Traffic & Transport Technical Study

Breen SSD Application: New Resource Recovery Facility and Marang Parklands

80218082



Prepared for

Breen Resource Pty Ltd

9 April 2021

Cardno

Contact Information

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 9 - The Forum
203 Pacific Highway
St Leonards NSW 2065
Australia

www.cardno.com
Phone +61 2 9496 7700
Fax +61 2 9439 5170

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Executive Summary

Introduction

Cardno has been engaged by Breen Resource Pty Ltd to undertake a Traffic and Transport Technical Study as part of an Environmental Impact Statement (EIS) to support the State Significant Development (SSD) application. Breen currently operates a waste management and landfill facility which is involved in the restoration of land formerly subject to sand mining, using a range of construction and demolition waste materials to fill the land.

In June 2010, a Voluntary Planning Agreement (VPA) was entered into between Breen Holdings Pty Ltd (subsequently novated to Breen Property), Australand Kurnell Pty Ltd (now renamed Frasers Property) and Sutherland Shire Council (Council). At no cost to the community, the legally binding VPA required Breen Property and Frasers to deliver the following:

- A staged transfer of 91ha of land to public ownership for the purpose of environmental conservation and public open space.
- Construction of regional recreation facilities, including 10 playing fields, a skate park, 3 amenities buildings, walking and cycling tracks, picnic facilities and associated parking for over 400 cars.
- Rehabilitation and landscaping of degraded land previously dredged for sand mining to support an ecological 'green corridor' stretching from the Towra Point Nature Reserve to the ocean at Wanda Beach.

The delivery of the land and associated works is currently being undertaken in accordance with the VPA. Development Application DA/11/0665 (DA/11/0665), which was approved by Council on 23 April 2012, provides for the first three stages of the works required by the VPA, including a concept masterplan for ten sporting fields, skate park, and associated parking, lighting, amenities building; habitat rehabilitation, and stormwater treatment facilities.

The first stage of the recreational facilities approved under DA/11/0665 has already been developed, comprising Sporting Field No. 1, two hockey fields, the skate park, car parking, and associated amenities and landscaping. Subsequent stages of the concept masterplan for DA/11/0665 are located on Lots 1122 and 1123 DP794114 (Lot 1122 and Lot 1123), and Lot 6 DP1158627 (Lot 6), and include seven more playing fields, as well as additional car parking and amenities.

The Existing Breen Resources Facility is located on land that will, subject to the approval of this application, be developed as the Marang Parklands. Stages 2 and 3 of the Playing Fields will also be developed on a part of this land under separate consents already obtained.

To deliver the Marang Parklands on Lots 1122 and 1123 and Lot 6, the Existing Breen Resources Facility infrastructure needs to be demolished and/or relocated.

Breen is therefore proposing to construct and operate a new integrated resource recovery facility. This will allow Breen to deliver the recreational space and other publicly accessible Marang Parklands in the western part of the Proposal Site to the community. It will also provide improved recycling capability in line with NSW Government priorities and targets to increase resource recovery from the C&D and C&I sectors.

The Proposal is comprised of the delivery of the Embellished Marang Parklands, the continuation of landfilling on the residual parts of Lot 5 and the construction of the New Resource Recovery Facility.

Specifically, the Proposal involves the following key integrated components:

- Construction and operation of a resource management facility, comprising:
  - A New Resource Recovery Facility on the eastern part of the Proposal Site (Lot 5), including consolidation of existing waste management activities within this part of the Proposal Site; and
  - A waste disposal facility, being the continuation of current land restoration, landfilling and contouring operations at the Proposal Site by permanent application of some of the residual waste materials from the New Resource Recovery Facility to land on Lot 5;
- Use of suitable material processed by the New Resource Recovery Facility to cap, contour and re-profile areas of the Proposal Site and to construct the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6;

- Re-profiling of parts of the Proposal Site within Lots 1122, 1123 and 6, with some existing waste materials from those lots;
- Delivery of an activated and integrated community space in the form of the Embellished Marang Parklands on Lots 1122, 1123 and Lot 6, to provide a superior parkland to that proposed under the VPA. This will include, among other things, integrated water usage and management and utilising personnel, plant, material and infrastructure across the whole of the Site.

To enable the above Proposal, the Existing Breen Resources Facility on Lots 1122, 1123 and 6 (this includes those parts of Lots 1122, 1123 and 6 that will comprise the Playing Fields) will be demolished and/or relocated (as required) to Lot 5.

The proposed Embellished Marang Parklands include the following improvements and benefits to the community over and above those contemplated by the 2010 VPA:

- A cleared 'Village Green' area in the middle of the parklands with amphitheatre, providing a place for the community to hold events and celebrations in a semi natural setting; and
- Associated picnic areas for all members of the local and wider community to use and enjoy; and
- A playground; and
- A network of accessible paths, including key pedestrian and cycle links between Quibray Bay and Cronulla Beach, to allow visitors to easily access the parklands for pedestrians and cycling, reinforcing the Sydney Green Grid; and
- An elevated landscape, including a panoramic look out in the western part of the parklands that offers spectacular all-round regional views that will assist in a better understanding of the varied landscapes of this part of Sydney.

To facilitate the delivery of the Proposal, subject to approval of this SSD application it is necessary for Breen to maintain ongoing operational activities at the Existing Breen Resources Facility under DA/269/90 until the New Resource Recovery Facility is fully operational. As such, the Proposal is intended to be delivered in multiple construction and operational stages, with the following key sequences:

- The reprofiling of Lots 1122 and 1123 and Lot 6 concurrent with the construction of the New Resource Recovery Facility on Lot 5, This will allow the continued operation of the Existing Breen Resources Facility on parts of Lots 1122 and 1123 and Lot 6 until the New Resource Recovery Facility is fully operational; and
- The revegetation of Lots 1122 and 1123 and Lot 6 and installation of the Marang Parklands landscaping, infrastructure and facilities concurrent with the demolition of Existing Breen Resources Facility infrastructure and processing areas on Lots 1122 and 1123 and Lot 6; and
- Landfilling on Lot 5 would continue under DA/269/90 whilst the above sequence of works is completed.

Waste management activities on the Proposal Site will be relocated from Lots 1122 and 1123 to Lot 5, with infrastructure, buildings and facilities to be modernised and upgraded to improve worker and visitor amenity, and to reduce environmental impacts associated with the operation of the facility on neighbours. In total, the New Resource Recovery Facility is proposed to have a capacity to accept and process up to approximately 650,000 tonnes per annum.

The landform proposed for the Marang Parklands has been designed to create a variety of spaces, grades and profiles to achieve specific recreation and environmental objectives. Recreation objectives include pathways and tracks that are wheelchair accessible, steeper tracks for more challenging walks and hikes, as well as an open amphitheatre, lawns and lookouts to connect the community to the surrounding wetlands, parks and ocean. A total of 200 car parking spaces are detailed in association with the Marang Parklands area.

Assessment Approach

The traffic and transport study has been prepared to address the Secretarys Environmental Assessment Requirements (SEARs). The SEARs generally cover the following:

- Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes;
- Details on how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network;

- An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model.
- Swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site;

In order to adequately detail and respond the SEARs requirements, the traffic and transport study is based on the following:

- Existing site condition review of the Proposal site;
- Data collection and use of historic data sources. Historical data from 2018 and 2016 has been relied upon to align with historical data obtained for the Existing Breen Resource Facility and to remove the potential impacts the COVID-19 pandemic has had on traffic patterns in the area which may be considered atypical;
- Analysis of parking requirements in accordance with relevant local and state planning documents;
- Establishment of baseline traffic conditions through the use of traffic modellign software;
- Development of forecast traffic generation profiles for the peak hour to assess the Proposal's impact;
- Review of road safety considerations and the Proposal's impact;
- Identification of management and mitigation measures to appropriately control the Proposal's traffic impact.

Parking

The number of car parking spaces to be provided on the site is typically to be determined in accordance with the Sutherland Shire DCP, however, in this instance the Sutherland Shire DCP does not apply to the Proposal Site as the Sutherland Shire Local Environmental Plan does not apply to the Proposal Site. As such, a review has been carried out having consideration to the current site operations and staffing levels than adopting Council's generic car parking rate which is applicable to the whole LGA.

The Existing Breen Resources Facility currently operates with 52 staff on-site at any one time, with on average four visitors throughout the day. A number of staff carpool to the site, and staff are encouraged to do so. Worst case scenario is to assume that all staff and visitors drive, and are parked on-site at the same time. This is a total of 56 parked vehicles.

The Proposal site has sufficient space to cater for some 88 car parking spaces to support the New Resource Recovery Facility and landfill. This is considerably higher than the current day to day demand of the site. This level of parking is highly unlikely to be fully utilised however does allow for atypical operations.

Based on other regional parklands, the proposed car parking of 200 spaces will be sufficient to service the Marang Parklands and recreational activities occurring within this portion of the Proposal site such that there will be no overflow parking onto Captain Cook Drive or the sports fields.

Parking for other modes such as motorcycle and bicycle is faciliatetd on-site along with on-site loading requirements.

On-site vehicle manoeuvring checks (swept paths) for both the New Resource Recovery Facility and the Marang Parklands have been completed.

Traffic Generation

The New Resource Recovery Facility traffic generation has been derived on historic 2017/2018 weighbridge data and the surveys undertaken in 2018 from the Existing Breen Resource Facility. The forecast increase associated with the New Resource Recovery Facility is some 53 peak hour vehicles in the morning and 34 trips on the Saturday. There is little to no activity that overlaps with the weekday PM peak hour.

The Marang parklands traffic generation has been derived based on first principles calculation using the proposed number of car spaces. The assessment accounts for 43 to 85 peak hour vehicle trips.

As part of the cumulative assessment, the traffic modelling also considers the following:

- Relocated Boat Harbour Access generating up to 25 trips in the peak hour
- Fully developed sports fields generating up to 600 trips
- Fully developed Woolooware Bay Town Centre generating up to 910 vehicle trips (recorded at Woolooware Road)

> Background traffic growth of 1%

Road Network Performance

Operation

The existing road network performance has been established using the traffic survey data captured and modelling using SIDRA v8. The intersections assessed have been modelled as per TfNSW modelling guidelines and show the following results:

> Woolooware Road / Captain Cook Drive will perform at LoS B or better in 2021 and LoS F in 2031 under the baseline conditions. The inclusion of the Proposal traffic will see the 2021 performance shift to LoS C or better whilst the 2031 performance will remain at LoS F.

  The change in LoS from B to C in 2021 occurs during the Saturday peak hour. The performance of LoS C on the weekend peak is considered to be satisfactory as per the RMS (now TfNSW) Guide. The LoS F identified in 2031 occurs on the Saturday peak under baseline conditions. The additional traffic associated with the Proposal results in minor increase in delay retaining the LoS F outcome. The LoS F is not triggered as a result of the Proposal.

> Elouera Road / Captain Cook Drive will perform at LoS B or better in 2021 and LoS C or better in 2031 under the baseline conditions. The Propoal's traffic impact is negligible in this location with both the 2021 and 2031 LoS performance retained.

> Existing Breen Access / Captain Cook Drive will perform at LoS B or better in 2021 and LoS C or better in 2031. With the inclusion of the Proposal traffic, the 2021 result is LoS C or better whilst the 2031 result is LoS D or better.

  The worst movement in this priority controlled intersection is the right turn out onto Captain Cook Drive, which has the associated LoS C/D in 2031 under the Proposal conditions. However, the volume of traffic for this movement in most cases is 1-2 vehicles in the hour and is not reflective of the intersections performance. The more critical left turn out and right turn into the site operate satisfactorily at LoS A.

> Hockey Field Access / Captain Cook Drive will perform at LoS B in 2021 and LoS C or better in 2031. With the inclusion of the Proposal's traffic generation, these LoS results do not change which reflects minimal impact

  Lindum Road / Captain Cook Drive will perform at LoS A in 2021 and 2031 under baseline conditions. With the inclusion of the Proposal's traffic generation, this LoS result will remain unchanged

Construction

Based on the construction detail proposed and the reuse of existing haulage, recovery of material on site, it is envisaged that construction of the Proposal will have negligible impact on traffic conditions on Captain Cook Drive. The works are not expected to introduce any considerable additional construction vehicles to Captain Cook Drive. No alterations to the existing site access to the Existing Breen Resource Facility from Captain Cook Drive will be required until such time that the intersection is upgraded for the sports field (pursuant to separate consent).

Once the Lindum Road access is constructed that would also be used for construction entrance to the Proposal site.

There are likely to be movements associated with the delivery of machinery, as well as contracted employees for construction of the New Resource Facility and the Marang Parklands. Delivery of machinery is expected to add 2-4 movements per day in early stages of the construction program. Most of the equipment required and delivered to the Proposal site will remain on-site for construction of both the New Resource Facility and Marang Parklands, reducing the cumulative traffic impact and need for construction equipment. The estimated contracted employees are forecast to add 50 inbound trips in the morning and 50 outbound trips in the afternoon (progressively leaving the site once on-site work slows down).

Management & Mitigation

The analysis of all transport related impacts has found that the traffic generated by the Proposal is expected to have a minimal impact to the surrounding road network in terms of traffic flow efficiency and road safety.

Specific to the New Resource Recovery Facility, the following measures are recommended to manage and mitigate any potential traffic impact:

- Operational Traffic Management Plan
- Workplace Travel Plan
- Signage and pedestrian priority measures at site driveway / Lindum Road extension

Specific to the Marang Parklands, it is recommended that the following measures are implemented to help manage and mitigate any potential traffic impact

- Signage and Wayfinding Strategy

Specific to the overall Proposal:

- Speed zone reduction from 80km/h to 60-70km/h across the site frontage.

A Construction Traffic Management Plan (CTMP) will be prepared by suitably qualified professional to manage and mitigate potential traffic impacts during the construction program. The CTMP will provide specific details on the construction program, once known.

An internal management strategy will also be established within the construction site as part of the CTMP. This strategy will form part of the site's induction that will be undertaken by all personnel on-site and also detail the following:

- 10 km/h speed limit on internal access roads;
- Radio communication between construction vehicles available at all times;
- All loads to be correctly restrained; and
- Warning signage to be provided at critical areas and intersection points.

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1 Introduction

1.1 Background

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The proposed Embellished Marang Parklands include the following improvements and benefits to the community over and above those contemplated by the 2010 VPA:

- A cleared ‘Village Green’ area in the middle of the parklands with amphitheatre, providing a place for the community to hold events and celebrations in a semi natural setting; and
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- A playground; and
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> An elevated landscape, including a panoramic look out in the western part of the parklands that offers spectacular all-round regional views that will assist in a better understanding of the varied landscapes of this part of Sydney.

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- The reprofiling of Lots 1122 and 1123 and Lot 6 concurrent with the construction of the New Resource Recovery Facility on Lot 5, This will allow the continued operation of the Existing Breen Resources Facility on parts of Lots 1122 and 1123 and Lot 6 until the New Resource Recovery Facility is fully operational; and
- The revegetation of Lots 1122 and 1123 and Lot 6 and installation of the Marang Parklands landscaping, infrastructure and facilities concurrent with the demolition of Existing Breen Resources Facility infrastructure and processing areas on Lots 1122 and 1123 and Lot 6; and
- Landfilling on Lot 5 would continue under DA/269/90 whilst the above sequence of works is completed.

Figure 1-1 Site Location



1.2 SEARs

The SSD application must prepare an EIS in accordance with the Planning Secretary's Environmental Assessment Requirements (SEARs). This report will provide a detailed assessment of the key traffic and transport issues as outlines in the SEARs as shown in **Table 1-1**.

Table 1-1 SEARs Traffic and Transport

SEARs	Section of Report
Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation.	**Section 7 & 8**
Plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network.	**Section 6, 7 & 8**
An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections using SIDRA or similar traffic model.	**Section 7, 8 & 9**
Swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site.	**Section 6**
Plans of any proposed road upgrades, infrastructure works or new roads required for the development.	**Section 5 & 8**
An assessment of potential impacts on local road pavement lifespan.	**Section 7**

Table 1-2 Agency Requirements Traffic and Transport

Agency Requirements – Transport for New South Wales (TfNSW)	Section of Report
Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation. All affected intersections should be examined / modelled. These should include, but not be limited to: a. Captain Cook Drive / Elouera Road b. Captain Cook Drive / Woolooware Road	**Section 7 & 8**
Details of the proposed accesses and the parking provisions associated with the proposed redevelopment including compliance with the requirements of the relevant Australian Standards (i.e. turn paths, sight distance requirements, aisle widths, etc.).	**Section 6**
Dangerous goods routes, if applicable, should be assessed and mapped.	**Section 7**
A time of day profile that separates heavy and light vehicles for each hour of operation on an average weekday should be provided. This should include an estimation of the distribution of traffic over 7 days.	**Section 7**
A demonstration how the capacity of the waste processing and handling facilities will match the estimated truck demand (to minimise storage and double handling of materials, and ensure queues do not tail back onto Lindum Road).	**Section 6 & 7**
The safety of recreational vehicles (i.e. four wheel drive traffic and cyclists) is to be assessed and addressed with heavy vehicles accessing the site.	**Section 7 & 8**
It should be ascertained if there is a risk of truck rollovers (particularly for bulk carriers/wagons) and whether sensitive parklands and waterways need additional protections (such as wire safety barriers) in these locations.	**Section 8**

Proposed number of car parking spaces and compliance with the appropriate parking codes.	**Section 6**
Details of light and heavy vehicle movements (including vehicle type and likely arrival and departure times).	**Section 7**
To ensure that the above requirements are fully addressed, the transport and traffic study must properly ascertain the cumulative study area traffic impacts associated with the redevelopment (and any other known proposed developments in the area). This process provides an opportunity to identify a package of traffic and transport infrastructure measures required to support future development. Regional and local intersection and road improvements, vehicular access options for adjoining sites, public transport needs, the timing and cost of infrastructure works and the identification of funding responsibilities associated with the development should be identified.	**Section 7 & 8**
The Environmental Assessment report to assess the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling); the potential for implementing a location-specific sustainable travel plan (e.g. 'Travelsmart' or other travel behaviour change initiative); and the provision of facilities to increase the non-car mode share for travel to and from the site. This will entail an assessment of the accessibility of the development site by public transport.	**Section 7 & 8**

1.3 Consultation Process

As part of the consultation process, a draft report (version 6) was issued to TfNSW on Thursday 12 November 2020 seeking their review and comment. TfNSW responded on Friday 27 November 2020 as shown in **Appendix G** which has been addressed as part of this assessment.

1.4 Reference Documents

The following documentation has been taken into consideration in the preparation of this assessment:

- Sutherland Shire Development Control Plan (DCP) (Sutherland Shire Council, 2015);
- Woolooware Bay Town Centre – Stage 4 Residential / Hotel Traffic and Parking Impact Assessment (McLaren Traffic Engineering, 2017);
- Green Hills Parklands, Kurnell Traffic Impact Assessment (Colston Budd Hunt & Kafes, June 2011);
- Assessment of Proposed Intersection, Captain Cook (Parking & Traffic Consultants, March 2012);
- Guide to Traffic Generating Developments (TfNSW, 2002);
- Guide to Traffic Management Part 12: Traffic Impacts of Developments (Austroads, 2016);
- NSW Long Term Transport Masterplan (TfNSW, 2012); and
- Road Design Guide (RTA now TfNSW) including Austroads Supplements.

1.5 Report Structure

The traffic and transport report is set out as follows:

Section 1 - Introduction
Overview of the Proposal and requirements of the traffic and transport assessment

Section 2 - Assessment Methodology
Outlines the traffic and transport scope of works

Section 3 - Existing Conditions
Examination of the site and surrounding environs

Section 5 - Development Details
Summary of the Proposal and relevant traffic and transport aspects

Section 6 - Parking Assessment
Assessment of the parking requirement and layout inclusive of circulation areas for all transport modes

Section 7 - Operational Transport Assessment
Assessment of the traffic generation and impact for the site in operation

Section 8 - Construction Transport Assessment
Examination of the likely construction staging and transport impacts

Section 9 - Mitigation Measures
Outline of measures to address traffic and transport impact during operation and construction

Section 10 - Conclusion
Summarises the findings of the traffic and transport study

2 Assessment Methodology

2.1 Site Assessment

To appropriately review the Proposal's traffic and transport impact, the existing road and surrounding environs have been reviewed and assessed to understand the existing conditions. This includes undertaking physical site inspection of the Proposal's locality, traffic data collection, review of other transport modes and road safety conditions.

2.2 Data Collection

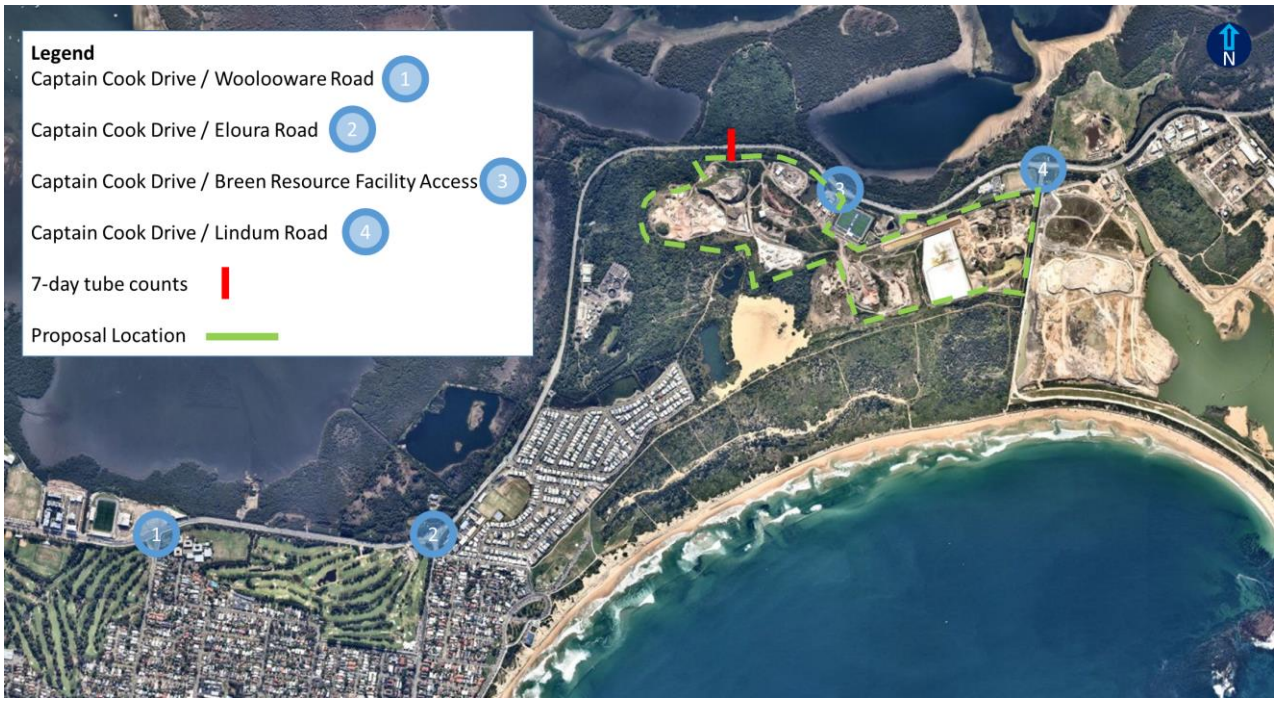
At the time of this SSD application, the traffic conditions on Captain Cook Drive and around the Proposal site are potentially impacted by the COVID-19 pandemic. The impact of COVID-19 on peoples travel behaviour (both for commuting and recreational) is largely dependent on the NSW Government restrictions at the time as well as employer requirements (as an example, staged return to work or full time working from home). Due to the potential misinformation that traffic surveys in 2020 may provide, the traffic and transport assessment relies upon data from 2018 and 2016.

The benefit of the 2018 traffic surveys is it aligns with the site specific weighbridge data for the Existing Breen Resources Facility. This data is considered to be appropriate in defining baseline conditions, unaffected by COVID-19.

The 2018 traffic data has been collected by a sub consultant at the direction of Cardno, in the form of intersection and midblock surveys. The midblock traffic survey was undertaken for 7 consecutive days from Wednesday 9 May 2018 to Wednesday 16 May 2018, whilst intersection survey counts were obtained on Wednesday 9 May 2018 from 7.00am to 10.00am and 4.00pm to 7.00pm. The location of the traffic surveys is shown in **Figure 2-1**.

In addition to the data collection above, traffic data has been sourced from other approved developments in the regional, namely the Woolooware Bay town centre (Cronulla Sharks SSD) located to the west of the Proposal site to cover the entire traffic modelling study area.

Figure 2-1 Traffic Volume Locations



The intersection of Woolooware Road / Captain Cook Drive has recently been upgraded to a signalised intersection (circa June 2020). The traffic volume data for this intersection is sourced from the Woolooware Bay Town Centre SSD applications (also referred to as the "Sharks development"). These SSD applications provide traffic volume for 2016 and future scenarios (future referred to as a cumulative assessment of existing plus Sharks development and Shearwater (Greenhills) development known at the time) for the

weekday PM and Saturday only. No morning peak hour has been assessed as part of the Cronulla Sharks SSD application.

For the assessment of the Proposal at this intersection, the morning peak hour has been assessed based on the 2016 weekday PM results contained within the Cronulla Sharks SSD documents and a reduced traffic generation of 40% in line with the TfNSW shopping centre survey results in lieu of information contained within the Cronulla Sharks SSD for the AM period (refer to surveys undertaken for Technical Direction 14/03a). Further discussion is provided in **Section 7.3** with regard to the suitability of this assessment methodology.

2.3 Parking Analysis

The number of car parking spaces to be provided on the site is typically to be determined in accordance with the Sutherland Shire DCP, however, in this instance the Sutherland Shire DCP does not apply to the Proposal Site. This is because the Proposal Site is not zoned under the Sutherland Shire Local Environmental Plan. As such, a review has been carried out having consideration to the current Existing Breen Resource Facility operations and staffing levels than adopting Council's generic car parking rate which is applicable to the whole LGA.

With regard to the Existing Breen Resource Facility, as it is presently operating on the Proposal Site and the Proposal seeks to relocate the facility to Lot 5, the parking demand can be benchmarked against the existing operation and employment levels. Adoption of a first principles approach with respect to the Marang Parkland areas is an appropriate method to adopt with respect to the parking assessment in lieue of any Council or TfNSW Guidelines and provides a practical outcome to ensure sufficient parking is provided for the Marang Parkland demands.

Assessment of the internal circulation and roadways has been prepared with regard to SSCDCP2015, RMS (now TfNSW) Guide to Traffic Generating Developments, Austroads Guide to Traffic Management and Australian Standard for Parking Facilities. This ensures the Proposal sufficiently satisfies design requirements of the aforementioned guidelines / standards and minimise operational impacts to the New Resource Recovery Facility and visitors to the Proposal site.

The assessment of parking demand also considers the construction phase of the Proposal to ensure there will be no detrimental impact on parking availability and locations during construction of the Proposal

2.4 Traffic Modelling Methodology

In order to assess the traffic impacts of the Proposal, the suitable criteria is the capacity and performance of key intersections along Captain Cook Drive. The potential impacts have been assessed using SIDRA v8 which is a software widely accepted by Council and TfNSW and is suitable for the Proposal site's locality.

The assessment has considered the existing intersection performances as well as future baseline and development impacts. Austroads Guide to Traffic Management Part 12 outlines that mitigation measures should consider the level of service for the surrounding road network at opening year and having due regard to long term plans for the surrounding network. Assessment of a design year, such as a 10-year design horizon is commonly adopted to adequately assess the Proposal's impact. The scenarios assessed for the weekday morning and afternoon peak hour are guided by the following:

- 2018 Base
- 2021 Base (assumed year of opening but with no Proposal)
- 2021 Base plus Proposal
- 2031 Base (10 year design horizon but with no Proposal)
- 2031 Base plus Proposal

The future year scenarios include consideration of regional traffic growth (or background growth), previously assessed sports field / Marang Parklands (refer to CBRK 2011) as well as traffic changes due to the nearby Woolooware Bay Town Centre (refer to McLaren Traffic Engineering 2017 for the Cronulla Sharks SSD). With regard to the New Resource Recovery Facility, whilst there is an increase in productivity from 400,000tpa to 650,000tpa, the Proposal is not expected to result in any substantive change to the number of vehicles currently accessing the Existing Breen Resource Facility. By considering the regional traffic, the Proposal and other nearby development, the assessment sufficiently considers the cumulative traffic impact on Captain Cook Drive and key intersections. The future year scenarios are outlined in **Table 2-1**.

Table 2-1 Traffic Modelling Scenarios

Modelled Scenario	Name	Cumulative Assessment			Proposal	
		Completed Woolooware Bay Town Centre (Sharks)	Sports Field	Boat Harbour	New Resource Recovery Facility	Parklands
2021 AM	Base			✓		
	Base plus Proposal			✓	✓	✓
2021 PM	Base		✓	✓		
	Base plus Proposal		✓	✓	✓	✓
2021 Saturday	Base		✓	✓		
	Base plus Proposal		✓	✓	✓	✓
2031 AM	Base			✓		
	Base plus Proposal			✓	✓	✓
2031 PM	Base	✓	✓	✓		
	Base plus Proposal	✓	✓	✓	✓	✓
2031 Saturday	Base	✓	✓	✓		
	Base plus Proposal	✓	✓	✓	✓	✓

External importation of fill material to the Proposal Site during construction will be limited.

2.5 Mitigation Measures

The impacts of the Proposal, both operationally and during construction, have been considered and addressed through a range of both generic and specific mitigation measures. This is to ensure the impact of the Proposal is not detrimental to the safe and efficient operation of the nearby road network and other transport modes.

3 Existing Conditions

3.1 Site Location

The Proposal site is located within the Sutherland Shire Local Government Area, approximately 12 kilometres south of the Sydney Kingsford Smith Airport. The Proposal site is situated on the Kurnell Peninsula, positioned between Quibray Bay (within Botany Bay) to the north and Bate Bay (being Cronulla and Wanda beaches) to the south. It is currently accessible from Captain Cook Drive and Lindum Road. The current main site access and waste management infrastructure is at Lot 1123, 330 Captain Cook Drive, Kurnell. It is relocating to a location further east accessed via Lindum Road (Lot 5). The location of the proposed site is shown in **Figure 3-1**.

Figure 3-1 Subject Site



3.2 Road Hierarchy

Transport for New South Wales (TfNSW), formerly Roads and Maritime Services (RMS), established an administrative framework of State, Regional and Local Road categories to help manage the extensive network of roads in partnership with Local Governments. Typically, state roads are managed and financed by TfNSW, and Regional / Local Roads are managed and financed by Councils. Regional Roads perform an intermediate function between the main arterial network of State Roads and Local Roads and therefore receive financial assistance from TfNSW.

The key road network in the vicinity of the subject site consists of:

- **Captain Cook Drive**

Captain Cook Dive is classified as a Regional Road, linking between Taren Point Road-The Boulevard and Prince Charles Parade. The road is configured as two lanes adjacent to the Proposal site with one in each direction separated by a dividing line. The posted speed limit fluctuates between 50, 70 and 80km/h and passing through multiple school zones with speed limits of 40km/h. Kerbside parking is not permitted on either side of the road adjacent to the Proposal site as on-road bicycle lanes are provided on either side of the road.

- **Lindum Road**

Lindum Road is a Local Road under the care and maintenance of Council. This road runs from Captain Cook Drive and gives access to the northern boundary of the Existing Breen Resource Facility (however, direct

access to Lindum Road from the Proposal Site does not currently exist). The road is configured as two lanes which is not separated by a dividing line. The speed limit is 50km/h. Unrestricted kerbside parking is available on the north of the east-west leg and both sides of the north-south leg, in addition to the car park at the end of the road adjacent Greenhills Skate Park.

> **Elouera Road**

Elouera Road is a Local Road under the care and maintenance of the Council, linking Captain Cook Drive with Kingsway at North Cronulla Beach. The road is configured as two lanes with one in each direction separated by a dividing line. The speed limit is 50km/h and the school zone speed limit of 40km/h is applicable near Cronulla High School. Restricted kerbside parking is available on both sides of the road with parallel parking permitted on the east side and parallel and perpendicular parking available on the west side.

> **Woolooware Road (north)**

Woolooware Road is a Local Road under the care and maintenance of the Council, linking Captain Cook Drive and Denman Avenue. The road is configured as two lanes with one in each direction separated by a dividing line. The speed limit is 50km/h and the school zone speed limit of 40km/h is applicable near Woolooware High School. Unrestricted kerbside parking is available on both sides of the road.

3.3 Speed Zoning

Captain Cook Drive, between Elouera Road and the gateway entry to Kurnell near Bridges Street to the east (approximate total length of 6.7km) is subject to a number of various speed zones as listed below and shown in **Figure 3-2**:

School Zone 40km/h ~0.2km near Cronulla High School

50km/h ~0.2km on approach to Bridges Street, Kurnell

60km/h ~1.3km starting near the new Dicker Data site to the east

70km/h ~0.5km across the Shearwater / Greenhills residential frontage

80km/h ~4.5km from Shearwater / Greenhills residential suburb to the new Dicker Data site, including the Proposal frontage

Figure 3-2 Existing Speed Zoning Scheme



3.4 Traffic Volumes

2018 traffic data has been collected by a sub consultant at the direction of Cardno, in the form of intersection and midblock surveys. The midblock traffic survey was undertaken for 7 consecutive days from Wednesday 9 May 2018 to Wednesday 16 May 2018 (on Captain Cook Drive, approximately 1.6km west of Lindum Road), whilst intersection survey counts were obtained on Wednesday 9 May 2018 from 7.00am to 10.00am and 4.00pm to 7.00pm. The full results of this survey are provided in **Appendix B.**

Whilst the data is now circa 2 years old, it is considered to be an appropriate baseline to adopt to avoid misrepresentation of traffic volumes during COVID-19 and post COVID-19 periods. The assessment methodology utilises a growth rate which is consistent with traffic engineering practice and in majority of cases is widely accepted by the road authority. This approach removes the influence of COVID-19 on the base year assessment and assumes traffic volumes return to similar levels post COVID-19 and continues to grow generally into the future.

The survey results show that during an average weekday, some 10,850 two-way vehicles travel along Captain Cook Drive. This is inclusive of heavy vehicles, which make up some 10% of the total traffic volume. The weekly traffic profile is shown in **Figure 3-3** and **Figure 3-4**.

