 5 | T1 | 119 | 0 | 125 | 0.0 | 0.741 | 21.2 | LOS C | 6.6 | 46.3 | 0.96 | 1.20 | 1.63 | 45.3 |
| 6 | R2 | 72 | 0 | 76 | 0.0 | 0.741 | 26.8 | LOS C | 6.6 | 46.3 | 0.96 | 1.20 | 1.63 | 45.5 |
| Approach | | 335 | 0 | 353 | 0.0 | 0.741 | 23.9 | LOS C | 6.6 | 46.3 | 0.96 | 1.20 | 1.63 | 44.8 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 81 | 0 | 85 | 0.0 | 0.455 | 5.0 | LOS A | 3.4 | 23.9 | 0.54 | 0.50 | 0.54 | 53.9 |
| 8 | T1 | 1010 | 9 | 1063 | 0.9 | 0.639 | 6.4 | LOS A | 6.3 | 44.8 | 0.60 | 0.53 | 0.60 | 54.9 |
| 9 | R2 | 195 | 14 | 205 | 7.2 | 0.639 | 10.8 | LOS B | 6.3 | 44.8 | 0.63 | 0.54 | 0.63 | 54.5 |
| Approach | | 1286 | 23 | 1354 | 1.8 | 0.639 | 7.0 | LOS A | 6.3 | 44.8 | 0.60 | 0.53 | 0.60 | 54.8 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 411 | 0 | 433 | 0.0 | 0.598 | 9.7 | LOS A | 4.5 | 31.3 | 0.88 | 1.02 | 1.13 | 51.7 |
| 11 | T1 | 36 | 0 | 38 | 0.0 | 0.302 | 9.1 | LOS A | 1.5 | 10.4 | 0.79 | 0.92 | 0.80 | 51.1 |
| 12 | R2 | 100 | 0 | 105 | 0.0 | 0.302 | 14.7 | LOS B | 1.5 | 10.4 | 0.79 | 0.92 | 0.80 | 51.4 |
| Approach | | 547 | 0 | 576 | 0.0 | 0.598 | 10.5 | LOS B | 4.5 | 31.3 | 0.86 | 1.00 | 1.05 | 51.6 |
| All Vehicles | | 3250 | 53 | 3421 | 1.6 | 0.741 | 9.4 | LOS A | 6.6 | 46.3 | 0.73 | 0.74 | 0.85 | 52.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: Cab-SAP [AM | Cabbage Tree Rd - SAP | 2020 Base (Site Folder: 2020 Base Year)]

AM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 370 | 10.0 | 389 | 10.0 | *0.709 | 25.1 | LOS C | 12.5 | 95.1 | 0.95 | 0.85 | 1.00 | 42.4 |
| 6 | R2 | 33 | 10.0 | 35 | 10.0 | 0.067 | 24.6 | LOS C | 0.9 | 6.5 | 0.74 | 0.71 | 0.74 | 41.3 |
| Approach | | 403 | 10.0 | 424 | 10.0 | 0.709 | 25.1 | LOS C | 12.5 | 95.1 | 0.93 | 0.84 | 0.98 | 42.3 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 14 | 10.0 | 15 | 10.0 | 0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.5 |
| 9 | R2 | 10 | 10.0 | 11 | 10.0 | *0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.4 |
| Approach | | 24 | 10.0 | 25 | 10.0 | 0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.4 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 23 | 10.0 | 24 | 10.0 | 0.026 | 14.0 | LOS B | 0.4 | 3.0 | 0.50 | 0.66 | 0.50 | 47.4 |
| 11 | T1 | 427 | 10.0 | 449 | 10.0 | *0.687 | 21.4 | LOS C | 13.5 | 102.5 | 0.91 | 0.80 | 0.93 | 44.3 |
| Approach | | 450 | 10.0 | 474 | 10.0 | 0.687 | 21.0 | LOS C | 13.5 | 102.5 | 0.89 | 0.80 | 0.90 | 44.5 |
| All Vehicles | | 877 | 10.0 | 923 | 10.0 | 0.709 | 23.4 | LOS C | 13.5 | 102.5 | 0.91 | 0.81 | 0.94 | 43.2 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |
| All Pedestrians | | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |

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: Cab-SAP [PM | Cabbage Tree Rd - SAP | 2020 Base (Site Folder: 2020 Base Year)]

PM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 379 | 10.0 | 399 | 10.0 | * 0.759 | 30.8 | LOS C | 15.3 | 116.0 | 0.97 | 0.90 | 1.06 | 39.8 |
| 6 | R2 | 14 | 10.0 | 15 | 10.0 | 0.030 | 27.6 | LOS C | 0.4 | 3.1 | 0.74 | 0.68 | 0.74 | 40.1 |
| Approach | | 393 | 10.0 | 414 | 10.0 | 0.759 | 30.7 | LOS C | 15.3 | 116.0 | 0.96 | 0.89 | 1.05 | 39.8 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 33 | 10.0 | 35 | 10.0 | 0.046 | 19.4 | LOS B | 0.8 | 5.9 | 0.60 | 0.68 | 0.60 | 44.3 |
| 9 | R2 | 23 | 10.0 | 24 | 10.0 | * 0.186 | 45.7 | LOS D | 1.0 | 7.2 | 0.97 | 0.71 | 0.97 | 33.5 |
| Approach | | 56 | 10.0 | 59 | 10.0 | 0.186 | 30.2 | LOS C | 1.0 | 7.2 | 0.75 | 0.69 | 0.75 | 39.1 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 10 | 10.0 | 11 | 10.0 | 0.011 | 13.8 | LOS B | 0.2 | 1.3 | 0.46 | 0.63 | 0.46 | 47.6 |
| 11 | T1 | 553 | 10.0 | 582 | 10.0 | * 0.775 | 24.2 | LOS C | 20.9 | 159.0 | 0.92 | 0.87 | 0.99 | 42.9 |
| Approach | | 563 | 10.0 | 593 | 10.0 | 0.775 | 24.0 | LOS C | 20.9 | 159.0 | 0.92 | 0.87 | 0.98 | 43.0 |
| All Vehicles | | 1012 | 10.0 | 1065 | 10.0 | 0.775 | 27.0 | LOS C | 20.9 | 159.0 | 0.93 | 0.87 | 0.99 | 41.5 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |
| All Pedestrians | | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |

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: Tom-Wes [AM | Tomago Rd - WesTrack | 2020 Base (Site Folder: 2020 Base Year)]

AM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 18 | 10.0 | 19 | 10.0 | 0.012 | 17.5 | LOS B | 0.2 | 1.4 | 0.58 | 0.64 | 0.58 | 45.5 |
| 3 | R2 | 5 | 10.0 | 5 | 10.0 | 0.030 | 37.6 | LOS D | 0.2 | 1.3 | 0.93 | 0.64 | 0.93 | 36.5 |
| Approach | | 23 | 10.0 | 24 | 10.0 | 0.030 | 21.8 | LOS C | 0.2 | 1.4 | 0.65 | 0.64 | 0.65 | 43.2 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 45 | 10.0 | 47 | 10.0 | * 0.273 | 39.2 | LOS D | 1.6 | 12.2 | 0.96 | 0.74 | 0.96 | 35.7 |
| 5 | T1 | 366 | 10.0 | 385 | 10.0 | * 0.273 | 16.2 | LOS B | 4.6 | 34.6 | 0.73 | 0.60 | 0.73 | 47.5 |
| Approach | | 411 | 10.0 | 433 | 10.0 | 0.273 | 18.7 | LOS B | 4.6 | 34.6 | 0.75 | 0.62 | 0.75 | 45.9 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 336 | 10.0 | 354 | 10.0 | 0.133 | 3.2 | LOS A | 1.8 | 13.6 | 0.32 | 0.27 | 0.32 | 57.2 |
| 12 | R2 | 106 | 10.0 | 112 | 10.0 | * 0.188 | 21.9 | LOS C | 1.2 | 9.0 | 0.89 | 0.73 | 0.89 | 43.2 |
| Approach | | 442 | 10.0 | 465 | 10.0 | 0.188 | 7.7 | LOS A | 1.8 | 13.6 | 0.46 | 0.38 | 0.46 | 53.1 |
| All Vehicles | | 876 | 10.0 | 922 | 10.0 | 0.273 | 13.2 | LOS B | 4.6 | 34.6 | 0.60 | 0.50 | 0.60 | 49.2 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Tom-Wes [PM | Tomago Rd - WesTrack | 2020 Base (Site Folder: 2020 Base Year)]

PM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 158 | 10.0 | 166 | 10.0 | 0.090 | 13.3 | LOS B | 1.2 | 9.1 | 0.51 | 0.69 | 0.51 | 48.0 |
| 3 | R2 | 75 | 10.0 | 79 | 10.0 | * 0.342 | 32.8 | LOS C | 2.2 | 17.0 | 0.95 | 0.76 | 0.95 | 38.3 |
| Approach | | 233 | 10.0 | 245 | 10.0 | 0.342 | 19.6 | LOS B | 2.2 | 17.0 | 0.65 | 0.71 | 0.65 | 44.4 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 5 | 10.0 | 5 | 10.0 | 0.023 | 30.8 | LOS C | 0.1 | 1.1 | 0.89 | 0.64 | 0.89 | 38.9 |
| 5 | T1 | 322 | 10.0 | 339 | 10.0 | * 0.347 | 20.0 | LOS C | 4.1 | 31.4 | 0.85 | 0.69 | 0.85 | 45.4 |
| Approach | | 327 | 10.0 | 344 | 10.0 | 0.347 | 20.2 | LOS C | 4.1 | 31.4 | 0.85 | 0.69 | 0.85 | 45.2 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 540 | 10.0 | 568 | 10.0 | 0.233 | 4.7 | LOS A | 3.3 | 24.9 | 0.42 | 0.36 | 0.42 | 56.1 |
| 12 | R2 | 17 | 10.0 | 18 | 10.0 | * 0.026 | 17.0 | LOS B | 0.1 | 1.0 | 0.83 | 0.65 | 0.83 | 45.9 |
| Approach | | 557 | 10.0 | 586 | 10.0 | 0.233 | 5.0 | LOS A | 3.3 | 24.9 | 0.43 | 0.37 | 0.43 | 55.7 |
| All Vehicles | | 1117 | 10.0 | 1176 | 10.0 | 0.347 | 12.5 | LOS B | 4.1 | 31.4 | 0.60 | 0.53 | 0.60 | 49.7 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [AM | Pacific Hwy - Tomago Rd | 2020 Base (Site Folder: 2020 Base Year)]

AM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 358 | 10.0 | 377 | 10.0 | 0.340 | 20.1 | LOS C | 3.6 | 27.6 | 0.80 | 0.77 | 0.80 | 43.9 |
| Approach | | 358 | 10.0 | 377 | 10.0 | 0.340 | 20.1 | LOS C | 3.6 | 27.6 | 0.80 | 0.77 | 0.80 | 43.9 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 12 | 10.0 | 13 | 10.0 | 0.017 | 15.4 | LOS B | 0.2 | 1.3 | 0.58 | 0.65 | 0.58 | 47.4 |
| 5 | T1 | 1169 | 10.0 | 1231 | 10.0 | * 0.764 | 15.5 | LOS B | 14.3 | 108.6 | 0.90 | 0.88 | 1.02 | 47.8 |
| Approach | | 1181 | 10.0 | 1243 | 10.0 | 0.764 | 15.5 | LOS B | 14.3 | 108.6 | 0.90 | 0.87 | 1.01 | 47.8 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1181 | 10.0 | 1243 | 10.0 | 0.447 | 1.2 | LOS A | 2.9 | 21.9 | 0.39 | 0.26 | 0.39 | 58.2 |
| 12 | R2 | 811 | 10.0 | 854 | 10.0 | * 0.769 | 26.4 | LOS C | 10.8 | 82.2 | 0.96 | 0.93 | 1.14 | 41.1 |
| Approach | | 1992 | 10.0 | 2097 | 10.0 | 0.769 | 11.5 | LOS B | 10.8 | 82.2 | 0.62 | 0.53 | 0.70 | 49.8 |
| All Vehicles | | 3531 | 10.0 | 3717 | 10.0 | 0.769 | 13.7 | LOS B | 14.3 | 108.6 | 0.73 | 0.67 | 0.81 | 48.5 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [PM | Pacific Hwy - Tomago Rd | 2020 Base (Site Folder: 2020 Base Year)]

PM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 1153 | 10.0 | 1214 | 10.0 | * 0.796 | 23.0 | LOS C | 15.1 | 114.7 | 0.92 | 0.93 | 1.10 | 42.5 |
| Approach | | 1153 | 10.0 | 1214 | 10.0 | 0.796 | 23.0 | LOS C | 15.1 | 114.7 | 0.92 | 0.93 | 1.10 | 42.5 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 11 | 10.0 | 12 | 10.0 | 0.021 | 18.9 | LOS B | 0.2 | 1.5 | 0.71 | 0.66 | 0.71 | 44.9 |
| 5 | T1 | 915 | 10.0 | 963 | 10.0 | * 0.822 | 22.6 | LOS C | 13.1 | 99.6 | 0.98 | 1.01 | 1.25 | 43.8 |
| Approach | | 926 | 10.0 | 975 | 10.0 | 0.822 | 22.5 | LOS C | 13.1 | 99.6 | 0.98 | 1.00 | 1.25 | 43.8 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1714 | 10.0 | 1804 | 10.0 | 0.648 | 1.6 | LOS A | 5.5 | 41.6 | 0.51 | 0.33 | 0.51 | 57.7 |
| 12 | R2 | 537 | 10.0 | 565 | 10.0 | 0.371 | 16.3 | LOS B | 4.7 | 35.9 | 0.71 | 0.77 | 0.71 | 46.2 |
| Approach | | 2251 | 10.0 | 2369 | 10.0 | 0.648 | 5.1 | LOS A | 5.5 | 41.6 | 0.56 | 0.44 | 0.56 | 54.5 |
| All Vehicles | | 4330 | 10.0 | 4558 | 10.0 | 0.822 | 13.6 | LOS B | 15.1 | 114.7 | 0.75 | 0.69 | 0.85 | 48.3 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [AM | Industrial Dr - Tourle St | 2020 Base (Site Folder: 2020 Base Year)]

AM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1177 | 10.0 | 1239 | 10.0 | 0.494 | 10.3 | LOS B | 18.3 | 139.3 | 0.52 | 0.47 | 0.52 | 51.4 |
| 6 | R2 | 713 | 10.0 | 751 | 10.0 | * 0.970 | 94.9 | LOS F | 31.7 | 240.8 | 1.00 | 1.08 | 1.48 | 23.3 |
| Approach | | 1890 | 10.0 | 1989 | 10.0 | 0.970 | 42.2 | LOS D | 31.7 | 240.8 | 0.70 | 0.70 | 0.88 | 35.3 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 825 | 10.0 | 868 | 10.0 | 0.501 | 13.9 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 9 | R2 | 692 | 10.0 | 728 | 10.0 | * 0.942 | 84.1 | LOS F | 28.7 | 218.3 | 1.00 | 1.04 | 1.39 | 25.0 |
| Approach | | 1517 | 10.0 | 1597 | 10.0 | 0.942 | 45.9 | LOS D | 28.7 | 218.3 | 0.46 | 0.76 | 0.63 | 35.5 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 850 | 10.0 | 895 | 10.0 | 0.516 | 8.3 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 11 | T1 | 1384 | 10.0 | 1457 | 10.0 | * 0.958 | 69.4 | LOS E | 59.0 | 448.4 | 1.00 | 1.15 | 1.30 | 28.2 |
| Approach | | 2234 | 10.0 | 2352 | 10.0 | 0.958 | 46.1 | LOS D | 59.0 | 448.4 | 0.62 | 0.91 | 0.81 | 34.5 |
| All Vehicles | | 5641 | 10.0 | 5938 | 10.0 | 0.970 | 44.8 | LOS D | 59.0 | 448.4 | 0.60 | 0.80 | 0.78 | 35.0 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [PM | Industrial Dr - Tourle St | 2020 Base (Site Folder: 2020 Base Year)]

PM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 140 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1453 | 10.0 | 1529 | 10.0 | 0.650 | 16.2 | LOS B | 31.4 | 238.5 | 0.67 | 0.61 | 0.67 | 47.5 |
| 6 | R2 | 825 | 10.0 | 868 | 10.0 | * 0.948 | 87.4 | LOS F | 36.9 | 280.5 | 1.00 | 1.03 | 1.35 | 24.5 |
| Approach | | 2278 | 10.0 | 2398 | 10.0 | 0.948 | 42.0 | LOS D | 36.9 | 280.5 | 0.79 | 0.77 | 0.91 | 35.4 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 713 | 10.0 | 751 | 10.0 | 0.433 | 9.2 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.4 |
| 9 | R2 | 850 | 10.0 | 895 | 10.0 | * 0.951 | 88.0 | LOS F | 38.3 | 291.1 | 1.00 | 1.04 | 1.35 | 24.4 |
| Approach | | 1563 | 10.0 | 1645 | 10.0 | 0.951 | 52.0 | LOS D | 38.3 | 291.1 | 0.54 | 0.80 | 0.73 | 32.6 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 692 | 10.0 | 728 | 10.0 | 0.420 | 8.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.4 |
| 11 | T1 | 1087 | 10.0 | 1144 | 10.0 | * 0.931 | 68.9 | LOS E | 46.0 | 349.6 | 1.00 | 1.09 | 1.24 | 28.3 |
| Approach | | 1779 | 10.0 | 1873 | 10.0 | 0.931 | 45.2 | LOS D | 46.0 | 349.6 | 0.61 | 0.87 | 0.76 | 34.8 |
| All Vehicles | | 5620 | 10.0 | 5916 | 10.0 | 0.951 | 45.8 | LOS D | 46.0 | 349.6 | 0.66 | 0.81 | 0.81 | 34.4 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Wil-Nel [AM | Williamtown Dr - Nelson Bay Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 110 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 243 | 10.0 | 256 | 10.0 | 0.170 | 6.1 | LOS A | 1.7 | 13.3 | 0.20 | 0.63 | 0.20 | 52.4 |
| 2 | T1 | 1482 | 10.0 | 1560 | 10.0 | * 0.860 | 29.7 | LOS C | 42.4 | 322.5 | 0.90 | 0.89 | 0.98 | 40.3 |
| Approach | | 1725 | 10.0 | 1816 | 10.0 | 0.860 | 26.4 | LOS C | 42.4 | 322.5 | 0.80 | 0.85 | 0.87 | 41.6 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 1068 | 10.0 | 1124 | 10.0 | 0.412 | 5.4 | LOS A | 10.9 | 82.6 | 0.40 | 0.36 | 0.40 | 55.1 |
| 9b | R3 | 85 | 10.0 | 89 | 10.0 | * 0.538 | 39.1 | LOS D | 3.6 | 27.3 | 0.99 | 0.77 | 0.99 | 35.8 |
| Approach | | 1153 | 10.0 | 1214 | 10.0 | 0.538 | 7.9 | LOS A | 10.9 | 82.6 | 0.44 | 0.39 | 0.44 | 53.0 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 69 | 10.0 | 73 | 10.0 | 0.116 | 20.2 | LOS C | 1.9 | 14.8 | 0.57 | 0.71 | 0.57 | 45.0 |
| 29a | R1 | 79 | 10.0 | 83 | 10.0 | * 0.320 | 51.1 | LOS D | 4.1 | 31.2 | 0.94 | 0.77 | 0.94 | 32.0 |
| Approach | | 148 | 10.0 | 156 | 10.0 | 0.320 | 36.7 | LOS D | 4.1 | 31.2 | 0.76 | 0.74 | 0.76 | 37.1 |
| All Vehicles | | 3026 | 10.0 | 3185 | 10.0 | 0.860 | 19.8 | LOS B | 42.4 | 322.5 | 0.66 | 0.67 | 0.70 | 45.0 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 77.9 | 37.2 | 0.48 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 80.4 | 40.5 | 0.50 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 71.3 | 28.6 | 0.40 |
| All Pedestrians | | 150 | 158 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 76.5 | 35.4 | 0.46 |

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: Wil-Nel [PM | Williamtown Dr - Nelson Bay Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 120 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 157 | 10.0 | 165 | 10.0 | 0.106 | 5.7 | LOS A | 0.8 | 6.0 | 0.15 | 0.61 | 0.15 | 52.8 |
| 2 | T1 | 1331 | 10.0 | 1401 | 10.0 | * 0.876 | 39.7 | LOS D | 43.8 | 332.7 | 0.95 | 0.96 | 1.07 | 36.3 |
| Approach | | 1488 | 10.0 | 1566 | 10.0 | 0.876 | 36.1 | LOS D | 43.8 | 332.7 | 0.87 | 0.92 | 0.97 | 37.5 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 900 | 10.0 | 947 | 10.0 | 0.393 | 10.0 | LOS A | 12.5 | 95.2 | 0.50 | 0.44 | 0.50 | 51.5 |
| 9b | R3 | 50 | 10.0 | 53 | 10.0 | * 0.345 | 37.8 | LOS D | 2.0 | 14.8 | 0.97 | 0.75 | 0.97 | 36.2 |
| Approach | | 950 | 10.0 | 1000 | 10.0 | 0.393 | 11.4 | LOS B | 12.5 | 95.2 | 0.52 | 0.46 | 0.52 | 50.4 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 209 | 10.0 | 220 | 10.0 | 0.299 | 21.2 | LOS C | 6.9 | 52.6 | 0.61 | 0.75 | 0.61 | 44.4 |
| 29a | R1 | 303 | 10.0 | 319 | 10.0 | * 0.899 | 66.2 | LOS E | 20.9 | 159.1 | 0.98 | 1.00 | 1.30 | 28.3 |
| Approach | | 512 | 10.0 | 539 | 10.0 | 0.899 | 47.8 | LOS D | 20.9 | 159.1 | 0.83 | 0.89 | 1.02 | 33.3 |
| All Vehicles | | 2950 | 10.0 | 3105 | 10.0 | 0.899 | 30.2 | LOS C | 43.8 | 332.7 | 0.75 | 0.77 | 0.83 | 39.9 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 82.9 | 37.2 | 0.45 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 85.4 | 40.5 | 0.47 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 76.3 | 28.6 | 0.37 |
| All Pedestrians | | 150 | 158 | 54.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 81.5 | 35.4 | 0.43 |

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: Nel-Cab [AM | Nelson Bay Rd - Cabbage Tree Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 AM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 79 | 10.0 | 83 | 10.0 | 0.677 | 7.1 | LOS A | 7.3 | 55.6 | 0.76 | 0.72 | 0.84 | 52.5 |
| 2 | T1 | 1028 | 10.0 | 1082 | 10.0 | 0.677 | 7.3 | LOS A | 7.3 | 55.6 | 0.77 | 0.75 | 0.86 | 53.6 |
| 3 | R2 | 273 | 10.0 | 287 | 10.0 | 0.677 | 13.6 | LOS B | 7.3 | 55.3 | 0.78 | 0.80 | 0.89 | 52.8 |
| Approach | | 1380 | 10.0 | 1453 | 10.0 | 0.677 | 8.6 | LOS A | 7.3 | 55.6 | 0.77 | 0.76 | 0.87 | 53.4 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 513 | 10.0 | 540 | 10.0 | 1.712 | 658.9 | LOS F | 219.0 | 1664.2 | 1.00 | 7.96 | 21.20 | 5.1 |
| 5 | T1 | 174 | 10.0 | 183 | 10.0 | 1.712 | 655.5 | LOS F | 219.0 | 1664.2 | 1.00 | 7.96 | 21.20 | 5.2 |
| 6 | R2 | 65 | 10.0 | 68 | 10.0 | 1.712 | 661.2 | LOS F | 219.0 | 1664.2 | 1.00 | 7.96 | 21.20 | 5.2 |
| Approach | | 752 | 10.0 | 792 | 10.0 | 1.712 | 658.3 | LOS F | 219.0 | 1664.2 | 1.00 | 7.96 | 21.20 | 5.1 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 59 | 10.0 | 62 | 10.0 | 0.490 | 7.7 | LOS A | 3.6 | 27.6 | 0.74 | 0.77 | 0.79 | 52.6 |
| 8 | T1 | 844 | 10.0 | 888 | 10.0 | 0.689 | 9.9 | LOS A | 8.0 | 60.8 | 0.82 | 0.85 | 0.95 | 53.4 |
| 9 | R2 | 137 | 10.0 | 144 | 10.0 | 0.689 | 14.9 | LOS B | 8.0 | 60.8 | 0.86 | 0.89 | 1.05 | 53.0 |
| Approach | | 1040 | 10.0 | 1095 | 10.0 | 0.689 | 10.5 | LOS B | 8.0 | 60.8 | 0.82 | 0.85 | 0.96 | 53.3 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 392 | 10.0 | 413 | 10.0 | 0.753 | 15.6 | LOS B | 6.3 | 48.0 | 0.95 | 1.16 | 1.49 | 47.5 |
| 11 | T1 | 27 | 10.0 | 28 | 10.0 | 0.361 | 11.6 | LOS B | 1.8 | 13.7 | 0.84 | 0.97 | 0.93 | 49.1 |
| 12 | R2 | 95 | 10.0 | 100 | 10.0 | 0.361 | 17.3 | LOS B | 1.8 | 13.7 | 0.84 | 0.97 | 0.93 | 49.3 |
| Approach | | 514 | 10.0 | 541 | 10.0 | 0.753 | 15.7 | LOS B | 6.3 | 48.0 | 0.93 | 1.11 | 1.36 | 47.9 |
| All Vehicles | | 3686 | 10.0 | 3880 | 10.0 | 1.712 | 142.7 | LOS F | 219.0 | 1664.2 | 0.85 | 2.30 | 5.11 | 18.4 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: Nel-Cab [PM | Nelson Bay Rd - Cabbage Tree Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 PM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 62 | 10.0 | 65 | 10.0 | 0.639 | 7.0 | LOS A | 6.6 | 49.8 | 0.78 | 0.72 | 0.85 | 52.5 |
| 2 | T1 | 852 | 10.0 | 897 | 10.0 | 0.639 | 7.2 | LOS A | 6.6 | 49.8 | 0.78 | 0.75 | 0.86 | 53.6 |
| 3 | R2 | 336 | 10.0 | 354 | 10.0 | 0.639 | 13.4 | LOS B | 6.5 | 49.1 | 0.79 | 0.82 | 0.89 | 52.3 |
| Approach | | 1250 | 10.0 | 1316 | 10.0 | 0.639 | 8.8 | LOS A | 6.6 | 49.8 | 0.78 | 0.76 | 0.87 | 53.2 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 369 | 10.0 | 388 | 10.0 | 1.414 | 399.6 | LOS F | 108.6 | 825.7 | 1.00 | 5.15 | 13.27 | 8.0 |
| 5 | T1 | 93 | 10.0 | 98 | 10.0 | 1.414 | 395.7 | LOS F | 108.6 | 825.7 | 1.00 | 5.15 | 13.27 | 8.1 |
| 6 | R2 | 40 | 10.0 | 42 | 10.0 | 1.414 | 401.4 | LOS F | 108.6 | 825.7 | 1.00 | 5.15 | 13.27 | 8.1 |
| Approach | | 502 | 10.0 | 528 | 10.0 | 1.414 | 399.0 | LOS F | 108.6 | 825.7 | 1.00 | 5.15 | 13.27 | 8.0 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 82 | 10.0 | 86 | 10.0 | 0.624 | 11.4 | LOS B | 6.0 | 45.6 | 0.87 | 0.98 | 1.11 | 50.5 |
| 8 | T1 | 906 | 10.0 | 954 | 10.0 | 0.877 | 18.1 | LOS B | 18.0 | 137.1 | 0.95 | 1.19 | 1.56 | 48.1 |
| 9 | R2 | 208 | 10.0 | 219 | 10.0 | 0.877 | 25.4 | LOS C | 18.0 | 137.1 | 1.00 | 1.31 | 1.85 | 46.0 |
| Approach | | 1196 | 10.0 | 1259 | 10.0 | 0.877 | 18.9 | LOS B | 18.0 | 137.1 | 0.95 | 1.20 | 1.58 | 47.9 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 437 | 10.0 | 460 | 10.0 | 0.773 | 15.1 | LOS B | 6.9 | 52.3 | 0.96 | 1.17 | 1.51 | 47.9 |
| 11 | T1 | 46 | 10.0 | 48 | 10.0 | 0.429 | 11.7 | LOS B | 2.3 | 17.4 | 0.84 | 0.98 | 0.98 | 49.3 |
| 12 | R2 | 115 | 10.0 | 121 | 10.0 | 0.429 | 17.4 | LOS B | 2.3 | 17.4 | 0.84 | 0.98 | 0.98 | 49.5 |
| Approach | | 598 | 10.0 | 629 | 10.0 | 0.773 | 15.3 | LOS B | 6.9 | 52.3 | 0.92 | 1.12 | 1.37 | 48.3 |
| All Vehicles | | 3546 | 10.0 | 3733 | 10.0 | 1.414 | 68.6 | LOS E | 108.6 | 825.7 | 0.90 | 1.59 | 2.95 | 29.0 |

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

# MOVEMENT SUMMARY

## Site: Cab-SAP [AM | Cabbage Tree Rd - SAP | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 376 | 10.0 | 396 | 10.0 | * 0.721 | 25.5 | LOS C | 12.8 | 97.6 | 0.95 | 0.86 | 1.02 | 42.3 |
| 6 | R2 | 33 | 10.0 | 35 | 10.0 | 0.067 | 24.6 | LOS C | 0.9 | 6.5 | 0.74 | 0.71 | 0.74 | 41.3 |
| Approach | | 409 | 10.0 | 431 | 10.0 | 0.721 | 25.4 | LOS C | 12.8 | 97.6 | 0.93 | 0.85 | 0.99 | 42.2 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 14 | 10.0 | 15 | 10.0 | 0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.5 |
| 9 | R2 | 10 | 10.0 | 11 | 10.0 | * 0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.4 |
| Approach | | 24 | 10.0 | 25 | 10.0 | 0.170 | 39.9 | LOS D | 0.9 | 6.5 | 0.96 | 0.71 | 0.96 | 35.4 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 24 | 10.0 | 25 | 10.0 | 0.028 | 14.0 | LOS B | 0.4 | 3.1 | 0.50 | 0.66 | 0.50 | 47.4 |
| 11 | T1 | 433 | 10.0 | 456 | 10.0 | * 0.697 | 21.7 | LOS C | 13.8 | 105.0 | 0.91 | 0.81 | 0.94 | 44.2 |
| Approach | | 457 | 10.0 | 481 | 10.0 | 0.697 | 21.3 | LOS C | 13.8 | 105.0 | 0.89 | 0.81 | 0.92 | 44.4 |
| All Vehicles | | 890 | 10.0 | 937 | 10.0 | 0.721 | 23.7 | LOS C | 13.8 | 105.0 | 0.91 | 0.82 | 0.95 | 43.0 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |
| All Pedestrians | | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |

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: Cab-SAP [PM | Cabbage Tree Rd - SAP | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 385 | 10.0 | 405 | 10.0 | *0.771 | 31.4 | LOS C | 15.7 | 119.4 | 0.98 | 0.91 | 1.08 | 39.6 |
| 6 | R2 | 14 | 10.0 | 15 | 10.0 | 0.030 | 27.6 | LOS C | 0.4 | 3.1 | 0.74 | 0.68 | 0.74 | 40.1 |
| Approach | | 399 | 10.0 | 420 | 10.0 | 0.771 | 31.2 | LOS C | 15.7 | 119.4 | 0.97 | 0.91 | 1.07 | 39.6 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 33 | 10.0 | 35 | 10.0 | 0.046 | 19.4 | LOS B | 0.8 | 5.9 | 0.60 | 0.68 | 0.60 | 44.3 |
| 9 | R2 | 23 | 10.0 | 24 | 10.0 | *0.186 | 45.7 | LOS D | 1.0 | 7.2 | 0.97 | 0.71 | 0.97 | 33.5 |
| Approach | | 56 | 10.0 | 59 | 10.0 | 0.186 | 30.2 | LOS C | 1.0 | 7.2 | 0.75 | 0.69 | 0.75 | 39.1 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 10 | 10.0 | 11 | 10.0 | 0.011 | 13.8 | LOS B | 0.2 | 1.3 | 0.46 | 0.63 | 0.46 | 47.6 |
| 11 | T1 | 561 | 10.0 | 591 | 10.0 | *0.786 | 24.9 | LOS C | 21.6 | 164.2 | 0.93 | 0.89 | 1.01 | 42.6 |
| Approach | | 571 | 10.0 | 601 | 10.0 | 0.786 | 24.7 | LOS C | 21.6 | 164.2 | 0.92 | 0.88 | 1.00 | 42.6 |
| All Vehicles | | 1026 | 10.0 | 1080 | 10.0 | 0.786 | 27.5 | LOS C | 21.6 | 164.2 | 0.93 | 0.88 | 1.01 | 41.2 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |
| All Pedestrians | | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |

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: Tom-Wes [AM | Tomago Rd - WesTrack | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 20 | 10.0 | 21 | 10.0 | 0.014 | 17.5 | LOS B | 0.2 | 1.5 | 0.58 | 0.65 | 0.58 | 45.5 |
| 3 | R2 | 5 | 10.0 | 5 | 10.0 | 0.030 | 37.6 | LOS D | 0.2 | 1.3 | 0.93 | 0.64 | 0.93 | 36.5 |
| Approach | | 25 | 10.0 | 26 | 10.0 | 0.030 | 21.5 | LOS C | 0.2 | 1.5 | 0.65 | 0.65 | 0.65 | 43.4 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 49 | 10.0 | 52 | 10.0 | * 0.298 | 39.4 | LOS D | 1.8 | 13.3 | 0.96 | 0.74 | 0.96 | 35.7 |
| 5 | T1 | 400 | 10.0 | 421 | 10.0 | * 0.298 | 16.4 | LOS B | 5.0 | 38.3 | 0.74 | 0.61 | 0.74 | 47.4 |
| Approach | | 449 | 10.0 | 473 | 10.0 | 0.298 | 18.9 | LOS B | 5.0 | 38.3 | 0.76 | 0.63 | 0.76 | 45.8 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 367 | 10.0 | 386 | 10.0 | 0.145 | 3.3 | LOS A | 2.0 | 15.0 | 0.32 | 0.27 | 0.32 | 57.1 |
| 12 | R2 | 116 | 10.0 | 122 | 10.0 | * 0.205 | 22.0 | LOS C | 1.3 | 9.9 | 0.89 | 0.73 | 0.89 | 43.2 |
| Approach | | 483 | 10.0 | 508 | 10.0 | 0.205 | 7.7 | LOS A | 2.0 | 15.0 | 0.46 | 0.38 | 0.46 | 53.0 |
| All Vehicles | | 957 | 10.0 | 1007 | 10.0 | 0.298 | 13.4 | LOS B | 5.0 | 38.3 | 0.61 | 0.50 | 0.61 | 49.1 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Tom-Wes [PM | Tomago Rd - WesTrack | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 173 | 10.0 | 182 | 10.0 | 0.098 | 13.4 | LOS B | 1.3 | 10.0 | 0.52 | 0.69 | 0.52 | 48.0 |
| 3 | R2 | 82 | 10.0 | 86 | 10.0 | * 0.373 | 33.0 | LOS C | 2.5 | 18.7 | 0.95 | 0.76 | 0.95 | 38.2 |
| Approach | | 255 | 10.0 | 268 | 10.0 | 0.373 | 19.7 | LOS B | 2.5 | 18.7 | 0.66 | 0.71 | 0.66 | 44.4 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 5 | 10.0 | 5 | 10.0 | 0.023 | 30.8 | LOS C | 0.1 | 1.1 | 0.89 | 0.64 | 0.89 | 38.9 |
| 5 | T1 | 352 | 10.0 | 371 | 10.0 | * 0.379 | 20.3 | LOS C | 4.6 | 34.7 | 0.86 | 0.70 | 0.86 | 45.2 |
| Approach | | 357 | 10.0 | 376 | 10.0 | 0.379 | 20.4 | LOS C | 4.6 | 34.7 | 0.86 | 0.70 | 0.86 | 45.1 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 590 | 10.0 | 621 | 10.0 | 0.254 | 4.8 | LOS A | 3.6 | 27.7 | 0.43 | 0.37 | 0.43 | 56.0 |
| 12 | R2 | 19 | 10.0 | 20 | 10.0 | * 0.029 | 17.0 | LOS B | 0.1 | 1.1 | 0.83 | 0.66 | 0.83 | 45.9 |
| Approach | | 609 | 10.0 | 641 | 10.0 | 0.254 | 5.2 | LOS A | 3.6 | 27.7 | 0.44 | 0.38 | 0.44 | 55.7 |
| All Vehicles | | 1221 | 10.0 | 1285 | 10.0 | 0.379 | 12.7 | LOS B | 4.6 | 34.7 | 0.61 | 0.54 | 0.61 | 49.6 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [AM | Pacific Hwy - Tomago Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 391 | 10.0 | 412 | 10.0 | 0.356 | 22.4 | LOS C | 4.7 | 35.5 | 0.80 | 0.78 | 0.80 | 42.8 |
| Approach | | 391 | 10.0 | 412 | 10.0 | 0.356 | 22.4 | LOS C | 4.7 | 35.5 | 0.80 | 0.78 | 0.80 | 42.8 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 13 | 10.0 | 14 | 10.0 | 0.017 | 16.4 | LOS B | 0.2 | 1.6 | 0.56 | 0.65 | 0.56 | 46.9 |
| 5 | T1 | 1278 | 10.0 | 1345 | 10.0 | * 0.787 | 17.9 | LOS B | 18.7 | 141.9 | 0.91 | 0.89 | 1.01 | 46.4 |
| Approach | | 1291 | 10.0 | 1359 | 10.0 | 0.787 | 17.8 | LOS B | 18.7 | 141.9 | 0.90 | 0.88 | 1.01 | 46.4 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1291 | 10.0 | 1359 | 10.0 | 0.464 | 1.1 | LOS A | 3.3 | 24.9 | 0.34 | 0.22 | 0.34 | 58.4 |
| 12 | R2 | 887 | 10.0 | 934 | 10.0 | * 0.808 | 31.3 | LOS C | 14.6 | 110.7 | 0.97 | 0.95 | 1.18 | 39.1 |
| Approach | | 2178 | 10.0 | 2293 | 10.0 | 0.808 | 13.4 | LOS B | 14.6 | 110.7 | 0.60 | 0.52 | 0.68 | 48.6 |
| All Vehicles | | 3860 | 10.0 | 4063 | 10.0 | 0.808 | 15.8 | LOS B | 18.7 | 141.9 | 0.72 | 0.67 | 0.80 | 47.2 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [PM | Pacific Hwy - Tomago Rd | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 1261 | 10.0 | 1327 | 10.0 | * 0.812 | 27.4 | LOS C | 22.2 | 168.4 | 0.92 | 0.92 | 1.04 | 40.4 |
| Approach | | 1261 | 10.0 | 1327 | 10.0 | 0.812 | 27.4 | LOS C | 22.2 | 168.4 | 0.92 | 0.92 | 1.04 | 40.4 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 12 | 10.0 | 13 | 10.0 | 0.020 | 22.0 | LOS C | 0.3 | 2.1 | 0.67 | 0.66 | 0.67 | 43.4 |
| 5 | T1 | 1001 | 10.0 | 1054 | 10.0 | * 0.806 | 26.5 | LOS C | 18.4 | 139.6 | 0.97 | 0.95 | 1.11 | 41.8 |
| Approach | | 1013 | 10.0 | 1066 | 10.0 | 0.806 | 26.4 | LOS C | 18.4 | 139.6 | 0.96 | 0.95 | 1.11 | 41.9 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1874 | 10.0 | 1973 | 10.0 | 0.650 | 1.2 | LOS A | 6.4 | 48.9 | 0.40 | 0.26 | 0.40 | 58.2 |
| 12 | R2 | 587 | 10.0 | 618 | 10.0 | 0.378 | 18.9 | LOS B | 6.8 | 52.0 | 0.69 | 0.77 | 0.69 | 44.8 |
| Approach | | 2461 | 10.0 | 2591 | 10.0 | 0.650 | 5.4 | LOS A | 6.8 | 52.0 | 0.47 | 0.38 | 0.47 | 54.3 |
| All Vehicles | | 4735 | 10.0 | 4984 | 10.0 | 0.812 | 15.8 | LOS B | 22.2 | 168.4 | 0.70 | 0.64 | 0.76 | 47.0 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [AM | Industrial Dr - Tourle St | 2026 No SAP (Site Folder: 2026 No SAP)]

AM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1287 | 10.0 | 1355 | 10.0 | 0.540 | 10.8 | LOS B | 21.1 | 160.0 | 0.54 | 0.50 | 0.54 | 51.0 |
| 6 | R2 | 780 | 10.0 | 821 | 10.0 | * 1.062 | 146.9 | LOS F | 44.0 | 334.4 | 1.00 | 1.25 | 1.84 | 17.3 |
| Approach | | 2067 | 10.0 | 2176 | 10.0 | 1.062 | 62.2 | LOS E | 44.0 | 334.4 | 0.72 | 0.78 | 1.03 | 29.4 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 902 | 10.0 | 949 | 10.0 | 0.548 | 22.2 | LOS C | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.2 |
| 9 | R2 | 757 | 10.0 | 797 | 10.0 | * 1.030 | 126.5 | LOS F | 39.4 | 299.3 | 1.00 | 1.18 | 1.71 | 19.2 |
| Approach | | 1659 | 10.0 | 1746 | 10.0 | 1.030 | 69.8 | LOS E | 39.4 | 299.3 | 0.46 | 0.82 | 0.78 | 29.7 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 929 | 10.0 | 978 | 10.0 | 0.564 | 8.9 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.2 |
| 11 | T1 | 1513 | 10.0 | 1593 | 10.0 | * 1.059 | 130.4 | LOS F | 87.8 | 667.2 | 1.00 | 1.49 | 1.72 | 19.0 |
| Approach | | 2442 | 10.0 | 2571 | 10.0 | 1.059 | 84.2 | LOS F | 87.8 | 667.2 | 0.62 | 1.12 | 1.07 | 25.3 |
| All Vehicles | | 6168 | 10.0 | 6493 | 10.0 | 1.062 | 72.9 | LOS E | 87.8 | 667.2 | 0.61 | 0.93 | 0.98 | 27.7 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [PM | Industrial Dr - Tourle St | 2026 No SAP (Site Folder: 2026 No SAP)]

PM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 150 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1589 | 10.0 | 1673 | 10.0 | 0.714 | 18.8 | LOS B | 39.7 | 301.6 | 0.72 | 0.67 | 0.72 | 45.9 |
| 6 | R2 | 902 | 10.0 | 949 | 10.0 | * 1.027 | 131.3 | LOS F | 51.8 | 394.0 | 1.00 | 1.14 | 1.58 | 18.8 |
| Approach | | 2491 | 10.0 | 2622 | 10.0 | 1.027 | 59.6 | LOS E | 51.8 | 394.0 | 0.82 | 0.84 | 1.03 | 30.2 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 780 | 10.0 | 821 | 10.0 | 0.474 | 10.2 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 9 | R2 | 929 | 10.0 | 978 | 10.0 | * 1.007 | 119.2 | LOS F | 51.0 | 387.8 | 1.00 | 1.11 | 1.50 | 20.1 |
| Approach | | 1709 | 10.0 | 1799 | 10.0 | 1.007 | 69.5 | LOS E | 51.0 | 387.8 | 0.54 | 0.84 | 0.82 | 28.3 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 757 | 10.0 | 797 | 10.0 | 0.460 | 8.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.3 |
| 11 | T1 | 1189 | 10.0 | 1252 | 10.0 | * 1.025 | 119.1 | LOS F | 68.2 | 518.0 | 1.00 | 1.32 | 1.53 | 20.3 |
| Approach | | 1946 | 10.0 | 2048 | 10.0 | 1.025 | 76.1 | LOS E | 68.2 | 518.0 | 0.61 | 1.01 | 0.93 | 26.8 |
| All Vehicles | | 6146 | 10.0 | 6469 | 10.0 | 1.027 | 67.6 | LOS E | 68.2 | 518.0 | 0.68 | 0.89 | 0.94 | 28.5 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Wil-Nel [AM | Williamtown Dr - Nelson Bay Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 110 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 374 | 10.0 | 394 | 10.0 | 0.265 | 6.0 | LOS A | 3.2 | 24.4 | 0.24 | 0.63 | 0.24 | 52.8 |
| 2 | T1 | 1489 | 10.0 | 1567 | 10.0 | * 0.892 | 35.5 | LOS D | 48.4 | 367.5 | 0.91 | 0.95 | 1.06 | 37.9 |
| Approach | | 1863 | 10.0 | 1961 | 10.0 | 0.892 | 29.6 | LOS C | 48.4 | 367.5 | 0.77 | 0.88 | 0.89 | 40.1 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 1086 | 10.0 | 1143 | 10.0 | 0.419 | 5.5 | LOS A | 11.1 | 84.6 | 0.40 | 0.36 | 0.40 | 55.0 |
| 9b | R3 | 104 | 10.0 | 109 | 10.0 | * 0.658 | 40.6 | LOS D | 4.5 | 34.6 | 1.00 | 0.81 | 1.08 | 35.4 |
| Approach | | 1190 | 10.0 | 1253 | 10.0 | 0.658 | 8.5 | LOS A | 11.1 | 84.6 | 0.45 | 0.40 | 0.46 | 52.5 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 77 | 10.0 | 81 | 10.0 | 0.131 | 21.9 | LOS C | 2.3 | 17.6 | 0.60 | 0.71 | 0.60 | 44.1 |
| 29a | R1 | 135 | 10.0 | 142 | 10.0 | * 0.273 | 50.7 | LOS D | 3.5 | 26.4 | 0.93 | 0.76 | 0.93 | 32.1 |
| Approach | | 212 | 10.0 | 223 | 10.0 | 0.273 | 40.3 | LOS D | 3.5 | 26.4 | 0.81 | 0.74 | 0.81 | 35.7 |
| All Vehicles | | 3265 | 10.0 | 3437 | 10.0 | 0.892 | 22.6 | LOS C | 48.4 | 367.5 | 0.66 | 0.70 | 0.73 | 43.5 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 77.9 | 37.2 | 0.48 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 80.4 | 40.5 | 0.50 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 73.8 | 31.9 | 0.43 |
| All Pedestrians | | 150 | 158 | 49.3 | LOS E | 0.2 | 0.2 | 0.95 | 0.95 | 77.4 | 36.5 | 0.47 |

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: Wil-Nel [PM | Williamtown Dr - Nelson Bay Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Williamtown Dr - Nelson Bay Rd | 2020 Base | Import
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 100 seconds (Site Practical Cycle Time)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1a | L1 | 213 | 10.0 | 224 | 10.0 | 0.148 | 5.4 | LOS A | 1.1 | 8.6 | 0.18 | 0.61 | 0.18 | 53.2 |
| 2 | T1 | 1350 | 10.0 | 1421 | 10.0 | * 0.826 | 26.9 | LOS C | 33.3 | 252.8 | 0.90 | 0.87 | 0.97 | 41.6 |
| Approach | | 1563 | 10.0 | 1645 | 10.0 | 0.826 | 24.0 | LOS C | 33.3 | 252.8 | 0.80 | 0.84 | 0.86 | 42.9 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 8 | T1 | 908 | 10.0 | 956 | 10.0 | 0.358 | 5.2 | LOS A | 8.4 | 63.6 | 0.39 | 0.35 | 0.39 | 55.3 |
| 9b | R3 | 58 | 10.0 | 61 | 10.0 | * 0.333 | 33.9 | LOS C | 2.1 | 15.8 | 0.95 | 0.75 | 0.95 | 37.9 |
| Approach | | 966 | 10.0 | 1017 | 10.0 | 0.358 | 6.9 | LOS A | 8.4 | 63.6 | 0.43 | 0.38 | 0.43 | 53.8 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | | | |
| 27b | L3 | 227 | 10.0 | 239 | 10.0 | 0.352 | 19.0 | LOS B | 6.5 | 49.0 | 0.64 | 0.76 | 0.64 | 45.6 |
| 29a | R1 | 434 | 10.0 | 457 | 10.0 | * 0.852 | 57.9 | LOS E | 12.4 | 94.4 | 1.00 | 0.97 | 1.30 | 30.2 |
| Approach | | 661 | 10.0 | 696 | 10.0 | 0.852 | 44.6 | LOS D | 12.4 | 94.4 | 0.88 | 0.90 | 1.07 | 34.2 |
| All Vehicles | | 3190 | 10.0 | 3358 | 10.0 | 0.852 | 23.1 | LOS C | 33.3 | 252.8 | 0.70 | 0.71 | 0.77 | 43.2 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov ID | Crossing | Input Vol. ped/h | Dem. Flow ped/h | Aver. Delay sec | Level of Service | AVERAGE BACK OF QUEUE [ Ped ped | Dist ] m | Prop. Que | Effective Stop Rate | Travel Time sec | Travel Dist. m | Aver. Speed m/sec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | |
| P1 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 72.9 | 37.2 | 0.51 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 75.4 | 40.5 | 0.54 |
| NorthWest: Williamtown Dr | | | | | | | | | | | | |
| P7 | Full | 50 | 53 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 68.8 | 31.9 | 0.46 |
| All Pedestrians | | 150 | 158 | 44.3 | LOS E | 0.1 | 0.1 | 0.94 | 0.94 | 72.4 | 36.5 | 0.50 |