Figure 3-3 Weekday Traffic Volume

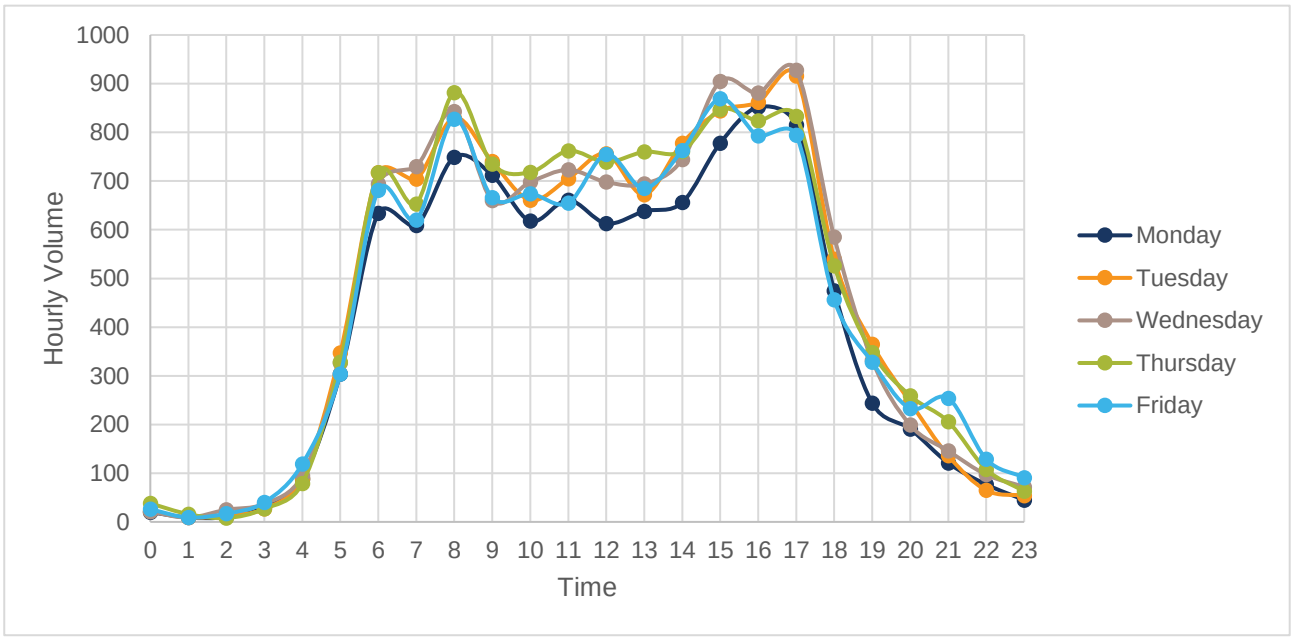
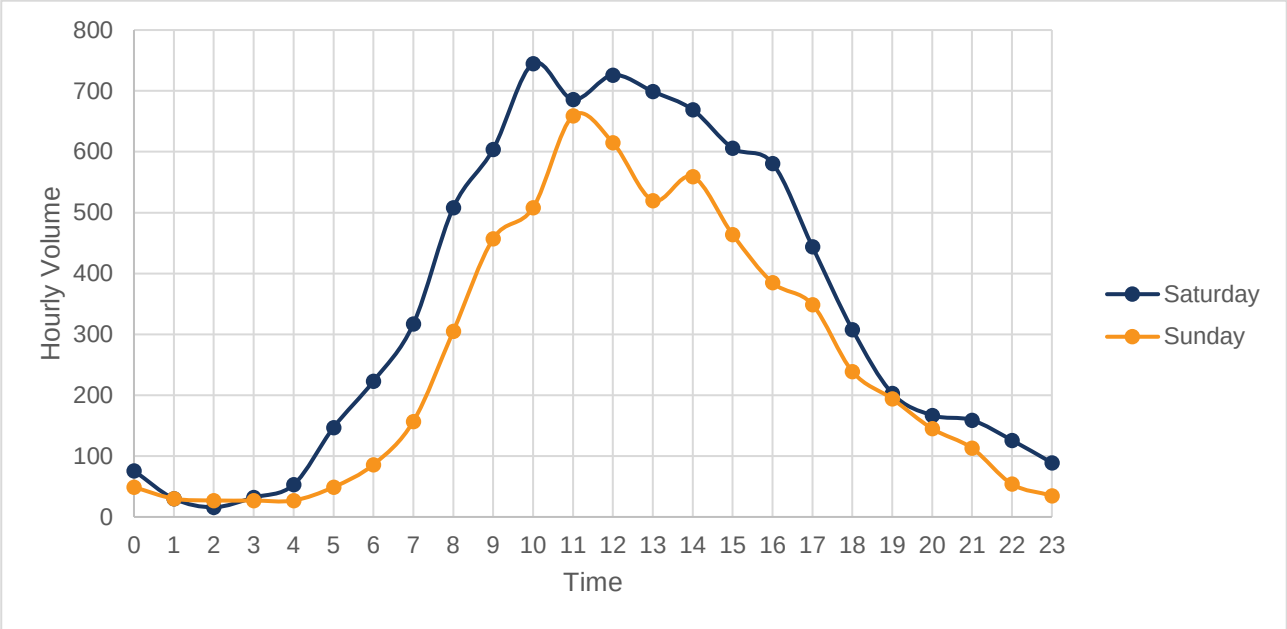


Figure 3-4 Weekend Traffic Volume

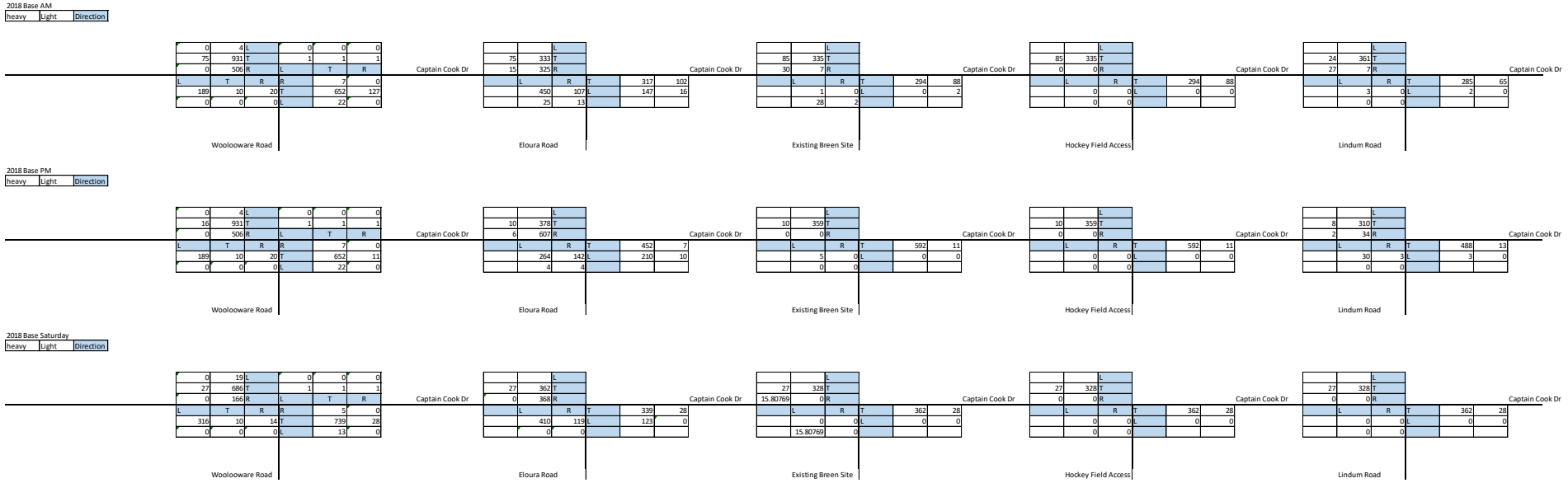


The peak two-way traffic volume was recorded on Wednesday with 928 vehicles, whilst the weekend peak occurred on Saturday with 745 vehicles, or approximately 20% lower than the weekday peak hour.

The recorded 85th percentile speed at the survey location was 81.7km/h for eastbound traffic and 83.9km/h for westbound traffic. The average speed was recorded as 74.2km/h for eastbound and 75.8km/h for westbound traffic.

The weekday peak hour typically occurs at 8:00-9:00am and 5:00-6:00pm, which are typically identified as the 'commuter' peak hours. The network traffic volume diagram for the weekday AM and PM as well as Saturday are shown in **Figure 3-5**.

Figure 3-5 Baseline Traffic Volumes



3.5 Network Performance

3.5.1 Performance Criteria

The common methodology in assessing the road network performance is based on considering traffic volumes and peak hour intersection performance. The performance criteria is based on establishing a baseline (i.e. without Proposal) and future conditions (i.e. with Proposal) in a cumulative assessment.

The RMS (now TfNSW) Guide to Traffic Generating Developments states that the capacity of urban roads is generally determined by the capacity of the intersections.

Intersection performance is primarily assessed based on the Degree of Saturation (DoS), Average Delay in seconds, Level of Service (LoS) and 95% Back of Queue distance in metres. Level of Service (LoS) is the standard measure used to assess the operational performance of the network and intersections. Level of Service is ranked from LoS A to LoS F, with LoS A representing the best performance and LoS F the worst. The assessment of intersection operation is based on criteria defined by TfNSW as outlined in Table 3-1**.**

Table 3-1 Level of Service Criteria for Intersections

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Giveway & Stop Signs
A	< 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near Capacity & accident study required
E	57 to 70	At Capacity, at signals incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	> 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires additional capacity.

Source: Guide to Traffic Generating Developments (TfNSW, 2002)

The Average Vehicle Delay (AVD) provides a measure of the operational performance of an intersection and determines the LoS when applying the TfNSW method. It should be noted that the AVD's should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route). For traffic signals, the weighted average delay over all movements should be utilised. For roundabouts and priority control intersections (sign control) the critical movement for assessing LoS should be the movement with the highest average delay.

The Degree of Saturation (DoS) is another measure of the operational performance of individual intersections. For intersections controlled by traffic signals, both queue length and delay increase rapidly as DoS approaches 1.0. It is usual to attempt to keep DoS to less than 0.9. Degrees of Saturation in the order of 0.7 generally represent satisfactory intersection operation. When DoS exceed 0.9 queues can be anticipated.

SIDRA Intersection 8.0 has been used to analyse the existing performance of surrounding intersections. SIDRA is a common modelling tool widely accepted by Council and TfNSW.

3.5.2 Intersection Performance

3.5.3 Captain Cook Drive / Woolooware Road (north)

Intersection surveys were unable to be recorded firsthand for the junction of Captain Cook Drive / Woolooware Road due to the impact of COVID-19 on normal traffic conditions. In addition to this, the impending development of Woolooware Bay Town Centre is likely to result in changed weekday and weekend traffic volumes which would not be captured in the 2018/2019/2020 survey year.

This intersection was controlled by a roundabout at the time of the November 2016 surveys contained within the Cronulla Sharks SSD applications. The roundabout has since been removed (circa September 2019) and traffic signals have been introduced to the intersection (circa June 2020).

Surveys were recorded by McLaren Traffic Engineering on Friday 4 November 2016 from 4:00-7:00pm and on Saturday 5 November from 10:00am-2:00pm. The peak hours identified were Friday 4:45-5:45pm and Saturday 10:00-11:00am. Peak hour traffic volumes from the previous roundabout were inputted into SIDRA to determine the intersection performance of the current signalised intersection.

Cardno has adopted the 2016 surveys and updated them within the SIDRA v8 program, with the intersection performance results shown below. It is noted that the morning peak is not captured at the nearby Elouera Road intersection, the traffic volumes are lower in the morning peak than compared to the evening peak hour. The results from hereon in for the morning peak hour are based on the base PM peak hour.

Table 3-2 Base Woolooware Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)
AM Base				
South Approach	0.256	22.7	B	49.2
East Approach	0.885	56.9	E	223
North Approach	0.022	55.4	D	2.1
West Approach	0.822	11.5	A	163.4
Summary	**0.855**	**26.9**	**B**	
PM Base				
South Approach	0.256	22.7	B	49.2
East Approach	0.885	56.9	E	223
North Approach	0.022	55.4	D	2.1
West Approach	0.822	11.5	A	163.4
Summary	**0.855**	**26.9**	**B**	
SAT Base				
South Approach	0.329	12.9	A	42.9
East Approach	0.779	27.8	B	112.3
North Approach	0.016	45.3	D	1.8
West Approach	0.666	32.8	C	125.5
Summary	**0.779**	**27.6**	**B**	

The signalised intersection is estimated to operate at LoS “B” during the base conditions, which is reflective of good operation with acceptable delays.

3.5.4 Captain Cook Drive / Elouera Road

Intersection surveys were conducted by a sub consultant at the direction of Cardno at the roundabout junction of Captain Cook Drive / Lindum Road. The surveys were recorded on Wednesday 9 May 2018 from 7:00-10:00am and 4:00-7:00pm, coinciding with the commuter peak hours.

Table 3-3 Base Elouera Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)
AM Base				
South Approach	0.427	15.1	B	26.5
East Approach	0.384	6.2	A	22.4
West Approach	0.301	11.7	A	16.5
Summary	**0.427**	**15.1**	**B**	
PM Base				
South Approach	0.329	14.3	A	22.6
East Approach	0.456	8.4	A	26.1
West Approach	0.42	11.7	A	23.9
Summary	**0.456**	**14.3**	**A**	
SAT Base				
South Approach	0.365	13.7	A	18.9
East Approach	0.289	6.8	A	13.8
West Approach	0.3	11.7	A	14.1
Summary	**0.365**	**13.7**	**A**	

The roundabout intersection is estimated to operate at LoS “B” or better during the base conditions, which is reflective of good operation with acceptable delays.

3.5.5 Captain Cook Drive / Site Access 1

Intersection surveys were recorded at the roundabout junction of Captain Cook Drive / Site Access. The surveys were recorded on Wednesday 9 May 2018 from 7:00-10:00am and 4:00-7:00pm whilst the weekend traffic movements are obtained from the weekend tube survey results overlaid with the average production for a Saturday.

Table 3-4 Base Site Access 1 / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)
AM Base				
South Approach	0.024	30.2	C	0.5
East Approach	0.237	6.3	A	0
West Approach	0.258	11.1	A	2.7
Summary	0.258	30.2	C	
PM Base				
South Approach	0.005	20.3	B	0.1

East Approach	0.329	5.5	A	0
West Approach	0.203	9	A	0
Summary	0.329	20.3	B	
SAT Base				
South Approach	0.13	15	B	0.1
East Approach	0.22	5.5	A	0
West Approach	0.221	11.4	A	0
Summary	0.22	11.4	B	

The priority controlled intersection is estimated to operate at LoS "C" during the base conditions, which is reflective of good operation with minimal delays. It is however noted that the worst movement which results in the LoS C or better is associated with the right turn from the site onto Captain Cook Drive, which in most cases is 1-2 vehicles in the hour. The more critical left turn out and right turn into the site operate satisfactorily at LoS A.

3.5.6 Captain Cook Drive / Hockey Field Access

The hockey field access is currently only utilised when hockey games are held. Games are infrequent and at all other times, the access is gated. No 2018 base model has been developed due to the level of infrequent events (though has been considered from 2021 onwards to determine Proposal impact).

3.5.7 Captain Cook Drive / Lindum Road

Intersection surveys were recorded at the roundabout junction of Captain Cook Drive / Lindum Road. The surveys were recorded on Wednesday 9 May 2018 from 7:00-10:00am and 4:00-7:00pm, coinciding with the commuter peak hours. The baseline weekend peak hour has been derived based on the tube data and traffic generation contained with the sports field 2011 study (CBHK, 2011).

Table 3-5 Base Lindum Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)
AM Base				
South Approach	0.005	10	A	0.2
East Approach	0.291	5.1	A	13.9
West Approach	0.276	9	A	14.8
Summary	**0.291**	**9**	**A**	
PM Base				
South Approach	0.042	11	A	1.5
East Approach	0.368	4.8	A	17.1
West Approach	0.227	8.1	A	11
Summary	**0.368**	**8.1**	**A**	
SAT Base				

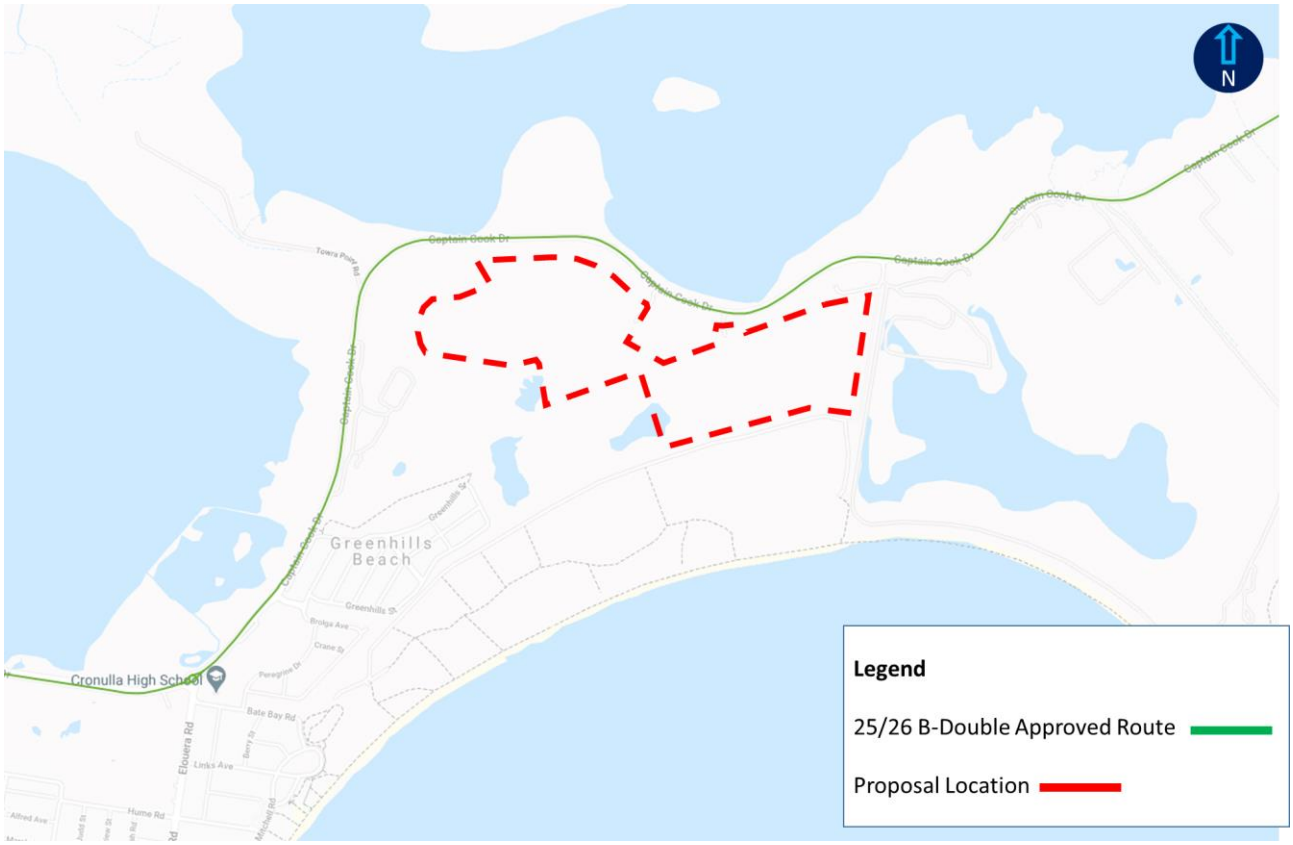
South Approach	0.035	10.3	A	1.2
East Approach	0.286	4.7	A	12.7
West Approach	0.257	8.1	A	12.9
Summary	**0.286**	**10.3**	**A**	

The roundabout intersection is estimated to operate at LoS “A” during the base conditions, which is reflective of good operation with minimal delays.

3.6 Heavy Vehicles & Freight

Captain Cook Drive is currently an approved heavy vehicle route for vehicles up to an including 26m B-Double as shown in Figure 3-6**.** Currently, it does not appear that Lindum Road has the same classification but is accessible for general access vehicles which includes 19m Semi-trailers.

Figure 3-6 TfNSW Heavy Vehicle Access Map

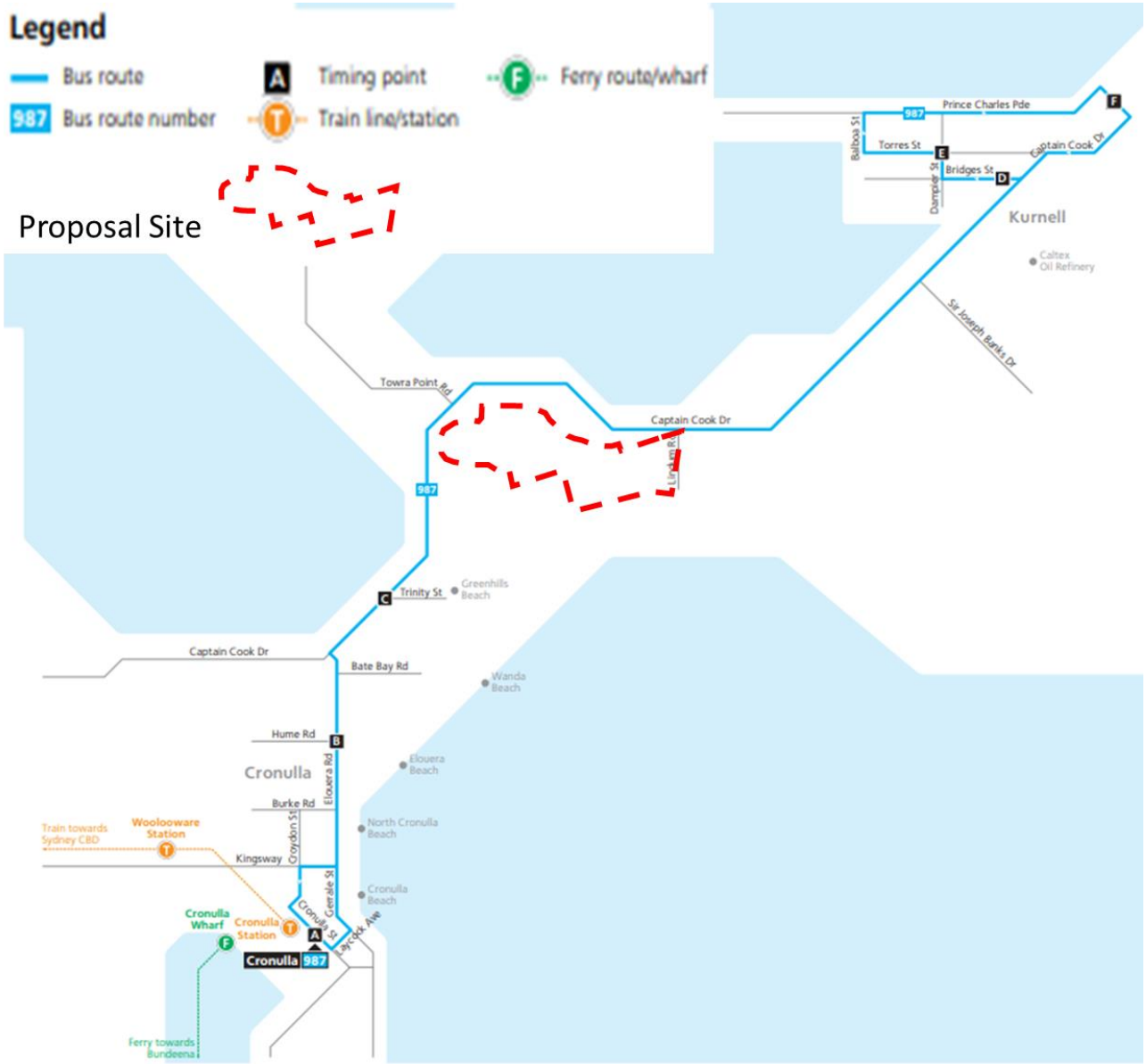


3.7 Existing Public Transport

The facility is serviced by bus, operated by Transdev. Route 987 – Cronulla to Kurnell (Loop Service) stops a 200m walk from the proposed site entry. The Lindum Road bus stops are provided at bus bays off Captain Cook Drive, adjacent to Greenhills Fields.

On weekdays, 12 services are provided each day with the first service leaving Cronulla Station 6:17am and the last service leaving at 6:35pm. On Saturdays, eight services are provided, with the first and last services departing from Cronulla Station at 8:20am and 5:50pm respectively. On Sundays and public holidays, four services are provided per day with the first service departing Cronulla station at 07:35am and last service departing at 6:20pm.

Figure 3-7 Existing Public Transport Services



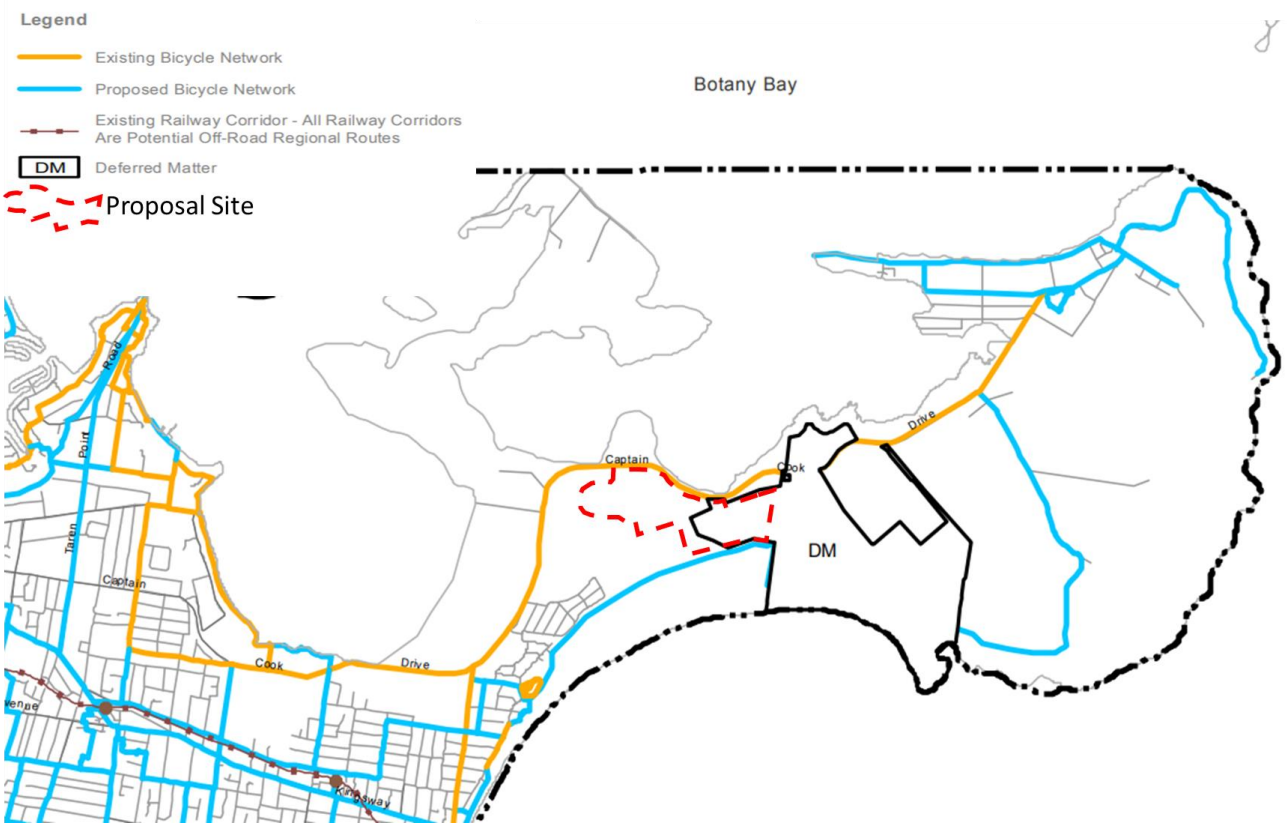
Source: Transport for NSW, 2020

3.8 Active Transport Network

The main cycling route providing access to the Proposal site is Elouera Road and Captain Cook Drive. Delineated on-road bicycle lanes are provided on either side of these roads. It is a prominent route for cyclists, particularly on weekends, providing a safe option for cyclists travelling between Cronulla and Kurnell.

A portion of the Sutherland Shire Cycleway Network Map is shown in **Figure 3-8** and provides an overview of existing and proposed bicycle networks around the Proposal site.

Figure 3-8 Existing & Future Cycle Paths



Source: Sutherland Shire Council, 2015

3.9 Pavement Conditions

A visual inspection has been carried out on 11 September 2020 on the pavement condition along Captain Cook Drive between Elouera Road and Lindum Avenue. Captain Cook Drive, west of Elouera Road has not been included as this has been recently upgraded to dual carriageway (circa 2015) between Elouera Road and Woolooware Road. Captain Cook Drive west of Woolooware Road is also part of the Woolooware Bay Town Centre frontage and is subject to a number of civil works either ongoing (future retail town centre) or recently completed (intersection upgrades to residential towers at Foreshore Road, as well as the works at Woolooware Road).

The visual inspection has been guided by Austroads Guide to Pavement Technology Part 5: Pavement Evaluation and Treatment Design as well as Institute of Public Works Engineering Australia (IPWEA) Practice Note 9: Road Pavement.

In general, pavement defects are characterised as:

- Deformation
- Cracking
- Surface texture and wearing
- Edge defects
- Potholing
- Patching

The criteria to visually assess the pavement conditions is summarised in **Table 3-6** below.

Table 3-6 Pavement Condition Criteria

Condition	Description
Very Good	Near perfect physical condition, where there is negligible defect and pavement is likely to perform adequately as originally designed (i.e. 20-40 year design life). Standard routine maintenance considered to be applicable to maintain condition.
Good	Adequate physical condition with only minor defects identifiable. Defect unlikely to result in pavement failure in the short to medium term. Potential for longer term deterioration to occur with ongoing loadings. Minor work required to maintain condition.
Average	Moderate physical condition with noticeable defects and early signs of pavement failure. Short term failure of pavement unlikely. Works required to maintain condition.
Poor	Deteriorated physical condition with significant defects. Short term failure more likely and requiring maintenance / replacement. Short term works required to improve condition.
Very Poor	Obvious locations of failed physical condition, or near failure. Increased roughness of surface and surface defects. Major works required to improve condition.

Majority of Captain Cook Drive is considered to be average or above, with more noticeable defects located at the existing access to the Existing Breen Resource Facility and on the eastern approach to Trinity Street.

4 Existing Waste Management Facility Operation

The Existing Breen Resource Facility currently accepts excavated materials and C&D waste as part of the land restoration activities permitted under DA269/90. It is understood there is no limit on the amount processed and is subject to demand from various sources. As an example, the site has previously processed upwards of near 2 million tonnes of material (2003-2004) The Existing Breen Resources Facility is typically open to the public from 6 am to 4 pm Monday to Friday, and 6 am to 1.30 pm on Saturdays. It is licenced to operate during the evening and night-time period and does so when necessary to receive or process waste materials.

The above table demonstrates that whilst the Proposal details a cap on intake of 650,000t which would appear to be an increase on what has been recorded in the 2017/2018 weighbridge data (see further for discussion), this cap is actually below what has been previously accepted at the Existing Breen Resource Facility. Placing a cap on the intake (and ultimately limiting the export amount that is recycled) is a considered to be a beneficial outcome for the general public as this will in turn limit the number of vehicular movements entering / exiting the Proposal site.

This study uses the 2017/2018 weighbridge data to establish the baseline production in order to assess the estimated traffic generation increase under the Proposal. The data indicates that some 640,000 tonnes of material was processed to / from external sites and transported via Captain Cook Drive in the 2017/18 year (approximately 474,000t received and 166,000t exported). In addition to the 166,000t considered as recycled export material, there is a large quantity of recycled material circulated on-site to the sports field areas and other associated areas for the rehabilitation of the area (i.e is not exported off-site). At some point in time, when the fill requirements of the sport fields and Marang Parkland area has been fulfilled, the recycled material will become a retail product to external sites.

From the 2017/18 data, the amount of waste processed to / from external sites is summarised in **Figure 4-1** and **Table 4-1**.

Figure 4-1 2017/2018 Average Production per Day

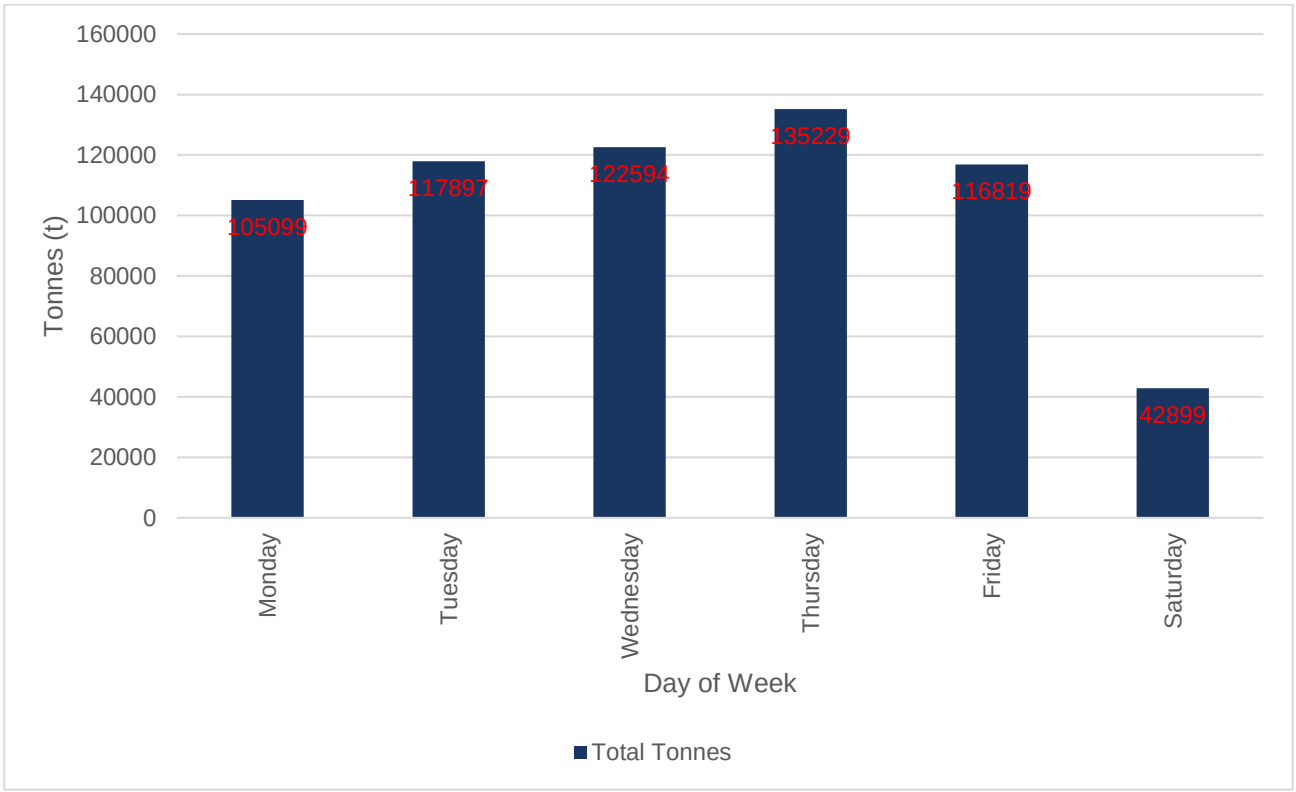


Table 4-1 2017/18 Average Production per Day

Day of the Week	Tonnes

Monday	105099
Tuesday	117897
Wednesday	122594
Thursday	135229
Friday	116819
Weekday Average	119528
Saturday	42899

The total daily trips (in and out) to external sites is summarised in **Figure 4-2** and **Table 4-2** and separated by waste type.