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: Nel-Cab [AM | Nelson Bay Rd - Cabbage Tree Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 AM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 191 | 10.0 | 201 | 10.0 | 0.908 | 21.4 | LOS C | 21.8 | 165.7 | 1.00 | 1.36 | 1.96 | 44.5 |
| 2 | T1 | 1103 | 10.0 | 1161 | 10.0 | 0.908 | 27.7 | LOS C | 21.8 | 165.7 | 1.00 | 1.38 | 2.00 | 44.8 |
| 3 | R2 | 273 | 10.0 | 287 | 10.0 | 0.908 | 29.6 | LOS C | 20.6 | 156.2 | 1.00 | 1.42 | 2.05 | 43.5 |
| Approach | | 1567 | 10.0 | 1649 | 10.0 | 0.908 | 27.3 | LOS C | 21.8 | 165.7 | 1.00 | 1.38 | 2.00 | 44.5 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 513 | 10.0 | 540 | 10.0 | 0.927 | 37.2 | LOS D | 13.7 | 103.9 | 1.00 | 1.54 | 2.53 | 39.9 |
| 5 | T1 | 174 | 10.0 | 183 | 10.0 | 0.625 | 15.5 | LOS B | 4.1 | 31.2 | 0.90 | 1.06 | 1.24 | 48.4 |
| 6 | R2 | 65 | 10.0 | 68 | 10.0 | 0.625 | 21.2 | LOS C | 4.1 | 31.2 | 0.90 | 1.06 | 1.24 | 48.5 |
| Approach | | 752 | 10.0 | 792 | 10.0 | 0.927 | 30.8 | LOS C | 13.7 | 103.9 | 0.97 | 1.39 | 2.12 | 42.3 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 59 | 10.0 | 62 | 10.0 | 0.661 | 8.7 | LOS A | 6.8 | 51.6 | 0.84 | 0.89 | 1.02 | 52.1 |
| 8 | T1 | 876 | 10.0 | 922 | 10.0 | 0.661 | 13.3 | LOS B | 6.8 | 51.6 | 0.84 | 0.92 | 1.04 | 53.0 |
| 9 | R2 | 212 | 10.0 | 223 | 10.0 | 0.661 | 15.4 | LOS B | 6.6 | 49.9 | 0.85 | 0.96 | 1.06 | 51.9 |
| Approach | | 1147 | 10.0 | 1207 | 10.0 | 0.661 | 13.5 | LOS B | 6.8 | 51.6 | 0.84 | 0.92 | 1.04 | 52.8 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 467 | 10.0 | 492 | 10.0 | 0.232 | 12.2 | LOS B | 1.4 | 10.7 | 0.16 | 0.53 | 0.16 | 55.1 |
| 11 | T1 | 27 | 10.0 | 28 | 10.0 | 0.232 | 9.2 | LOS A | 1.4 | 10.7 | 0.91 | 0.94 | 0.91 | 53.4 |
| 12 | R2 | 143 | 10.0 | 151 | 10.0 | 0.332 | 15.8 | LOS B | 2.0 | 15.3 | 0.91 | 0.98 | 0.94 | 49.5 |
| Approach | | 637 | 10.0 | 671 | 10.0 | 0.332 | 12.9 | LOS B | 2.0 | 15.3 | 0.36 | 0.65 | 0.37 | 53.7 |
| All Vehicles | | 4103 | 10.0 | 4319 | 10.0 | 0.927 | 21.8 | LOS C | 21.8 | 165.7 | 0.85 | 1.14 | 1.50 | 47.4 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: Nel-Cab [PM | Nelson Bay Rd - Cabbage Tree Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Nelson Bay Rd - Cabbage Tree Rd | 2020 Base | Import
Site Category: 2020 PM
Roundabout

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Nelson Bay Road (S) | | | | | | | | | | | | | | |
| 1 | L2 | 110 | 10.0 | 116 | 10.0 | 0.728 | 9.7 | LOS A | 9.4 | 71.3 | 0.90 | 0.91 | 1.12 | 51.7 |
| 2 | T1 | 884 | 10.0 | 931 | 10.0 | 0.728 | 12.2 | LOS B | 9.4 | 71.3 | 0.90 | 0.93 | 1.13 | 52.4 |
| 3 | R2 | 336 | 10.0 | 354 | 10.0 | 0.728 | 16.5 | LOS B | 9.1 | 69.1 | 0.91 | 0.98 | 1.17 | 50.7 |
| Approach | | 1330 | 10.0 | 1400 | 10.0 | 0.728 | 13.1 | LOS B | 9.4 | 71.3 | 0.90 | 0.94 | 1.14 | 51.9 |
| East: Lavis Lane | | | | | | | | | | | | | | |
| 4 | L2 | 369 | 10.0 | 388 | 10.0 | 0.835 | 34.5 | LOS C | 8.4 | 63.8 | 1.00 | 1.29 | 1.83 | 42.6 |
| 5 | T1 | 93 | 10.0 | 98 | 10.0 | 0.451 | 14.4 | LOS B | 2.5 | 19.3 | 0.89 | 1.00 | 1.06 | 49.0 |
| 6 | R2 | 40 | 10.0 | 42 | 10.0 | 0.451 | 20.1 | LOS C | 2.5 | 19.3 | 0.89 | 1.00 | 1.06 | 49.1 |
| Approach | | 502 | 10.0 | 528 | 10.0 | 0.835 | 29.7 | LOS C | 8.4 | 63.8 | 0.97 | 1.21 | 1.63 | 44.2 |
| North: Nelson Bay Road (N) | | | | | | | | | | | | | | |
| 7 | L2 | 82 | 10.0 | 86 | 10.0 | 0.855 | 17.6 | LOS B | 14.0 | 106.6 | 1.00 | 1.32 | 1.79 | 46.6 |
| 8 | T1 | 981 | 10.0 | 1033 | 10.0 | 0.855 | 24.8 | LOS C | 14.0 | 106.6 | 1.00 | 1.33 | 1.81 | 47.0 |
| 9 | R2 | 241 | 10.0 | 254 | 10.0 | 0.855 | 25.7 | LOS C | 13.1 | 99.3 | 1.00 | 1.34 | 1.85 | 45.5 |
| Approach | | 1304 | 10.0 | 1373 | 10.0 | 0.855 | 24.5 | LOS C | 14.0 | 106.6 | 1.00 | 1.33 | 1.82 | 46.7 |
| West: Cabbage Tree Road | | | | | | | | | | | | | | |
| 10 | L2 | 469 | 10.0 | 494 | 10.0 | 0.236 | 7.4 | LOS A | 1.3 | 10.1 | 0.14 | 0.51 | 0.14 | 55.3 |
| 11 | T1 | 46 | 10.0 | 48 | 10.0 | 0.236 | 7.9 | LOS A | 1.3 | 10.1 | 0.84 | 0.86 | 0.84 | 54.2 |
| 12 | R2 | 227 | 10.0 | 239 | 10.0 | 0.481 | 16.1 | LOS B | 3.0 | 23.1 | 0.89 | 1.02 | 1.05 | 49.3 |
| Approach | | 742 | 10.0 | 781 | 10.0 | 0.481 | 10.1 | LOS B | 3.0 | 23.1 | 0.42 | 0.69 | 0.46 | 53.2 |
| All Vehicles | | 3878 | 10.0 | 4082 | 10.0 | 0.855 | 18.5 | LOS B | 14.0 | 106.6 | 0.85 | 1.06 | 1.30 | 49.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

# MOVEMENT SUMMARY

## Site: Cab-SAP [AM | Cabbage Tree Rd - SAP | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 394 | 10.0 | 415 | 10.0 | * 0.755 | 26.7 | LOS C | 13.9 | 106.0 | 0.96 | 0.90 | 1.07 | 41.6 |
| 6 | R2 | 131 | 10.0 | 138 | 10.0 | 0.265 | 26.0 | LOS C | 3.7 | 27.8 | 0.80 | 0.77 | 0.80 | 40.6 |
| Approach | | 525 | 10.0 | 553 | 10.0 | 0.755 | 26.5 | LOS C | 13.9 | 106.0 | 0.92 | 0.87 | 1.00 | 41.4 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 56 | 10.0 | 59 | 10.0 | 0.680 | 43.2 | LOS D | 3.7 | 28.4 | 1.00 | 0.84 | 1.18 | 34.4 |
| 9 | R2 | 40 | 10.0 | 42 | 10.0 | * 0.680 | 43.2 | LOS D | 3.7 | 28.4 | 1.00 | 0.84 | 1.18 | 34.3 |
| Approach | | 96 | 10.0 | 101 | 10.0 | 0.680 | 43.2 | LOS D | 3.7 | 28.4 | 1.00 | 0.84 | 1.18 | 34.3 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 94 | 10.0 | 99 | 10.0 | 0.108 | 14.5 | LOS B | 1.7 | 12.8 | 0.53 | 0.69 | 0.53 | 47.1 |
| 11 | T1 | 475 | 10.0 | 500 | 10.0 | * 0.780 | 24.9 | LOS C | 16.7 | 126.8 | 0.95 | 0.91 | 1.06 | 42.5 |
| Approach | | 569 | 10.0 | 599 | 10.0 | 0.780 | 23.2 | LOS C | 16.7 | 126.8 | 0.88 | 0.87 | 0.97 | 43.2 |
| All Vehicles | | 1190 | 10.0 | 1253 | 10.0 | 0.780 | 26.3 | LOS C | 16.7 | 126.8 | 0.91 | 0.87 | 1.00 | 41.6 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |
| All Pedestrians | | 50 | 53 | 29.3 | LOS C | 0.1 | 0.1 | 0.92 | 0.92 | 51.3 | 28.6 | 0.56 |

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: Cab-SAP [PM | Cabbage Tree Rd - SAP | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Cabbage Tree Rd - SAP | 2025 SAP 25% Developed
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Cabbage Tree Rd (E) | | | | | | | | | | | | | | |
| 5 | T1 | 427 | 10.0 | 449 | 10.0 | *0.836 | 34.8 | LOS C | 18.8 | 142.7 | 0.99 | 1.00 | 1.19 | 38.2 |
| 6 | R2 | 56 | 10.0 | 59 | 10.0 | 0.113 | 27.6 | LOS C | 1.7 | 12.8 | 0.76 | 0.73 | 0.76 | 40.1 |
| Approach | | 483 | 10.0 | 508 | 10.0 | 0.836 | 33.9 | LOS C | 18.8 | 142.7 | 0.96 | 0.97 | 1.14 | 38.4 |
| North: Access Rd to SAP | | | | | | | | | | | | | | |
| 7 | L2 | 131 | 10.0 | 138 | 10.0 | 0.177 | 19.8 | LOS B | 3.2 | 24.4 | 0.63 | 0.73 | 0.63 | 44.1 |
| 9 | R2 | 94 | 10.0 | 99 | 10.0 | *0.761 | 50.5 | LOS D | 4.3 | 32.6 | 1.00 | 0.89 | 1.30 | 32.1 |
| Approach | | 225 | 10.0 | 237 | 10.0 | 0.761 | 32.6 | LOS C | 4.3 | 32.6 | 0.79 | 0.79 | 0.91 | 38.2 |
| West: Cabbage Tree Rd (W) | | | | | | | | | | | | | | |
| 10 | L2 | 40 | 10.0 | 42 | 10.0 | 0.044 | 14.5 | LOS B | 0.7 | 5.7 | 0.48 | 0.67 | 0.48 | 47.2 |
| 11 | T1 | 579 | 10.0 | 609 | 10.0 | *0.855 | 31.3 | LOS C | 25.4 | 192.7 | 0.97 | 1.00 | 1.15 | 39.6 |
| Approach | | 619 | 10.0 | 652 | 10.0 | 0.855 | 30.2 | LOS C | 25.4 | 192.7 | 0.93 | 0.98 | 1.11 | 40.0 |
| All Vehicles | | 1327 | 10.0 | 1397 | 10.0 | 0.855 | 32.0 | LOS C | 25.4 | 192.7 | 0.92 | 0.94 | 1.09 | 39.1 |

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

* Critical Movement (Signal Timing)

**Pedestrian Movement Performance**

| Mov | Input Vol. | Dem. | Aver. | Level of | AVERAGE BACK OF QUEUE | Prop. | Effective | Travel Time | Travel Dist. | Aver. |
|---|---|---|---|---|---|---|---|---|---|---|

| ID | Crossing | | Flow | Delay | Service | [ Ped | Dist ] | Que | Stop Rate | | | Speed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ped/h | ped/h | sec | | ped | m | | | sec | m | m/sec |
| North: Access Rd to SAP | | | | | | | | | | | | |
| P3 | Full | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |
| All Pedestrians | | 50 | 53 | 34.3 | LOS D | 0.1 | 0.1 | 0.93 | 0.93 | 58.8 | 31.9 | 0.54 |

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: Tom-Wes [AM | Tomago Rd - WesTrack | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 20 | 10.0 | 21 | 10.0 | 0.014 | 18.2 | LOS B | 0.2 | 1.6 | 0.59 | 0.65 | 0.59 | 45.2 |
| 3 | R2 | 5 | 10.0 | 5 | 10.0 | 0.035 | 38.9 | LOS D | 0.2 | 1.3 | 0.94 | 0.64 | 0.94 | 36.0 |
| Approach | | 25 | 10.0 | 26 | 10.0 | 0.035 | 22.3 | LOS C | 0.2 | 1.6 | 0.66 | 0.65 | 0.66 | 43.0 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 49 | 10.0 | 52 | 10.0 | * 0.347 | 40.8 | LOS D | 1.8 | 13.7 | 0.98 | 0.74 | 0.98 | 35.2 |
| 5 | T1 | 464 | 10.0 | 488 | 10.0 | * 0.333 | 16.1 | LOS B | 5.8 | 44.3 | 0.73 | 0.62 | 0.73 | 47.7 |
| Approach | | 513 | 10.0 | 540 | 10.0 | 0.347 | 18.4 | LOS B | 5.8 | 44.3 | 0.76 | 0.63 | 0.76 | 46.1 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 517 | 10.0 | 544 | 10.0 | 0.200 | 3.2 | LOS A | 2.8 | 21.1 | 0.32 | 0.28 | 0.32 | 57.3 |
| 12 | R2 | 116 | 10.0 | 122 | 10.0 | * 0.205 | 22.3 | LOS C | 1.3 | 10.2 | 0.89 | 0.73 | 0.89 | 43.0 |
| Approach | | 633 | 10.0 | 666 | 10.0 | 0.205 | 6.7 | LOS A | 2.8 | 21.1 | 0.43 | 0.36 | 0.43 | 54.0 |
| All Vehicles | | 1171 | 10.0 | 1233 | 10.0 | 0.347 | 12.2 | LOS B | 5.8 | 44.3 | 0.58 | 0.48 | 0.58 | 50.0 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Tom-Wes [PM | Tomago Rd - WesTrack | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Tomago Rd - WesTrack | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: WesTrack Access Rd | | | | | | | | | | | | | | |
| 1 | L2 | 173 | 10.0 | 182 | 10.0 | 0.105 | 14.6 | LOS B | 1.4 | 10.7 | 0.55 | 0.70 | 0.55 | 47.3 |
| 3 | R2 | 82 | 10.0 | 86 | 10.0 | * 0.498 | 35.7 | LOS D | 2.6 | 19.9 | 0.99 | 0.77 | 0.99 | 37.2 |
| Approach | | 255 | 10.0 | 268 | 10.0 | 0.498 | 21.4 | LOS C | 2.6 | 19.9 | 0.69 | 0.72 | 0.69 | 43.5 |
| East: Tomago Rd (E) | | | | | | | | | | | | | | |
| 4 | L2 | 5 | 10.0 | 5 | 10.0 | 0.030 | 33.2 | LOS C | 0.1 | 1.1 | 0.92 | 0.64 | 0.92 | 38.0 |
| 5 | T1 | 502 | 10.0 | 528 | 10.0 | * 0.481 | 19.5 | LOS B | 6.5 | 49.5 | 0.87 | 0.73 | 0.87 | 45.8 |
| Approach | | 507 | 10.0 | 534 | 10.0 | 0.481 | 19.6 | LOS B | 6.5 | 49.5 | 0.87 | 0.73 | 0.87 | 45.7 |
| West: Tomago Rd (W) | | | | | | | | | | | | | | |
| 11 | T1 | 655 | 10.0 | 689 | 10.0 | 0.269 | 4.1 | LOS A | 3.7 | 28.3 | 0.39 | 0.34 | 0.39 | 56.7 |
| 12 | R2 | 19 | 10.0 | 20 | 10.0 | * 0.029 | 17.4 | LOS B | 0.2 | 1.2 | 0.83 | 0.66 | 0.83 | 45.7 |
| Approach | | 674 | 10.0 | 709 | 10.0 | 0.269 | 4.5 | LOS A | 3.7 | 28.3 | 0.41 | 0.35 | 0.41 | 56.3 |
| All Vehicles | | 1436 | 10.0 | 1512 | 10.0 | 0.498 | 12.8 | LOS B | 6.5 | 49.5 | 0.62 | 0.55 | 0.62 | 49.6 |