Figure 4-2 2017/18 Average Traffic Movements per Day

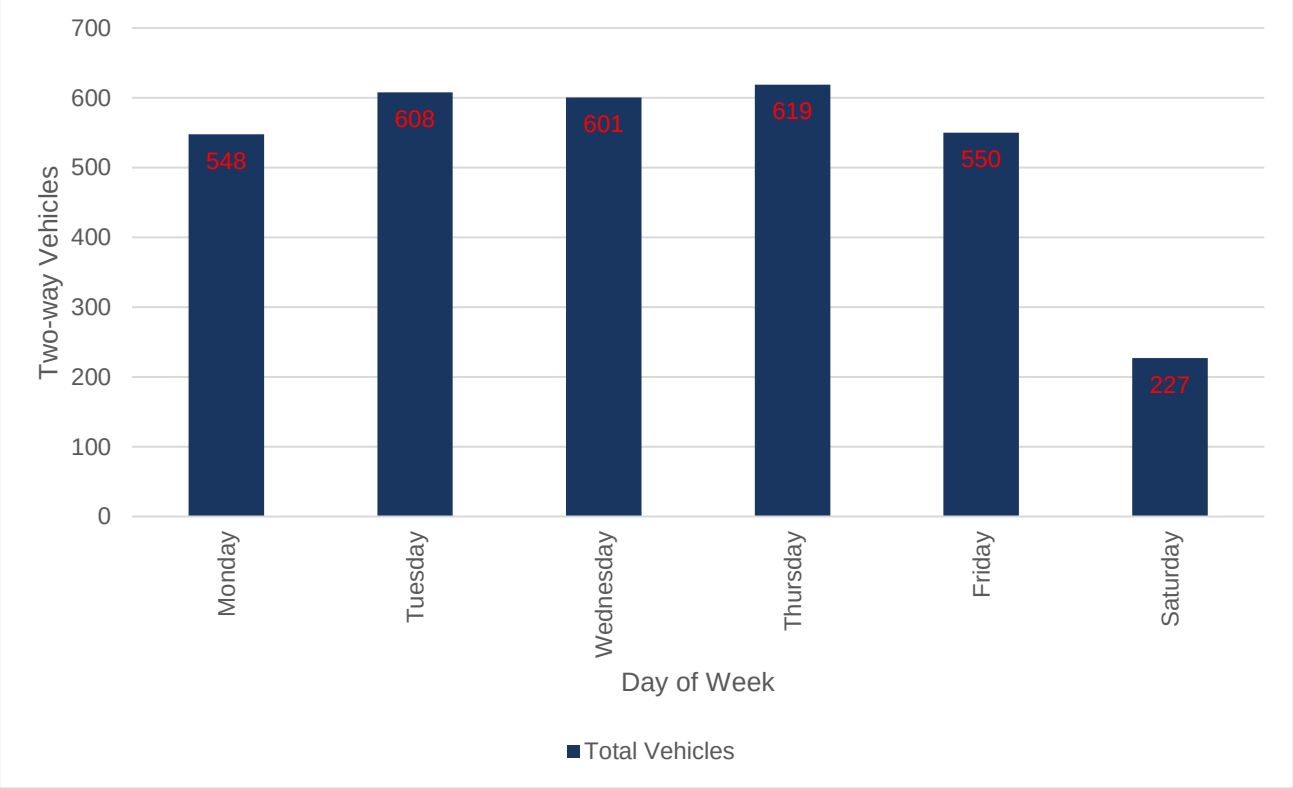


Table 4-2 2017/18 Average Total Traffic Movements per Day

Day of the Week	Traffic Movements
Monday	548
Tuesday	608
Wednesday	601
Thursday	619
Friday	550
Weekday Average	585
Saturday	227

It can be seen that the average weekday traffic volume is 585 movements whilst the Saturday is some 227 movements. The weekday average represents a higher turnover by a factor of 2.58 than compared to the Saturday.

The average hourly profile is shown in **Figure 4-3** and **Figure 4-4** for the weekday and weekend respectively. The result show the average peak is 70 vehicles during the weekday and 40 on a Saturday.

Figure 4-3 2017/18 Average Weekday Traffic Generation per Hour per Product

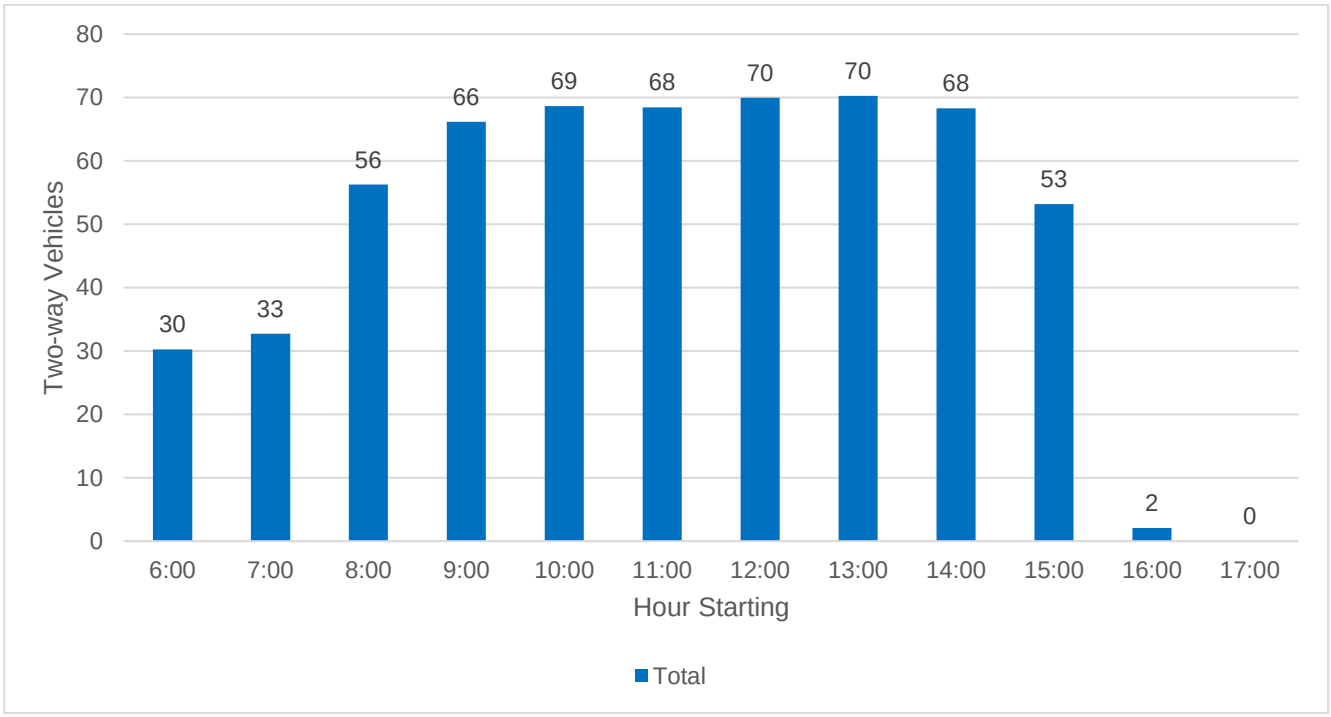
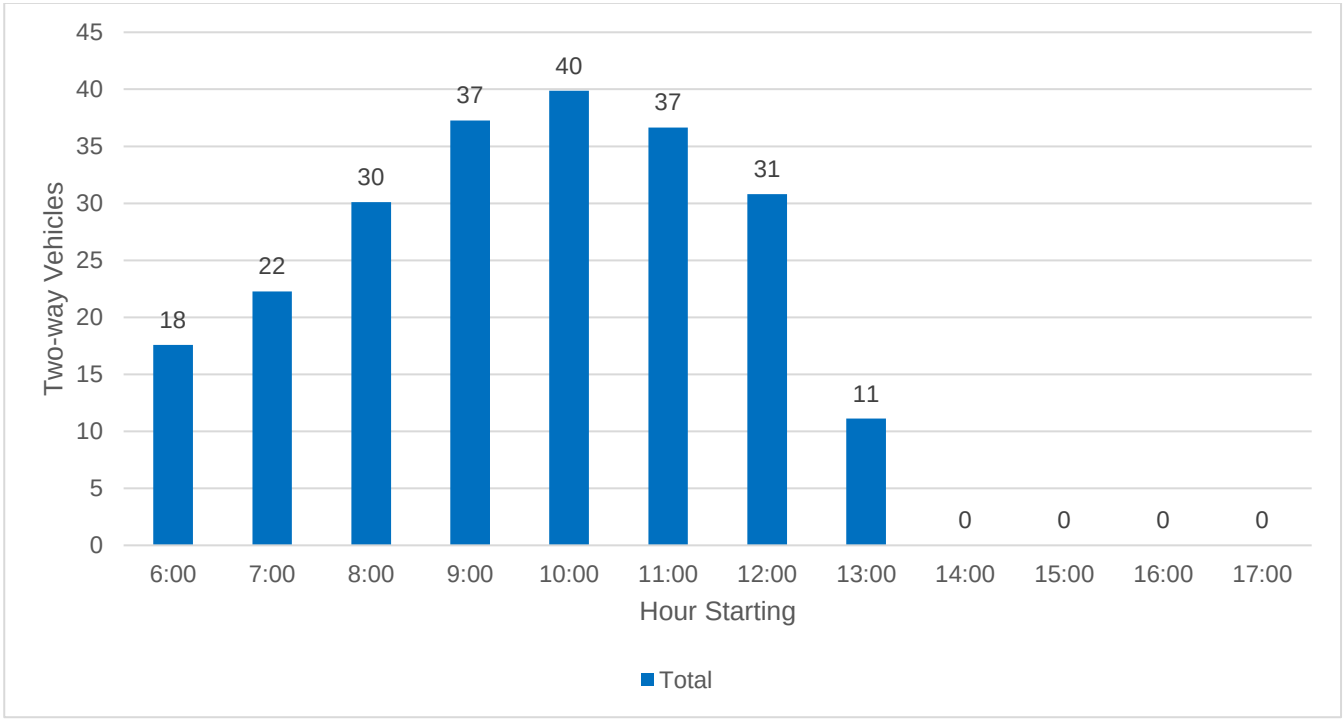


Figure 4-4 2017/18 Average Saturday Traffic Generation per Hour per Product



The traffic generation associated with the staff movements typically occurs in the morning prior to the incoming of waste vehicles and progressively depart the site in the afternoon / evening when productivity of the site slows down in line with the demand.

Table 4-3 shows the traffic flow in and out of the site for the corresponding survey hour recorded at the Captain Cook Drive driveway.

Table 4-3 Surveyed Driveway Traffic Volume

Start	End	In	Out	Total	Weekday Average
7:00	8:00	23	22	45	33
7:15	8:15	25	22	47	37
7:30	8:30	32	23	55	43
7:45	8:45	45	22	67	50
8:00	9:00	43	25	68	56
8:15	**9:15**	**43**	**29**	**72**	61
8:30	9:30	39	31	70	64
8:45	9:45	31	32	63	65
9:00	10:00	33	37	70	66
16:00	**17:00**	**1**	**31**	**32**	2
16:15	17:15	0	14	14	0
16:30	17:30	0	4	4	0
16:45	17:45	0	3	3	0
17:00	18:00	0	5	5	0
17:15	18:15	0	3	3	0
17:30	18:30	0	4	4	0
17:45	18:45	0	3	3	0
18:00	19:00	0	1	1	0

The Proposal site peak hour which overlaps during the commuter peak period is 8:15-9:15am and 4:00-5:00pm. The site generated 72 and 32 peak hour vehicle trips during this time. The actual on-road commuter peak hour is 8:30-9:30am and 5:00-6:00pm whereby the site generates similar morning traffic but considerably less traffic in the evening commuter peak hour

It is relevant to note that on the day of the survey, the weighbridge generated 682 movements which reflects an above average day however when considering the peak hour assessment, the evening peak hour was below the average weekday.

5 Development Details

5.1 Overview

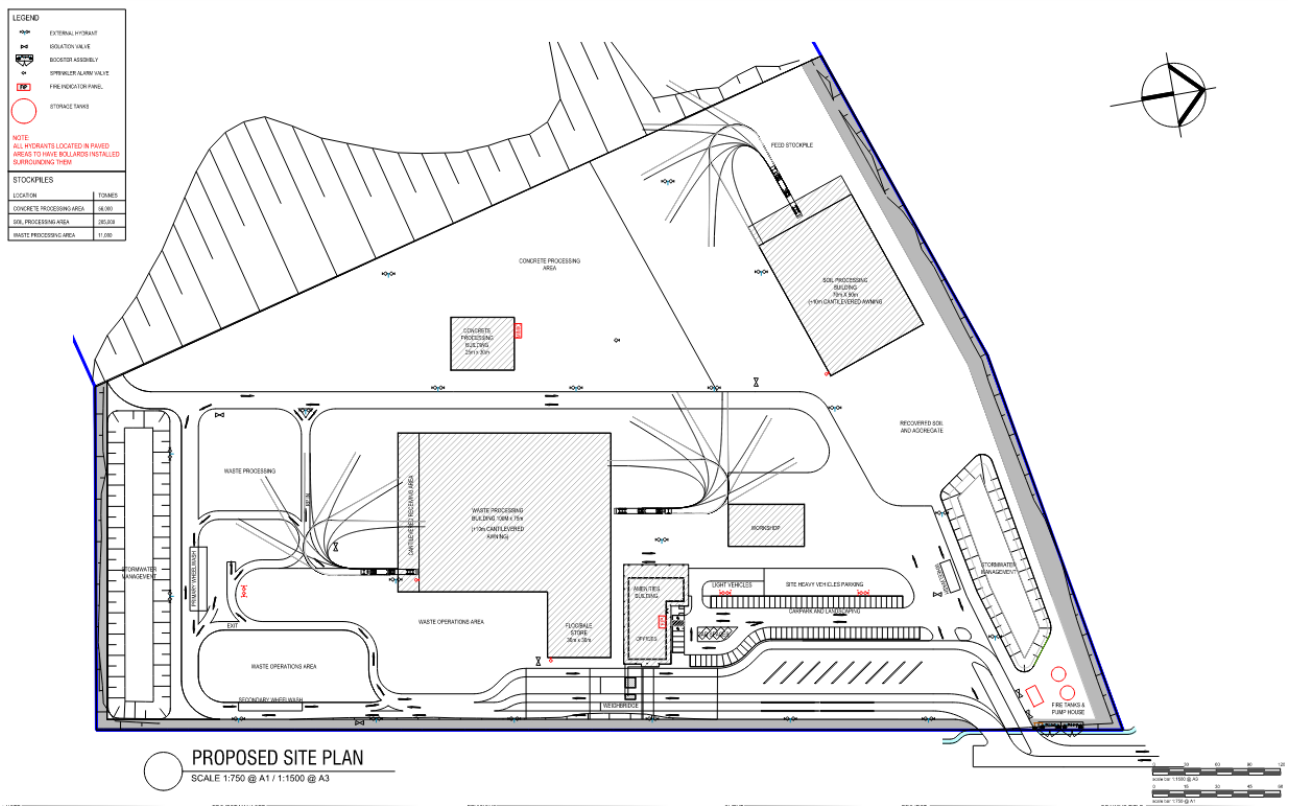
5.1.1 New Resource Recovery Facility

Waste management activities will generally be the same as existing, with infrastructure, buildings and facilities to be modernised and upgraded to improve worker and visitor amenity, and to reduce environmental impacts associated with the operation of the facility on neighbours. The Proposed Site layout is shown in **Figure 5-1**. The layout and key aspects of the New Resource Recovery Facility are described below:

- An enclosed processing building for the recycling plant and light residual waste processing
- A covered and partially enclosed concrete processing building
- A covered and partially enclosed soil processing building
- Public/light vehicle drop-off area
- Three weighbridges (2 in and 1 out) to ensure secure access to the Proposal Site for all commercial vehicles and public drop-off/small vehicles bringing material to the Proposal Site or taking material off site
- A separate internal weighing zone for tracking internal movements
- Site office and administration building and workshop
- Stockpiles and storage areas for stockpiling of recovered materials and temporary storage of skip bins
- Associated facilities including a parking area, wheel washes, recovered water basins for management of stormwater and to allow for water recovery and reuse, internal roadways, fencing and visual screening
- Access to the New Resource Recovery Facility would be via a new access from Lindum Road, along the eastern boundary of the Proposal site

The Proposal includes 24 hour operation for resource recovery operations and waste acceptance to the New Resource Recovery Facility and Landfil. The New Resource Recovery Facility is proposed to have a capacity to accept and process up to approximately 650,000 tonnes per annum.

Figure 5-1 Proposed Site Layout



5.1.2 Marang Parkland & Open Space

Receipt of waste to Lots 1122, 1123 and Lot 6 under DA/269/90 for the purposes of landfilling on those lots has ceased to facilitate the delivery of the Marang Parklands and Playing Fields. However, further site re-profiling is needed to create high quality activated open space and parklands for the Sutherland Shire community.

The landform proposed for the Marang Parkland has been designed to create a variety of spaces, grades and profiles to achieve specific recreation and environmental objectives. Recreation objectives include pathways and tracks that are wheelchair accessible, steeper tracks for more challenging walks and hikes, as well as an open amphitheatre, lawns and lookouts to connect the community to the surrounding wetlands, parks and ocean. The environmental objectives include creating sheltered and more open landscapes creating the right environment for forest and heath landscapes that replicate the former sand dune profiles.

Figure 5-2 Marang Parklands Landscape Masterplan



5.1.3 Site Access Points

The site access for the New Resource Recovery Facility is proposed via Lindum Road along the eastern boundary of the Proposal Site. The new site access would require the extension of Lindum Road for a short distance beyond the extent of the currently formed road which provides access to Greenhills Sporting Field No. 1 and the Skate Park, as well as to the adjoining sand mining site. The extension of Lindum Road would require alteration of the pedestrian access arrangement along the existing footpath that currently occupies the Lindum Road reserve. The Lindum Road upgrade works would be designed and constructed to Council's engineering standards.

Access to the Marang Parklands will be via the Existing Breen Resource Facility site access (which is an approved access point for the sport fields off Captain Cook) and Hockey Field access off Captain Cook Drive.

Internally, the Hockey Field Access and Existing Breen Resource Facility site access will be connected under the approved playing field layout, however no internal connection will exist to Lindum Road to the east.

However pedestrian / cycling connectivity between the eastern and western portion of the sports field / Marang Parkland area is provided.

Figure 5-3 Site Access



6 Parking Assessment

6.1 Car Parking Requirement

As previously outlined, the number of car parking spaces to be provided on a site is typically to be determined in accordance with the Sutherland Shire DCP, however, in this instance the Sutherland Shire DCP does not apply to the Proposal Site. This is because the Sutherland Shire Local Environmental Plan does not presently apply to the Proposal Site. As such, a review has been carried out having consideration to the current Existing Breen Resource Facility operations and staffing levels than adopting Council's generic car parking rate which is applicable to the whole LGA.

6.1.1 New Resource Recovery Facility

The Existing Breen Resource Facility currently operates with 52 staff on-site at any one time, with on average four visitors throughout the day. A number of staff carpool to the site, and staff are encouraged to do so. The New Resource Recovery Facility is anticipated to generate 80 full time equivalent (FTA) jobs, supported by 10 FTE administrative jobs.

The New Resource Recovery Facility has sufficient space to cater for some 88 car parking spaces, which is considerably higher than the current day to day demand of the site. This level of parking is highly unlikely to be fully utilised however does allow for atypical operations. The parking area surface is proposed to be hardstand with defined spacing, segregated also for site personnel and visitors.

6.1.2 Marang Parklands

The proposed Marang Parklands and open space area is proposed to be serviced by a total of 200 car parking spaces. There is no standard or guideline to determine the necessary car parking rate for open space similar to the Proposal.

A number of regional parks have been reviewed with regard to their size and car parking provision. The parks listed below are within the Western Sydney Parklands each offering a range of on-site facilities, function capabilities and commercial operations.

Location	Size(1)	Car Spaces(2)	Parking Rate Provision
Bungarribee Park, Arndell Park	200 Hectares	~330	1.65 spaces per Hectare
Nurragingy Reserve, Doonside	93 Hectares	~300	3.2 spaces per Hectare
Plough and Harrow Park, Abbotsbury	152 Hectares	~394	2.59 spaces per Hectare
Shale Hills, West Hoxton	58 Hectares	~77	1.3 spaces per Hectare
Lizard Log Park, Abbotsbury	81 Hectares	~450	5.6 spaces per Hectare
Average			2.9 space per Hectare

Notes: (1) Based on available online resources or estimate from Nearmaps

(2) Based on aerial imagery from Nearmaps

Based on the desktop review of other regional parks, the average provision of car parking is 2.9 spaces per Hectare. The Marang parkland portion of the Proposal is for some 45 hectares of parkland / open space which results in the requirement for 131 car parking spaces.

It is therefore considered that the proposed car parking of 200 spaces will be sufficient to service the Marang Parklands and recreational activities occurring within this portion of the Proposal such that there will be no overflow parking onto Captain Cook Drive or the sports fields during standard operation.

6.2 Motorcycle Parking Requirement

Using Sutherland Shire DCP as a guide, (noting that the Sutherland Shire DCP does not apply to the Proposal Site), motorcycle parking shall be provided for all non-residential development at the rate of one motorcycle space per 25 car spaces or part thereof.

Therefore, based on the proposed 88 and 200 car spaces within the New Resource Recovery Facility and Marang Parklands respectively, a total of 4 and 8 motorcycle spaces should be provided for each land use, total 12 spaces. There is adequate space within the car parking areas to provide these spaces as part of the detailed design.

6.3 Bicycle Parking Requirement

Using Sutherland Shire DCP as a guide, (noting that the Sutherland Shire DCP does not apply to the Proposal Site), bicycle parking for all development, except dwelling houses, dual occupancies, multi dwelling housing and residential flat building developments must be provided at a rate of 1 bicycle parking space per 10 car parking spaces for the first 200 car spaces, then one space per 20 parking spaces thereafter.

In addition, Bicycle parking facilities are to be installed in accordance with Australian Standard AS2890.3 – Bicycle Parking Facilities (as amended) and Austroad's Guide to Traffic Engineering Practice – Part 14 – Bicycles.

Therefore, based on the proposed 88 and 200 car spaces within the New Resource Recovery Facility and Marang parklands respectively, a total of 9 and 20 bicycle spaces should be provided for each land use, total 29 spaces. There is adequate space within the car parking areas (and other locations within the parklands) to provide these spaces as part of the detailed design. Given the recreational nature of the Marang parklands, and the site's location on a heavily utilise bicycle route (Captain Cook Drive), provision in excess of 20 bicycle spaces should be considered for this land use and hence monitoring of the site during its operation will ascertain the need, if any, for additional bicycle infrastructure.

6.4 Service Vehicle Requirements

6.4.1 New Resource Recovery Facility

Similar to the car parking requirement, it is best practice to establish the service vehicle parking requirements based on the existing operation.

Currently, the Existing Breen Resources Facility requires layover parking for contractors and customers to uncover their load prior to entering the weighbridge. This is for a number of reasons, including but not limited to the requirement by the Environmental Protection Authority for licenced facilities to inspect every load on the weighbridge.

The Proposal proposes four truck layover spaces, one car and trailer and three car / utility vehicle spaces. Internally there are a number of loading bays, wheel wash zones and other ancillary requirements.

6.4.2 Marang Parklands

The service vehicle requirements for the Marang Parklands is largely dictated by the ongoing maintenance of the Proposal Site. There is opportunity for service vehicles to utilise recommended bus parking zones and pick-up/drop-off zones (see further) rather than provision of an additional dedicated spaces for what is a low-frequency requirement.

6.5 Bus / Coach Parking

Similar to car park, the need for bus and coach parking is subject to seasonal variability and recreational facilities on-site. As an example, the Lizard and Log Park provides bus parking of approximately 80m likely to contain some five standard buses. The Plough and Harrow Park appears to have provision for six mini-buses. The approved sports field is required to provide a total of nine bus / coach parking spaces.

With regard to the Proposal, it is recommended that two bus / coach spaces be provided to support the operation of the Marang Parklands.

6.6 Disabled Parking

Using Sutherland Shire Council's DCP as a guide (noting that the Sutherland Shire DCP does not apply to the Proposal Site), disabled parking is to be provide in accordance with the BCA. The New Resource Recovery Facility would require the provision of 1 space per 100 car spaces, which equates to one disabled space within the 88 spaces provided on-site. The parking area for the New Resource Recovery Facility contains two disabled parking spaces which is satisfactory.

Regarding the Marang Parklands, the BCA building class does not cover this land use. It is recommended that higher provision be adopted of at least 1 space per 50 car spaces. This equates to 4 spaces within the provided 200 parking spaces.

6.7 Other Provisions

Short term parking such as taxi or drop-off spaces is not strictly required within Sutherland Shire Council's DCP which was used as a guide. Similarly emergency vehicle parking is not strictly required.

Consideration should be given to these car parking types to support the operation of the Marang Parklands. It is recommended that 2 spaces be dedicated to short term parking for pick-up/drop-off and emergency vehicle support.

6.8 Design Review

6.8.1 Design Specifications

It is anticipated that as part of documentation for a construction certificate, compliance against AS2890 will be required. Accordingly, this design review is based on the plans for the SSD only.

The following standards are applicable to the employee and visitor car parking areas:

- Employee parking spaces measuring minimum 2.4m x 5.4m;
- Visitor parking spaces measuring minimum 2.5m x 5.4m;
- Aisle width minimum of 5.8m;
- Headroom clearance minimum of 2.2m for standard passenger vehicles. This shall increase to 2.5m for disabled car parking spaces;
- Disabled car parking spaces measuring 2.4m x 5.4m with adjacent shared zone of the same width;
- Parking aisle shall not exceed a gradient of 5% parallel to the angle of parking or 6.25% in any other direction, except for disabled parking areas which shall not exceed 2.5% in any other direction; and
- Additional clearance of minimum of 300m to hazards / obstructions.

The following standards are applicable to the commercial / heavy vehicle areas:

- Headroom clearance minimum of 3.5m for vehicles less than 6.4m in length and 4.5m for vehicles longer than 6.4m in length;
- Gradient of 4% in any direction within loading areas; and
- Ramps not to exceed 15.4%, with ramp transitions of 6.25% to 8.3% depending on vehicle type.

Relevant swept paths of the Proposal site are provided in **Appendix D**.

7 Operational Transport Assessment

7.1 New Resource Recovery Facility

7.1.1 Traffic Generation

It is understood that the relocation of the resource recovery infrastructure from Lot 1123 to Lot 5 will result in some operational efficiencies currently not being experienced along with the proposed increase in productivity. Currently, there is no limitation on the production capacity however the Proposal specifies a limit on intake of 650,000tpa in line with the below breakdown.

Table 7-1 Proposed Product Intake

Description	Proposed (tpa)	2017-2018 Intake
Soils	300,000	273,624
Heavy C&D waste (brick and concrete)	150,000	123,151
Light C&D waste	150,000	76,923
Light C&I waste and non-putrescible organic waste	50,000	
Total	650,000	473,698

The current operation is understood to not receive Light C&I waste, however for the purpose of this assessment, it is considered vehicle sizes are equivalent to the current intake of Light C&D waste. Delivery Tonnages will be split as per **Table 7-1**.

The capped increase to 650,000tpa is an increase of approximately 37% compared to the 2017/18 intake however in some cases is a reduction of previous historical intakes. The average tonnes per vehicle for the intake of material is summarised below:

- Soil – ~13.8 tonnes
- Heavy C&D – ~7.8 tonnes
- Light C&D / C&I – ~4.3 tonnes

For the purpose of estimating the forecast intake vehicle movements, the above averages are reflective of the assumed increase.

It is understood that the efficiency of the recycled material is based on the following:

- Soil – 90% efficiency
- Heavy C&D – 100% efficiency
- Light C&D / C&I – 90% efficiency

The resulting future exported material is summarised in **Table 7-2**.

Table 7-2 Forecast Product Export

Description	Estimate (tpa)	2017-2018 Export
Soils	270,000	1,434
Heavy C&D waste (brick and concrete)	150,000	123,151
Light C&D waste	135,000	42,253
Light C&I waste and non-putrescible organic waste	45,000	
Total	600,000	166,838

The future potential export from the Proposal site is expected to be some 3.6 times greater than the recorded 2017/18 year.

As the exported material will be for larger commercial customers, it is expected that the large vehicle capacities will be used to move the different product types. The following tonnes per vehicle has been used to estimate the forecast increase.

- Soil – ~13.8 tonnes
- Heavy C&D – ~7.8 tonnes
- Light C&D / C&I – ~20.2 tonnes

The forecast daily and peak hourly traffic movements are summarised in **Figure 7-1**.

Figure 7-1 Comparison of Existing and Forecast Daily Traffic

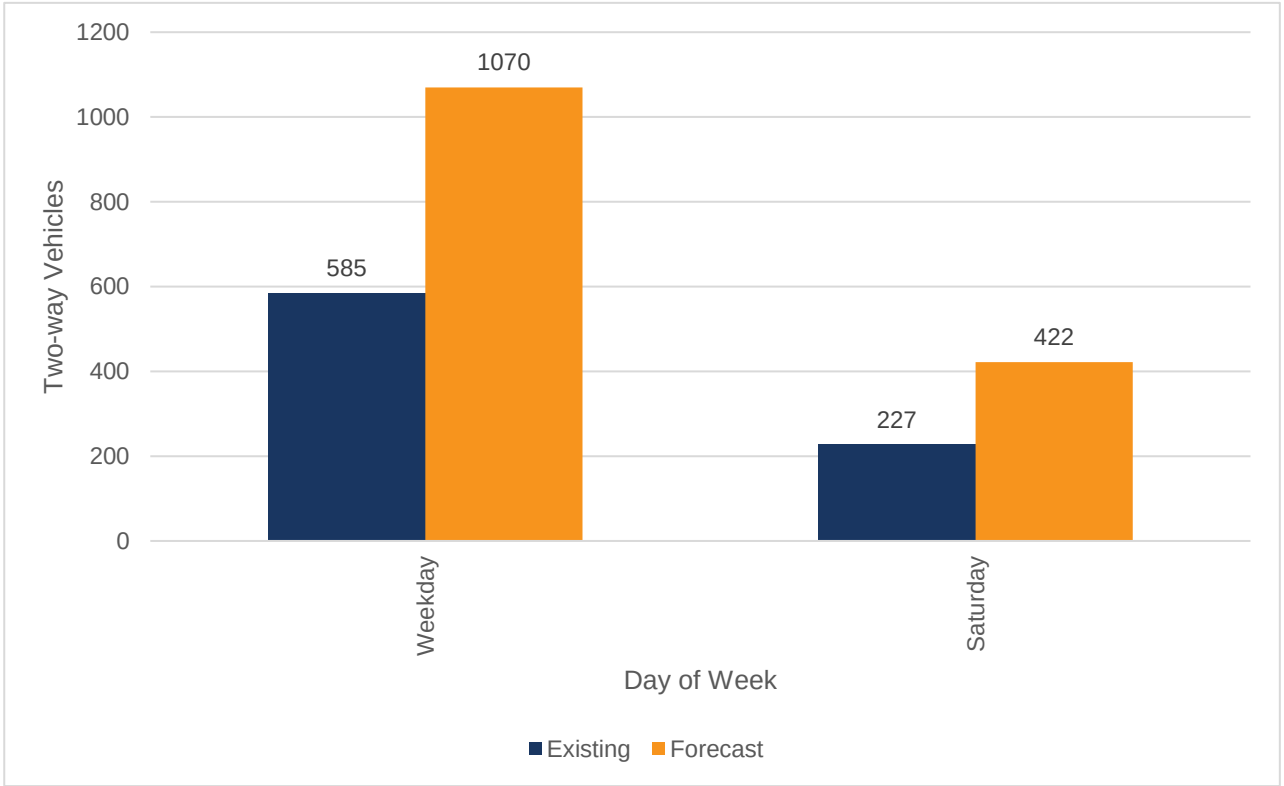


Figure 7-2 Comparison of Existing and Forecast Hourly Traffic

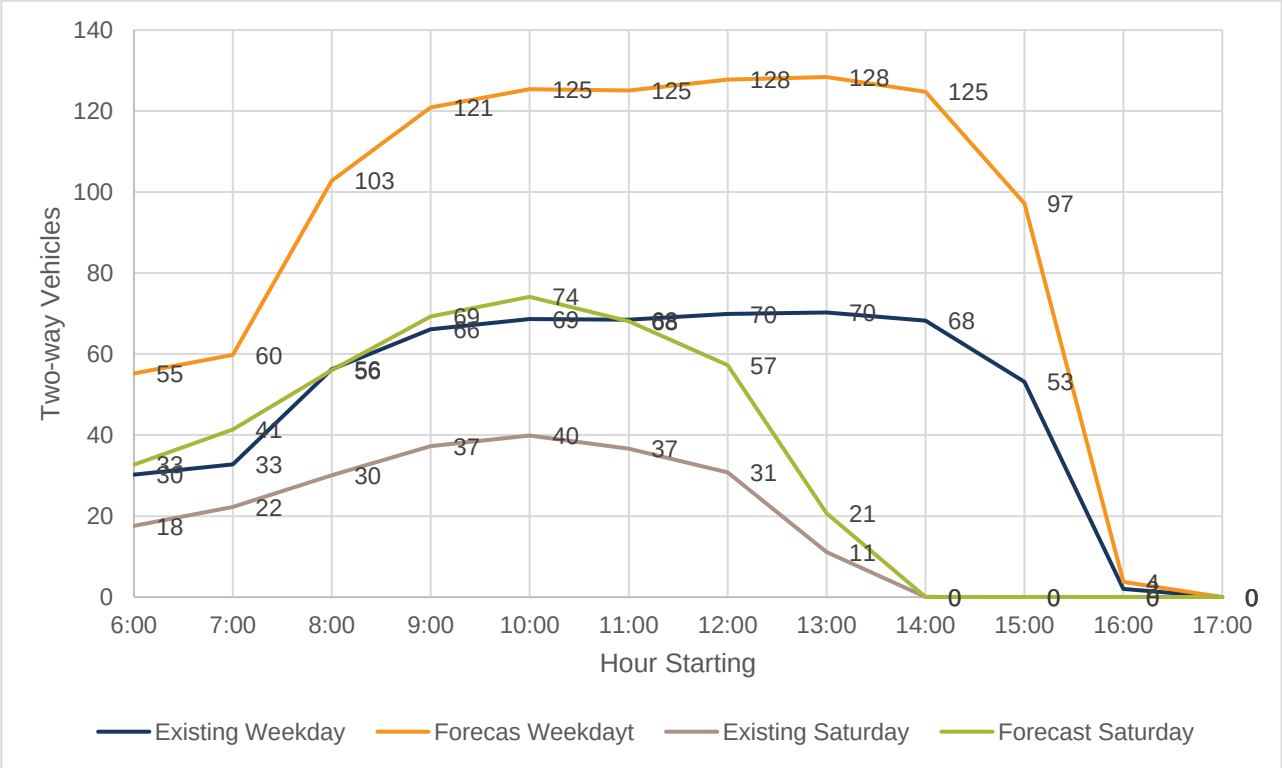


Table 7-3 Comparison of Surveyed Traffic Generation and Forecast Increase

Start	End	Total	Weekday Average	Forecast Increase
7:00	8:00	45	33	27
7:15	8:15	47	37	30
7:30	8:30	55	43	36
7:45	8:45	67	50	41
8:00	9:00	68	56	47
8:15	**9:15**	**72**	61	50
8:30	9:30	70	64	53
8:45	9:45	63	65	54
9:00	10:00	70	66	55
16:00	**17:00**	**32**	2	2
16:15	17:15	14	0	0
16:30	17:30	4	0	0
16:45	17:45	3	0	0
17:00	18:00	5	0	0
17:15	18:15	3	0	0
17:30	18:30	4	0	0
17:45	18:45	3	0	0
18:00	19:00	1	0	0

The analysis focuses on the 8:30-9:30am and 5:00-6:00pm time period where it can be seen the New Resource Recovery Facility is highly unlikely to contribute heavy vehicle movements to the evening peak hour.

The Proposal is also for 24 hour operation of the New Resource Recovery Facility which may result in increased traffic volumes in off-peak evening hours, above what currently occurs. The Existing Breen Resource Facility is licenced to operate during the evening and night-time period and does so when necessary. The traffic impact assessment focuses on the peak hour assessment during the weekday and weekend periods. The evening and night-time periods and other off-peak times are characterised by lower surrounding traffic volumes on Captain Cook Drive as evidenced by the daily traffic volumes shown **in Figure 3-3**. It is therefore unnecessary to assess intersection performance for evening and night-time periods on the basis that the reduced baseline traffic volumes results in increased capacity.

7.1.2 Traffic Assignment

Figure 7-3 New Resource Recovery Facility AM Traffic Generation Assumptions

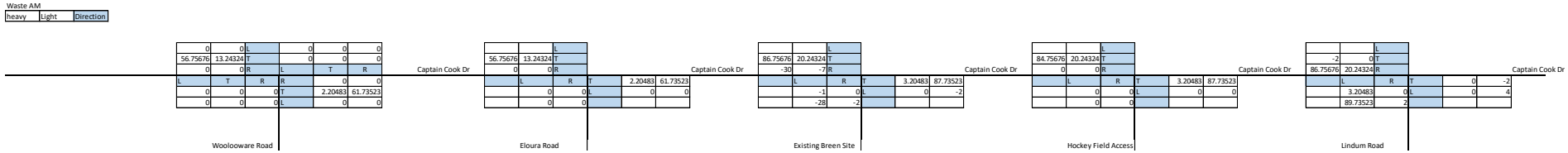


Figure 7-4 New Resource Recovery Facility PM Traffic Generation Assumptions

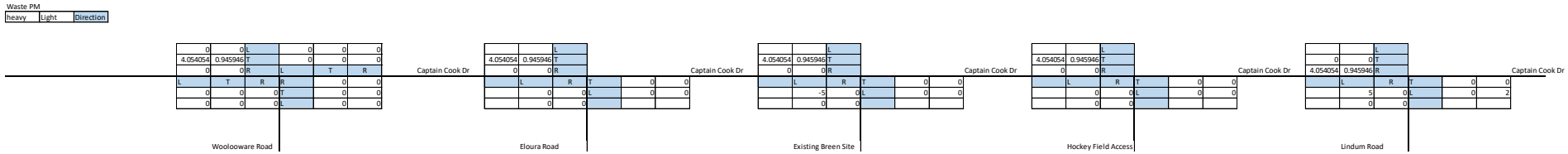
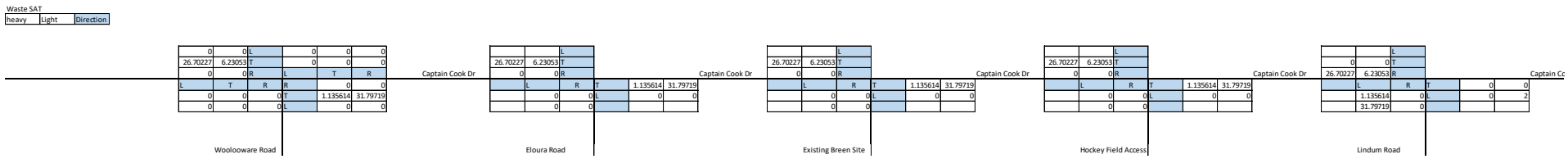


Figure 7-5 New Resource Recovery Facility SAT Traffic Generation Assumptions



7.2 Marang Parkland Traffic Generation

The Marang Parkland area, subject to the approval of this SSD, will be delivered as part of a VPA. The Marang Parkland area shows a total of 200 car parking spaces.

Traffic generation for parkland / open space is largely dependent on the local or regional area it serves, on-site facilities, location of neighbouring open space areas and ease of access.

A first principles assessment has been undertaken to determine the traffic generation potential of the Marang Parkland area. The following assumptions have been made:

- Design level 85% of maximum capacity. The adoption of the 85% level is consistent with planning for other land uses as indicated in the TfNSW Guide
- Assume duration of stay for car parking is over 1 hour. A trip rate of 0.5 trips per space is adopted (i.e. a 2 hour duration of stay)
- Weekday morning and afternoon, as well as weekend midday result in different utilisation as follows:
  - AM factor of 0.5
  - PM Factor of 0.75
  - Weekend factor of 1.00
- Traffic generation is assigned to Site Access 1 only
- Inbound and Outbound splits are even (i.e. 50% in; 50% out)

Based on the above assumptions, the traffic generation attributed to the parkland is as follows.

Table 7-4 Parklands Traffic Generation

	AM Peak	PM Peak	Saturday
	Site Access 1 (western access)		
Car Spaces	200		
Design Limit	0.85 = 170 car spaces		
Trip Rate	0.5 trips per car space		
Factor	0.5	0.75	1.0
Traffic Generation	170 spaces x 0.5 trips per space x 0.5 factor =43 trips	170 spaces x 0.5 trips per space x 0.75 factor =64 trips	170 spaces x 0.5 trips per space x 1.0 factor =85 trips

7.2.2 Traffic Assignment

Figure 7-6 Marang Parklands AM Traffic Generation Assumptions

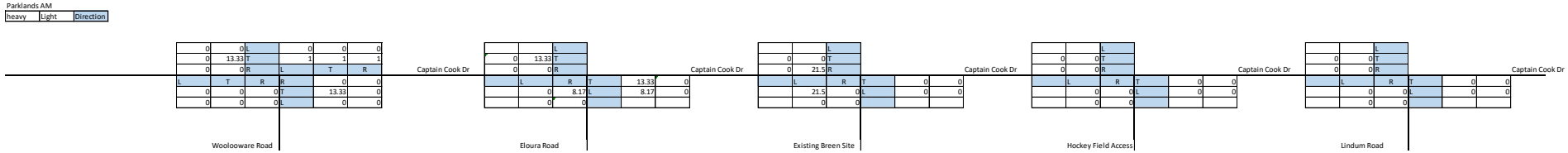


Figure 7-7 Marang Parklands PM Traffic Generation Assumptions

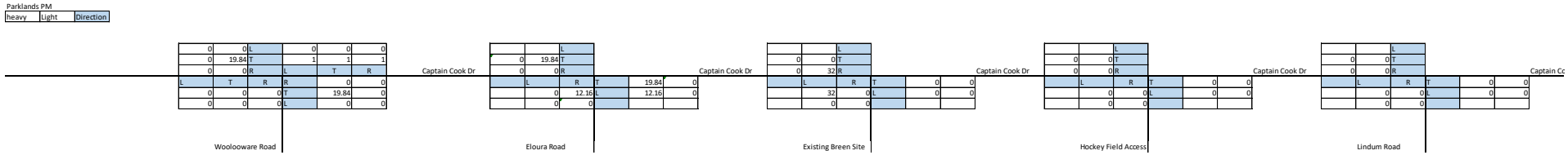


Figure 7-8 Marang Parklands SAT Traffic Generation Assumptions



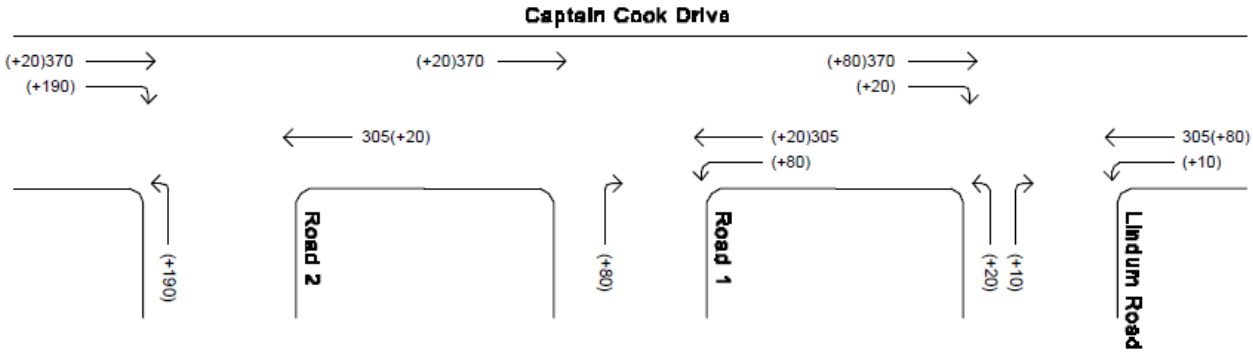
7.3 Additional Traffic Generation Considerations

7.3.1 Playing Fields (subject to separate consents)

As the New Resource Recovery Facility proposes to have its main entry / exit point onto Lindum Road, an assessment of the Lindum Road roundabout has been undertaken. In order to comprehensively assess the roundabouts performance, the traffic generation associated with the recreational playing fields has also been considered.

The traffic assessment prepared for the playing fields (Colston Budd Hunt & Kafes, 2011 as submitted for DA/11/0665), identified that there would be an additional 60 vehicle trips turning into and out of the Lindum Road roundabout during the Saturday midday peak hour whilst an additional 160 peak hour vehicle trips travelling east and west through the roundabout on Captain Cook Drive during the same period. This is reflected in **Figure 7-9** below, which is contained in the 2011 assessment.

Figure 7-9 Greenhills Fields Traffic Assessment



Source: Colston Budd Hunt & Kafes, 2011

Whilst 3 of the potential 10 playing fields have been delivered, the full 220 vehicle trips through the roundabout intersection will be taken into consideration. However, it can be said that the peak hour for the recreational fields is limited to a weekend and weekday evening, and not the weekday morning period. For this reason, a nominal 50% reduction in the weekend trip generation associated with the playing fields has been applied to the weekday evening peak hour and no activity in the morning peak hour.

Figure 7-10 Playing Field PM Traffic Generation Assumptions

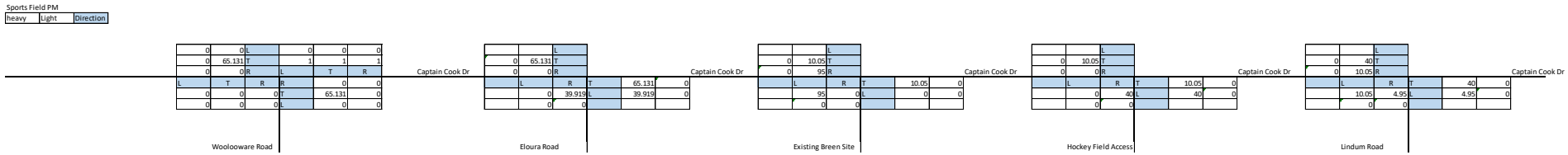
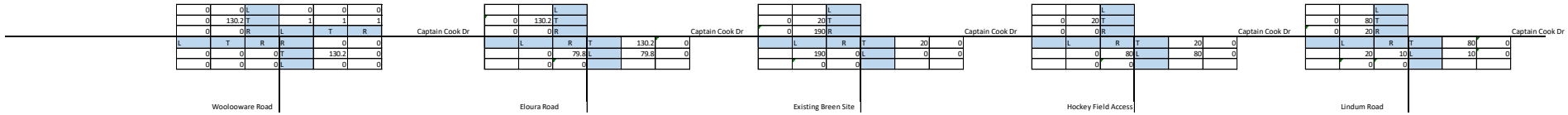


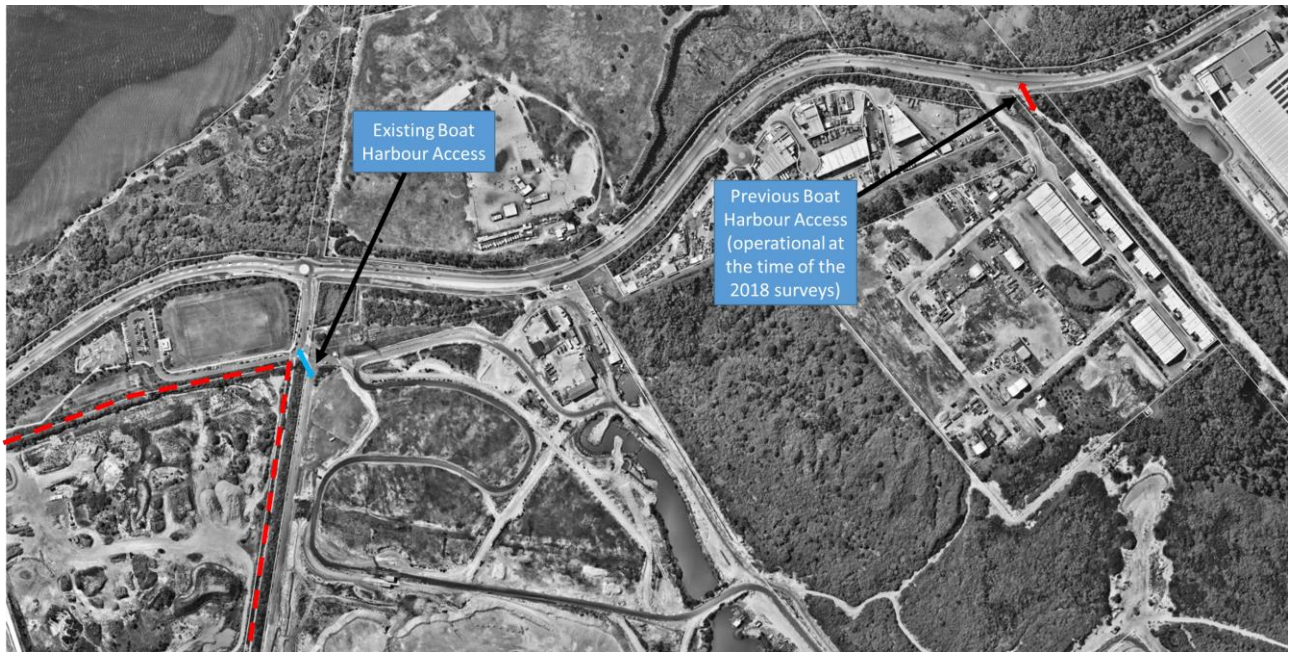
Figure 7-11 Playing Field SAT Traffic Generation Assumptions



7.3.2 Boat Harbour Access Relocation

Relocation of the Boat Harbour Access is understood to be approved under a road opening application with Council, RDA18/1172, and currently operates at the time of this report. During the 2018 surveys, the relocation had not finished construction and the traffic rerouting to Lindum Road was not in effect. The relocation is generally shown in **Figure 7-12**.

Figure 7-12 Relocated Boat Harbour Access



The operation of the Boat Harbour is largely seasonal, with fluctuation in traffic generation dependent on day of the week and month of the year.

To account for the relocated access to Lindum Road within the traffic data, the following assumptions are made based on aerial imagery:

- General observation of Boat Harbour aerials indicate an approximate maximum of 100 vehicles along the beach (refer to **Appendix E**).
- Assume duration of stay is well over an hour and results in a trip generation rate of 0.25 trips per vehicle overserved (i.e. a 4 hour duration of stay) which would be consistent with full or half day visits to the beach.
- Weekday morning and afternoon, as well as weekend midday result in different utilisation as follows:
  - AM Factor of 0.1
  - PM Factor of 0.5
  - Weekend factor of 1.0
- Inbound and Outbound splits are as follows
  - AM 100% inbound
  - PM 100% outbound
  - Weekend 50% inbound; 50% outbound
- Traffic generation will be from Lindum Road
- No discount in traffic volumes have been made from the traffic surveys captured in 2018, reflecting a worst case scenario.

Table 7-5 Estimated Boat Harbour Traffic Generation

	AM Peak	PM Peak	Saturday
	Lindum Road		
Car Spaces	100		
Trip Rate	0.25 trips per car space		
Factor	0.1	0.5	1.0
Traffic Generation	100 spaces x 0.25 trips per space x 0.1 factor =3 trips	153 spaces x 0.25 trips per space x 0.5 factor =13 trips	153 spaces x 0.25 trips per space x 1.0 factor =25 trips

Figure 7-13 Boat Harbour AM Traffic Generation Assumptions

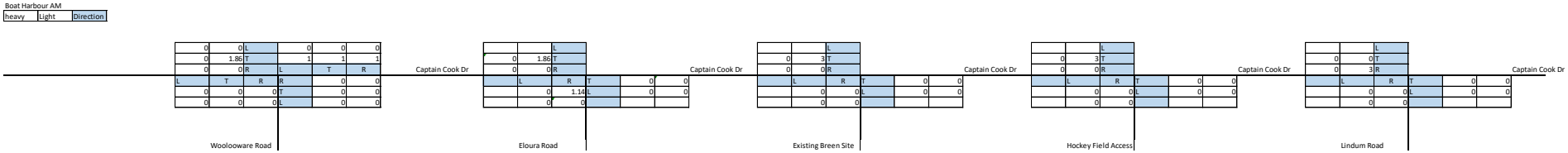


Figure 7-14 Boat Harbour PM Traffic Generation Assumptions

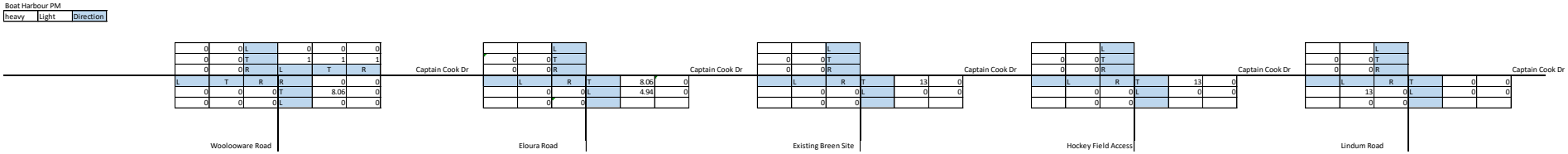
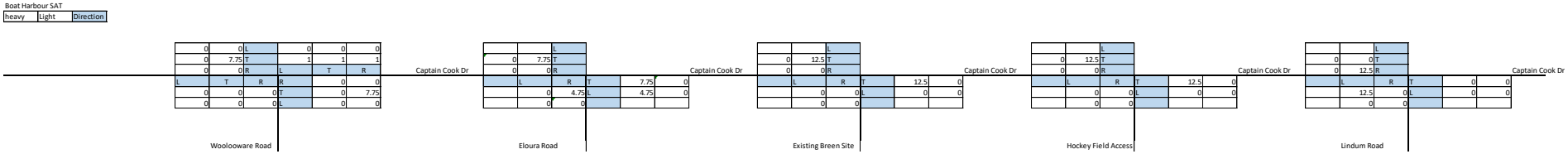


Figure 7-15 Boat Harbour SAT Traffic Generation Assumptions



7.3.3 Woolooware Bay Town Centre

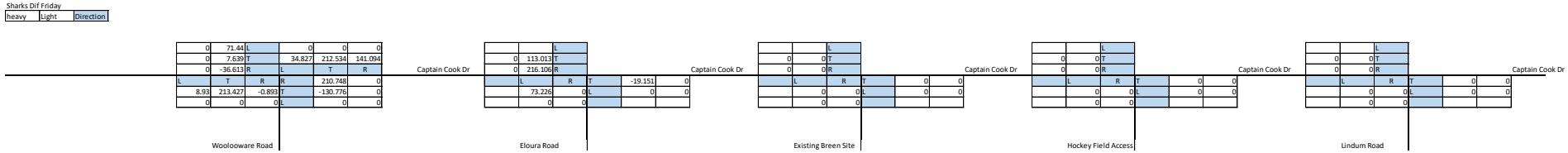
The traffic generation forecast for Woolooware Bay Town Centre is adopted from the Cronulla Sharks SSD Mod 6 (MP10_0230) application (which was withdrawn) and traffic impact assessment (McLaren Traffic Engineering, 2017). Particular reference is made to Appendix E of that document which contains the SIDRA modelling result for base and future scenarios, as well as the analysis that identifies the Mod 6 application results in 6.3 – 10.7% increase above approved 2015 traffic generation level.

The following has been undertaken to establish the Woolooware Bay Town Centre traffic generation and its distribution across the study area:

- Identify the volume differences assessed in the SIDRA modelling prepared for the Mod 6 application. The difference in volumes is attributed to the traffic generated by the Town Centre and provision for Shearwater development
- Removal of the 383 trips allocated to Shearwater within the modelling to account for the 2018 surveys (which is more current than the base surveys used in the Mod 6 assessment).
- Reduction of 6.3-10.7% to account for the approved traffic generation under 2015 approved volumes (identified in Section 3.3.1 of the McLaren Traffic Engineering assessment)
- Assessment of the weekday AM peak hour based on a 40% reduction of the weekday PM peak hour (as per the TfNSW results for shopping centres).

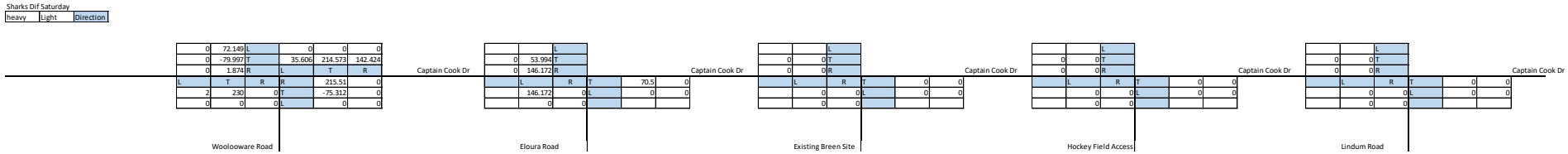
The resulting traffic generation based on the above process is shown in **Figure 7-16** and **Figure 7-17** for the weekday AM, PM and Saturday peak hour.

Figure 7-16 Woolooware Bay Town Centre PM Traffic Generation Assumptions



Noting that the AM peak period is 60% of the above values.

Figure 7-17 Woolooware Bay Town Centre SAT Traffic Generation Assumptions



7.3.4 Regional Traffic Growth

To account for other developments in the region and increased traffic generation associate with population growth, a 1% background traffic growth along Captain Cook Drive and Elouera Road has been included.

7.4 2021 Cumulative Traffic Assignment

Figure 7-18 2021 Base AM

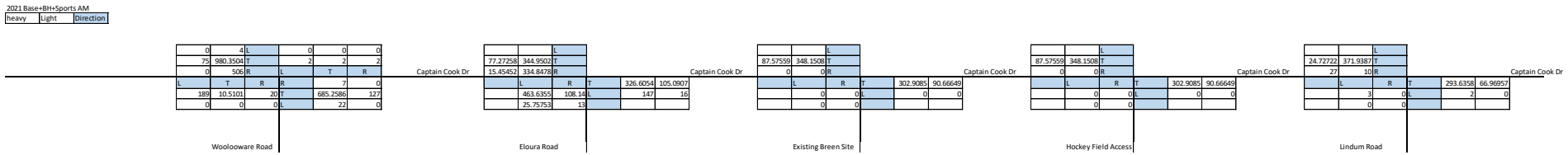


Figure 7-19 2021 Base PM

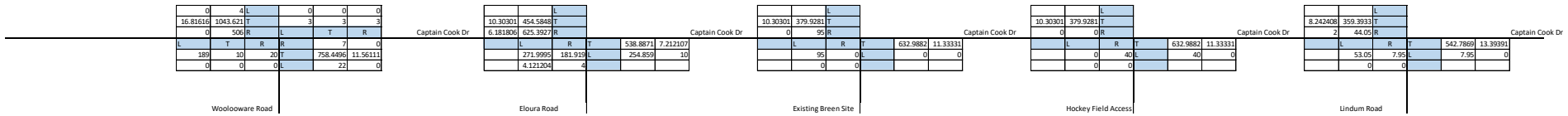


Figure 7-20 2021 Base Saturday

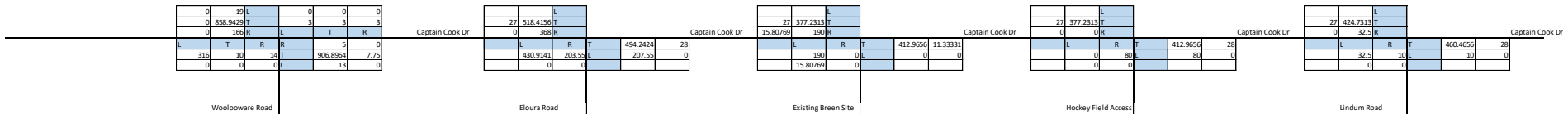


Figure 7-21 2021 Base + Proposal AM

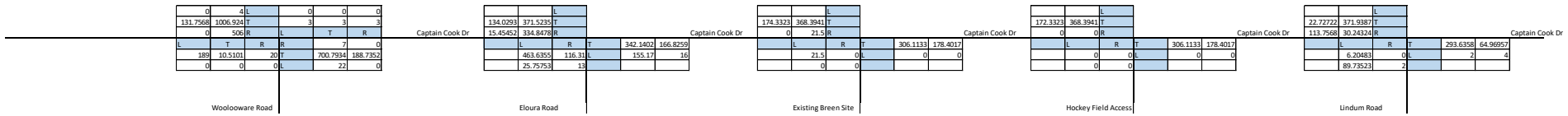


Figure 7-22 2021 Base + Proposal PM

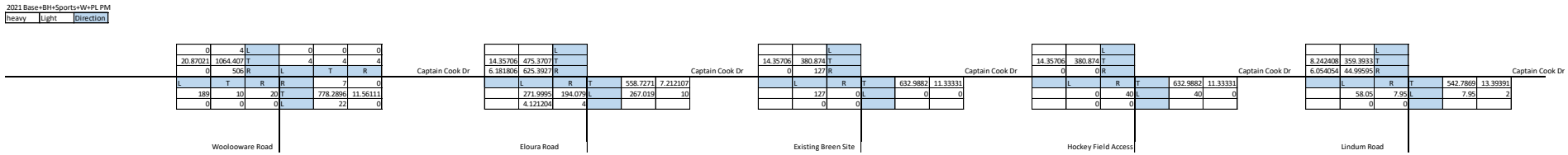
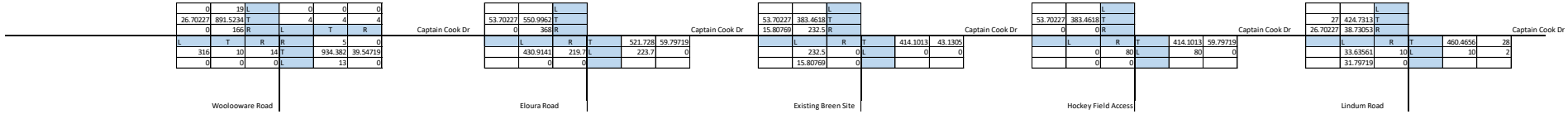


Figure 7-23 2021 Base + Proposal Saturday



7.5 Year 2021 Intersection Performance

The following tables provide summary results of the intersection performance for the year 2021. Full SIDRA movement summaries are provided in **Appendix F**.

Table 7-6 2021 Woolooware Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.261	24	B	51.9	0.283	28	D	61.1
East Approach	0.888	57.7	E	237	0.892	59.9	E	290.2
North Approach	0.022	57.1	E	2.2	0.023	62.9	E	2.4
West Approach	0.823	11	A	168.2	0.846	11	A	195.7
Summary	0.888	27.1	B		0.892	28.4	B	
	PM Base				PM Base + Proposal			
South Approach	0.245	19.4	B	41.5	0.246	19.8	B	42.4
East Approach	0.882	53.3	D	177.4	0.882	53.2	D	183.5
North Approach	0.021	50.2	D	1.9	0.021	50.7	D	2
West Approach	0.823	12	A	148.2	0.83	12.1	A	152.6
Summary	0.882	25.4	B		0.882	25.6	B	

	SAT Base				SAT Base + Proposal			
South Approach	0.353	15.4	B	52.1	0.36	17	B	61.2
East Approach	0.657	23.1	B	139.2	0.714	25.5	B	162.3
North Approach	0.017	56.8	E	2.2	0.019	60.2	E	2.3
West Approach	0.747	35.8	C	194.8	0.774	37	C	217.8
Summary	0.747	27.9	B		0.774	29.6	C	

The signalised intersection is estimated to operate at LoS “B” during the base conditions, which is reflective of good operation with acceptable delays. The impact of the Proposal will be negligible, with little to no change in delay across the peak hours inclusive of individual approach movements such as the north and east approach which appear to perform at LoS “D/E” in most baseline and future scenarios. It is noted that the Saturday result indicates a shift from LoS “B” to LoS “C”, however the delay increase is some 2 seconds where the baseline condition for 2021 is on the cusp of LoS B/C without the Proposal generated from the traffic. In any case, LoS “C” is a satisfactory performance for this intersection.

Table 7-7 2021 Elouera Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.439	15.3	B	28.6	0.473	17.1	B	40.7
East Approach	0.399	6.5	A	23.6	0.493	6.7	A	33.3
West Approach	0.286	11.7	A	17.3	0.393	11.8	A	25.7
Summary	0.439	15.3	B		0.493	17.1	B	

PM Base					PM Base + Proposal			
South Approach	0.417	15.4	B	33.6	0.501	17.4	B	44.3
East Approach	0.564	9.3	A	40.9	0.499	6.9	A	32.9
West Approach	0.456	11.9	A	27.5	0.385	11.8	A	24.2
Summary	0.564	15.4	B		0.501	17.4	B	
SAT Base					SAT Base			
South Approach	0.516	16.8	B	47.2	0.566	18.6	B	62.1
East Approach	0.443	6.3	A	25	0.508	6.4	A	31.6
West Approach	0.41	12.2	A	23.9	0.473	12.4	A	30.8
Summary	0.516	16.8	B		0.566	18.6	B	

The roundabout intersection is estimated to operate at LoS “B” or better during the base conditions, which is reflective of good operation with acceptable delays. The traffic generated by the Proposal results in little to no change in intersection performance, with LoS “B” retained across all peak hours.

Table 7-8 2021 Site Access 1 / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.004	17.6	B	0.1	0.017	30.1	C	0.2
East Approach	0.245	5.5	A	0	0.324	5.5	A	0
West Approach	0.266	7.6	A	0	0.357	8.9	A	0.8
Summary	0.266	17.6	B		0.357	30.1	C	
	PM Base				PM Base + Proposal			
South Approach	0.075	26.1	B	0.1	0.1	27.7	B	0.2
East Approach	0.351	5.5	A	0	0.351	5.5	A	0
West Approach	0.215	10.1	A	4.1	0.22	10.3	A	5.7
Summary	0.351	26.1	B		0.351	27.7	B	
	SAT Base				SAT Base + Proposal			
South Approach	0.169	20.8	B	0.1	0.203	26	B	0.1
East Approach	0.234	5.5	A	0	0.262	5.5	A	0
West Approach	0.262	8.5	A	8.3	0.336	9.5	A	12.4
Summary	0.262	20.8	B		0.336	26	B	

The priority controlled intersection is estimated to operate at LoS “B” during the base conditions, which is reflective of good operation with minimal delays. The traffic generated by the Proposal has little impact on intersection performance. It is however noted that the LoS “C” reported in the AM peak hour is based on the

worst movement which results in the LoS C. This is associated with the right turn from the site onto Captain Cook Drive, which in most cases is 1-2 vehicles in the hour. The more critical left turn out and right turn into the site operate satisfactorily at LoS A.

Table 7-9 2021 Hockey Field Access / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	n.a				n.a			
East Approach								
West Approach								
Summary								
	PM Base				PM Base + Proposal			
South Approach	0.231	26.8	B	5.5	0.235	27.2	B	5.6
East Approach	0.351	5.5	A	0	0.351	5.5	A	0
West Approach	0.214	9.7	A	0	0.218	9.7	A	0
Summary	0.351	26.8	B		0.351	27.2	B	
	SAT Base				SAT Base + Proposal			
South Approach	0.318	21.1	B	8.7	0.383	26.1	B	10.6
East Approach	0.248	5.5	A	0	0.277	5.5	A	0
West Approach	0.228	8.2	A	0	0.254	8.6	A	0
Summary	0.318	21.1	B		0.383	26.1	B	

The priority controlled intersection is estimated to operate at LoS “B” or better during the base conditions, which is reflective of good operation with acceptable delays. There is minimal impact on this intersections performance as a result of traffic generated by the Proposal.

Table 7-10 2021 Lindum Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.005	10.1	A	0.2	0.201	13	A	13
East Approach	0.301	5.1	A	14.5	0.388	7.6	A	19.9
West Approach	0.286	8.9	A	15.5	0.385	9	A	27.2
Summary	0.301	10.1	A		0.388	13	A	
	PM Base				PM Base + Proposal			
South Approach	0.082	11.6	A	3.1	0.089	11.6	A	3.4
East Approach	0.419	4.9	A	21	0.424	4.9	A	21.4
West Approach	0.273	8.2	A	14	0.276	8.2	A	14.3
Summary	0.419	11.6	A		0.424	11.6	A	
	SAT Base				SAT Base + Proposal			
South Approach	0.054	11	A	2	0.128	11.2	A	6.3
East Approach	0.365	4.8	A	17.7	0.403	5.1	A	20.2
West Approach	0.327	8.1	A	18	0.355	8.6	A	21.4
Summary	0.365	11	A		0.403	11.2	A	

The roundabout intersection is estimated to operate at LoS “A” during the base conditions, which is reflective of good operation with minimal delays. There is minimal impact on this intersections performance as a result of the Proposal. Delays to through movements along Captain Cook Drive will remain relatively unchanged and will have minimal queueing as a result.