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

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [AM | Pacific Hwy - Tomago Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 70 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 456 | 10.0 | 480 | 10.0 | 0.359 | 22.4 | LOS C | 5.9 | 45.0 | 0.76 | 0.78 | 0.76 | 42.8 |
| Approach | | 456 | 10.0 | 480 | 10.0 | 0.359 | 22.4 | LOS C | 5.9 | 45.0 | 0.76 | 0.78 | 0.76 | 42.8 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 13 | 10.0 | 14 | 10.0 | 0.018 | 19.6 | LOS B | 0.3 | 2.0 | 0.58 | 0.65 | 0.58 | 45.5 |
| 5 | T1 | 1278 | 10.0 | 1345 | 10.0 | * 0.830 | 24.2 | LOS C | 23.5 | 178.5 | 0.95 | 0.96 | 1.09 | 43.0 |
| Approach | | 1291 | 10.0 | 1359 | 10.0 | 0.830 | 24.1 | LOS C | 23.5 | 178.5 | 0.94 | 0.96 | 1.09 | 43.0 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1291 | 10.0 | 1359 | 10.0 | 0.448 | 0.9 | LOS A | 3.2 | 24.5 | 0.29 | 0.19 | 0.29 | 58.7 |
| 12 | R2 | 1036 | 10.0 | 1091 | 10.0 | * 0.815 | 32.9 | LOS C | 19.2 | 146.0 | 0.96 | 0.94 | 1.12 | 38.5 |
| Approach | | 2327 | 10.0 | 2449 | 10.0 | 0.815 | 15.1 | LOS B | 19.2 | 146.0 | 0.59 | 0.52 | 0.66 | 47.6 |
| All Vehicles | | 4074 | 10.0 | 4288 | 10.0 | 0.830 | 18.8 | LOS B | 23.5 | 178.5 | 0.72 | 0.69 | 0.81 | 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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Pac-Tom [PM | Pacific Hwy - Tomago Rd | 2026 With SAP (Site Folder: 2026 With SAP)]

PM | Pacific Hwy - Tomago Rd | 2020 Base
Site Category: 2020 PM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

**Vehicle Movement Performance**

| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| South: Tomago Rd | | | | | | | | | | | | | | |
| 1 | L2 | 1410 | 10.0 | 1484 | 10.0 | * 0.835 | 29.3 | LOS C | 28.4 | 215.5 | 0.92 | 0.93 | 1.04 | 39.6 |
| Approach | | 1410 | 10.0 | 1484 | 10.0 | 0.835 | 29.3 | LOS C | 28.4 | 215.5 | 0.92 | 0.93 | 1.04 | 39.6 |
| East: Pacific Hwy (E) | | | | | | | | | | | | | | |
| 4 | L2 | 12 | 10.0 | 13 | 10.0 | 0.022 | 25.4 | LOS C | 0.3 | 2.5 | 0.69 | 0.66 | 0.69 | 41.7 |
| 5 | T1 | 1001 | 10.0 | 1054 | 10.0 | * 0.853 | 34.5 | LOS C | 22.5 | 171.0 | 1.00 | 1.03 | 1.20 | 38.3 |
| Approach | | 1013 | 10.0 | 1066 | 10.0 | 0.853 | 34.4 | LOS C | 22.5 | 171.0 | 0.99 | 1.02 | 1.20 | 38.4 |
| West: Pacific Hwy (W) | | | | | | | | | | | | | | |
| 11 | T1 | 1874 | 10.0 | 1973 | 10.0 | 0.634 | 1.1 | LOS A | 6.4 | 48.7 | 0.35 | 0.22 | 0.35 | 58.4 |
| 12 | R2 | 651 | 10.0 | 685 | 10.0 | 0.386 | 18.8 | LOS B | 8.1 | 61.8 | 0.65 | 0.76 | 0.65 | 44.9 |
| Approach | | 2525 | 10.0 | 2658 | 10.0 | 0.634 | 5.6 | LOS A | 8.1 | 61.8 | 0.43 | 0.36 | 0.43 | 54.2 |
| All Vehicles | | 4948 | 10.0 | 5208 | 10.0 | 0.853 | 18.3 | LOS B | 28.4 | 215.5 | 0.68 | 0.66 | 0.76 | 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.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

# MOVEMENT SUMMARY

## Site: Ind-Tou [AM | Industrial Dr - Tourle St | 2026 With SAP (Site Folder: 2026 With SAP)]

AM | Industrial Dr - Tourle St | 2020 Base
Site Category: 2020 AM
Signals - EQUISAT (Fixed-Time/SCATS) Isolated  Cycle Time = 130 seconds (Site Optimum Cycle Time - Minimum Delay)

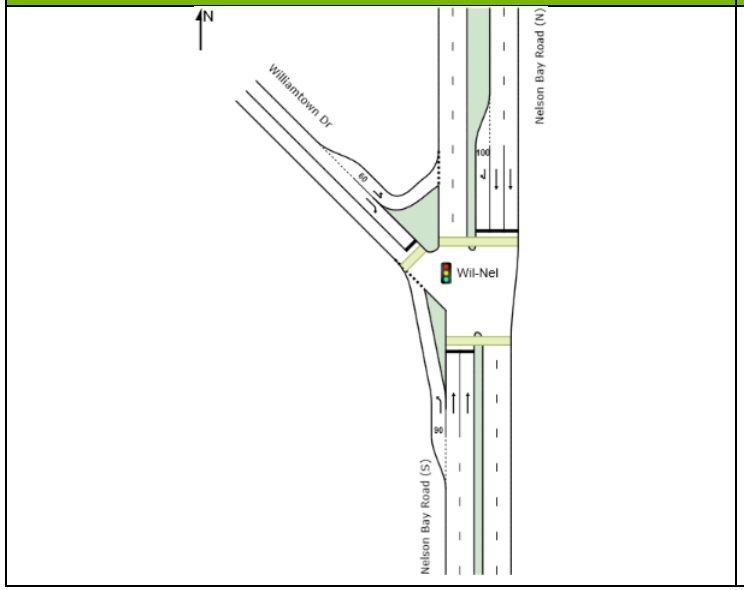
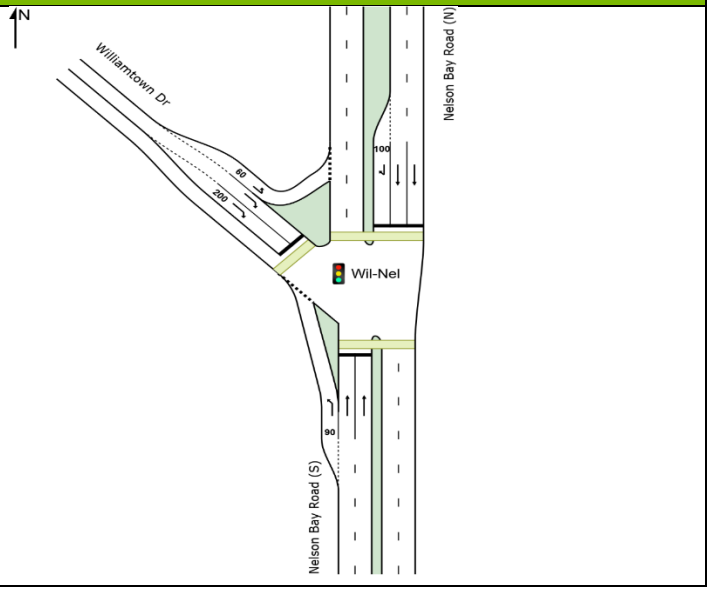
**Vehicle Movement Performance**

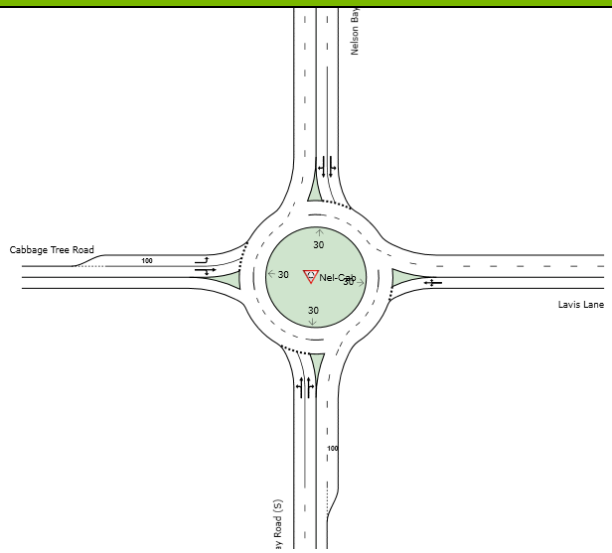
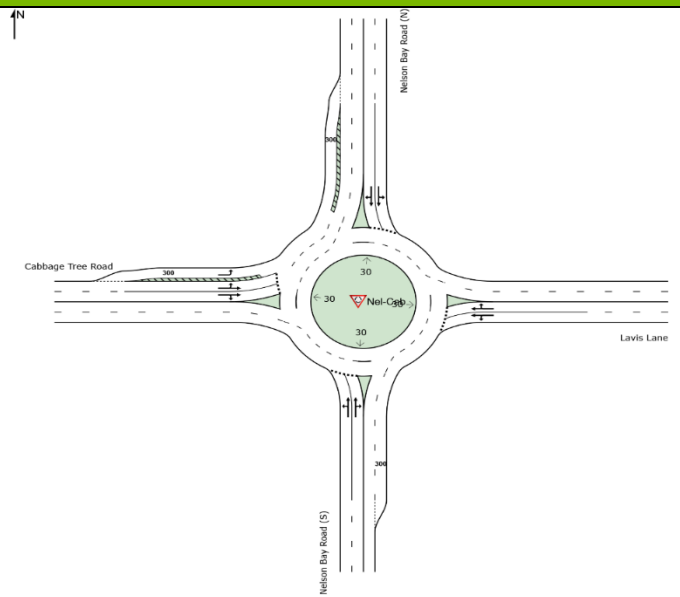
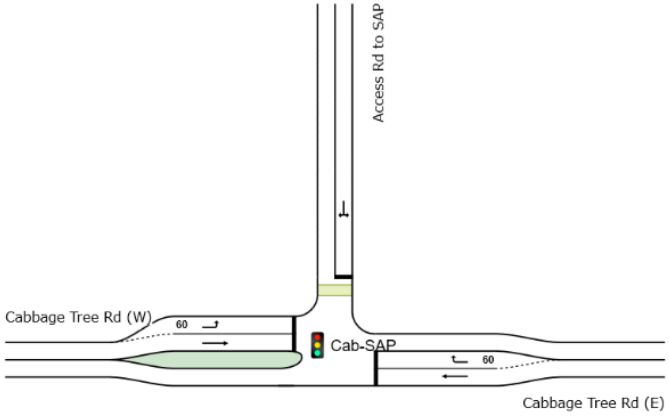
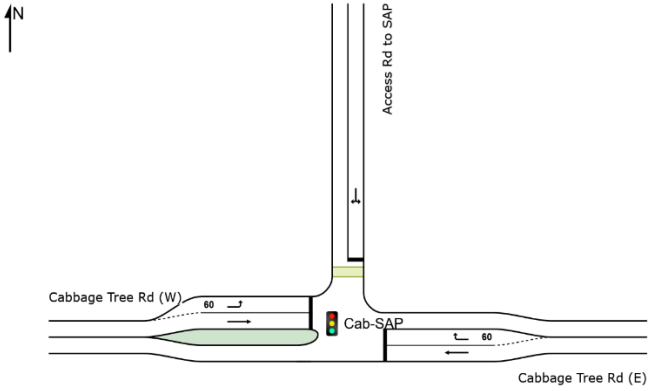
| Mov ID | Turn | INPUT VOLUMES [ Total veh/h | HV ] % | DEMAND FLOWS [ Total veh/h | HV ] % | Deg. Satn v/c | Aver. Delay sec | Level of Service | 95% BACK OF QUEUE [ Veh. veh | Dist ] m | Prop. Que | Effective Stop Rate | Aver. No. Cycles | Aver. Speed km/h |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East: Industrial Dr (E) | | | | | | | | | | | | | | |
| 5 | T1 | 1287 | 10.0 | 1355 | 10.0 | 0.547 | 11.4 | LOS B | 21.6 | 164.0 | 0.56 | 0.51 | 0.56 | 50.6 |
| 6 | R2 | 836 | 10.0 | 880 | 10.0 | * 1.100 | 174.5 | LOS F | 51.9 | 394.2 | 1.00 | 1.32 | 2.00 | 15.2 |
| Approach | | 2123 | 10.0 | 2235 | 10.0 | 1.100 | 75.6 | LOS E | 51.9 | 394.2 | 0.73 | 0.83 | 1.13 | 26.4 |
| North: Tourle St | | | | | | | | | | | | | | |
| 7 | L2 | 926 | 10.0 | 975 | 10.0 | 0.562 | 24.6 | LOS C | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.2 |
| 9 | R2 | 813 | 10.0 | 856 | 10.0 | * 1.070 | 152.3 | LOS F | 46.9 | 356.2 | 1.00 | 1.26 | 1.87 | 16.8 |
| Approach | | 1739 | 10.0 | 1831 | 10.0 | 1.070 | 84.3 | LOS F | 46.9 | 356.2 | 0.47 | 0.87 | 0.87 | 26.6 |
| West: Industrial Dr (W) | | | | | | | | | | | | | | |
| 10 | L2 | 1060 | 10.0 | 1116 | 10.0 | 0.644 | 10.4 | LOS B | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 54.1 |
| 11 | T1 | 1513 | 10.0 | 1593 | 10.0 | * 1.089 | 152.7 | LOS F | 93.4 | 709.5 | 1.00 | 1.60 | 1.86 | 16.9 |
| Approach | | 2573 | 10.0 | 2708 | 10.0 | 1.089 | 94.1 | LOS F | 93.4 | 709.5 | 0.59 | 1.15 | 1.09 | 23.7 |
| All Vehicles | | 6435 | 10.0 | 6774 | 10.0 | 1.100 | 85.3 | LOS F | 93.4 | 709.5 | 0.60 | 0.97 | 1.05 | 25.3 |

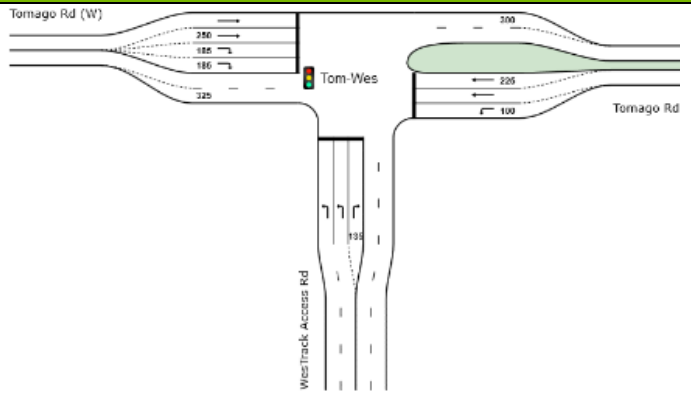
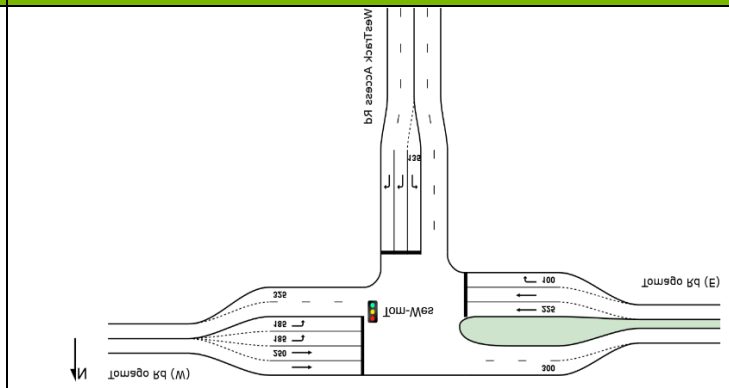
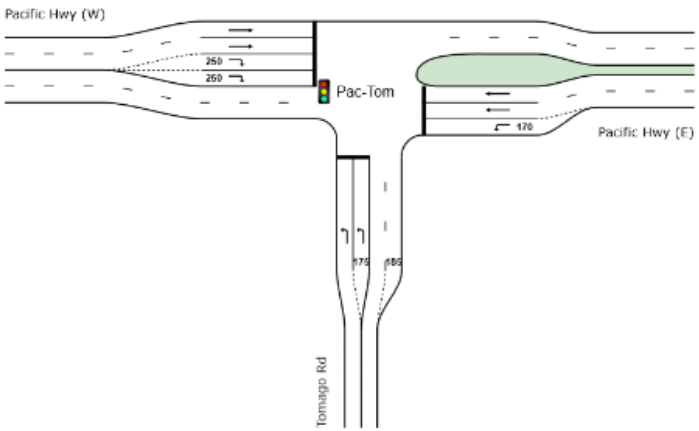
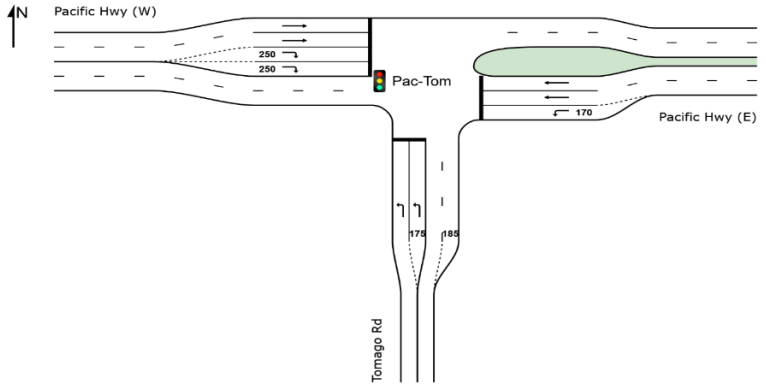
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA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