Key results for the year 2021 analysis is summarised below:

- The signalised intersection of Captain Cook Drive / Woolooware Road is estimated to operate at LoS “C” during the base conditions, which is reflective of good operation with acceptable delays. The impact of the Proposal will be negligible, with little to no change in delay across the peak hours. It is noted that the Saturday result indicates a shift from LoS “B” to LoS “C”, however the delay increase is some 2 seconds where the baseline condition for 2021 is on the cusp of LoS B/C without the Proposal generated from the traffic. In any case, LoS “C” is a satisfactory performance for this intersection;
- The roundabout intersection of Captain Cook Drive / Elouera Road is estimated to operate at LoS “B” or better during the base conditions, which is reflective of good operation with acceptable delays. The traffic generated by the Proposal results in little to no change in intersection performance, with LoS “B” retained across all peak hours;
- The priority controlled intersection is estimated to operate at LoS “B” during the base conditions, which is reflective of good operation with minimal delays. The traffic generated by the proposal has little impact on intersection performance. It is however noted that the LoS “C” reported in the AM peak hour is based on the worst movement which results in the LoS C. This is associated with the right turn from the site onto Captain Cook Drive, which in most cases is 1-2 vehicles in the hour. The more critical left turn out and right turn into the site operate satisfactorily at LoS A;
- The priority controlled intersection of Captain Cook Drive / Hockey Field access is estimated to operate at LoS “B” or better during the base conditions, which is reflective of good operation with acceptable delays. There is minimal impact on this intersections performance as a result of traffic generated by the Proposal; and
- The roundabout intersection of Captain Cook Drive / Lindum Road is estimated to operate at LoS “A” during the base conditions, which is reflective of good operation with minimal delays. There is minimal impact on this intersections performance as a result of the Proposal. Delays to through movements along Captain Cook Drive will remain relatively unchanged and will have minimal queueing as a result.

7.6 2031 Cumulative Traffic Assignment

Figure 7-24 2031 Base AM

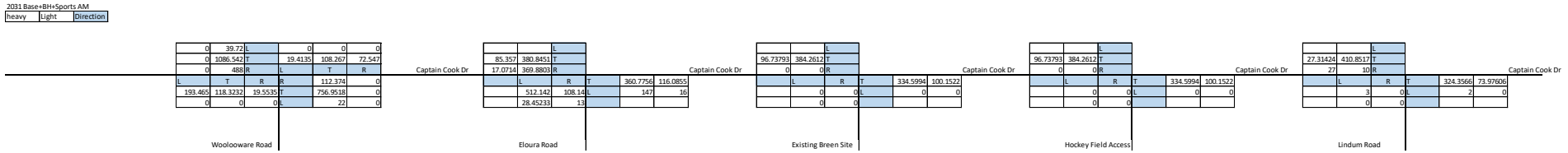


Figure 7-25 2031 Base PM

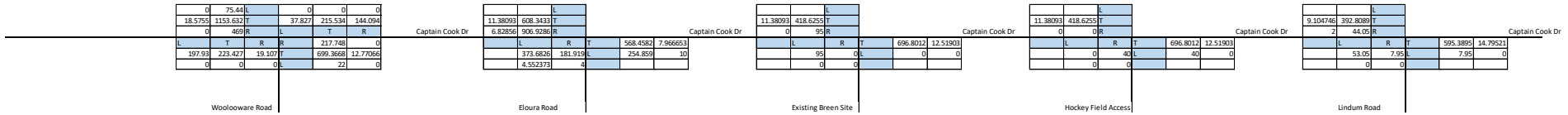


Figure 7-26 2031 Base Saturday

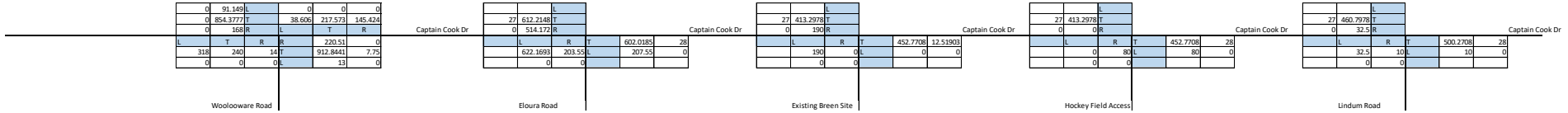


Figure 7-27 2031 Base + Proposal AM

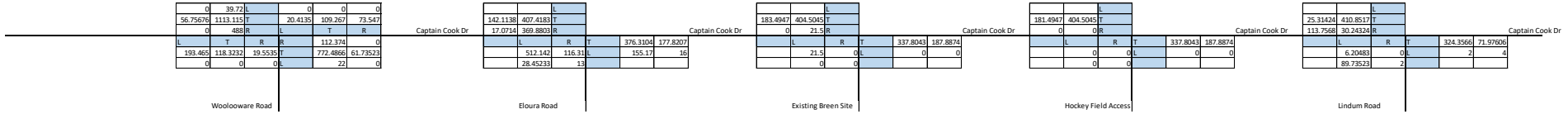


Figure 7-28 2031 Base + Proposal PM

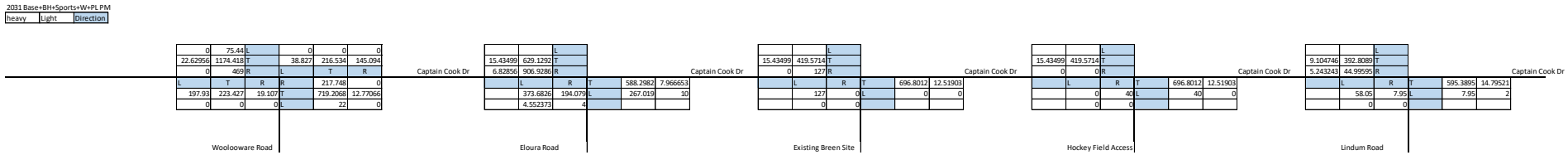
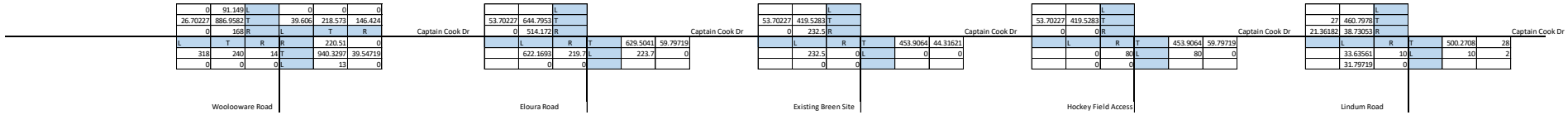


Figure 7-29 2031 Base + Proposal Saturday



7.7 Year 2031 Intersection Performance

The following tables provide summary results of the intersection performance for the year 2031. Full SIDRA movement summaries are provided in **Appendix F.**

Table 7-11 2031 Woolooware Road Signal Performance

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.872	68.4	E	49.2	0.841	55.2	D	116
East Approach	0.951	72.7	F	223	0.94	62.6	E	239.2
North Approach	0.69	60.6	E	2.1	0.701	52.7	D	71.3
West Approach	0.846	11.4	A	163.4	0.834	13.4	A	145.2
Summary	0.951	39.6	C		0.94	35.1	C	
	PM Base				PM Base + Proposal			
South Approach	1.005	62.6	E	225.5	1	59.6	E	214.2
East Approach	1.05	112.8	F	295.6	1.068	120.8	F	309.9
North Approach	1.015	102.5	F	228.4	1.016	100.6	F	222.1
West Approach	0.827	19.2	B	166.8	0.917	25.5	B	220.3
Summary	1.05	59.8	E		1.068	64.2	E	

	SAT Base				SAT Base + Proposal			
South Approach	0.96	84.4	F	340.1	1.008	74	F	252.8
East Approach	1.016	82.5	F	287.7	1.09	133.3	F	369.4
North Approach	0.678	50.8	D	160.1	0.729	44.6	D	137.1
West Approach	0.997	92	F	337.3	0.986	75.4	F	273.4
Summary	1.016	82	F		1.09	92.4	F	

The signalised intersection is estimated to operate at LoS “C” in the AM and LoS “E/F” in the PM / Saturday period under baseline conditions. The LoS “E/F” is considered to be unsatisfactory and reflective of increased delays and queuing. The additional traffic associated with the Proposal results in minor performance changes in the AM period, however this is largely due to the SIDRA program balancing the phasing time for all approaches. The LoS C reported in the baseline condition is retained under the Proposal scenario during the AM period. There is a minor improvement in the average delay reporting in the AM scenarios which is as a result of the SIDRA program optimising the cycle time and phase variations to suit the needs of the increased traffic volume. With regard to the PM and Saturday, the Proposal impact results in relatively minor change to delays with the LoS “E/F” begin retained. The LoS “F“ identified for the Saturday performance is not triggered as a result of the Proposal given it occurs in the forecasted baseline condition.

The additional traffic at this location as a result of the Proposal is some 3.7% increase above what is estimated to occur in the year 2031. This is a relatievly minor increase which supports the increase in delay of some 10 seconds.

Table 7-12 2031 Elouera Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.48	16.5	B	36.6	0.501	17.4	B	44.3
East Approach	0.455	6.8	A	28.3	0.499	6.9	A	32.9
West Approach	0.343	11.7	A	19.9	0.501	11.8	A	24.2
Summary	0.48	16.5	B		0.501	17.4	B	
	PM Base				PM Base + Proposal			
South Approach	0.491	16.9	B	49	0.509	17.1	B	52.2
East Approach	0.871	36.5	C	138.1	0.881	38.4	C	144.5
West Approach	0.656	12.3	A	7.2	0.665	12.4	A	51.9
Summary	0.871	36.5	C		0.881	38.4	C	
	SAT Base				SAT Base			
South Approach	0.693	22.8	B	120.8	0.757	26.6	B	144.8
East Approach	0.645	9.5	A	55.4	0.704	10.8	A	70
West Approach	0.509	12.4	A	35.2	0.481	12.6	A	41.5
Summary	0.693	22.8	B		0.757	26.6	B	

The roundabout intersection is estimated to operate at LoS “C” or better during the base conditions, which is reflective of satisfactory operation. The traffic generated by the Proposal results in little to no change in intersection performance, with LoS “C” or better being retained.

Table 7-13 2031 Site Access 1 / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	0.005	20.6	B	0.1	0.017	45.1	D	0.2
East Approach	0.27	5.5	A	0	0.35	5.5	A	0
West Approach	0.294	7.9	A	0	0.428	9.3	A	0.9
Summary	0.294	20.6	B		0.428	45.1	D	
	PM Base				PM Base + Proposal			
South Approach	0.075	32.3	C	0.2	0.1	34.1	C	0.2
East Approach	0.387	5.5	A	0	0.387	5.5	A	0
West Approach	0.238	11	A	4.6	0.241	11.5	A	6.6
Summary	0.387	32.3	C		0.387	34.1	C	
	SAT Base				SAT Base + Proposal			
South Approach	0.15	23	B	0.1	0.184	26.7	B	0.1
East Approach	0.256	5.5	A	0	0.27	5.5	A	0
West Approach	0.249	8.5	A	6.9	0.307	9.2	A	10
Summary	0.256	23	B		0.307	26.7	B	

The priority controlled intersection is estimated to operate at LoS “C” during the base conditions, which is reflective of good operation with minimal delays. With the inclusion of traffic associated with the Proposal, the LoS performance shifts to LoS D. It is however noted that the worst movement which results in the LoS D

or better is associated with the right turn from the Proposal Site onto Captain Cook Drive (consistent with the baseline results), which in most cases is 1-2 vehicles in the hour. The more critical left turn out and right turn into the site operate satisfactorily at LoS A.

Table 7-14 2031 Hockey Field Access / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base + Proposal			
South Approach	n.a				n.a			
East Approach								
West Approach								
Summary								
	PM Base				PM Base + Proposal			
South Approach	0.297	35.1	C	7	0.298	35.2	C	7
East Approach	0.387	5.5	A	0	0.387	5.5	A	0
West Approach	0.236	10.5	A	0	0.237	10.5	A	0
Summary	0.387	35.1	C		0.387	35.2	C	
	SAT Base				SAT Base + Proposal			
South Approach	0.37	25	B	10.2	0.407	28	B	11.2
East Approach	0.269	5.5	A	0	0.285	5.5	A	0
West Approach	0.247	8.5	A	0	0.259	8.7	A	0
Summary	0.269	25	B		0.407	28	B	

The priority controlled intersection is estimated to operate at LoS “C” or better during the base conditions, which is reflective of good operation with acceptable delays. There is minimal impact on this intersection’s performance as a result of traffic generated by the Proposal.

Table 7-15 2031 Lindum Road / Captain Cook Drive

Approach	DoS	AVD	LoS	Queue (m)	DoS	AVD	LoS	Queue (m)
	AM Base				AM Base			
South Approach	0.005	10.3	A	0.2	0.211	13.5	A	13.8
East Approach	0.33	5.1	A	16.4	0.423	7.5	A	22.5
West Approach	0.312	8.9	A	17.6	0.409	9	A	29.8
Summary	0.33	10.3	A		0.423	13.5	A	
	PM Base				PM Base			
South Approach	0.086	12	A	3.3	0.093	12.1	A	3.6
East Approach	0.453	4.9	A	23.9	0.454	4.9	A	24
West Approach	0.294	8.1	A	15.6	0.295	8.1	A	15.7
Summary	0.453	8.1	A		0.454	12.1	A	
	SAT Base				SAT Base			
South Approach	0.056	11.3	A	2	0.096	11.4	A	4.3
East Approach	0.391	4.8	A	19.6	0.41	4.9	A	21
West Approach	0.349	8.1	A	19.9	0.362	8.4	A	21.5
Summary	0.391	11.3	A		0.41	11.4	A	

The roundabout intersection is estimated to operate at LoS “A” during the base conditions, which is reflective of good operation with minimal delays. There is minimal impact on this intersection’s performance as a result of the Proposal. Delays to through movements along Captain Cook Drive will remain relatively unchanged and will have minimal queueing as a result.

Key results for the year 2031 analysis is summarised below:

- The signalised intersection of Captain Cook Drive / Woolooware Road is estimated to operate at LoS “C” in the AM and LoS “E/F” in the PM / Saturday period under baseline conditions. The LoS “E/F” is considered to be unsatisfactory and reflective of increased delays and queuing. The additional traffic associated with the Proposal results in minor performance changes in the AM period, however this is largely due to the SIDRA program balancing the phasing time for all approaches. The LoS C reported in the baseline condition is retained under the Proposal scenario. With regard to the PM and Saturday, the Proposal impact results in relatively minor change to delays with the LoS “E/F” being retained. The LoS “F“ identified for the Saturday performance is not triggered as a result of the Proposal given it occurs in the forecasted baseline condition.

  The additional traffic at this location as a result of the Proposal is some 3.7% increase above what is estimated to occur in the year 2031. This is a relatievly minor increase which supports the increase in delay of some 10 seconds;

- The roundabout intersection of Captain Cook Drive / Elouera Road is estimated to operate at LoS “C” or better during the base conditions, which is reflective of satisfactory operation. The traffic generated by the Proposal results in little to no change in intersection performance, with LoS “C” or better being retained;

- The priority controlled intersection of Captain Cook Drive / Existing Breen Resource Facility access is estimated to operate at LoS “C” during the base conditions, which is reflective of good operation with minimal delays. With the inclusion of traffic associated with the Proposal, the LoS performance shifts to LoS D. It is however, noted that the worst movement which results in the LoS D or better is associated with the right turn from the site onto Captain Cook Drive (consistent with the baseline results), which in most cases is 1-2 vehicles in the hour. The more critical left turn out and right turn into the site operate satisfactorily at LoS A;

- The priority controlled intersection of Captain Cook Drive / Hockey Field access is estimated to operate at LoS “C” or better during the base conditions, which is reflective of satisfactory operation. There is minimal impact on this intersection’s performance as a result of traffic generated by the Proposal; and

- The roundabout intersection of Captain Cook Drive / Lindum Road is estimated to operate at LoS “A” during the base conditions, which is reflective of good operation with minimal delays. There is minimal impact on this intersections performance as a result of the Proposal. Delays to through movements along Captain Cook Drive will remain relatively unchanged and will have minimal queueing as a result.

7.8 Intersection Performance Summary

Table 7-16 Woolooware Road / Captain Cook Drive Performance Comparison

	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS
Woolooware Road / Captain Cook Drive	2018 AM BASE	0.855	26.9	B	2021 AM BASE	0.888	27.1	B	2031 AM BASE	0.951	39.6	C
	2018 PM BASE	0.855	26.9	B	2021 PM BASE	0.882	25.4	B	2031 PM BASE	1.05	59.8	E
	2018 SAT BASE	0.779	27.6	B	2021 SAT BASE	0.747	27.9	B	2031 SAT BASE	1.016	82	F
					2021 AM BASE+ PROPOSAL	0.892	28.4	B	2031 AM BASE+ PROPOSAL	0.94	35.1	C
					2021 PM BASE+ PROPOSAL	0.882	25.6	B	2031 PM BASE+ PROPOSAL	1.068	64.2	E
					2021 SAT BASE+ PROPOSAL	0.774	29.6	C	2031 SAT BASE+ PROPOSAL	1.09	92.4	F

Table 7-17 Elouera Road / Captain Cook Drive Performance Comparison

	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS
Elouera Road/ Captain Cook Drive	2018 AM BASE	0.427	15.1	B	2021 AM BASE	0.439	15.3	B	2031 AM BASE	0.48	16.5	B
	2018 PM BASE	0.456	14.3	A	2021 PM BASE	0.564	15.4	B	2031 PM BASE	0.871	36.5	C
	2018 SAT BASE	0.365	13.7	A	2021 SAT BASE	0.516	16.8	B	2031 SAT BASE	0.693	22.8	B
					2021 AM BASE+ PROPOSAL	0.493	17.1	B	2031 AM BASE+ PROPOSAL	0.501	17.4	B
					2021 PM BASE+ PROPOSAL	0.501	17.4	B	2031 PM BASE+ PROPOSAL	0.881	38.4	C
					2021 SAT BASE+ PROPOSAL	0.566	18.6	B	2031 SAT BASE+ PROPOSAL	0.757	26.6	B

Table 7-18 Site Access 1 / Captain Cook Drive Performance Comparison

	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS
Site Access 1 / Captain Cook Drive	2018 AM BASE	0.258	30.2	C	2021 AM BASE	0.266	17.6	B	2031 AM BASE	0.294	20.6	B
	2018 PM BASE	0.329	20.3	B	2021 PM BASE	0.351	26.1	B	2031 PM BASE	0.387	32.3	C
	2018 SAT BASE	0.22	11.4	B	2021 SAT BASE	0.262	20.8	B	2031 SAT BASE	0.256	23	B
					2021 AM BASE+ PROPOSAL	0.357	30.1	C	2031 AM BASE+ PROPOSAL	0.428	45.1	D
					2021 PM BASE+ PROPOSAL	0.351	27.7	B	2031 PM BASE+ PROPOSAL	0.387	34.1	C
					2021 SAT BASE+ PROPOSAL	0.336	26	B	2031 SAT BASE+ PROPOSAL	0.307	26.7	B

Table 7-19 Hockey Field Access / Captain Cook Drive Performance Comparison

	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS
Hockey Field / Captain Cook Drive	2018 AM BASE	N.A	N.A	N.A	2021 AM BASE	N.A	N.A	N.A	2031 AM BASE	N.A	N.A	N.A
	2018 PM BASE	N.A	N.A	N.A	2021 PM BASE	0.351	26.8	B	2031 PM BASE	0.387	35.1	C
	2018 SAT BASE	N.A	N.A	N.A	2021 SAT BASE	0.318	21.1	B	2031 SAT BASE	0.269	25	B
					2021 AM BASE+ PROPOSAL	N.A	N.A	N.A	2031 AM BASE+ PROPOSAL	N.A	N.A	N.A
					2021 PM BASE+ PROPOSAL	0.351	27.2	B	2031 PM BASE+ PROPOSAL	0.387	35.2	C
					2021 SAT BASE+ PROPOSAL	0.383	26.1	B	2031 SAT BASE+ PROPOSAL	0.407	28	B

Table 7-20 Lindum Road / Captain Cook Drive Performance Comparison

	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS	Scenario	DoS	AVD	LoS
Lindum Road / Captain Cook Drive	2018 AM BASE	0.291	9	A	2021 AM BASE	0.301	10.1	A	2031 AM BASE	0.33	10.3	A
	2018 PM BASE	0.368	8.1	A	2021 PM BASE	0.419	11.6	A	2031 PM BASE	0.453	8.1	A
	2018 SAT BASE	0.286	10.3	A	2021 SAT BASE	0.365	11	A	2031 SAT BASE	0.391	11.3	A
					2021 AM BASE+ PROPOSAL	0.388	13	A	2031 AM BASE+ PROPOSAL	0.423	13.5	A
					2021 PM BASE+ PROPOSAL	0.424	11.6	A	2031 PM BASE+ PROPOSAL	0.454	12.1	A
					2021 SAT BASE+ PROPOSAL	0.403	11.2	A	2031 SAT BASE+ PROPOSAL	0.41	11.4	A

7.8.2 Queuing Considerations

The SIDRA modelling results show the maximum queue on the southern approach at Lindum Road is 13.8m which occurs in the weekday AM model. This distance is well clear of the Boat Harbour Access which is some 85m from Captain Cook Drive and the proposed Lindum Road extension to the New Resource Recovery Facility (some 135m from Captain Cook Drive) such that there is not expected to be any delays at these two driveway locations as a result of queuing from the roundabout.

With regard to the operation of the weighbridges, the potential queueing has been assessed using queuing theory as outlined by Austroads. The 2 inbound weighbridges are assumed to service a single queue as a worst case. The inbound traffic volume during the peak is up to 70 vehicles under the Proposal, or 1.2 vehicles every minute in the peak.

The servicing time (time for a vehicle to enter the weighbridge, be recorded, and leave the weighbridge) is conservatively assumed to be 60 seconds. As previously mentioned, there are 2 weighbridges servicing the queue.

Based on the above, the queue theory calculations result in the following:

- Under 2 vehicles in the system, inclusive of 1 vehicle on the weighbridge
- Average queue length of less than 1 vehicle

It is therefore concluded that the weighbridge and on-site setup will operate efficiently such that queuing to the public domain will not occur.

7.9 Road Safety Considerations

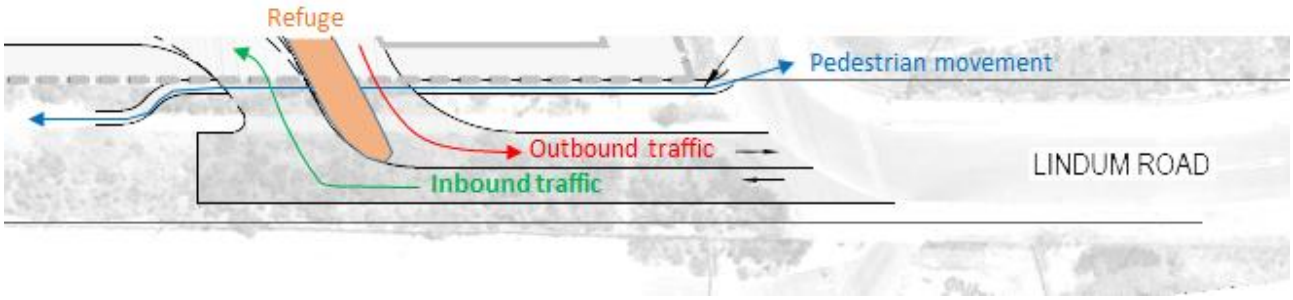
7.9.1 Driveway / Lindum Road Safety

The proposed driveway is generally an extension of Lindum Road and consists of an entry and exit lane at Lindum Road. The existing recreational footpath which is adjacent to the eastern boundary crosses the proposed driveway access point. The inbound and outbound driveways are separated by a physical median which provides a refuge for pedestrians in this location thus reducing the width required for pedestrians to cross at any one time. It is expected that directional signage will be present upon entry to inform incoming traffic. Vehicles that circulate the large truck detarping and weighbridge area are assumed to be familiar with the Proposal site as part of the overall site wayfinding signage. Vehicles which may be unfamiliar with the Proposal site and are likely to require the small truck parking locations have approximately 30m to travel into the site before turning left towards the smaller truck parking. Visitors / staff will be required to park in the car parking area approximately 50m into the site. The approximate travel distance and decision times are considered appropriate for the low speed environment.

The appropriate clearance requirements to obstructions and other vehicles will be achieved at CC stage. The median separation between the inbound and outbound traffic is aligned clear of the swept paths and does not impact access to the adjacent Boat Harbour publically accessible driveway (the southern most driveway to the Boat Harbour site off Lindum Road).

Pedestrian movement around the driveway is depicted in the following figure. The central median dividing the inbound and outbound traffic movements provides refuge for pedestrians at this location. There is satisfactory sight lines to / from pedestrians at the pram ramp crossing point within Lindum Road.

Figure 7-30 Pedestrian Movement



The proposed extension of Lindum Road and driveway location to the New Resource Recovery Facility enable clear sight lines to / from pedestrians along the footpath.

The driveway design currently provides a refuge between inbound and outbound traffic lanes, which allows the pedestrian to assess one direction of traffic at a time.

Additional measures, such as signage (e.g. give-way to pedestrians), traffic calming (e.g. speed humps or raised thresholds) and linemarking (e.g. zebra crossing) are all reasonable traffic management measures that will be considered to reinforce pedestrian priority along the footpath (where pedestrians have priority as per Australian Road Rules).

The interaction between commercial vehicles and pedestrians is in an environment of low speed travel and good sight lines. The level of risk is considered to be relatively low for the following reasons:

- Peak pedestrian activity would be Weekend days, where traffic generated from the Proposal site will be at its lowest.
- Peak weekday traffic generation is the AM peak, which does not overlap with the recreational sport fields nearby, and likely to coincide with significantly lower pedestrian activity in this location.
- Appropriate site conditions of entry requiring appropriate driver behaviour (travel speed, covering of loads, obeying road rules), and reprimands that are reflective of driver misconduct are reasonable instruments that will be enforced to result in the appropriate driver behaviour.

The above can be further detailed as part of the detailed design of the new driveway, and subject to review and sign-off by Council, pursuant to consent conditions if deemed appropriate.

7.9.2 Internal Circulation

It has been determined that there is negligible to no risk of truck rollovers on-site. This is due to flat grades throughout the New Resource Recovery Facility (being no more than 2%) and due to the small and contained nature of the Proposal Site. As such, no additional protections such as barriers have been proposed at this point in time.

It has been determined that there is negligible risk of truck rollover on-site within the Marang Parklands car park and drop off areas due to flat grades throughout the parking area (no greater than 4%). It is assumed that the largest vehicle to access the car park will be a garbage truck, and a reduced speed limit will be in place for all vehicles. Further consideration during detailed design may be required to assess the need for additional protections such as safety barriers along the access road leading into the car park and drop off area.

7.10 Impacts on Pavement Condition

The majority of Captain Cook Drive pavement condition is considered to be average or above, where more noticeable defects are limited to the Existing Breen Resource Facility access and on approach to the roundabout intersection at Trinity Street. It is expected that additional heavy vehicle movements associated with the Proposal would result in some deterioration in the pavement condition, however would not necessarily require additional treatment beyond the current maintenance procedures that are undertaken by Council.

Pavement condition at the Existing Breen Resource Facility access on Captain Cook Drive could be improved at a time when the sport fields are constructed and formalised access is created in this location.

7.11 Active Transport Modes

The New Resource Recovery Facility will be provided with compliant bicycle end-of-trip facilities to assist in promoting active transport. The footpath and road / driveway connection from Lindum Road will assist in linking the facility to the broader cycling network.

The Marang Parklands has a number of internal shared pathways within the site that will link to the pathway network within the playing fields. This will ultimately tie-in with the existing on-road cycle lanes along Captain Cook Drive to help support the movement of cyclists to and from the Proposal site. On-site bicycle parking will be provided to support this transport mode.

8 Construction Transport Assessment

8.1 Description

The construction sequence has been carefully planned to facilitate a staged release of the Marang Parklands, allowing this area to be utilised by the public as soon as each stage is completed, rather than waiting for the entire Proposal to be finalised before being able to realise the benefits this Proposal provides. Other advantages of this staging are that it:

- allows time for the Marang Parklands to be established prior to the construction of the relevant Playing Fields to prevent damage to the fields from sediment load during rainfall events.
- minimises interaction between construction activities and public access which reduces the safety risk to the construction team and the community.

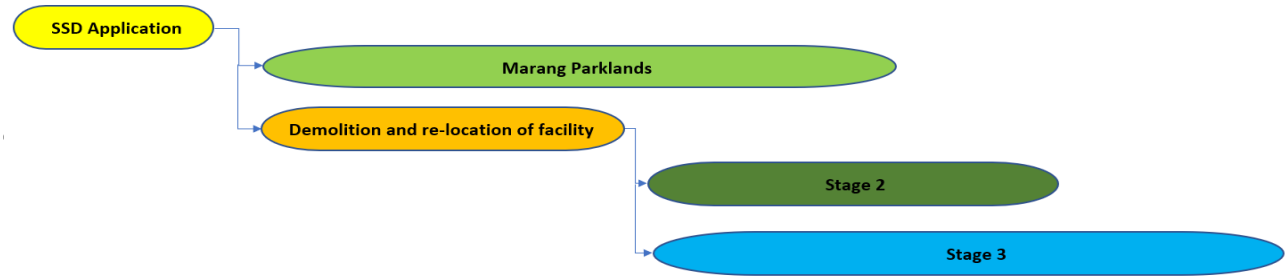
The development sequence is governed by a number of dependent activities:

1. Consent for the proposed New Resource Recovery Facility, Marang Parklands and landfill contours must be in place before the delivery of the Marang Parklands (under this SSDA) and Stage 2 and 3 of the Playing Fields (under previous development consents) can commence.
2. Once consent has been granted, Construction Certificates can be applied for and the construction of the New Resource Recovery Facility and Marang Parkland can commence (following the issue of these certificates).
3. Once the New Resource Recovery Facility has been delivered, Breen can demolish and/or re-locate the Existing Breen Resources Facility and associated infrastructure on Lots 1122, 1123 and Lot 6. Breen can complete the re-profiling, capping and closing works on the Marang Parklands footprint, and complete the development of the Marang Parkland.
4. Following the re-location of the Existing Breen Resources Facility and completion of the Marang Parklands, the works required to enable delivery of the Playing Fields (referred to as “Owners works” (in the VPA) can commence.
5. Once works to enable the delivery of the Playing Fields are complete, construction of the Playing Fields can commence. The works to construct the Playing Fields (already approved under separate consents) are called “Developer works” in the VPA.

8.2 Staging

At this point in time, the envisaged staging is as per **Figure 8-1** below.

Figure 8-1 Draft Staging Plan



The below timeframes for practical completion provide an estimate of the commencement and construction duration for each of the elements of work that form part of this Proposal (being sought under this SSDA), and Stages 2 and 3 of the Playing Fields the subject of the VPA.

Stage	Start	Finish
Relocation	November 2021	April 2023
Marang Parklands	November 2021	February 2024
Playing Fields Stage 2	April 2023	November 2024
Playing Fields Stage 3	April 2023	November 2025

8.3 Work Hours

Subject to approval, the construction hours are expected to be in accordance with the NSW Interim Construction Noise Guidelines as follows:

Monday to Friday	7am to 6pm
Saturday	8am to 1pm
Sunday	No work
Public Holidays	No work

8.4 Construction Work Force

It is estimated that construction of the New Resource Recovery Facility and the Marang Parklands would each support some 30 direct jobs in the construction industry and support a further 50 jobs in related (supplier) industries over the development period. As such, total employment generated during the construction phase is estimated at 80 jobs each, or 160 jobs in total.

The peak activity on-site at any one time will vary throughout the life of the construction program. The concurrent activity of relocating and constructing the New Resource Recovery Facility whilst constructing the Marang Parklands occur up until April 2023.

8.5 Construction Parking Requirements

During the various construction phases listed above, it is expected that up to 80 personnel may be required on-site at any one time. There may be instances where some of these personnel consist of existing Breen employees in association with the existing landfill activities across the Proposal site.

Given the large area of the Proposal Site, as well as the concurrent activities associated with the sport field construction, there will be adequate are on-site to facilitate parking of contractor vehicles. The location and arrangement of parking can be detailed within the subsequent Construction Traffic Management Plan (CTMP) and may be subject to staging to suit the construction activities and locations on-site. Parking on Captain Cook Drive or within existing sport field parking will not occur.

Travelling to / from the Proposal site for construction contractors is likely to be dominated by private vehicle based on the relatively low level of public transport and proximity to other transport services and facilities.

8.6 Construction Vehicle Types

Consistent with previous construction activities associated with the existing sports fields, it is expected that a mix of heavy vehicles during the construction phase. Whilst most of the required fill will be processed through the New Resource Recovery Facility and thus limiting the amount of fill material from external sources, there may still be the need for large vehicles to visit the Proposal Site. The following vehicle types can be expected:

- 25m B-double
- 19m Semi-trailer
- 19m Truck & Dog
- Rigid Trucks

On-site, the use of excavators, graders, watercarts and other specialised machinery will be required. Where necessary, these machines will be delivered to the Proposal Site as required.

8.7 Construction Traffic Volumes

Based on the construction detail proposed and the reuse of existing haulage and recovery of material on site, it is envisaged that construction will have negligible impact on traffic conditions on Captain Cook Drive. The works are not expected to introduce any considerable additional construction vehicles to Captain Cook Drive through the existing entry point to the Existing Breen Resources Facility. No alterations to the existing site access from Captain Cook Drive will be required.

There is likely to be movements associated with the delivery of machinery as well as contracted employees. Delivery of machinery is expected to add 2-4 movements per day in early stages of the construction program. Most of the equipment required and delivered to the Proposal site will remain on-site for construction of both the New Resource Facility and Marang Parklands, reducing the cumulative traffic impact and need for construction equipment. The estimated contracted employees are forecast to add 80 inbound trips in the morning and 80 outbound trips in the afternoon (progressively leaving the site once on-site work slows down).

8.8 Construction Vehicle Transport Route

Most, if not all construction related vehicles will approach the Proposal site from either Elouera Road or Captain Cook Drive west of Woolooware Road and access the Proposal site via right in / left out on Captain Cook Drive consistent with the current heavy vehicle movements of the Existing Breen Resource Facility and previous construction activities associated with the sport fields. Depending on the location of construction activity and staging, access points may vary through the life of the construction program.

8.9 Construction Traffic Impact

It is anticipated that the traffic generation during construction phase would be less than what has been assessed during the Proposal operation. As demonstrated in **Section 7**, the Proposal is forecast to have a negligible impact on the surrounding road network.

8.10 Pedestrian / Cyclist Considerations

Throughout the life of the construction program, pedestrian and cyclist routes will be maintained at all times, ensuring clear path of travel is achieved. If modification to any pedestrian or cycle path is required, the appropriate approvals will be sort prior to undertaking the work.

8.11 Public Transport Considerations

As majority of the construction activities are wholly contained on-site with minimal public domain works, it is expected that impacts to public transport will be minimal.

8.12 Emergency Service Vehicles

As majority of the construction activities are wholly contained on-site with minimal public domain works, it is expected that routes along Captain Cook Drive for emergency services will be restively free flow with little to no impact from the construction program.
Emergency access to on-site construction activities or the sports fields will be maintained at all times.

9 Mitigation Measures

9.1 Operational

The analysis of all transport related impacts has found that the traffic generated by the Proposal is expected to have a minimal impact to the surrounding road network in terms of traffic flow efficiency and road safety.

It is however acknowledged that the road environment will significantly change from the current industrial setting to a more active road side with completion of the sport fields and creation of the Marang Parklands. It has been previously highlighted that the 80km/h speed frontage on Captain Cook Drive should be reduced to 70km/h (CBHK, 2011).

Specific to the New Resource Recovery Facility, the following measures are recommended to manage and mitigate any potential traffic impact:

- Operational Traffic Management Plan
  - A traffic management plan that details the traffic operation and control of all on-site activities. As a minimum, the OTMP is to provide details and assessment of:
    - Site signage and wayfinding;
    - Loading procedures and hazard identification;
    - Internal and external pedestrian movement plans;
    - Internal and external vehicular movement plans;
    - Parking locations and requirements;
    - Employee and visitor induction requirements;
    - General traffic procedures and rules to be adhered to;
    - Site specific traffic information not listed above.
- Workplace Travel Plan
  - A workplace travel plan is recommended to promote sustainable travel trends, such as car pooling or public transport. The travel plan should provide the following details and assessment:
    - Bus routes and service timetables, inclusive of the nearest bus stop location and pathways. Subsidised OPAL trips may also be considered as an incentive for employees;
    - Incentives for carpooling of employees where possible, and the appropriate mechanism to enable employees to connect with each other to promote carpooling;
    - Provision of secure bicycle parking and end-of-trip facilities such as changeroom facilities (i.e. showers)
    - Promotion of sustainable travel modes through engaging activities / competitions (e.g. STEPtember).
- Signage and pedestrian priority measures at site driveway / Lindum Road extension
  - Signage (e.g. give-way to pedestrians), traffic calming (e.g. speed humps or raised thresholds) and linemarking (e.g. zebra crossing) to be considered
- Permanently classify Lindum Road for approval of B-Doubles via TfNSW / National Heavy Vehicle Regulator.

Specific to the Marang Parklands, it is recommended that the following measures are implemented to help manage and mitigate any potential traffic impact

- Signage and Wayfinding Strategy
  - Development of a comprehensive signage plan that integrates with the approved sport fields (which are not subject of the SSD). This is to ensure sufficient level of detail is provided to visitors on parking locations, facilities, emergency access points, loading and disabled parking. This will seek to minimise the level of internal traffic movements associated with circulation and parking.

Specific to the overall Proposal:

- Speed zone reduction from 80km/h to 60-70km/h across the Proposal site frontage on Captain Cook Drive.

9.2 Construction

A Construction Traffic Management Plan (CTMP) will be prepared by suitably qualified professional to manage and mitigate potential traffic impacts during the construction program. The CTMP provide specific details on the construction program, once know, and include the following:

- temporary traffic controls, including detours and signage;
- notifying the local community about construction-related traffic impacts;
- minimising potential conflict between construction-related traffic and:
  - Sports clubs; and
  - Adjacent land owners
- implementing measures to minimise construction-related traffic on the public road network outside of standard construction hours;
- ensuring construction-related traffic does not track dirt onto the public road network;
- ensuring loaded vehicles entering or leaving the site have their loads covered or contained;
- providing sufficient parking on site for all construction-related traffic;
- responding to any emergency repair requirements or maintenance during construction
- a traffic management system for managing over-dimensional vehicles;
- fatigue management include a drivers code of conduct that addresses:
  - travelling speeds;
  - procedures to ensure that drivers to and from the site adhere to the designated over dimensional and heavy vehicle routes; and
  - procedures to ensure that drivers to and from the site implement safe driving practices; and
- include a detailed program to monitor and report on the effectiveness of these measures and the code of conduct.

An internal management strategy will be established within the construction site. This strategy will form part of the site's induction that will be undertaken by all personnel on-site.

The following key items are to be implemented:

- 10 km/h speed limit on internal access roads;
- Radio communication between construction vehicles available at all times;
- All loads to be correctly restrained; and
- Warning signage to be provided at critical areas and intersection points.

The on-site parking within the construction compound is required to provide a dedicated safe area where personnel can access their vehicles.

10 Conclusion

This traffic and transport assessment identifies the traffic and parking impacts of the Proposal on the external rod network, as well as provision of management and mitigation measures to appropriately control any Proposal impact. The following conclusions re drawn:

- The number of car parking spaces to be provided on the Proposal Site is typically to be determined in accordance with the Sutherland Shire DCP, however, in this instance the Sutherland Shire DCP does not apply to the Proposal Site as the Sutherland Shire Local Environmental Plan does not apply to the Proposal Site. As such, a review has been carried out having consideration to the current site operations and staffing levels than adopting Council's generic car parking rate which is applicable to the whole LGA

  The Existing Breen Resources Facility currently operates with 52 staff on-site at any one time, with on average four visitors throughout the day. A number of staff carpool to the site, and staff are encouraged to do so. Worst case scenario is to assume that all staff and visitors drive, and are parked on-site at the same time. This is a total of 56 parked vehicles.

  The Proposal site has sufficient space to cater for some 88 car parking spaces, which is considerably higher than the current day to day demand of the Existing Breen Resource Facility. This level of parking is highly unlikely to be fully utilised however does allow for atypical operations.

  Based on other regional parklands, the proposed car parking of 200 spaces will be sufficient to service the Marang Parklands and recreational activities occurring within this portion of the Proposal such that there will be no overflow parking onto Captain Cook Drive or the sports fields.

  Parking for other modes such as motorcycle and bicycle is faciliatetd on-site along with on-site loading requirements;
- The New Resource Recogery Facility traffic generation has been derived on historic 2017/2018 weighbridge data and the surveys undertaken in 2018. The forecast increase assocaited with the New Resource Recovery Facility is some 53 peak hour vehicles in the morning and 34 trips on the Saturday. There is little to no activity that overlaps with the weekday PM peak hour;
- The Marang Parklands traffic generation has been derived based on first principles calculation using the proposed number of car spaces. The assessment acount for 43 to 85 peak hour vehicle trips;
- Woolooware Road / Captain Cook Drive will perform at LoS B or better in 2021 and LoS F in 2031 under the baseline conditions. The inclusion of the Proposal traffic will see the 2021 performanc shift to LoS C or better whilst the 2031 performance will remain at LoS F;

  The change in LoS from B to C in 2021 occurs during the Saturday peak hour. The performance of LoS C on the weekend peak is considered to be satisfactory as per the RMS (now TfNSW) Guide. The LoS F identified in 2031 occurs on the Saturday peak, whereby the Proposal adds a minor increase in delay but is not the triggering development in this intersection perfomance as the LoS F occurs without the Proposal traffic;
- Elouera Road / Captain Cook Drive will perform at LoS B or better in 2021 and LoS C or better in 2031 under the baseline conditions. The Proposal's traffic impact is negligible in this location with both the 2021 and 2031 LoS performnce retained;
- Existing Breen Access / Captain Cook Drive will perform at LoS B or better in 2021 and LoS C or better in 2031. With the inclusion of the Proposal traffic, the 2021 result is LoS C or better whilst the 2031 result is LoS D or better;

  The worst movement in this priority controlled intersection is the right turn out onto Captain Cook Drive, which has the associated LoS C/D in 2031 under the Proposal conditions. However, the volume of traffic for this movement in most cases is 1-2 vehicles in the hour and is not reflective of the intersections performance. The more critical left turn out and right turn into the site operate satisfactorily at LoS A;
- Hockey Field Access / Captain Cook Drive will perform at LoS B in 2021 and LoS C or better in 2031. With the inclusion of the Proposal's traffic generation, these LoS results do not change which reflects minimal impact;

  Lindum Road / Captain Cook Drive will perform at LoS A in 2021 and 2031 under baseline conditions. With the inclusion of the Proposal's traffic generation, this LoS result will remain unchanged
- On-site queuing is expected to be wholly contained and not extend to the public domain;

- It has been determined that there is negligible to no risk of truck rollovers on-site. This is due to flat grades throughout the New Resource Recovery Facility (being no more than 2%) and due to the small and contained nature of the site. As such, no additional protections such as barriers have been proposed at this point in time.

  It has been determined that there is negligible risk of truck rollover on-site within the Marang Parklands car park and drop off areas due to flat grades throughout the parking area (no greater than 4%). It is assumed that the largest vehicle to access the car park will be a garbage truck, and a reduced speed limit will be in place for all vehicles. Further consideration during detailed design may be required to assess the need for additional protections such as safety barriers along the access road leading into the car park and drop off area.

- Majority of Captain Cook Drive's pavement condition is considered to be average or above, where more noticeable defects are limited to the Existing Breen Resource Facility access and on approach to the roundabout intersection at Trinity Street. It is expected that additional heavy vehicle movements associated with the Proposal would result in some deterioration in the pavement condition, however would not necessarily require additional treatment beyond the current maintenance procedures that are undertaken by Council.

  Pavement condition at the Existing Breen Resource Facility access on Captain Cook Drive could be improved at a time when the sport fields are constructed and formalise access is created in this location;

- The analysis of all transport related impacts has found that the traffic generated by the Proposal is expected to have a minimal impact to the surrounding road network in terms of traffic flow efficiency and road safety.

Breen SSD Application: New Resource Recovery Facility and Marang Parklands

APPENDIX A

SITE PLAN



LEGEND

- Project Boundary
- Landform contours
- Shared pathways
- Recycled scuptures/ Interpretative trail
- Kurnell Dune Forest
- Coastal Dune Heath
- Modified Kurnell Dune Heath (Low Heath)
- Informal native grass (Indicative Area)
- Managed native grass (Indicative Area)
- Trees
- Picnic shelters
- Picnic tables
- BBQ

KEY

1. Amphitheatre
2. Sculpture meadow/ Community sculptures
3. Villiage green
4. Drop off, turn around area & coach parking
5. Disabled parking
6. Pedestrian entry zone - formal
7. Location for future amenities building and pavillion
8. Panoramic lookout & giant slide
9. Rock stabilised embankment
10. Slide network
11. Sculptural lookout/ peak
12. General carparking
13. Open grassed informal picnic zones
14. Grassed viewing embankment
15. Playground
16. Vehicular access points - informal
17. Pedestrian access points
18. BBQ - picnic facilities
19. Future amenities block
20. Nature play/trail connection

CLOUSTON associates
LANDSCAPE ARCHITECTS • URBAN DESIGNERS • LANDSCAPE PLANNERS
65-69 KENT STREET • SYDNEY NSW 2000 • PO BOX R1388 • ROYAL EXCHANGE NSW 1225 • sydney@clouston.com.au • TELEPHONE +61 2 8272 4999 • FACSIMILE +61 2 8272 4998

Client: BREENRESOURCES

1:5000 @ A3

0 40 80 120 160 200m

PARKLANDS EMBELLISHMENT PLAN • Kurnell

S20-0039 Sk 14

LANDSCAPE MASTERPLAN - OVERALL

28/9/2020

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Lindrum Rd and Captain Cook Dr, Kurnell

Date:	Wed 09/05/18
Weather:	Fine
Suburban:	Kurnell
Customer:	Cardno

North:	N/A
East:	Captain Cook Dr
South:	Lindrum Rd
West:	Captain Cook Dr

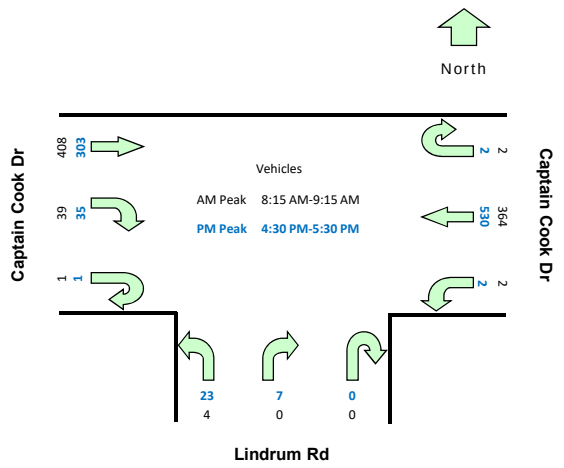
Survey Start			
AM:	7:00	PM:	16:00
Vehicular Peakhour Start			
AM:	8:15 AM-	PM:	4:30 PM-5:30 PM

All Vehicles

Time		East Approach Captain Cook			South Approach Lindrum Rd			West Approach Captain Cook			Hourly Total	
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	Hour	Peak
7:00	7:15	0	80	0	0	1	0	0	5	78	699	
7:15	7:30	0	81	0	0	0	0	0	8	84	726	
7:30	7:45	0	82	0	0	0	0	0	5	87	760	
7:45	8:00	0	86	0	0	0	0	0	4	98	798	
8:00	8:15	0	58	0	0	1	0	1	13	118	818	
8:15	8:30	0	89	0	0	0	1	0	11	106	820	Peak
8:30	8:45	2	109	0	0	0	2	0	8	91	779	
8:45	9:00	0	83	1	0	0	1	0	11	112	703	
9:00	9:15	0	83	1	0	0	0	1	9	99	631	
9:15	9:30	0	75	0	0	0	0	2	6	83		
9:30	9:45	0	65	0	0	1	0	0	10	60		
9:45	10:00	1	66	1	0	0	3	1	6	58		
16:00	16:15	0	125	2	0	0	2	0	4	86	872	
16:15	16:30	0	132	4	0	1	5	0	6	98	898	
16:30	16:45	0	112	1	0	4	4	0	5	63	903	Peak
16:45	17:00	1	115	0	0	1	5	0	10	86	903	Peak
17:00	17:15	0	150	1	0	1	11	0	17	65	895	
17:15	17:30	1	153	0	0	1	3	1	3	89	801	
17:30	17:45	0	85	1	0	0	7	0	7	89	693	
17:45	18:00	0	113	1	0	1	9	0	9	77	622	
18:00	18:15	0	92	2	0	0	4	1	7	45	528	
18:15	18:30	0	76	0	0	2	1	0	4	60		
18:30	18:45	0	61	0	0	2	1	0	4	50		
18:45	19:00	0	60	0	0	2	1	0	4	49		

Peak Time		East Approach Captain Cook			South Approach Lindrum Rd			West Approach Captain Cook			Peak
Period Start	Period End	U	WB	L	U	R	L	U	R	EB	total
8:15	9:15	2	364	2	0	0	4	1	39	408	820
16:30	17:30	2	530	2	0	7	23	1	35	303	903

Graphic



TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of Site Driveway and Captain Cook Dr, Kurnell

Date:	Wed 09/05/18
Weather:	Fine
Suburban:	Kurnell
Customer:	Cardno

North:	N/A
East:	Captain Cook Dr
South:	Site Driveway
West:	Captain Cook Dr

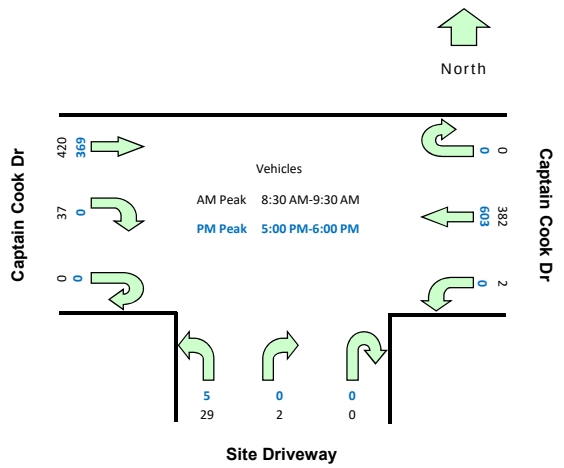
Survey Start			
AM:	7:00	PM:	16:00
Vehicular Peakhour Start			
AM:	8:30 AM-	PM:	5:00 PM-6:00 PM

All Vehicles

Time		East Approach Captain Cook			South Approach Site Driveway			West Approach Captain Cook			Hourly Total	
Period Start	**Period End**	**U**	**WB**	**L**	**U**	**R**	**L**	**U**	**R**	**EB**	**Hour**	**Peak**
7:00	7:15	0	76	0	0	0	5	0	5	77	688	
7:15	7:30	0	65	1	0	0	7	0	5	67	735	
7:30	7:45	0	69	0	0	1	6	0	3	89	788	
7:45	8:00	0	87	2	0	1	2	0	7	113	856	
8:00	8:15	0	86	1	0	2	3	0	6	112	861	
8:15	8:30	0	90	1	0	1	7	0	12	87	865	
8:30	8:45	0	107	1	0	0	6	0	15	107	872	Peak
8:45	9:00	0	87	1	0	1	5	0	6	117	815	
9:00	9:15	0	93	0	0	0	9	0	7	105	776	
9:15	9:30	0	95	0	0	1	9	0	9	91		
9:30	9:45	0	73	0	0	0	7	0	8	91		
9:45	10:00	0	70	2	0	1	10	0	7	88		
16:00	16:15	0	124	1	0	1	18	0	0	86	874	
16:15	16:30	0	140	0	0	1	9	0	0	105	909	
16:30	16:45	0	106	0	0	0	2	0	0	74	900	
16:45	17:00	0	102	0	0	0	0	0	0	105	966	
17:00	17:15	0	187	0	0	0	2	0	0	76	977	Peak
17:15	17:30	0	157	0	0	0	0	0	0	89	874	
17:30	17:45	0	133	0	0	0	1	0	0	114	791	
17:45	18:00	0	126	0	0	0	2	0	0	90	704	
18:00	18:15	0	98	0	0	0	0	0	0	64	603	
18:15	18:30	0	93	0	0	0	1	0	0	69		
18:30	18:45	0	85	0	0	0	0	0	0	76		
18:45	19:00	0	54	0	0	0	0	0	0	63		

Peak Time		East Approach Captain Cook			South Approach Site Driveway			West Approach Captain Cook			Peak
Period Start	**Period End**	U	WB	L	U	R	L	U	R	EB	**total**
8:30	9:30	0	382	2	0	2	29	0	37	420	872
17:00	18:00	0	603	0	0	0	5	0	0	369	977

Graphic



TRANS TRAFFIC SURVEY

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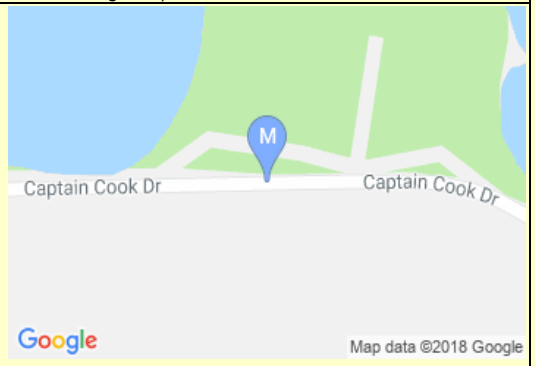
AUTOMATIC COUNT SUMMARY

Street Name :	Captain Cook Drive	**Location :**	1.0km west of Lindum Road, Kurnell
Suburb :	Kurnell	**Start Date :**	00:00 Wed 09/May/2018
Metrocount ID	U358YHJE/P	**Finish Date :**	00:00 Wed 16/May/2018
Site ID Number :	879	**Speed Zone :**	80 km/h
Prepared By :	Vo Son Binh	**Email:**	binh@trafficsurvey.com.au

GPS information		Lat 34° 1' 25.28 North Long 151° 10' 14.30 East	Direction of Travel		
			Combined	**Northbound**	**Southbound**
Traffic Volume :		Weekdays Average	10,843	5,390	5,453
(Vehicles/Day)		7 Day Average	9,782	4,870	4,912
Weekday	**AM**	08:00	826	463	363
Peak hour starts	**PM**	17:00	857	362	536
Speeds :		85th Percentile	82.8	81.7	83.9
(Km/Hr)		Average	75.0	74.2	75.8
Classification % :		Light Vehicles up to 5.5m	90.6%	90.8%	90.4%

Location

GPS Information	Load Google Map (internet required)
(Latitude, Longitude)	-34.023688,151.170639



Speed Data	Speed Graph	Speed Bin
Volume Data	Volume Graph	Classification

QUALITY SYSTEM CERTIFICATION DNV·GL ISO 9001
SAFETY SYSTEM CERTIFICATION DNV·GL AS/NZS 4801
ENVIRONMENTAL SYSTEM CERTIFICATION DNV·GL ISO 14001

QUALITY ASSURED COMPANY BY ISO 9001:2015
OH&S SYSTEM CERTIFIED TO ISO 4801:2001
ENVIRONMENT MANAGEMENT SYSTEM CERTIFIED TO ISO14001:2015

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Site Captain Cook Drive

Direction Combined

Back to Site Summary Page

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	7 days		Weekday		Weekend	
Date	14/05/2018	15/05/2018	9/05/2018	10/05/2018	11/05/2018	12/05/2018	13/05/2018	Total	Average	Total	Average	Total	Average
AM Peak	08:00	08:00	08:00	08:00	08:00	10:00	11:00	N/A	08:00	N/A	08:00	N/A	11:00
PM Peak	16:00	17:00	17:00	15:00	15:00	12:00	12:00	N/A	15:00	N/A	17:00	N/A	12:00
00:00	20	22	21	38	26	76	49	252	36	127	25	125	63
01:00	9	9	9	16	9	30	30	112	16	52	10	60	30
02:00	10	13	25	8	17	16	27	116	17	73	15	43	22
03:00	30	27	37	27	40	32	27	220	31	161	32	59	30
04:00	88	89	95	79	119	53	27	550	79	470	94	80	40
05:00	304	347	327	328	304	147	49	1806	258	1610	322	196	98
06:00	634	717	694	717	681	223	86	3752	536	3443	689	309	155
07:00	609	704	730	653	620	317	157	3790	541	3316	663	474	237
08:00	749	830	843	882	827	508	305	4944	706	4131	826	813	407
09:00	712	740	660	735	666	604	457	4574	653	3513	703	1061	531
10:00	618	661	698	718	674	745	508	4622	660	3369	674	1253	627
11:00	661	705	723	762	655	686	659	4851	693	3506	701	1345	673
12:00	613	756	698	739	755	726	615	4902	700	3561	712	1341	671
13:00	638	672	694	760	685	699	520	4668	667	3449	690	1219	610
14:00	656	778	744	761	763	669	559	4930	704	3702	740	1228	614
15:00	778	844	905	847	869	606	464	5313	759	4243	849	1070	535
16:00	852	862	881	824	793	581	385	5178	740	4212	842	966	483
17:00	815	916	928	833	794	444	349	5079	726	4286	857	793	397
18:00	475	540	585	526	456	308	239	3129	447	2582	516	547	274
19:00	244	365	332	348	328	203	194	2014	288	1617	323	397	199
20:00	191	246	199	259	233	167	145	1440	206	1128	226	312	156
21:00	121	136	146	206	254	159	113	1135	162	863	173	272	136
22:00	77	65	97	108	129	126	54	656	94	476	95	180	90
23:00	45	54	72	63	91	89	35	449	64	325	65	124	62
Total	**9949**	**11098**	**11143**	**11237**	**10788**	**8214**	**6053**	**68482**	**9783**	**54215**	**10842**	**14267**	**7140**
% Heavy	**9.55%**	**10.89%**	**10.99%**	**12.79%**	**11.02%**	**4.13%**	**1.39%**	**9.39%**		**11.09%**		**2.96%**	

Breen SSD Application: New Resource Recovery Facility and Marang Parklands

APPENDIX C

BASE SIDRA RESULTS

MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 103 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	1.0	1.002	64.2	LOS E	28.8	203.2	1.00	1.11	1.70	22.8
2	T1	238	1.1	1.002	58.5	LOS E	28.8	203.2	1.00	1.11	1.70	15.6
3	R2	20	1.0	0.109	36.4	LOS C	0.7	5.2	0.95	0.69	0.95	36.9
Approach		468	1.1	1.002	60.1	LOS E	28.8	203.2	1.00	1.09	1.67	19.8
East: Captain Cook Dr												
4	L2	23	4.5	1.048	124.8	LOS F	37.9	288.9	1.00	1.51	1.96	19.8
5	T1	737	10.6	1.048	120.4	LOS F	37.9	288.9	1.00	1.49	1.99	19.9
6	R2	229	0.0	0.857	62.3	LOS E	12.3	86.0	1.00	1.10	1.77	21.0
Approach		989	8.0	1.048	107.1	LOS F	37.9	288.9	1.00	1.40	1.94	20.1
North: Woolooware Rd												
7	L2	152	0.0	1.039	117.3	LOS F	32.3	225.9	1.00	1.43	1.93	13.7
8	T1	226	0.0	1.039	112.9	LOS F	32.3	225.9	1.00	1.43	1.93	13.8
9	R2	40	0.0	0.185	57.2	LOS E	1.0	7.1	0.98	0.70	0.98	22.4
Approach		418	0.0	1.039	109.2	LOS F	32.3	225.9	1.00	1.36	1.84	14.3
West: Captain Cook Dr												
10	L2	79	0.0	0.097	10.3	LOS A	0.7	5.0	0.31	0.64	0.31	43.8
11	T1	1241	2.2	0.882	21.4	LOS B	25.0	178.4	0.75	0.75	0.85	44.4
12	R2	496	0.2	0.828	27.3	LOS B	19.6	137.3	0.90	0.87	0.96	40.6
Approach		1816	1.6	0.882	22.5	LOS B	25.0	178.4	0.77	0.77	0.85	43.3
All Vehicles		3691	3.0	1.048	59.8	LOS E	37.9	288.9	0.89	1.05	1.36	27.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	38.5	LOS D	0.1	0.1	0.87	0.87
P2	East Full Crossing	53	45.8	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	25.2	LOS C	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	45.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	38.8	LOS D			0.86	0.86

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 103 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

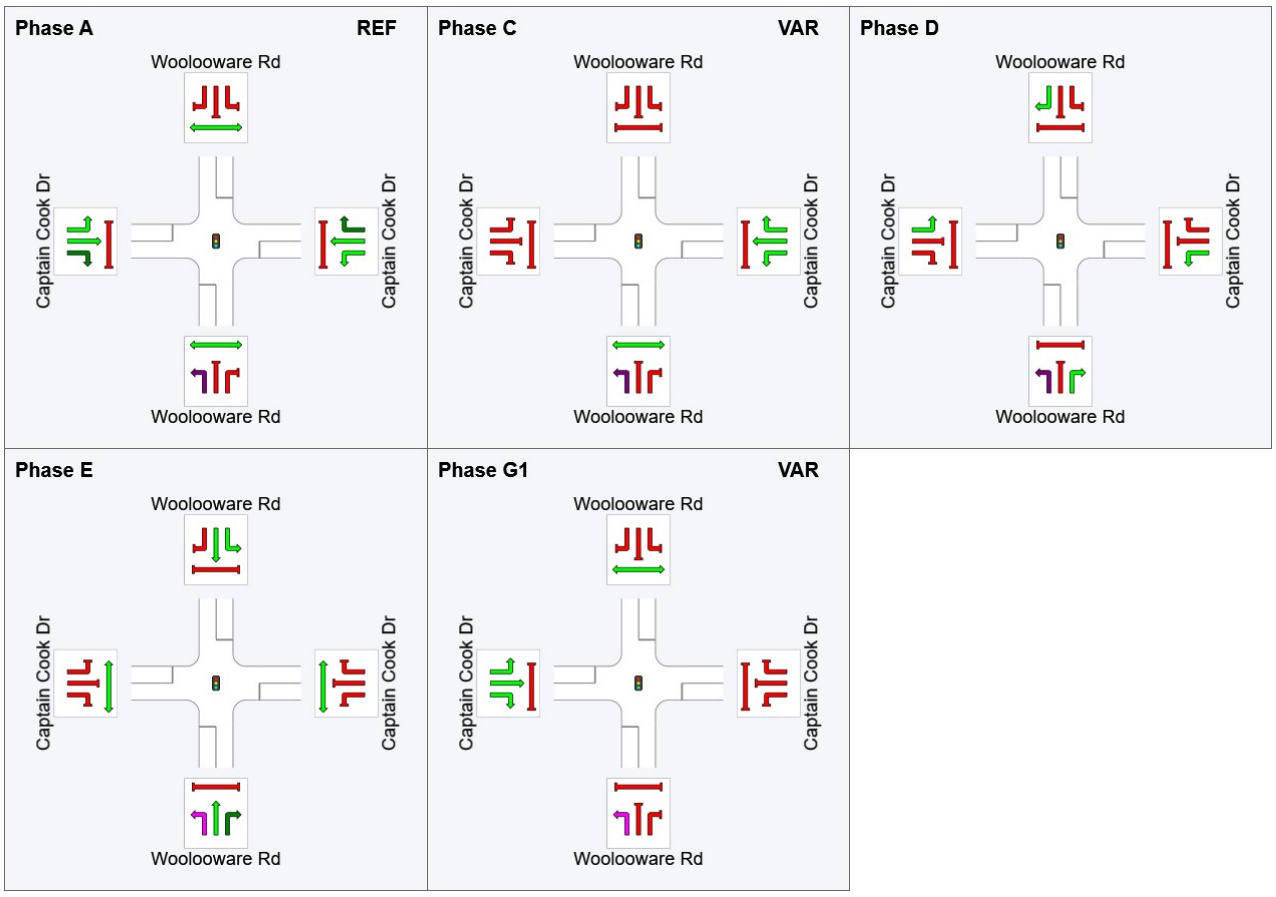
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	13	29	41	68
Green Time (sec)	7	10	6	21	29
Phase Time (sec)	13	16	12	27	35
Phase Split	13%	16%	12%	26%	34%

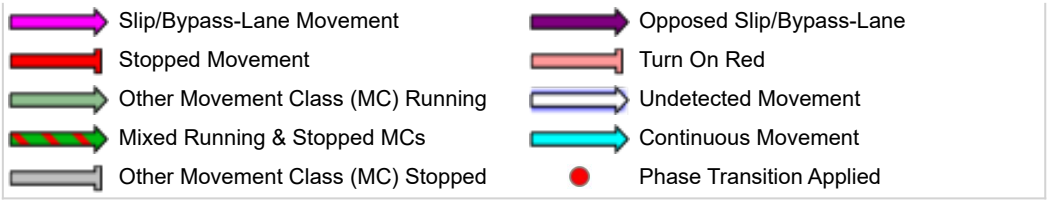
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 128 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	205	1.0	0.872	71.8	LOS F	20.2	142.9	1.00	1.13	1.77	27.9
2	T1	128	2.0	0.872	66.2	LOS E	20.2	142.9	1.00	1.13	1.77	20.1
3	R2	21	0.9	0.111	48.8	LOS D	1.1	7.6	0.93	0.70	0.93	32.8
Approach		354	1.4	0.872	68.4	LOS E	20.2	142.9	1.00	1.10	1.72	25.7
East: Captain Cook Dr												
4	L2	24	4.3	0.951	79.4	LOS F	43.4	326.6	1.00	1.16	1.34	26.7
5	T1	874	8.9	0.951	74.5	LOS F	43.4	326.6	0.96	1.13	1.35	27.0
6	R2	119	0.0	0.747	58.1	LOS E	7.8	54.4	0.95	0.93	1.15	21.9
Approach		1017	7.8	0.951	72.7	LOS F	43.4	326.6	0.96	1.11	1.33	26.5
North: Woolooware Rd												
7	L2	77	0.0	0.690	62.0	LOS E	11.7	82.2	1.00	0.85	1.04	21.8
8	T1	115	0.0	0.690	57.7	LOS E	11.7	82.2	1.00	0.85	1.04	22.2
9	R2	21	0.0	0.121	70.8	LOS F	0.7	4.7	0.99	0.67	0.99	19.5
Approach		213	0.0	0.690	60.6	LOS E	11.7	82.2	1.00	0.83	1.04	21.7
West: Captain Cook Dr												
10	L2	42	0.0	0.031	5.9	LOS A	0.1	0.4	0.02	0.58	0.02	48.3
11	T1	1153	0.8	0.453	0.7	LOS A	1.3	8.9	0.04	0.04	0.04	59.4
12	R2	515	0.2	0.846	35.8	LOS C	25.4	178.3	0.91	0.95	1.21	37.1
Approach		1710	0.6	0.846	11.4	LOS A	25.4	178.3	0.30	0.32	0.39	50.1
All Vehicles		3294	2.8	0.951	39.6	LOS C	43.4	326.6	0.63	0.68	0.86	35.2

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	36.8	LOS D	0.1	0.1	0.76	0.76
P2	East Full Crossing	53	58.3	LOS E	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	11.8	LOS B	0.1	0.1	0.43	0.43
P4	West Full Crossing	53	58.3	LOS E	0.2	0.2	0.96	0.96
All Pedestrians		211	41.3	LOS E			0.78	0.78

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 128 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

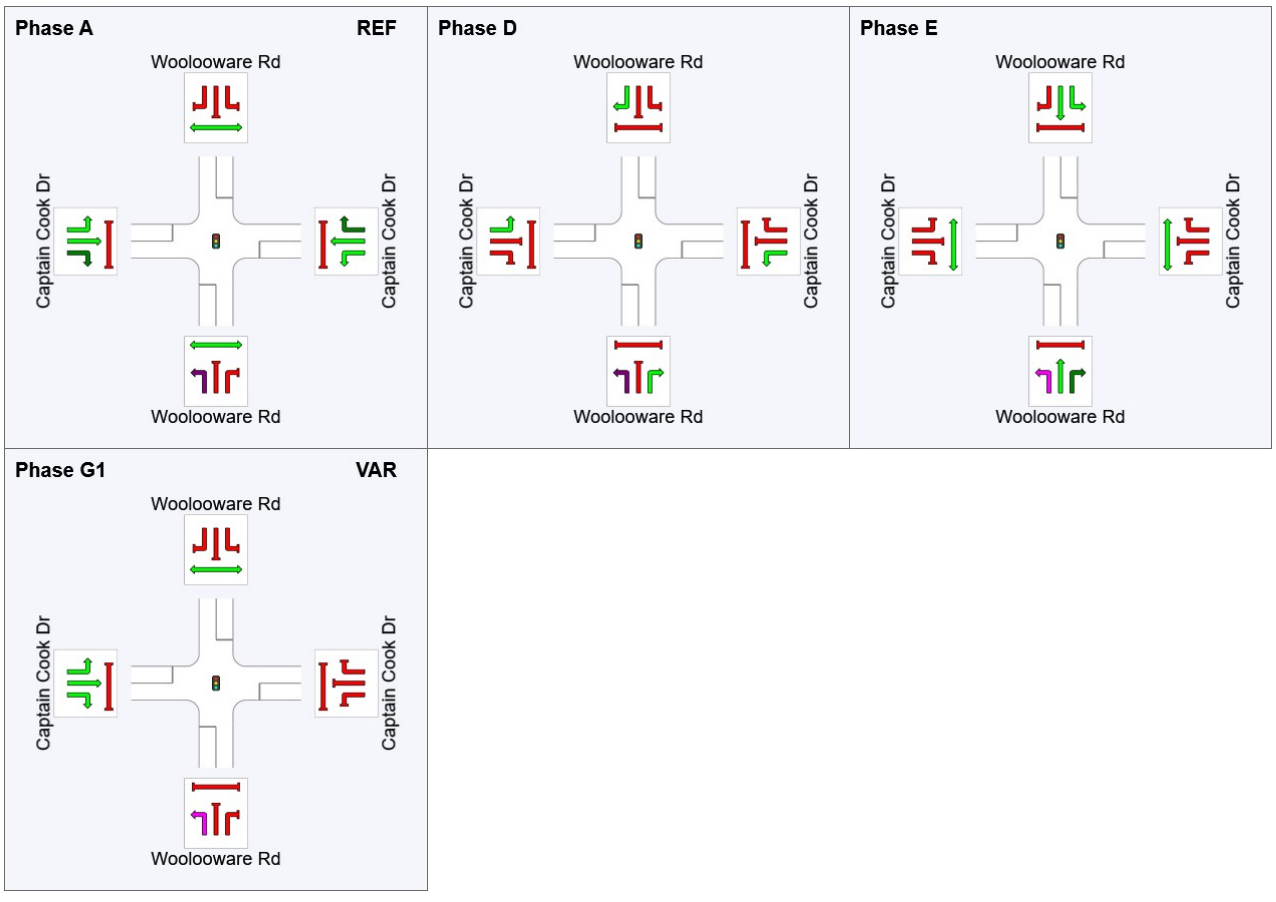
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	D	E	G1
Phase Change Time (sec)	0	46	58	84
Green Time (sec)	40	6	20	38
Phase Time (sec)	46	12	26	44
Phase Split	36%	9%	20%	34%