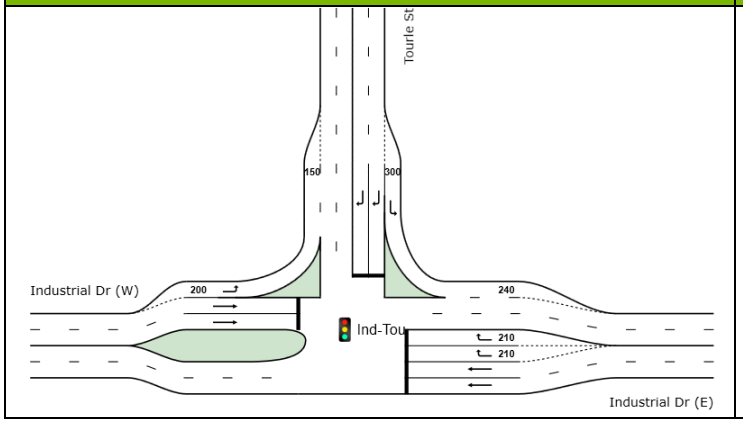
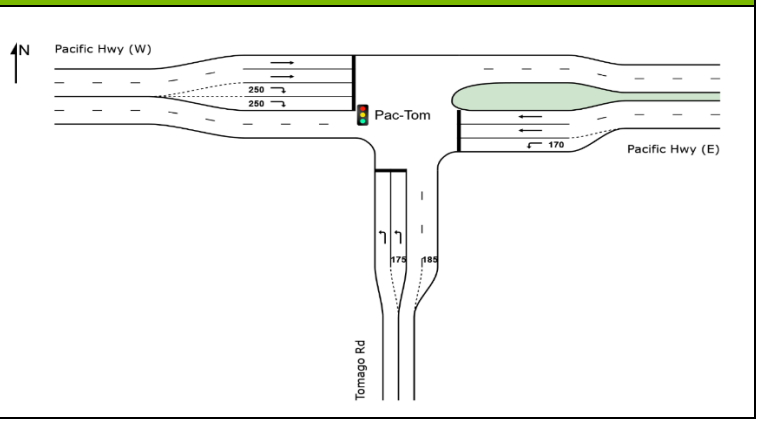
* Critical Movement (Signal Timing)

**Intersection Layout - Base case and required for 2041 excluding and including SAP traffic**

| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout with the SAP Traffic 2026 |
|---|---|
|  |  |

| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout with the SAP Traffic 2026 |
|---|---|
|  |  |
|  |  |
| | |

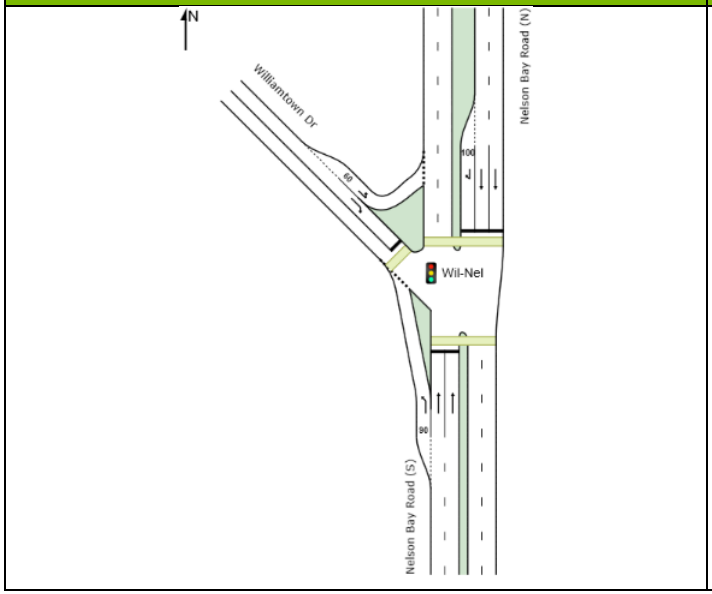
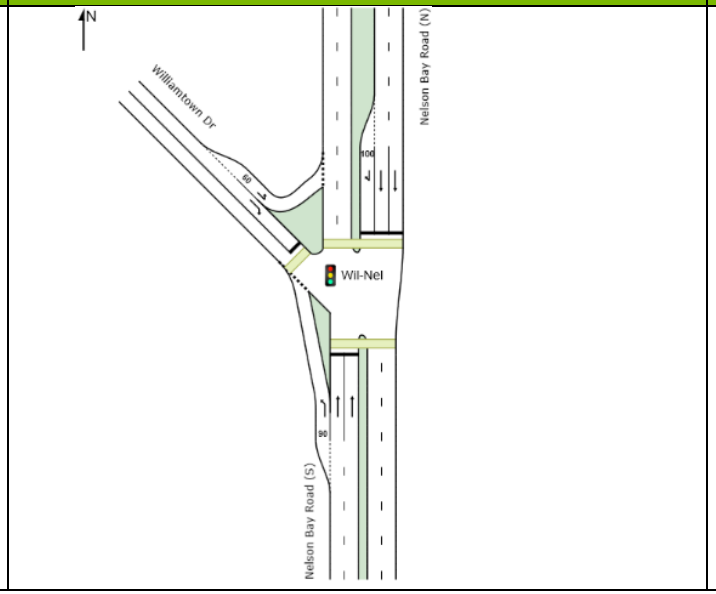
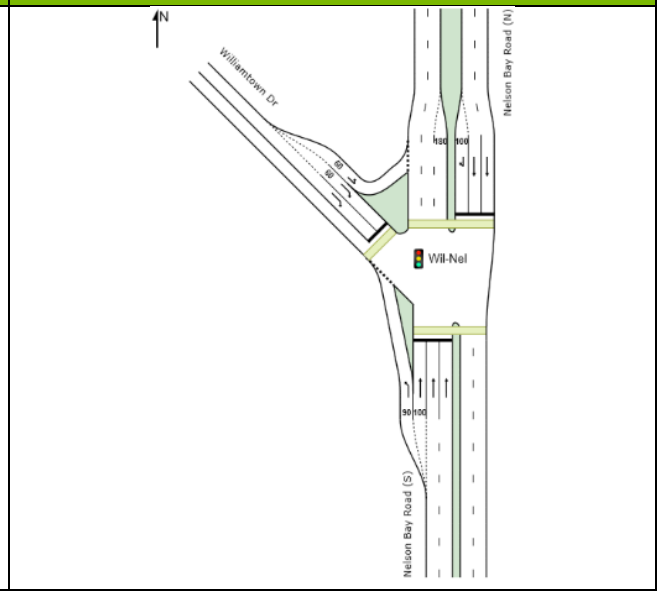
| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout with the SAP Traffic 2026 |
| --- | --- |
|  |  |
|  |  |

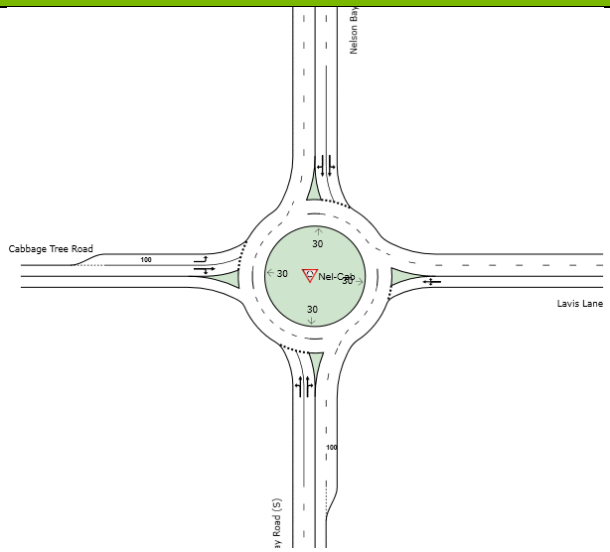
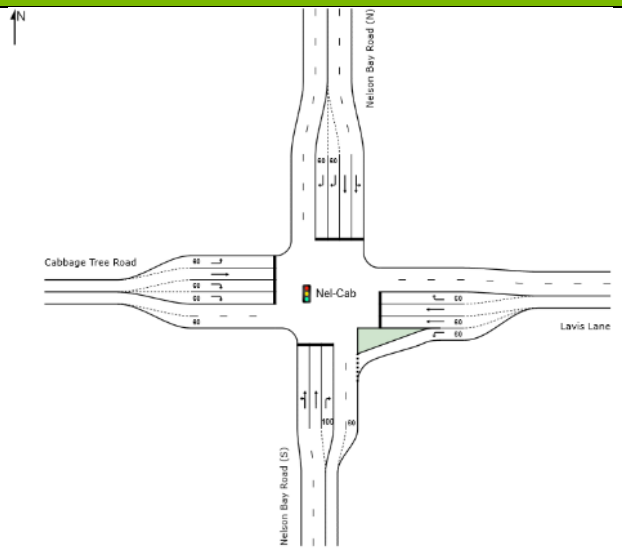
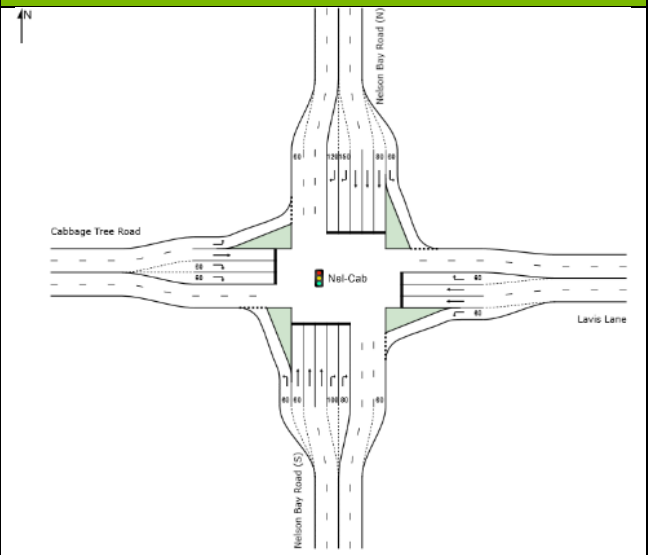
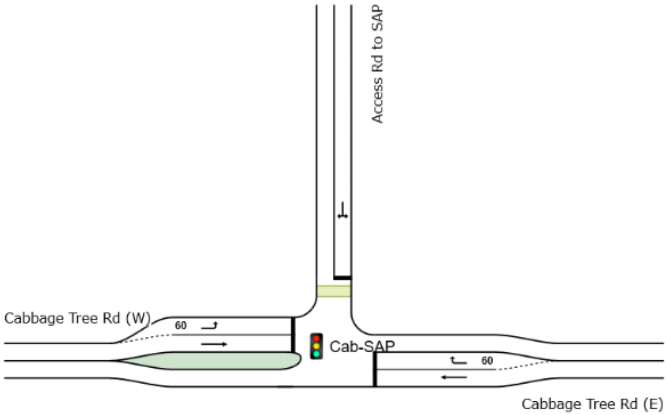
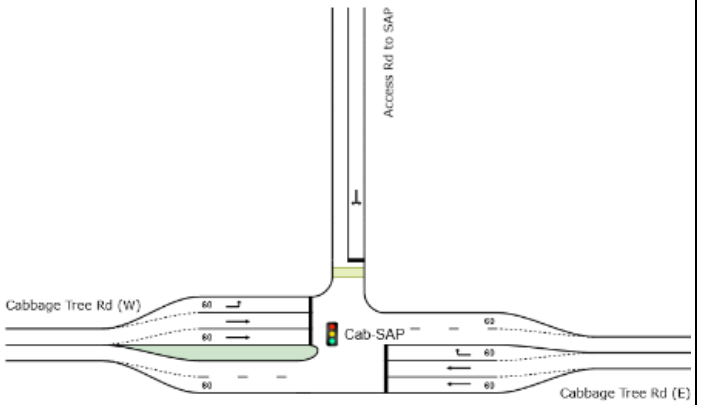
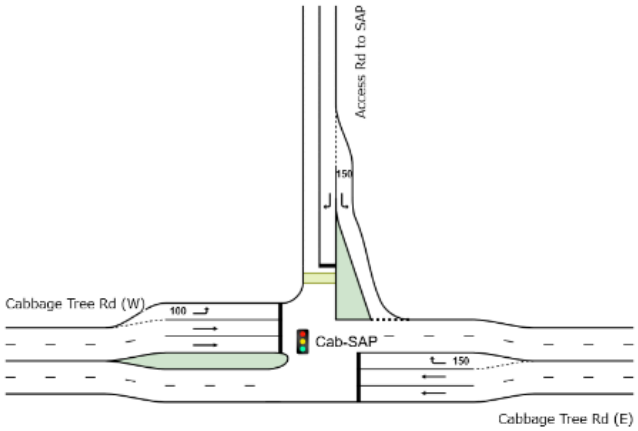
| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout with the SAP Traffic 2026 |
|---|---|
|  |  |

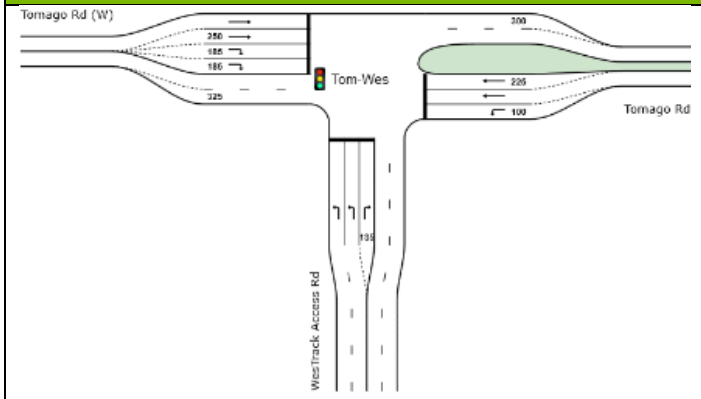
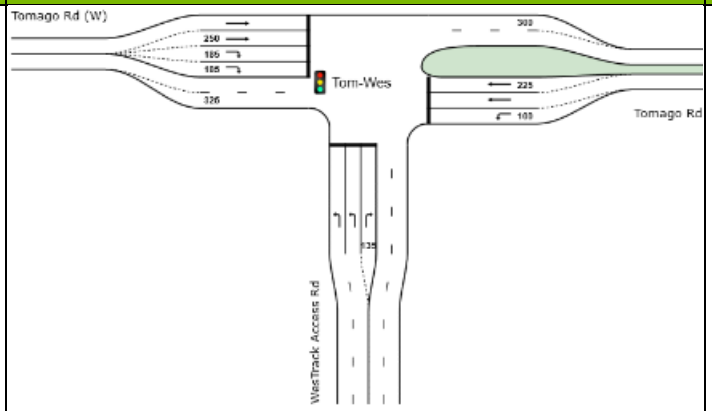
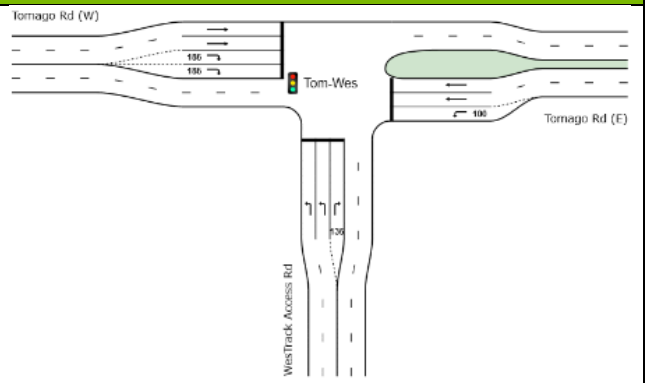
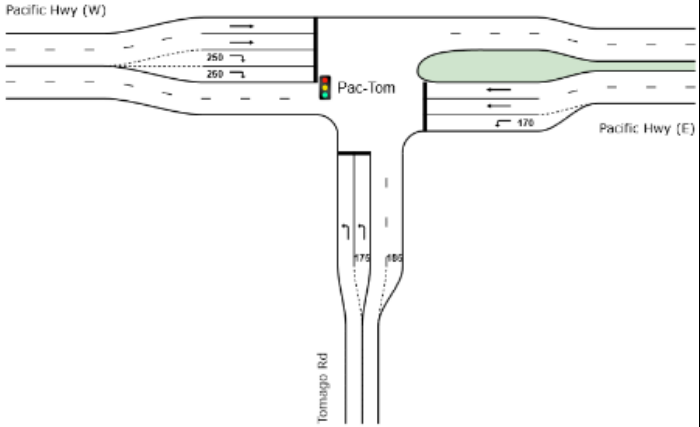
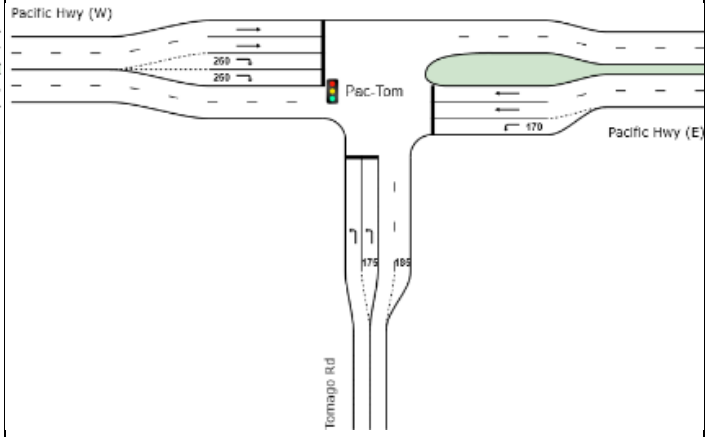
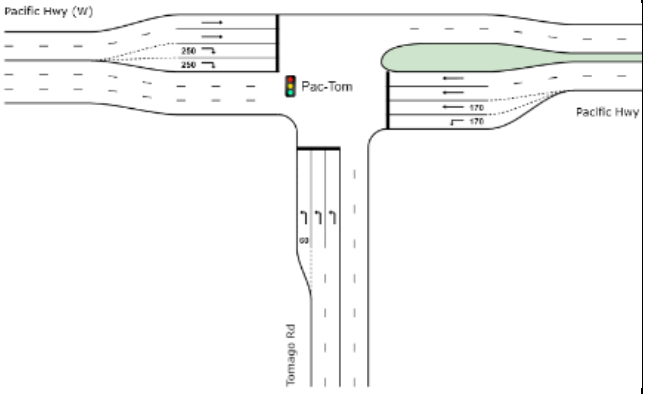