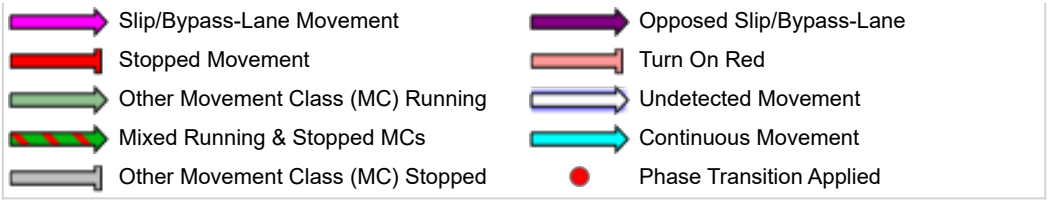
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 115 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	333	0.0	0.987	90.2	LOS F	45.1	315.9	1.00	1.28	1.87	24.6
2	T1	253	0.0	0.987	84.6	LOS F	45.1	315.9	1.00	1.28	1.87	17.1
3	R2	15	0.0	0.066	35.1	LOS C	0.6	3.9	0.89	0.68	0.89	37.5
Approach		600	0.0	0.987	86.5	LOS F	45.1	315.9	1.00	1.26	1.84	22.0
East: Captain Cook Dr												
4	L2	14	0.0	1.008	86.5	LOS F	31.0	226.5	1.00	1.23	1.67	22.3
5	T1	823	5.2	1.008	81.2	LOS F	31.0	226.5	1.00	1.23	1.68	22.5
6	R2	233	0.0	1.086	124.7	LOS F	21.0	147.2	1.00	1.19	2.14	10.4
Approach		1069	4.0	1.086	90.7	LOS F	31.0	226.5	1.00	1.22	1.78	19.4
North: Woolooware Rd												
7	L2	153	0.0	0.713	44.3	LOS D	19.4	135.7	0.96	0.84	0.96	26.7
8	T1	229	0.0	0.713	39.9	LOS C	19.4	135.7	0.96	0.84	0.96	27.3
9	R2	40	0.0	0.206	64.2	LOS E	1.1	8.0	0.99	0.70	0.99	20.8
Approach		422	0.0	0.713	43.8	LOS D	19.4	135.7	0.96	0.83	0.96	26.3
West: Captain Cook Dr												
10	L2	97	5.2	0.518	44.2	LOS D	4.5	32.6	0.99	0.77	0.99	25.5
11	T1	899	4.8	1.060	133.0	LOS F	46.0	335.2	1.00	1.51	1.92	18.6
12	R2	177	0.6	0.524	35.3	LOS C	7.1	49.8	0.94	0.80	0.94	37.3
Approach		1173	4.2	1.060	110.9	LOS F	46.0	335.2	0.99	1.34	1.70	20.5
All Vehicles		3264	2.8	1.086	91.1	LOS F	46.0	335.2	0.99	1.22	1.66	20.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	29.8	LOS C	0.1	0.1	0.88	0.88
P2	East Full Crossing	53	42.7	LOS E	0.1	0.1	0.86	0.86
P3	North Full Crossing	53	41.0	LOS E	0.1	0.1	0.85	0.85
P4	West Full Crossing	53	44.4	LOS E	0.2	0.2	0.88	0.88
All Pedestrians		211	39.5	LOS D			0.87	0.87

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 115 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

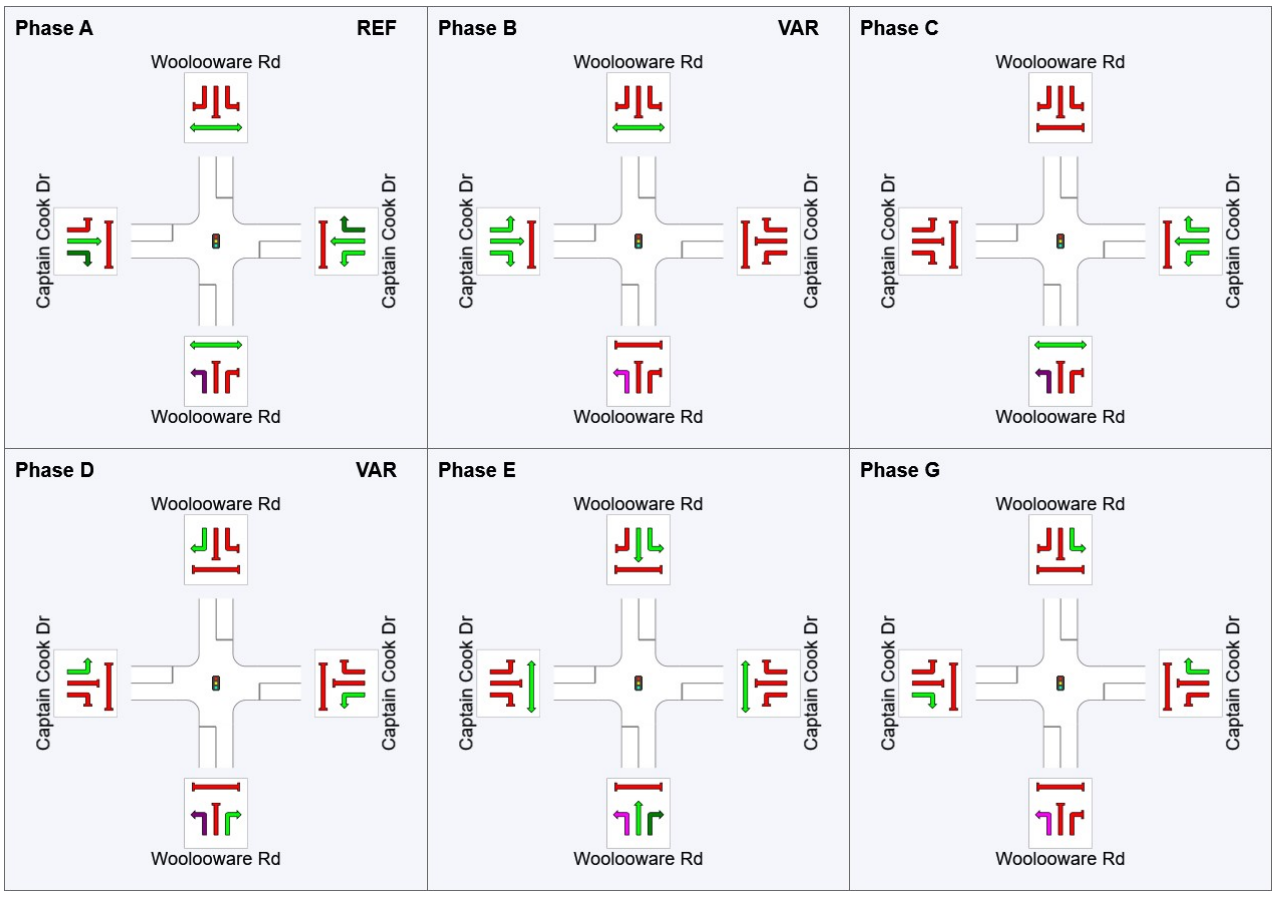
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C, D*, E, G
Output Phase Sequence: A, B*, C, D*, E, G
(* Variable Phase)

Phase Timing Summary

Phase	A	B	C	D	E	G
Phase Change Time (sec)	0	23	35	50	62	99
Green Time (sec)	17	6	9	6	31	10
Phase Time (sec)	23	12	15	12	37	16
Phase Split	20%	10%	13%	10%	32%	14%

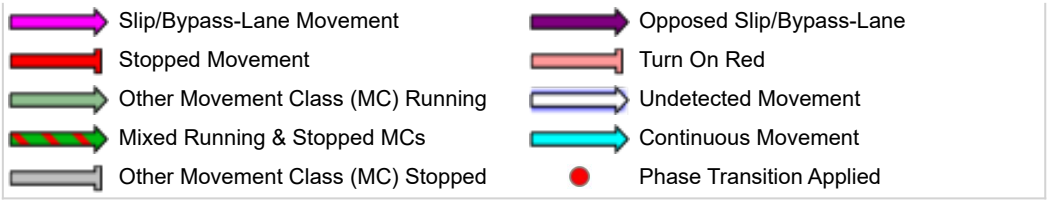
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.256	20.6	LOS B	6.7	49.2	0.62	0.71	0.62	44.5
2	T1	12	9.1	0.256	14.9	LOS B	6.7	49.2	0.62	0.71	0.62	38.0
3	R2	23	9.1	0.083	45.4	LOS D	1.1	8.3	0.86	0.69	0.86	33.7
Approach		244	5.6	0.256	22.7	LOS B	6.7	49.2	0.64	0.71	0.64	43.0
East: Captain Cook Dr												
4	L2	24	4.3	0.885	62.4	LOS E	28.1	223.0	1.00	1.05	1.22	30.5
5	T1	820	16.3	0.885	56.9	LOS E	28.1	223.0	1.00	1.05	1.23	31.0
6	R2	8	12.5	0.042	42.1	LOS C	0.4	3.0	0.81	0.68	0.81	26.2
Approach		853	15.9	0.885	56.9	LOS E	28.1	223.0	1.00	1.05	1.22	31.0
North: Woolooware Rd												
7	L2	2	50.0	0.022	52.5	LOS D	0.2	2.1	0.88	0.62	0.88	23.3
8	T1	2	50.0	0.022	48.2	LOS D	0.2	2.1	0.88	0.62	0.88	24.5
9	R2	2	50.0	0.015	65.5	LOS E	0.1	0.6	0.97	0.59	0.97	20.0
Approach		6	50.0	0.022	55.4	LOS D	0.2	2.1	0.91	0.61	0.91	22.4
West: Captain Cook Dr												
10	L2	4	0.0	0.004	6.2	LOS A	0.0	0.0	0.04	0.58	0.04	48.0
11	T1	1059	7.5	0.518	3.3	LOS A	4.8	36.0	0.17	0.15	0.17	56.9
12	R2	543	1.9	0.822	27.4	LOS B	23.0	163.4	0.85	0.88	0.99	40.6
Approach		1606	5.6	0.822	11.5	LOS A	23.0	163.4	0.40	0.40	0.45	50.1
All Vehicles		2709	8.9	0.885	26.9	LOS B	28.1	223.0	0.61	0.63	0.71	41.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	17.6	LOS B	0.1	0.1	0.54	0.54
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	41.2	LOS E			0.81	0.81

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

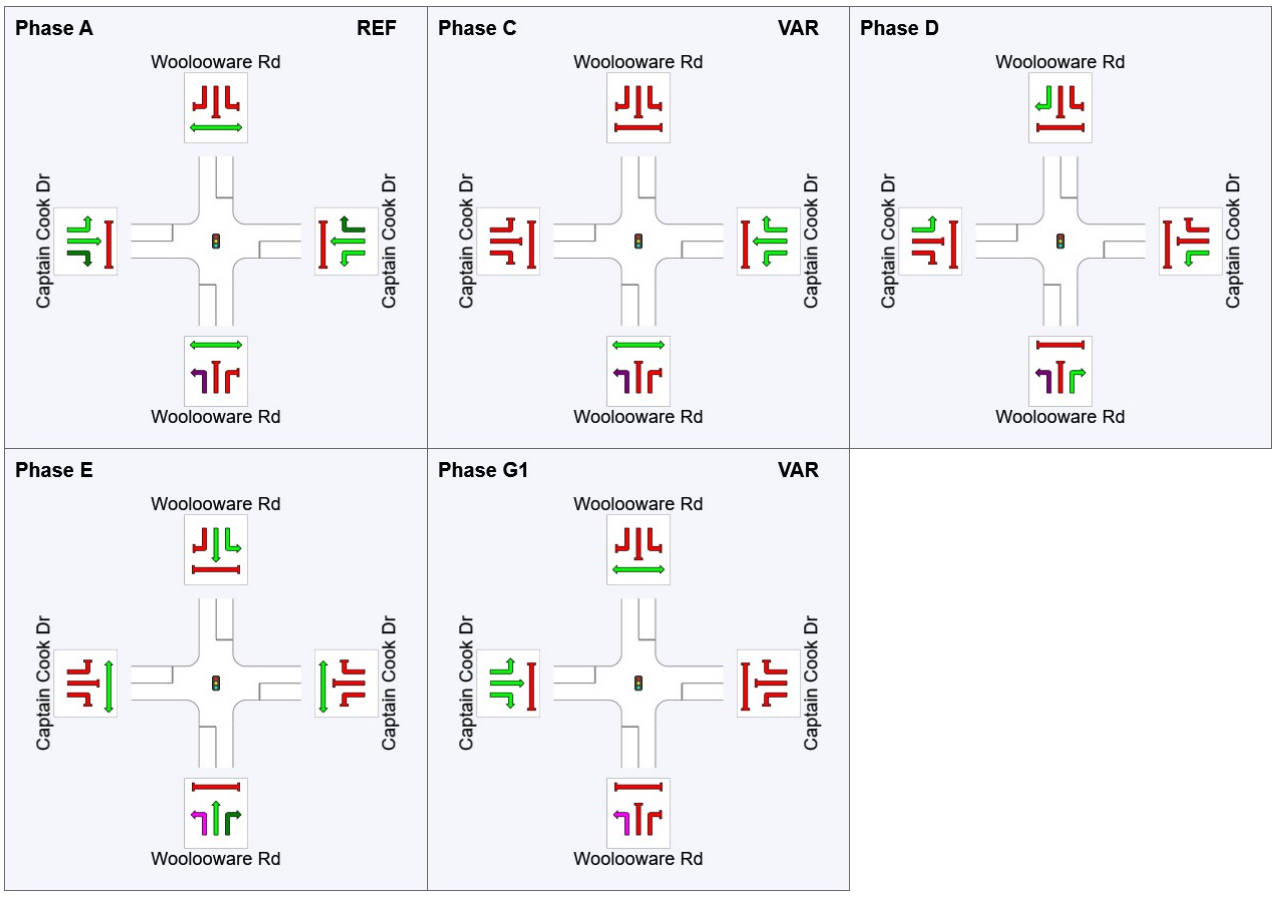
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	27	39	51	75
Green Time (sec)	21	6	6	18	39
Phase Time (sec)	27	12	12	24	45
Phase Split	23%	10%	10%	20%	38%

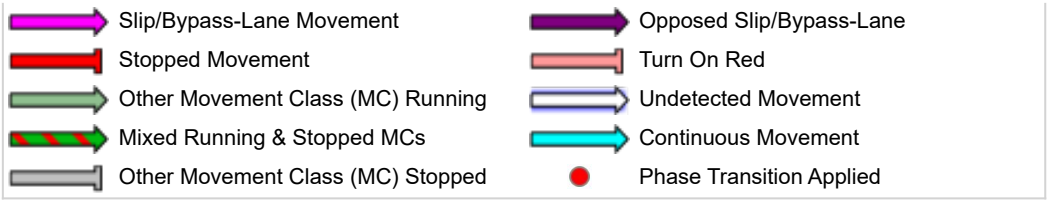
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.256	20.6	LOS B	6.7	49.2	0.62	0.71	0.62	44.5
2	T1	12	9.1	0.256	14.9	LOS B	6.7	49.2	0.62	0.71	0.62	38.0
3	R2	23	9.1	0.083	45.4	LOS D	1.1	8.3	0.86	0.69	0.86	33.7
Approach		244	5.6	0.256	22.7	LOS B	6.7	49.2	0.64	0.71	0.64	43.0
East: Captain Cook Dr												
4	L2	24	4.3	0.885	62.4	LOS E	28.1	223.0	1.00	1.05	1.22	30.5
5	T1	820	16.3	0.885	56.9	LOS E	28.1	223.0	1.00	1.05	1.23	31.0
6	R2	8	12.5	0.042	42.1	LOS C	0.4	3.0	0.81	0.68	0.81	26.2
Approach		853	15.9	0.885	56.9	LOS E	28.1	223.0	1.00	1.05	1.22	31.0
North: Woolooware Rd												
7	L2	2	50.0	0.022	52.5	LOS D	0.2	2.1	0.88	0.62	0.88	23.3
8	T1	2	50.0	0.022	48.2	LOS D	0.2	2.1	0.88	0.62	0.88	24.5
9	R2	2	50.0	0.015	65.5	LOS E	0.1	0.6	0.97	0.59	0.97	20.0
Approach		6	50.0	0.022	55.4	LOS D	0.2	2.1	0.91	0.61	0.91	22.4
West: Captain Cook Dr												
10	L2	4	0.0	0.004	6.2	LOS A	0.0	0.0	0.04	0.58	0.04	48.0
11	T1	1059	7.5	0.518	3.3	LOS A	4.8	36.0	0.17	0.15	0.17	56.9
12	R2	543	1.9	0.822	27.4	LOS B	23.0	163.4	0.85	0.88	0.99	40.6
Approach		1606	5.6	0.822	11.5	LOS A	23.0	163.4	0.40	0.40	0.45	50.1
All Vehicles		2709	8.9	0.885	26.9	LOS B	28.1	223.0	0.61	0.63	0.71	41.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	38.5	LOS D	0.1	0.1	0.80	0.80
P2	East Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	17.6	LOS B	0.1	0.1	0.54	0.54
P4	West Full Crossing	53	54.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	41.2	LOS E			0.81	0.81

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

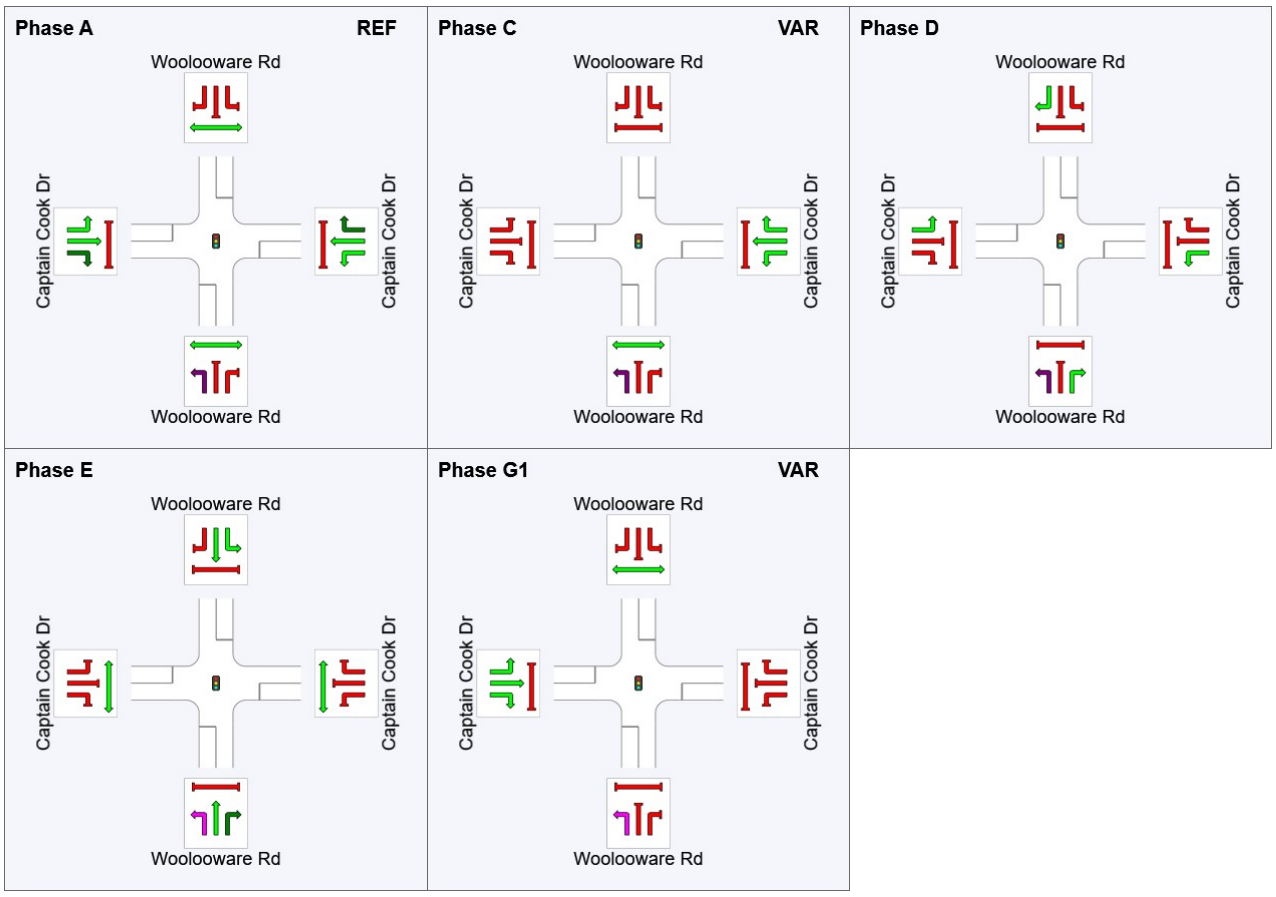
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	27	39	51	75
Green Time (sec)	21	6	6	18	39
Phase Time (sec)	27	12	12	24	45
Phase Split	23%	10%	10%	20%	38%

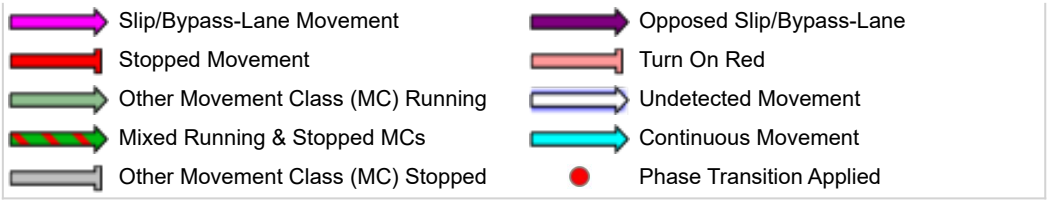
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	338	1.6	0.329	12.0	LOS A	6.1	42.9	0.53	0.71	0.53	49.7
2	T1	11	0.0	0.329	6.4	LOS A	6.1	42.9	0.53	0.71	0.53	44.9
3	R2	15	0.0	0.041	37.4	LOS C	0.6	4.1	0.81	0.67	0.81	36.6
Approach		363	1.4	0.329	12.9	LOS A	6.1	42.9	0.54	0.71	0.54	48.9
East: Captain Cook Dr												
4	L2	14	0.0	0.779	32.9	LOS C	15.4	111.3	0.98	0.88	1.06	40.6
5	T1	776	3.8	0.779	27.6	LOS B	15.5	112.3	0.98	0.89	1.06	41.3
6	R2	5	0.0	0.025	39.8	LOS C	0.2	1.5	0.93	0.62	0.93	27.1
Approach		795	3.7	0.779	27.8	LOS B	15.5	112.3	0.98	0.88	1.06	41.2
North: Woolooware Rd												
7	L2	2	50.0	0.016	41.6	LOS C	0.2	1.8	0.83	0.60	0.83	26.5
8	T1	2	50.0	0.016	37.3	LOS C	0.2	1.8	0.83	0.60	0.83	28.1
9	R2	2	50.0	0.013	57.1	LOS E	0.1	0.5	0.96	0.59	0.96	21.8
Approach		6	50.0	0.016	45.3	LOS D	0.2	1.8	0.88	0.60	0.88	25.2
West: Captain Cook Dr												
10	L2	25	20.1	0.135	37.9	LOS C	1.0	8.0	0.93	0.70	0.93	27.6
11	T1	751	3.8	0.666	34.2	LOS C	17.4	125.5	0.92	0.80	0.92	38.4
12	R2	180	2.9	0.417	26.3	LOS B	5.6	40.3	0.85	0.78	0.85	41.0
Approach		956	4.1	0.666	32.8	LOS C	17.4	125.5	0.91	0.79	0.91	38.7
All Vehicles		2120	3.6	0.779	27.6	LOS B	17.4	125.5	0.87	0.81	0.90	41.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	24.0	LOS C	0.1	0.1	0.84	0.84
P2	East Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94
P3	North Full Crossing	53	33.7	LOS D	0.1	0.1	0.80	0.80
P4	West Full Crossing	53	46.8	LOS E	0.1	0.1	0.94	0.94
All Pedestrians		211	37.8	LOS D			0.88	0.88

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2018 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 105 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

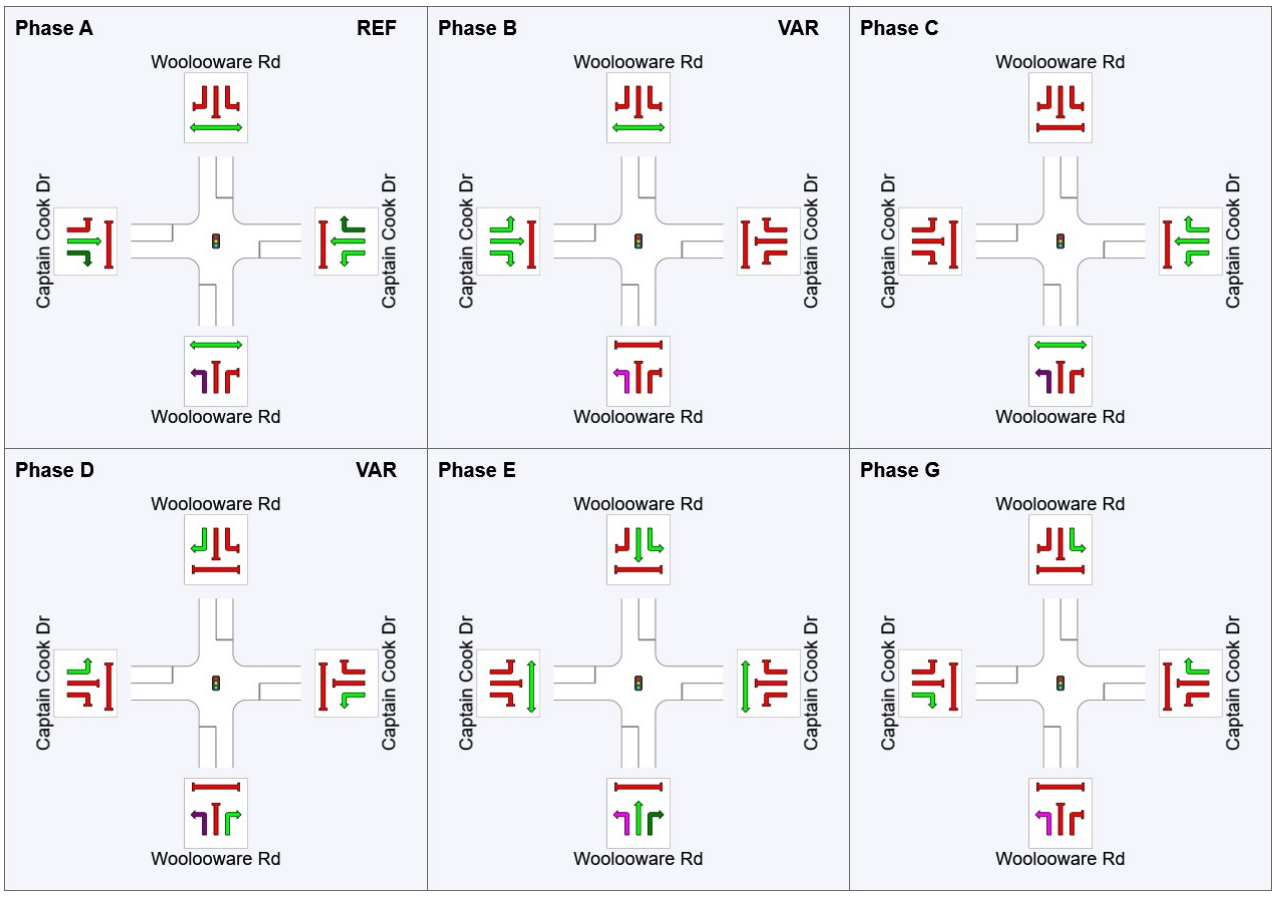
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C, D*, E, G
Output Phase Sequence: A, B*, C, D*, E, G
(* Variable Phase)

Phase Timing Summary

Phase	A	B	C	D	E	G
Phase Change Time (sec)	0	26	38	52	64	87
Green Time (sec)	20	6	8	6	17	12
Phase Time (sec)	26	12	14	12	23	18
Phase Split	25%	11%	13%	11%	22%	17%

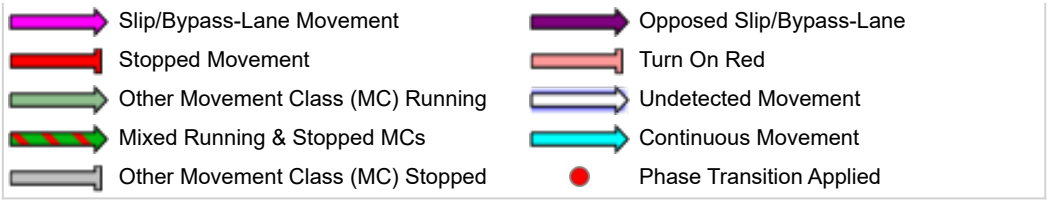
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2018 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	500	5.3	0.427	5.4	LOS A	3.6	26.5	0.50	0.69	0.50	53.3
3	R2	126	10.8	0.427	13.4	LOS A	3.6	26.5	0.50	0.69	0.50	54.3
3u	U	1	0.0	0.427	15.1	LOS B	3.6	26.5	0.50	0.69	0.50	55.9
Approach		627	6.4	0.427	7.0	LOS A	3.6	26.5	0.50	0.69	0.50	53.5
East: Captain Cook Dr (E)												
4	L2	175	9.6	0.189	6.4	LOS A	1.1	8.1	0.55	0.63	0.55	53.4
5	T1	441	24.3	0.384	6.2	LOS A	2.6	22.4	0.61	0.60	0.61	53.6
Approach		616	20.2	0.384	6.2	LOS A	2.6	22.4	0.59	0.61	0.59	53.6
West: Captain Cook Dr (W)												
11	T1	429	18.4	0.301	4.8	LOS A	2.0	16.5	0.36	0.44	0.36	55.1
12	R2	358	4.4	0.278	9.6	LOS A	1.8	13.1	0.37	0.62	0.37	52.2
12u	U	3	0.0	0.278	11.7	LOS A	1.8	13.1	0.37	0.62	0.37	53.2
Approach		791	12.0	0.301	7.0	LOS A	2.0	16.5	0.36	0.52	0.36	53.7
All Vehicles		2034	12.7	0.427	6.8	LOS A	3.6	26.5	0.47	0.60	0.47	53.6

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2018 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	282	1.5	0.329	5.8	LOS A	3.2	22.6	0.64	0.74	0.64	52.6
3	R2	151	2.8	0.329	12.3	LOS A	3.2	22.6	0.64	0.74	0.64	53.7
3u	U	1	0.0	0.329	14.3	LOS A	3.2	22.6	0.64	0.74	0.64	55.0
Approach		434	1.9	0.329	8.0	LOS A	3.2	22.6	0.64	0.74	0.64	53.0
East: RoadName												
4	L2	232	4.5	0.300	8.4	LOS A	2.0	14.3	0.75	0.79	0.75	52.1
5	T1	483	1.5	0.456	7.6	LOS A	3.7	26.1	0.82	0.75	0.82	53.2
Approach		715	2.5	0.456	7.8	LOS A	3.7	26.1	0.80	0.77	0.80	52.8
West: Captain Cook Dr												
11	T1	408	2.6	0.329	5.0	LOS A	2.3	16.5	0.43	0.48	0.43	55.1
12	R2	645	1.0	0.421	9.6	LOS A	3.4	23.9	0.44	0.62	0.44	52.1
12u	U	1	0.0	0.421	11.7	LOS A	3.4	23.9	0.44	0.62	0.44	52.9
Approach		1055	1.6	0.421	7.8	LOS A	3.4	23.9	0.43	0.56	0.43	53.2
All Vehicles		2203	2.0	0.456	7.9	LOS A	3.7	26.1	0.59	0.66	0.59	53.0

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2016 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	437	1.2	0.365	4.6	LOS A	2.7	18.9	0.42	0.63	0.42	54.0
3	R2	131	4.0	0.365	11.6	LOS A	2.7	18.9	0.42	0.63	0.42	55.1
3u	U	1	0.0	0.365	13.7	LOS A	2.7	18.9	0.42	0.63	0.42	56.5
Approach		568	1.9	0.365	6.2	LOS A	2.7	18.9	0.42	0.63	0.42	54.3
East: RoadName												
4	L2	159	18.5	0.184	6.8	LOS A	1.0	8.3	0.57	0.65	0.57	53.0
5	T1	367	2.9	0.289	5.7	LOS A	1.9	13.8	0.58	0.57	0.58	54.2
Approach		526	7.6	0.289	6.1	LOS A	1.9	13.8	0.58	0.60	0.58	53.9
West: Captain Cook Dr												
11	T1	409	6.9	0.270	4.6	LOS A	1.8	13.0	0.34	0.44	0.34	55.5
12	R2	398	2.6	0.300	9.6	LOS A	2.0	14.1	0.36	0.62	0.36	52.2
12u	U	3	0.0	0.300	11.7	LOS A	2.0	14.1	0.36	0.62	0.36	53.2
Approach		811	4.8	0.300	7.1	LOS A	2.0	14.1	0.35	0.53	0.35	53.8
All Vehicles		1905	4.7	0.365	6.6	LOS A	2.7	18.9	0.44	0.58	0.44	54.0