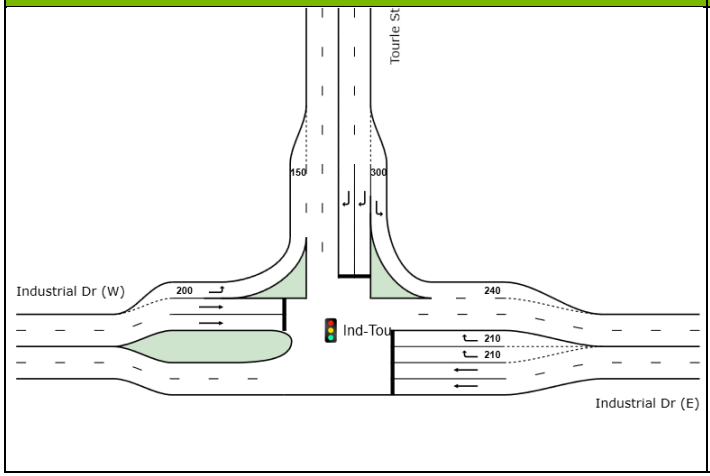
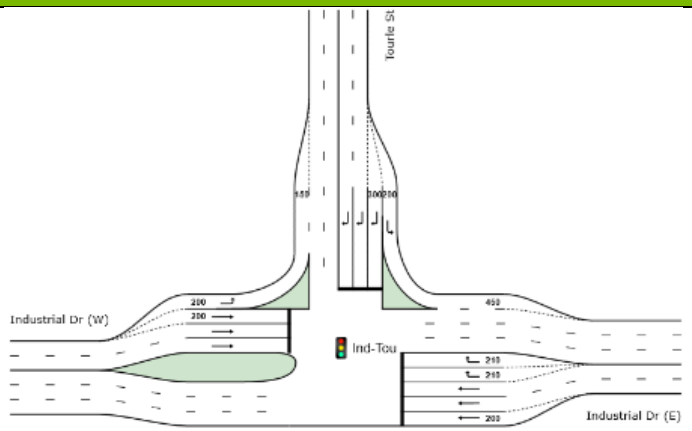
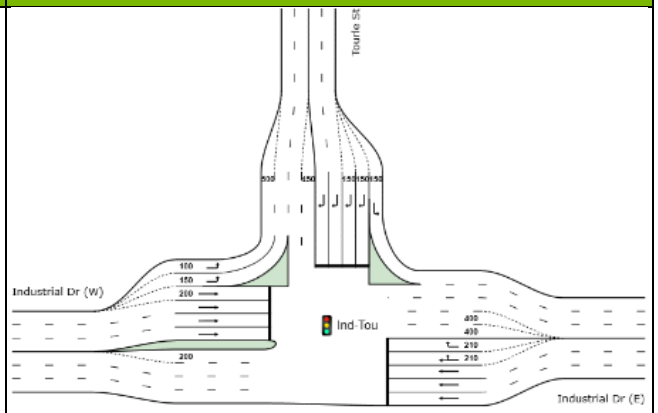


**Intersection Layout - Base case and required for 2041 excluding and including SAP traffic**

| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout 2041 Required Excluding SAP Traffic (SIDRA Results shown in Table 4-5) | Indicative Layout 2041 Required Including SAP Traffic (SIDRA Results shown in Table 4-4) |
|---|---|---|
|  |  |  |

| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout 2041 Required Excluding SAP Traffic (SIDRA Results shown in Table 4-5) | Indicative Layout 2041 Required Including SAP Traffic (SIDRA Results shown in Table 4-4) |
|---|---|---|
|  |  |  |
|  |  |  |
| | | |

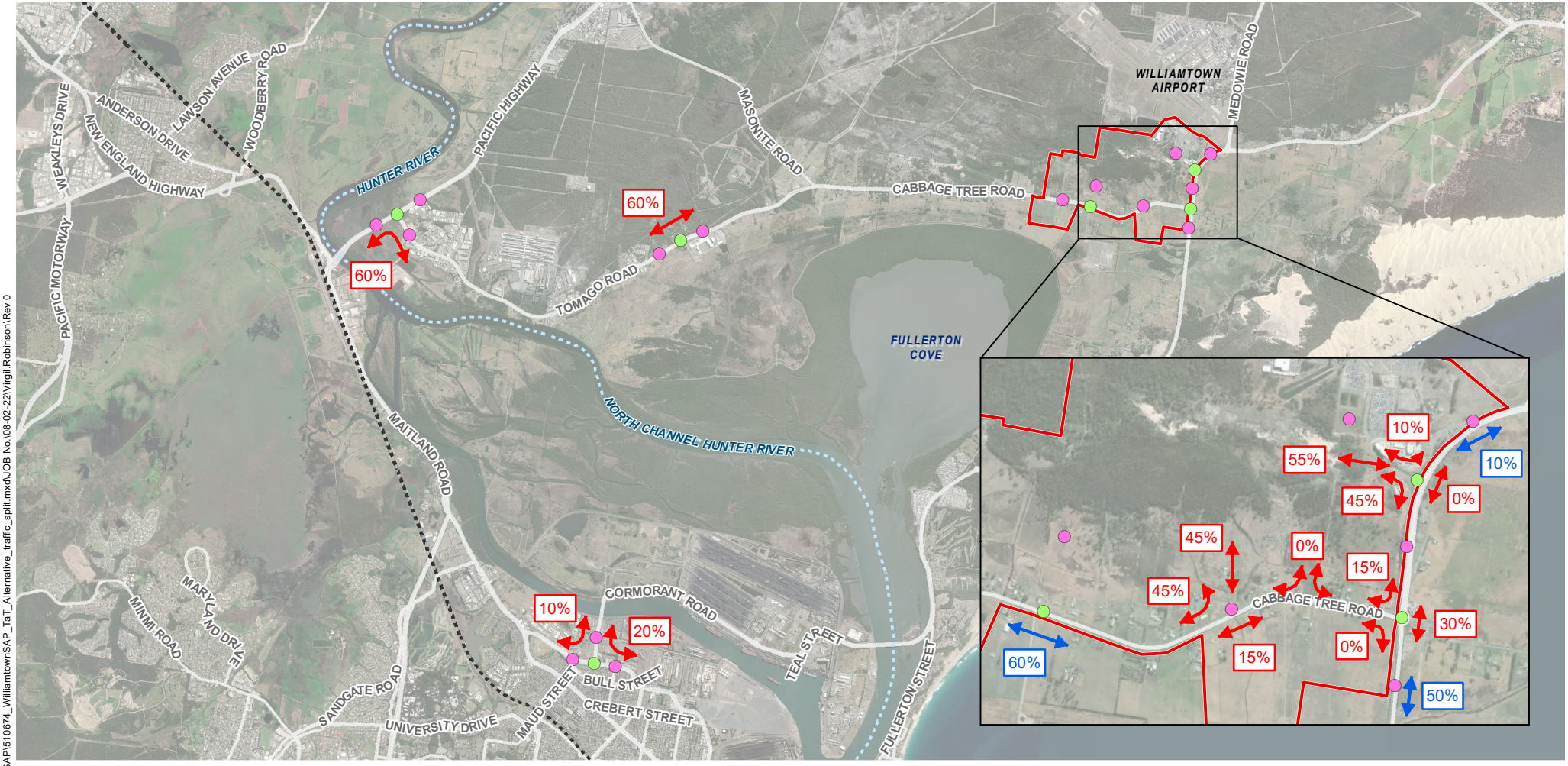
| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout 2041 Required Excluding SAP Traffic (SIDRA Results shown in Table 4-5) | Indicative Layout 2041 Required Including SAP Traffic (SIDRA Results shown in Table 4-4) |
|---|---|---|
|  |  |  |
|  |  |  |

| Existing Layout, (SIDRA Results shown in Table 4-2) | Indicative Layout 2041 Required Excluding SAP Traffic (SIDRA Results shown in Table 4-5) | Indicative Layout 2041 Required Including SAP Traffic (SIDRA Results shown in Table 4-4) |
|---|---|---|
|  |  |  |

# Appendix D

# Alternate Traffic Split, Travel Times & Midblock Traffic Results





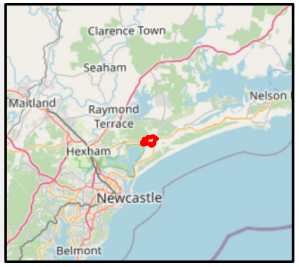

Williamtown SAP Structure Plan Boundary

River

Railway

Intersection assessment

Midblock assessment




**Source:** Aurecon, TfNSW, NSW Spatial Services, DPE, Esri

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0 2 4km

**Projection:** GDA 1994 MGA Zone 56

Williamtown SAP **Traffic and Transport**

**FIGURE:** Alternate traffic split

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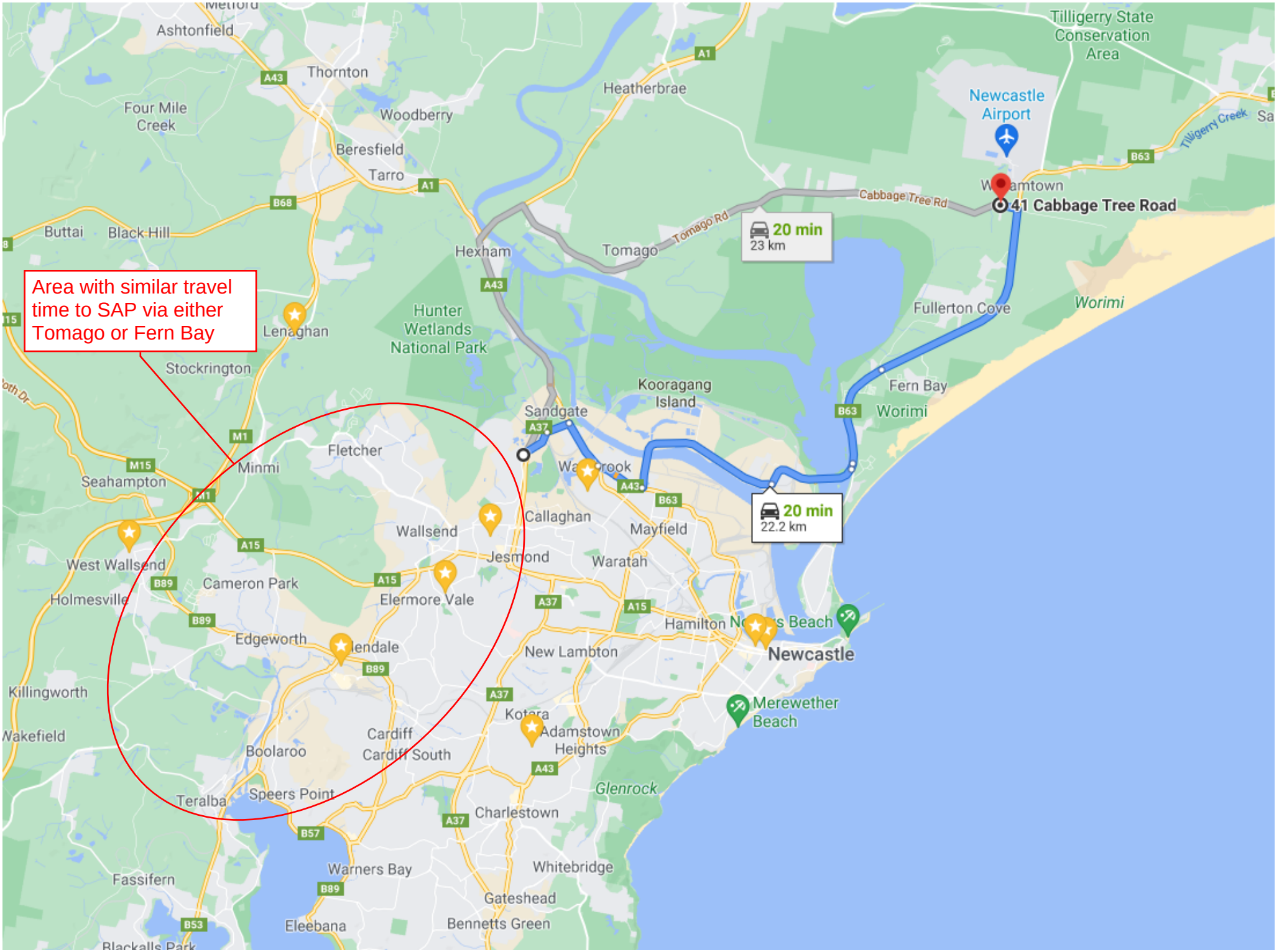
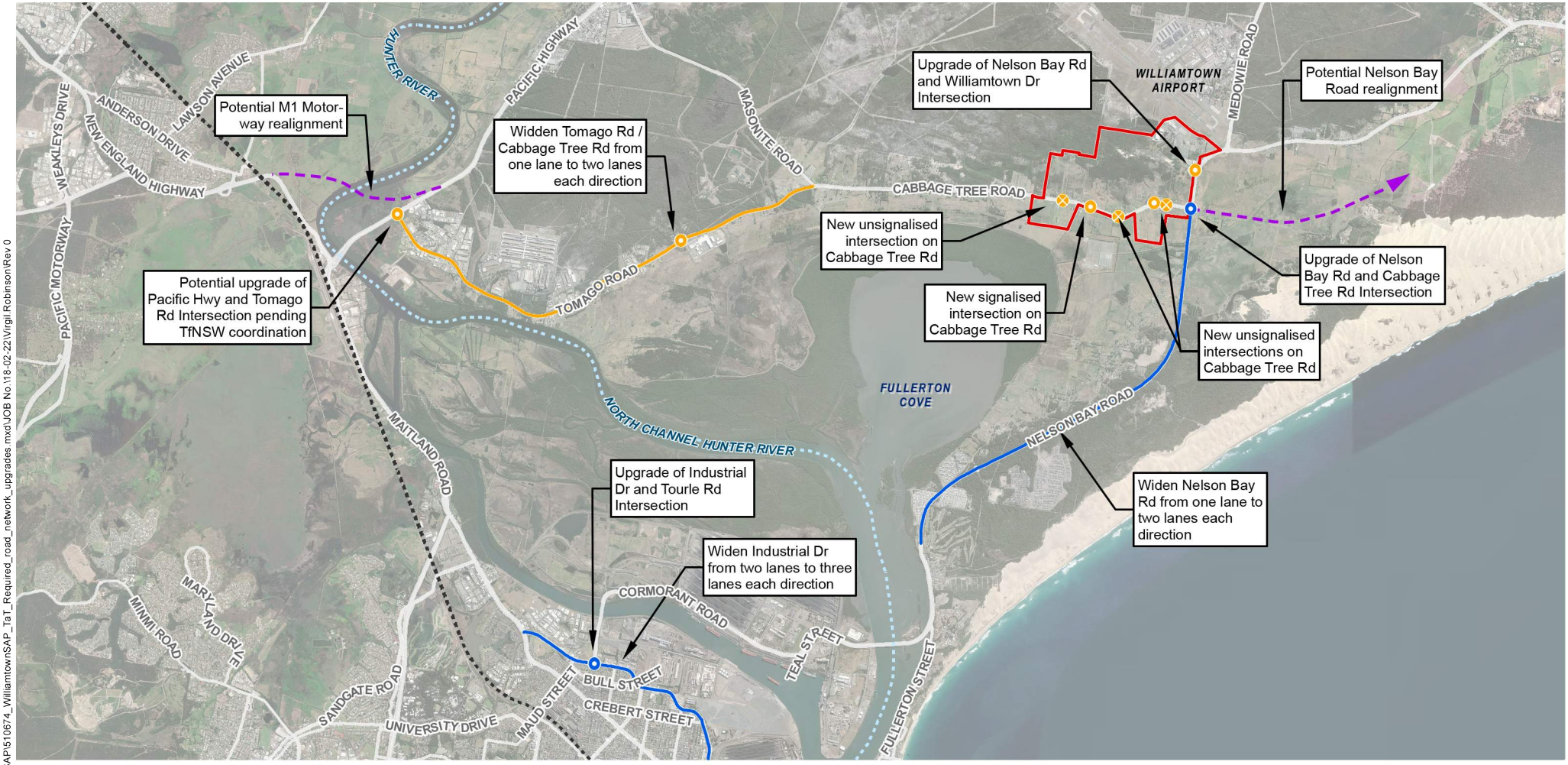

Area with similar travel time to SAP via either Tomago or Fern Bay
20 min
23 km
20 min
22.2 km
41 Cabbage Tree Road
Cabbage Tree Rd
Tomago Rd
Newcastle Airport
Tilligerry State Conservation Area
Tilligerry Creek
Ashtonfield
Thornton
Four Mile Creek
Woodberry
Beresfield
Tarro
Heatherbrae
Buttai
Black Hill
Hexham
Tomago
Hunter Wetlands National Park
Lenaghan
Stockrington
Fullerton Cove
Worimi
Fern Bay
Kooragang Island
Sandgate
Minmi
Fletcher
Seahampton
West Wallsend
Holmesville
Cameron Park
Wallsend
Elermore Vale
Callaghan
Jesmond
Mayfield
Waratah
Edgeworth
New Lambton
Hamilton
Newcastle
Merewether Beach
Killingworth
Wakefield
Boolaroo
Cardiff
Cardiff South
Adamstown Heights
Kotara
Glenrock
Teralba
Speers Point
Charlestown
Warners Bay
Whitebridge
Fassifern
Gateshead
Eleebana
Bennetts Green
Blackalls Park
M1
M15
A43
A1
B68
A37
A15
B63
B89
B57
B53

| | | | | | Before: | | | | After: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 2041 Including SAP Traffic | | | | 2041 Including SAP Traffic | | | |
| Intersection | Midblock | Direction | Lanes per direction | Current Capacity | 2041 Flow/ Capacity Ratio | Proposed Additional Lanes | New Capacity | New 2041 Flow/ Capacity Ratio | 2041 Flow/ Capacity Ratio | Proposed Additional Lanes | New Capacity | New 2041 Flow/ Capacity Ratio |
| Nelson Bay Road / Williamtown Drive (Newcastle Airpot) | Nelson Bay Road north of | NB | 2 | 3,400 | 60% | - | 3,400 | 60% | 60% | - | 3,400 | 60% |
| | | SB | 2 | 3,400 | 42% | - | 3,400 | 42% | 42% | - | 3,400 | 42% |
| | Williamtown Drive west of Nelson Bay | EB | 1 | 1,700 | 96% | - | 1,700 | 96% | 117% | - | 1,700 | 117% |
| | | WB | 1 | 1,700 | 82% | - | 1,700 | 82% | 103% | - | 1,700 | 103% |
| | Nelson Bay Road south of | NB | 2 | 3,400 | 90% | - | 3,400 | 90% | 96% | - | 3,400 | 96% |
| | | SB | 2 | 3,400 | 67% | - | 3,400 | 67% | 72% | - | 3,400 | 72% |
| Nelson Bay Road / Cabbage Tree Road | Nelson Bay Road north of Cabbage | NB | 2 | 3,400 | 82% | - | 3,400 | 82% | 86% | - | 3,400 | 86% |
| | | SB | 2 | 3,400 | 61% | - | 3,400 | 61% | 66% | - | 3,400 | 66% |
| | Cabbage Tree Road west of Nelson Bay | EB | 1 | 1,700 | 98% | 1 | 3,400 | 49% | 61% | 1 | 3,400 | 30% |
| | | WB | 1 | 1,700 | 99% | 1 | 3,400 | 50% | 50% | 1 | 3,400 | 25% |
| | Nelson Bay Road south of Cabbage | NB | 1 | 1,700 | 176% | 1 | 3,400 | 88% | 148% | 1 | 3,400 | 74% |
| | | SB | 1 | 1,700 | 173% | 1 | 3,400 | 87% | 145% | 1 | 3,400 | 73% |
| | Lavis Lane east of Nelson Bay Road | EB | 2 | 3,400 | 21% | - | 3,400 | 21% | 21% | - | 3,400 | 21% |
| | | WB | 2 | 3,400 | 36% | - | 3,400 | 36% | 36% | - | 3,400 | 36% |
| Cabbage Tree Road / SAP Access Road | Cabbage Tree Road east of SAP Access | EB | 1 | 1,700 | 111% | 1 | 3,400 | 56% | 60% | 1 | 3,400 | 30% |
| | | WB | 1 | 1,700 | 95% | 1 | 3,400 | 48% | 55% | 1 | 3,400 | 28% |
| | SAP Access Road north of Cabbage | NB | 1 | 1,700 | 90% | - | 1,700 | 90% | 68% | - | 1,700 | 68% |
| | | SB | 1 | 1,700 | 90% | - | 1,700 | 90% | 68% | - | 1,700 | 68% |
| | Cabbage Tree Road west of SAP Access | EB | 1 | 1,700 | 97% | 1 | 3,400 | 49% | 127% | 1 | 3,400 | 64% |
| | | WB | 1 | 1,700 | 93% | 1 | 3,400 | 47% | 123% | 1 | 3,400 | 62% |
| Tomago Road / WesTrac Drive | Tomago Road east of WesTrac Drive | EB | 1 | 1,700 | 89% | 1 | 3,400 | 45% | 118% | 1 | 3,400 | 59% |
| | | WB | 1 | 1,700 | 88% | 1 | 3,400 | 44% | 116% | 1 | 3,400 | 58% |
| | WesTrac Drive south of Tomago Road | NB | 2 | 3,400 | 11% | - | 3,400 | 11% | 11% | - | 3,400 | 11% |
| | | SB | 2 | 3,400 | 7% | - | 3,400 | 7% | 7% | - | 3,400 | 7% |
| | Tomago Road west of WesTrac Drive | EB | 1 | 1,700 | 99% | 1 | 3,400 | 50% | 127% | 1 | 3,400 | 64% |
| | | WB | 1 | 1,700 | 103% | 1 | 3,400 | 51% | 131% | 1 | 3,400 | 66% |
| Pacific Highway / Tomago Road | Pacific Highway east of Tomago Road | EB | 2 | 3,400 | 83% | - | 3,400 | 83% | 83% | - | 3,400 | 83% |
| | | WB | 2 | 3,400 | 57% | - | 3,400 | 57% | 57% | - | 3,400 | 57% |
| | Tomago Road south of Pacific Highway | NB | 1 | 1,700 | 168% | 1 | 3,400 | 84% | 196% | 1 | 3,400 | 98% |
| | | SB | 1 | 1,700 | 136% | 1 | 3,400 | 68% | 164% | 1 | 3,400 | 82% |
| | Pacific Highway west of Tomago Road | EB | 2 | 3,400 | 124% | - | 3,400 | 124% | 139% | - | 3,400 | 139% |
| | | WB | 2 | 3,400 | 128% | - | 3,400 | 128% | 142% | - | 3,400 | 142% |
| Industrial Drive / Tourle Street | Industrial Drive east of Tourle Street | EB | 2 | 3,400 | 111% | 1 | 5,100 | 74% | 110% | 1 | 5,100 | 73% |
| | | WB | 2 | 3,400 | 114% | 1 | 5,100 | 76% | 113% | 1 | 5,100 | 75% |
| | Tourle Street north of Industrial Drive | NB | 2 | 3,400 | 111% | - | 3,400 | 111% | 97% | - | 3,400 | 97% |
| | | SB | 2 | 3,400 | 111% | - | 3,400 | 111% | 97% | - | 3,400 | 97% |
| | Industrial Drive west of Tourle Street | EB | 2 | 3,400 | 133% | 1 | 5,100 | 88% | 122% | 1 | 5,100 | 81% |
| | | WB | 2 | 3,400 | 136% | 1 | 5,100 | 91% | 125% | 1 | 5,100 | 83% |

# Appendix E

# Proposed Indicative Intersection Upgrades: Structure Plan (Phase C)






Williamtown SAP Structure Plan Boundary

Potential TfNSW Projects in Planning

River

Railway

**Required Road Infrastructure Upgrades**

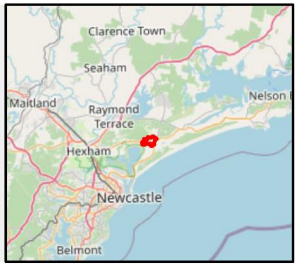
Background Growth Driven Road Upgrade

Williamtown SAP Driven Road Upgrade

Background Growth Driven Intersection Upgrade

Williamtown SAP Driven Intersection Upgrade (signalised)

Williamtown SAP Driven Intersection Upgrade (unsignalised)




**Source:** Aurecon, TfNSW, NSW Spatial Services, DPE, Esri

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0 2 4km

**Projection:** GDA 1994 MGA Zone 56

Williamtown SAP **Traffic and Transport**

**FIGURE:** Required road network upgrades

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# Appendix F
# Proposed Mobility Plan (prepared by Hatch Roberts Day)

MOBILITY

# MOVEMENT & PLACE

## PRINCIPLE

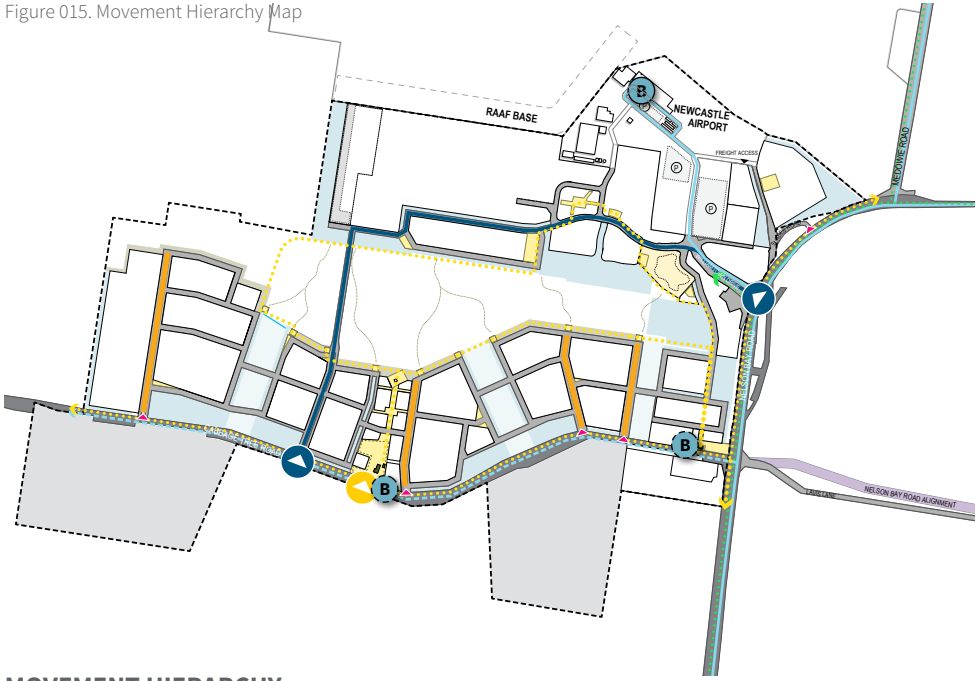
***Provide a truly integrated national model for Movement & Place whereby the movement network is designed to attract intended business clusters and corridors whilst the 'people-focused' character drives the design & location.***

## STRUCTURE PLAN RESPONSE

- Incorporation of a compact and efficient movement network
- Destinations such as the Commercial Centre and the Keeping Circle can be reached within a 5-10 min walk of each other
- Pedestrian Loop encircles Environmental Protection Area , connecting the precinct
- Road network connects to existing and planned road layouts
- With frequent intersections, the road layout minimises the potential for rat-running
- Provides multiple access points from Nelson Bay and Cabbage Tree Roads
- With a minimum number of 4-way intersections (3), the road layout reduces the need for round-abouts as they are expensive to construct and are not pedestrian-friendly
- Integration with new Nelson Bay Road alignment


Figure 014. Movement and Place Diagram

Figure 015. Movement Hierarchy Map



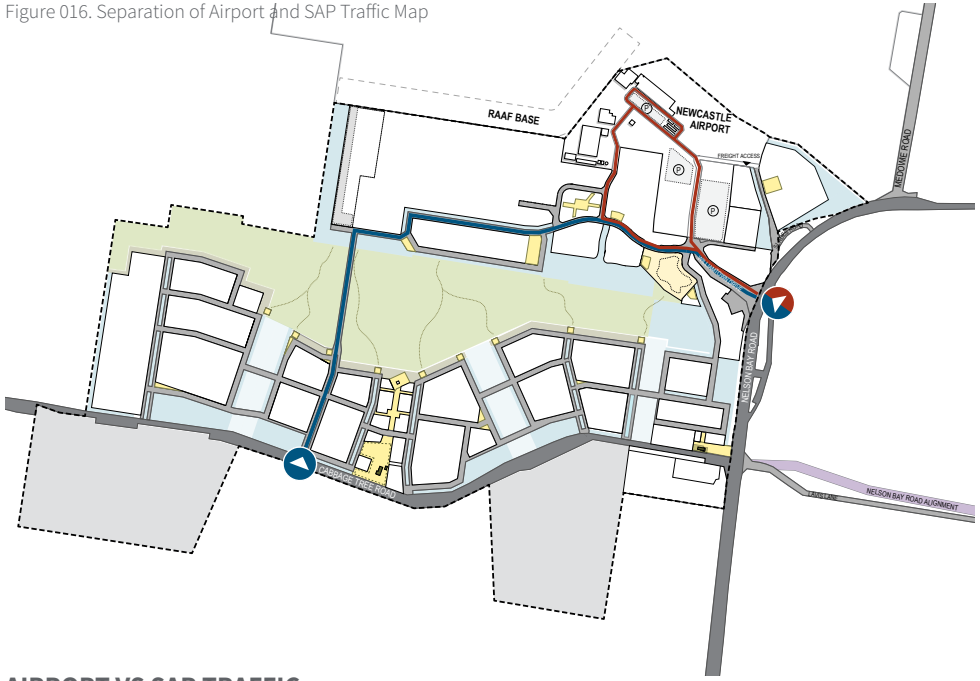

## MOVEMENT HIERARCHY

- Lack of E-W routes in the southern section is designed to keep internal SAP movements as local access only.
- Eliminates vehicles using the SAP roads as a rat-run instead of Cabbage Tree Road.
- Key N-S movement would be along the Local Distributor A or Nelson Bay Road.

**Legend**

- Pedestrian Connection
- Proposed Regional Cycleway
- Existing Bus Route
- Potential New Bus Route to be Considered
- Indicative Bus Stop to be Considered
- Existing Bus Stop
- Local Access Road
- Local Distributor B
- Local Distributor A
- Main Road
- Nelson Bay Road Alignment (Offline Option)
- Main Vehicular Access Point (incl. freight)
- Main Pedestrian Access Point
- Access point

Figure 016. Separation of Airport and SAP Traffic Map




## AIRPORT VS SAP TRAFFIC

- Key access point for Newcastle Airport would be via Williamtown Drive.
- Key access points for the Williamtown SAP would be via Cabbage Tree Road Main Access Point and Williamtown Drive.

**Legend**

- Main SAP Traffic Route
- Main Airport Traffic Route
- SAP Access Point
- Airport Access Point

**Document prepared by**

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