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

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2018 Base PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Existing Site Access 1												
1	L2	5	0.0	0.004	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.005	20.3	LOS B	0.0	0.1	0.80	0.81	0.80	43.9
Approach		6	0.0	0.005	8.1	LOS A	0.0	0.1	0.13	0.59	0.13	52.3
East: Captain Cook Dr (E)												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	635	1.8	0.329	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		636	1.8	0.329	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: Captain Cook Dr (W)												
11	T1	388	2.7	0.203	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.002	9.0	LOS A	0.0	0.0	0.55	0.61	0.55	51.0
Approach		389	2.7	0.203	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1032	2.1	0.329	0.1	NA	0.0	0.1	0.00	0.00	0.00	59.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2018 Base SAT]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Existing Site Access 1												
1	L2	17	0.0	0.013	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.003	15.0	LOS B	0.0	0.1	0.72	0.73	0.72	46.9
Approach		18	0.0	0.013	6.2	LOS A	0.0	0.1	0.04	0.56	0.04	53.8
East: Captain Cook Dr (E)												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	409	7.2	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		411	7.2	0.220	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: Captain Cook Dr (W)												
11	T1	409	6.9	0.221	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	18	94.1	0.036	11.4	LOS A	0.1	1.7	0.54	0.71	0.54	46.8
Approach		427	10.6	0.221	0.5	NA	0.1	1.7	0.02	0.03	0.02	59.3
All Vehicles		856	8.7	0.221	0.4	NA	0.1	1.7	0.01	0.03	0.01	59.4

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2018 Base AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Existing Site Access 1												
1	L2	22	95.2	0.024	6.6	LOS A	0.0	0.0	0.00	0.52	0.00	50.8
3	R2	2	50.0	0.015	30.2	LOS C	0.0	0.5	0.84	0.93	0.84	38.3
Approach		24	91.3	0.024	8.7	LOS A	0.0	0.5	0.07	0.55	0.07	49.4
East: Captain Cook Dr (E)												
4	L2	3	66.7	0.003	6.3	LOS A	0.0	0.0	0.00	0.57	0.00	50.9
5	T1	402	23.0	0.237	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		405	23.4	0.237	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: Captain Cook Dr (W)												
11	T1	442	20.2	0.258	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	33	77.4	0.063	11.1	LOS A	0.2	2.7	0.55	0.74	0.55	47.4
Approach		475	24.2	0.258	0.8	NA	0.2	2.7	0.04	0.05	0.04	58.9
All Vehicles		904	25.6	0.258	0.7	NA	0.2	2.7	0.02	0.04	0.02	59.0

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2018 Base SAT]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.04	0.57	0.04	53.3
Approach		2	0.0	0.001	5.6	LOS A	0.0	0.0	0.02	0.56	0.02	53.8
East: Captain Cook Dr (E)												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	2	50.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		3	33.3	0.001	1.8	NA	0.0	0.0	0.00	0.19	0.00	57.7
West: Captain Cook Dr (W)												
11	T1	2	50.0	0.001	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.03	0.56	0.03	53.5
Approach		3	33.3	0.001	1.9	NA	0.0	0.0	0.01	0.19	0.01	57.7
All Vehicles		8	25.0	0.001	2.8	NA	0.0	0.0	0.01	0.28	0.01	56.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2018 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	3	0.0	0.005	6.4	LOS A	0.0	0.2	0.49	0.56	0.49	52.3
3	R2	1	0.0	0.005	10.0	LOS A	0.0	0.2	0.49	0.56	0.49	52.9
Approach		4	0.0	0.005	7.3	LOS A	0.0	0.2	0.49	0.56	0.49	52.5
East: Captain Cook Dr (E)												
4	L2	3	33.3	0.291	5.1	LOS A	1.7	13.9	0.20	0.46	0.20	52.4
5	T1	368	18.6	0.291	5.0	LOS A	1.7	13.9	0.20	0.46	0.20	54.0
Approach		372	18.7	0.291	5.0	LOS A	1.7	13.9	0.20	0.46	0.20	54.0
West: Captain Cook Dr (W)												
11	T1	405	6.2	0.276	4.6	LOS A	1.9	14.8	0.02	0.48	0.02	55.1
12	R2	36	79.4	0.276	9.0	LOS A	1.9	14.8	0.02	0.48	0.02	51.5
Approach		441	12.2	0.276	4.9	LOS A	1.9	14.8	0.02	0.48	0.02	54.8
All Vehicles		817	15.1	0.291	5.0	LOS A	1.9	14.8	0.11	0.47	0.11	54.4

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2018 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	32	0.0	0.042	7.3	LOS A	0.2	1.5	0.57	0.65	0.57	52.0
3	R2	3	0.0	0.042	11.0	LOS A	0.2	1.5	0.57	0.65	0.57	52.6
Approach		35	0.0	0.042	7.7	LOS A	0.2	1.5	0.57	0.65	0.57	52.0
East: Captain Cook Dr (E)												
4	L2	4	0.0	0.368	4.6	LOS A	2.4	17.1	0.18	0.45	0.18	53.7
5	T1	527	2.6	0.368	4.8	LOS A	2.4	17.1	0.18	0.45	0.18	54.6
Approach		532	2.6	0.368	4.8	LOS A	2.4	17.1	0.18	0.45	0.18	54.6
West: Captain Cook Dr (W)												
11	T1	335	2.5	0.227	4.6	LOS A	1.5	11.0	0.04	0.48	0.04	54.9
12	R2	38	5.6	0.227	8.1	LOS A	1.5	11.0	0.04	0.48	0.04	54.5
Approach		373	2.8	0.227	4.9	LOS A	1.5	11.0	0.04	0.48	0.04	54.9
All Vehicles		939	2.6	0.368	4.9	LOS A	2.4	17.1	0.14	0.47	0.14	54.6

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2018 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	21	0.0	0.035	6.6	LOS A	0.2	1.2	0.51	0.63	0.51	51.9
3	R2	11	0.0	0.035	10.3	LOS A	0.2	1.2	0.51	0.63	0.51	52.5
Approach		32	0.0	0.035	7.8	LOS A	0.2	1.2	0.51	0.63	0.51	52.1
East: Captain Cook Dr (E)												
4	L2	11	0.0	0.286	4.5	LOS A	1.7	12.7	0.12	0.45	0.12	54.0
5	T1	411	7.2	0.286	4.7	LOS A	1.7	12.7	0.12	0.45	0.12	54.7
Approach		421	7.0	0.286	4.7	LOS A	1.7	12.7	0.12	0.45	0.12	54.7
West: Captain Cook Dr (W)												
11	T1	374	7.6	0.257	4.6	LOS A	1.7	12.9	0.09	0.46	0.09	54.7
12	R2	21	0.0	0.257	8.1	LOS A	1.7	12.9	0.09	0.46	0.09	54.6
Approach		395	7.2	0.257	4.8	LOS A	1.7	12.9	0.09	0.46	0.09	54.7
All Vehicles		847	6.8	0.286	4.9	LOS A	1.7	12.9	0.12	0.46	0.12	54.6

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2021 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	516	5.3	0.439	5.6	LOS A	3.9	28.6	0.51	0.70	0.52	53.2
3	R2	127	10.7	0.439	13.7	LOS A	3.9	28.6	0.51	0.70	0.52	54.1
3u	U	1	0.0	0.439	15.3	LOS B	3.9	28.6	0.51	0.70	0.52	55.8
Approach		644	6.4	0.439	7.2	LOS A	3.9	28.6	0.51	0.70	0.52	53.4
East: Captain Cook Dr (E)												
4	L2	172	9.8	0.189	6.5	LOS A	1.1	8.1	0.56	0.64	0.56	53.3
5	T1	455	24.3	0.399	6.3	LOS A	2.8	23.6	0.62	0.61	0.62	53.6
Approach		626	20.3	0.399	6.3	LOS A	2.8	23.6	0.61	0.62	0.61	53.5
West: Captain Cook Dr (W)												
11	T1	444	18.2	0.312	4.8	LOS A	2.1	17.3	0.37	0.45	0.37	55.1
12	R2	368	4.3	0.287	9.7	LOS A	1.9	13.7	0.37	0.62	0.37	52.2
12u	U	3	0.0	0.287	11.7	LOS A	1.9	13.7	0.37	0.62	0.37	53.1
Approach		816	11.9	0.312	7.0	LOS A	2.1	17.3	0.37	0.52	0.37	53.7
All Vehicles		2086	12.7	0.439	6.9	LOS A	3.9	28.6	0.48	0.61	0.49	53.5

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2021 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	291	1.4	0.417	7.0	LOS A	4.7	33.6	0.80	0.84	0.81	51.5
3	R2	196	2.2	0.417	13.3	LOS A	4.7	33.6	0.80	0.84	0.81	52.6
3u	U	1	0.0	0.417	15.4	LOS B	4.7	33.6	0.80	0.84	0.81	53.8
Approach		487	1.7	0.417	9.6	LOS A	4.7	33.6	0.80	0.84	0.81	52.0
East: RoadName												
4	L2	279	3.8	0.375	8.8	LOS A	2.6	18.8	0.81	0.83	0.81	51.8
5	T1	575	1.3	0.564	9.3	LOS A	5.8	40.9	0.90	0.89	1.03	52.8
Approach		854	2.1	0.564	9.1	LOS A	5.8	40.9	0.87	0.87	0.96	52.5
West: Captain Cook Dr												
11	T1	489	2.2	0.408	5.3	LOS A	3.2	22.5	0.53	0.52	0.53	54.6
12	R2	664	1.0	0.456	9.9	LOS A	3.9	27.5	0.53	0.64	0.53	51.8
12u	U	3	0.0	0.456	11.9	LOS A	3.9	27.5	0.53	0.64	0.53	52.6
Approach		1157	1.5	0.456	7.9	LOS A	3.9	27.5	0.53	0.59	0.53	52.9
All Vehicles		2498	1.7	0.564	8.7	LOS A	5.8	40.9	0.70	0.73	0.73	52.6

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2021 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	458	1.1	0.516	7.6	LOS A	6.7	47.2	0.77	0.86	0.85	51.3
3	R2	219	1.9	0.516	14.7	LOS B	6.7	47.2	0.77	0.86	0.85	52.3
3u	U	1	0.0	0.516	16.8	LOS B	6.7	47.2	0.77	0.86	0.85	53.5
Approach		678	1.4	0.516	9.9	LOS A	6.7	47.2	0.77	0.86	0.85	51.6
East: RoadName												
4	L2	221	1.0	0.233	6.3	LOS A	1.4	10.0	0.59	0.65	0.59	53.5
5	T1	551	5.4	0.443	6.0	LOS A	3.4	25.0	0.66	0.60	0.66	53.8
Approach		772	4.1	0.443	6.1	LOS A	3.4	25.0	0.64	0.61	0.64	53.7
West: Captain Cook Dr												
11	T1	576	4.9	0.410	5.1	LOS A	3.3	23.9	0.53	0.50	0.53	54.6
12	R2	388	0.3	0.333	10.1	LOS A	2.4	16.6	0.52	0.66	0.52	51.8
12u	U	3	0.0	0.333	12.2	LOS A	2.4	16.6	0.52	0.66	0.52	52.7
Approach		967	3.0	0.410	7.2	LOS A	3.3	23.9	0.52	0.57	0.52	53.4
All Vehicles		2417	2.9	0.516	7.6	LOS A	6.7	47.2	0.63	0.66	0.65	53.0

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2031 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	569	5.4	0.480	6.2	LOS A	5.0	36.6	0.55	0.75	0.59	52.7
3	R2	128	10.7	0.480	14.8	LOS B	5.0	36.6	0.55	0.75	0.59	53.6
3u	U	1	0.0	0.480	16.5	LOS B	5.0	36.6	0.55	0.75	0.59	55.2
Approach		699	6.3	0.480	7.8	LOS A	5.0	36.6	0.55	0.75	0.59	52.9
East: RoadName												
4	L2	172	9.8	0.199	6.8	LOS A	1.1	8.6	0.59	0.67	0.59	53.2
5	T1	502	24.3	0.455	6.6	LOS A	3.3	28.3	0.68	0.65	0.68	53.3
Approach		674	20.6	0.455	6.7	LOS A	3.3	28.3	0.66	0.65	0.66	53.3
West: Captain Cook Dr												
11	T1	489	18.1	0.343	4.8	LOS A	2.5	19.9	0.39	0.45	0.39	55.0
12	R2	408	4.6	0.318	9.7	LOS A	2.2	15.9	0.39	0.62	0.39	52.1
12u	U	3	0.0	0.318	11.7	LOS A	2.2	15.9	0.39	0.62	0.39	53.1
Approach		901	11.9	0.343	7.1	LOS A	2.5	19.9	0.39	0.53	0.39	53.6
All Vehicles		2274	12.8	0.480	7.2	LOS A	5.0	36.6	0.52	0.63	0.53	53.3

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2031 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	399	1.3	0.491	8.0	LOS A	6.9	49.0	0.85	0.90	0.92	51.0
3	R2	196	2.2	0.491	14.8	LOS B	6.9	49.0	0.85	0.90	0.92	52.1
3u	U	1	0.0	0.491	16.9	LOS B	6.9	49.0	0.85	0.90	0.92	53.3
Approach		596	1.6	0.491	10.2	LOS A	6.9	49.0	0.85	0.90	0.92	51.4
East: RoadName												
4	L2	279	3.8	0.564	17.8	LOS B	5.4	38.9	1.00	1.12	1.31	45.9
5	T1	606	1.4	0.871	36.5	LOS C	19.5	138.1	1.00	1.54	2.36	38.1
Approach		885	2.1	0.871	30.6	LOS C	19.5	138.1	1.00	1.41	2.03	40.3
West: Captain Cook Dr												
11	T1	653	1.8	0.547	5.5	LOS A	5.0	35.3	0.62	0.54	0.62	54.2
12	R2	962	0.8	0.656	10.2	LOS A	7.2	50.9	0.67	0.65	0.67	51.3
12u	U	3	0.0	0.656	12.3	LOS A	7.2	50.9	0.67	0.65	0.67	52.2
Approach		1618	1.2	0.656	8.3	LOS A	7.2	50.9	0.65	0.60	0.65	52.4
All Vehicles		3099	1.5	0.871	15.1	LOS B	19.5	138.1	0.79	0.89	1.10	48.1

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2031 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	660	0.8	0.693	12.4	LOS A	17.1	120.8	1.00	1.10	1.28	48.2
3	R2	219	1.9	0.693	20.8	LOS B	17.1	120.8	1.00	1.10	1.28	49.1
3u	U	1	0.0	0.693	22.8	LOS B	17.1	120.8	1.00	1.10	1.28	50.2
Approach		880	1.1	0.693	14.5	LOS A	17.1	120.8	1.00	1.10	1.28	48.4
East: RoadName												
4	L2	228	4.6	0.297	7.8	LOS A	1.9	14.0	0.73	0.77	0.73	52.5
5	T1	686	7.7	0.645	9.5	LOS A	7.4	55.4	0.90	0.90	1.08	52.6
Approach		915	6.9	0.645	9.1	LOS A	7.4	55.4	0.86	0.87	0.99	52.6
West: Captain Cook Dr												
11	T1	697	7.6	0.509	5.3	LOS A	4.7	35.2	0.61	0.52	0.61	54.1
12	R2	548	1.3	0.469	10.3	LOS A	4.0	28.2	0.61	0.67	0.61	51.5
12u	U	3	0.0	0.469	12.4	LOS A	4.0	28.2	0.61	0.67	0.61	52.4
Approach		1248	4.8	0.509	7.5	LOS A	4.7	35.2	0.61	0.59	0.61	52.9
All Vehicles		3043	4.4	0.693	10.0	LOS A	17.1	120.8	0.80	0.82	0.92	51.4

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

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2021 Base AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.004	17.6	LOS B	0.0	0.1	0.77	0.77	0.77	45.4
Approach		2	0.0	0.004	11.6	LOS A	0.0	0.1	0.38	0.66	0.38	49.5
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	415	23.1	0.245	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		416	23.0	0.245	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	459	20.2	0.266	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.001	7.6	LOS A	0.0	0.0	0.47	0.56	0.47	52.1
Approach		460	20.1	0.266	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		878	21.5	0.266	0.1	NA	0.0	0.1	0.00	0.00	0.00	59.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.005	20.6	LOS B	0.0	0.1	0.81	0.81	0.81	43.7
Approach		2	0.0	0.005	13.1	LOS A	0.0	0.1	0.40	0.68	0.40	48.5
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	458	23.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		459	22.9	0.270	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	506	20.2	0.294	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.001	7.9	LOS A	0.0	0.0	0.49	0.57	0.49	51.8
Approach		507	20.1	0.294	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		968	21.4	0.294	0.1	NA	0.0	0.1	0.00	0.00	0.00	59.9

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2021 Base PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	100	0.0	0.075	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.007	26.1	LOS B	0.0	0.1	0.85	0.88	0.85	41.1
Approach		101	0.0	0.075	5.8	LOS A	0.0	0.1	0.01	0.55	0.01	54.1
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	678	1.7	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		679	1.7	0.351	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	411	2.6	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	100	0.0	0.160	10.1	LOS A	0.6	4.1	0.61	0.83	0.61	50.3
Approach		511	2.1	0.215	2.0	NA	0.6	4.1	0.12	0.16	0.12	57.8
All Vehicles		1291	1.7	0.351	1.3	NA	0.6	4.1	0.05	0.11	0.05	58.6

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	100	0.0	0.075	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.008	32.3	LOS C	0.0	0.2	0.89	0.93	0.89	38.3
Approach		101	0.0	0.075	5.9	LOS A	0.0	0.2	0.01	0.55	0.01	54.1
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	746	1.7	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		747	1.7	0.387	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	453	2.6	0.238	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	100	0.0	0.180	11.0	LOS A	0.7	4.6	0.66	0.86	0.66	49.6
Approach		553	2.1	0.238	2.0	NA	0.7	4.6	0.12	0.15	0.12	57.8
All Vehicles		1401	1.7	0.387	1.3	NA	0.7	4.6	0.05	0.10	0.05	58.6

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2021 Base SAT]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	217	7.8	0.169	5.7	LOS A	0.0	0.0	0.00	0.55	0.00	54.0
3	R2	1	0.0	0.005	20.8	LOS B	0.0	0.1	0.81	0.82	0.81	43.6
Approach		218	7.7	0.169	5.8	LOS A	0.0	0.1	0.00	0.55	0.00	53.9
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	447	2.8	0.234	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		448	2.8	0.234	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	425	6.7	0.229	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	217	7.8	0.262	8.5	LOS A	1.1	8.3	0.54	0.77	0.55	51.1
Approach		642	7.0	0.262	2.9	NA	1.1	8.3	0.18	0.26	0.19	56.6
All Vehicles		1308	5.7	0.262	2.4	NA	1.1	8.3	0.09	0.22	0.09	57.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base SAT]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	200	0.0	0.150	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.006	23.0	LOS B	0.0	0.1	0.83	0.84	0.83	42.5
Approach		201	0.0	0.150	5.7	LOS A	0.0	0.1	0.00	0.55	0.00	54.2
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	491	2.8	0.256	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		492	2.8	0.256	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	463	6.1	0.249	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	200	0.0	0.242	8.5	LOS A	1.0	6.9	0.55	0.78	0.55	51.4
Approach		663	4.3	0.249	2.6	NA	1.0	6.9	0.17	0.23	0.17	57.1
All Vehicles		1356	3.1	0.256	2.1	NA	1.0	6.9	0.08	0.20	0.08	57.6

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2021 Base PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	42	0.0	0.231	26.8	LOS B	0.8	5.5	0.87	0.96	0.94	40.7
Approach		43	0.0	0.231	26.3	LOS B	0.8	5.5	0.85	0.95	0.92	40.9
East: Captain Cook Dr (E)												
4	L2	42	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	678	1.7	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		720	1.6	0.351	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: Captain Cook Dr (W)												
11	T1	411	2.6	0.214	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.002	9.7	LOS A	0.0	0.0	0.58	0.63	0.58	50.6
Approach		412	2.6	0.214	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1175	1.9	0.351	1.2	NA	0.8	5.5	0.03	0.06	0.03	58.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2031 Base PM]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	42	0.0	0.297	35.1	LOS C	1.0	7.0	0.91	0.99	1.03	37.3
Approach		43	0.0	0.297	34.4	LOS C	1.0	7.0	0.88	0.98	1.01	37.6
East: Captain Cook Dr (E)												
4	L2	42	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	746	1.7	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		788	1.6	0.387	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: Captain Cook Dr (W)												
11	T1	453	2.6	0.236	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.002	10.5	LOS A	0.0	0.0	0.63	0.65	0.63	50.0
Approach		454	2.6	0.236	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1285	1.9	0.387	1.4	NA	1.0	7.0	0.03	0.05	0.03	58.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2021 Base SAT]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	84	0.0	0.318	21.1	LOS B	1.2	8.7	0.82	0.97	0.99	43.5
Approach		85	0.0	0.318	20.9	LOS B	1.2	8.7	0.81	0.97	0.98	43.6
East: Captain Cook Dr (E)												
4	L2	84	0.0	0.045	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	464	6.3	0.248	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		548	5.4	0.248	0.9	NA	0.0	0.0	0.00	0.09	0.00	58.9
West: Captain Cook Dr (W)												
11	T1	425	6.7	0.228	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.001	8.2	LOS A	0.0	0.0	0.51	0.58	0.51	51.6
Approach		426	6.7	0.228	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1060	5.5	0.318	2.2	NA	1.2	8.7	0.07	0.12	0.08	57.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2031 Base SAT]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	84	0.0	0.370	25.0	LOS B	1.5	10.2	0.86	1.00	1.08	41.5
Approach		85	0.0	0.370	24.8	LOS B	1.5	10.2	0.85	0.99	1.07	41.7
East: Captain Cook Dr (E)												
4	L2	84	0.0	0.045	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	506	5.8	0.269	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		591	5.0	0.269	0.8	NA	0.0	0.0	0.00	0.08	0.00	58.9
West: Captain Cook Dr (W)												
11	T1	463	6.1	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.001	8.5	LOS A	0.0	0.0	0.53	0.59	0.53	51.4
Approach		464	6.1	0.247	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1140	5.1	0.370	2.3	NA	1.5	10.2	0.06	0.12	0.08	57.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2021 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	3	0.0	0.005	6.4	LOS A	0.0	0.2	0.50	0.56	0.50	52.2
3	R2	1	0.0	0.005	10.1	LOS A	0.0	0.2	0.50	0.56	0.50	52.9
Approach		4	0.0	0.005	7.3	LOS A	0.0	0.2	0.50	0.56	0.50	52.4
East: Captain Cook Dr (E)												
4	L2	3	0.0	0.301	4.7	LOS A	1.8	14.5	0.21	0.46	0.21	53.6
5	T1	380	18.6	0.301	5.1	LOS A	1.8	14.5	0.21	0.46	0.21	54.0
Approach		383	18.4	0.301	5.1	LOS A	1.8	14.5	0.21	0.46	0.21	54.0
West: Captain Cook Dr (W)												
11	T1	418	6.3	0.286	4.6	LOS A	2.0	15.5	0.02	0.48	0.02	55.1
12	R2	39	73.0	0.286	8.9	LOS A	2.0	15.5	0.02	0.48	0.02	51.8
Approach		457	12.0	0.286	5.0	LOS A	2.0	15.5	0.02	0.48	0.02	54.8
All Vehicles		844	14.8	0.301	5.0	LOS A	2.0	15.5	0.11	0.47	0.11	54.4

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	3	0.0	0.005	6.7	LOS A	0.0	0.2	0.53	0.57	0.53	52.1
3	R2	1	0.0	0.005	10.3	LOS A	0.0	0.2	0.53	0.57	0.53	52.7
Approach		4	0.0	0.005	7.6	LOS A	0.0	0.2	0.53	0.57	0.53	52.2
East: Captain Cook Dr (E)												
4	L2	3	0.0	0.330	4.7	LOS A	2.0	16.4	0.22	0.46	0.22	53.6
5	T1	419	18.6	0.330	5.1	LOS A	2.0	16.4	0.22	0.46	0.22	53.9
Approach		422	18.5	0.330	5.1	LOS A	2.0	16.4	0.22	0.46	0.22	53.9
West: Captain Cook Dr (W)												
11	T1	461	6.2	0.312	4.6	LOS A	2.3	17.6	0.02	0.48	0.02	55.1
12	R2	39	73.0	0.312	8.9	LOS A	2.3	17.6	0.02	0.48	0.02	51.8
Approach		500	11.4	0.312	4.9	LOS A	2.3	17.6	0.02	0.48	0.02	54.8
All Vehicles		926	14.5	0.330	5.0	LOS A	2.3	17.6	0.12	0.47	0.12	54.4

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2021 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	56	0.0	0.082	7.9	LOS A	0.4	3.1	0.62	0.70	0.62	51.5
3	R2	8	0.0	0.082	11.6	LOS A	0.4	3.1	0.62	0.70	0.62	52.1
Approach		64	0.0	0.082	8.4	LOS A	0.4	3.1	0.62	0.70	0.62	51.5
East: Captain Cook Dr (E)												
4	L2	9	11.1	0.419	4.9	LOS A	2.9	21.0	0.23	0.46	0.23	53.1
5	T1	585	2.3	0.419	4.9	LOS A	2.9	21.0	0.23	0.46	0.23	54.4
Approach		595	2.5	0.419	4.9	LOS A	2.9	21.0	0.23	0.46	0.23	54.4
West: Captain Cook Dr (W)												
11	T1	386	2.2	0.273	4.6	LOS A	2.0	14.0	0.08	0.48	0.08	54.8
12	R2	48	4.3	0.273	8.2	LOS A	2.0	14.0	0.08	0.48	0.08	54.3
Approach		435	2.4	0.273	5.0	LOS A	2.0	14.0	0.08	0.48	0.08	54.7
All Vehicles		1094	2.3	0.419	5.1	LOS A	2.9	21.0	0.19	0.48	0.19	54.4

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	56	0.0	0.086	8.4	LOS A	0.5	3.3	0.65	0.72	0.65	51.1
3	R2	8	0.0	0.086	12.0	LOS A	0.5	3.3	0.65	0.72	0.65	51.7
Approach		64	0.0	0.086	8.9	LOS A	0.5	3.3	0.65	0.72	0.65	51.2
East: Captain Cook Dr (E)												
4	L2	9	0.0	0.453	4.7	LOS A	3.3	23.9	0.23	0.45	0.23	53.6
5	T1	642	2.5	0.453	4.9	LOS A	3.3	23.9	0.23	0.45	0.23	54.4
Approach		652	2.4	0.453	4.9	LOS A	3.3	23.9	0.23	0.45	0.23	54.4
West: Captain Cook Dr (W)												
11	T1	424	2.5	0.294	4.6	LOS A	2.2	15.6	0.08	0.47	0.08	54.8
12	R2	46	0.0	0.294	8.1	LOS A	2.2	15.6	0.08	0.47	0.08	54.5
Approach		471	2.2	0.294	4.9	LOS A	2.2	15.6	0.08	0.47	0.08	54.7
All Vehicles		1186	2.2	0.453	5.1	LOS A	3.3	23.9	0.19	0.48	0.19	54.4

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2021 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	35	0.0	0.054	7.3	LOS A	0.3	2.0	0.58	0.67	0.58	51.6
3	R2	11	0.0	0.054	11.0	LOS A	0.3	2.0	0.58	0.67	0.58	52.2
Approach		45	0.0	0.054	8.2	LOS A	0.3	2.0	0.58	0.67	0.58	51.8
East: Captain Cook Dr (E)												
4	L2	11	0.0	0.365	4.6	LOS A	2.4	17.7	0.18	0.45	0.18	53.8
5	T1	515	5.7	0.365	4.8	LOS A	2.4	17.7	0.18	0.45	0.18	54.6
Approach		525	5.6	0.365	4.8	LOS A	2.4	17.7	0.18	0.45	0.18	54.5
West: Captain Cook Dr (W)												
11	T1	476	6.0	0.327	4.6	LOS A	2.5	18.0	0.10	0.46	0.10	54.7
12	R2	35	0.0	0.327	8.1	LOS A	2.5	18.0	0.10	0.46	0.10	54.6
Approach		511	5.6	0.327	4.9	LOS A	2.5	18.0	0.10	0.46	0.10	54.7
All Vehicles		1081	5.4	0.365	5.0	LOS A	2.5	18.0	0.15	0.47	0.15	54.5

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	35	0.0	0.056	7.6	LOS A	0.3	2.0	0.60	0.68	0.60	51.4
3	R2	11	0.0	0.056	11.3	LOS A	0.3	2.0	0.60	0.68	0.60	52.0
Approach		45	0.0	0.056	8.5	LOS A	0.3	2.0	0.60	0.68	0.60	51.5
East: Captain Cook Dr (E)												
4	L2	11	0.0	0.391	4.6	LOS A	2.7	19.6	0.18	0.45	0.18	53.7
5	T1	556	5.3	0.391	4.8	LOS A	2.7	19.6	0.18	0.45	0.18	54.5
Approach		566	5.2	0.391	4.8	LOS A	2.7	19.6	0.18	0.45	0.18	54.5
West: Captain Cook Dr (W)												
11	T1	514	5.5	0.349	4.6	LOS A	2.7	19.9	0.10	0.46	0.10	54.7
12	R2	35	0.0	0.349	8.1	LOS A	2.7	19.9	0.10	0.46	0.10	54.6
Approach		548	5.2	0.349	4.8	LOS A	2.7	19.9	0.10	0.46	0.10	54.7
All Vehicles		1160	5.0	0.391	5.0	LOS A	2.7	19.9	0.16	0.46	0.16	54.5

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

MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 123 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.261	21.9	LOS B	7.1	51.9	0.63	0.72	0.63	43.8
2	T1	12	9.1	0.261	16.2	LOS B	7.1	51.9	0.63	0.72	0.63	37.1
3	R2	23	9.1	0.086	47.1	LOS D	1.1	8.6	0.87	0.69	0.87	33.2
Approach		244	5.6	0.261	24.0	LOS B	7.1	51.9	0.65	0.71	0.65	42.3
East: Captain Cook Dr												
4	L2	24	4.3	0.888	63.2	LOS E	30.0	237.0	1.00	1.05	1.22	30.3
5	T1	855	15.6	0.888	57.7	LOS E	30.0	237.0	1.00	1.05	1.22	30.8
6	R2	8	12.5	0.043	42.1	LOS C	0.4	3.0	0.80	0.68	0.80	26.3
Approach		887	15.3	0.888	57.7	LOS E	30.0	237.0	1.00	1.05	1.22	30.7
North: Woolooware Rd												
7	L2	2	50.0	0.022	54.1	LOS D	0.2	2.2	0.89	0.62	0.89	22.9
8	T1	2	50.0	0.022	49.9	LOS D	0.2	2.2	0.89	0.62	0.89	24.0
9	R2	2	50.0	0.016	67.2	LOS E	0.1	0.6	0.97	0.59	0.97	19.7
Approach		6	50.0	0.022	57.1	LOS E	0.2	2.2	0.91	0.61	0.91	22.0
West: Captain Cook Dr												
10	L2	4	0.0	0.004	5.9	LOS A	0.0	0.0	0.02	0.58	0.02	48.3
11	T1	1111	7.1	0.531	2.6	LOS A	4.2	31.4	0.14	0.12	0.14	57.5
12	R2	543	1.9	0.823	28.2	LOS B	23.6	168.2	0.86	0.89	1.01	40.2
Approach		1658	5.4	0.823	11.0	LOS A	23.6	168.2	0.37	0.38	0.42	50.4
All Vehicles		2796	8.7	0.888	27.1	LOS B	30.0	237.0	0.60	0.62	0.70	41.3

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	38.3	LOS D	0.1	0.1	0.79	0.79
P2	East Full Crossing	53	55.8	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	17.2	LOS B	0.1	0.1	0.53	0.53
P4	West Full Crossing	53	55.8	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	41.8	LOS E			0.81	0.81

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 123 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

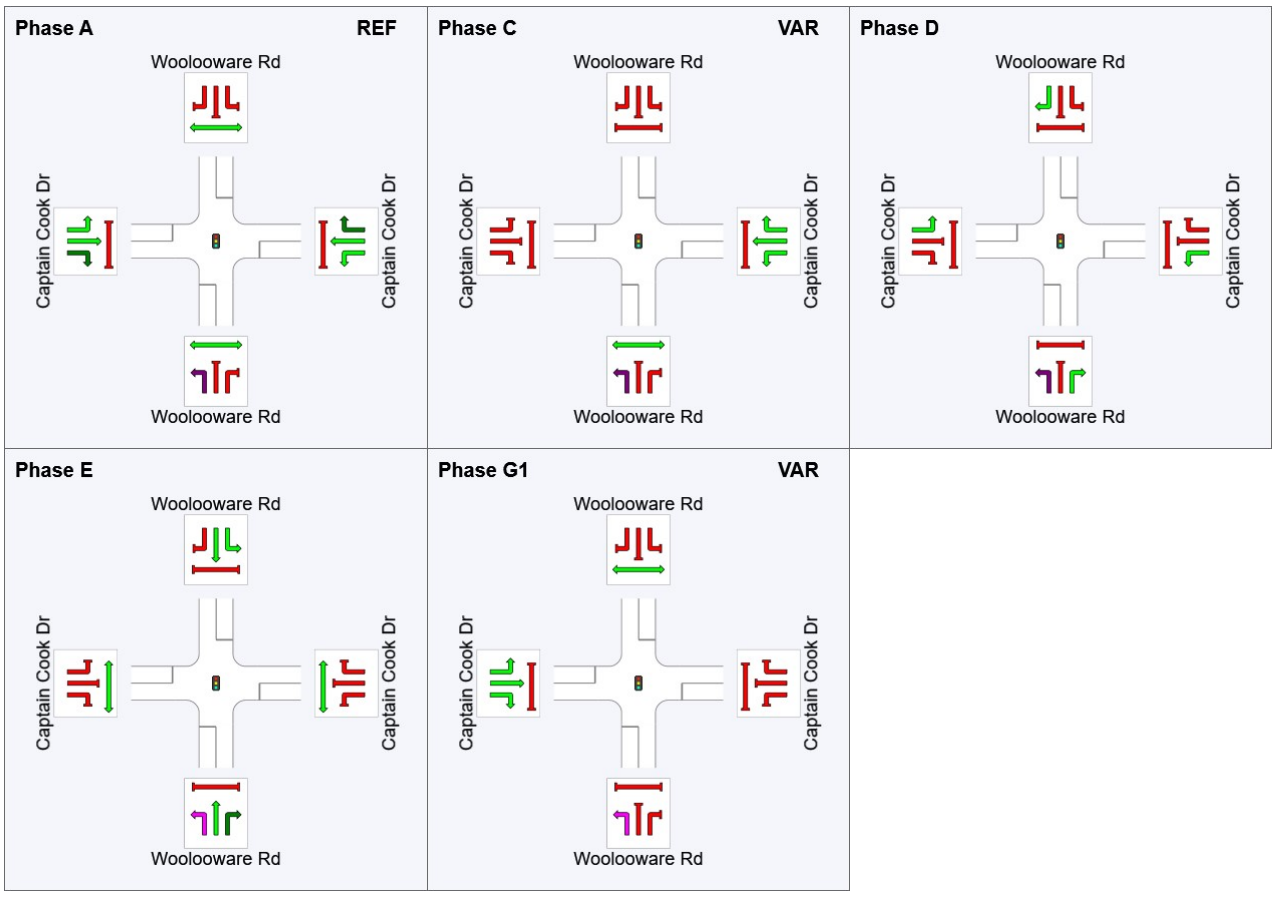
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	29	41	53	77
Green Time (sec)	23	6	6	18	40
Phase Time (sec)	29	12	12	24	46
Phase Split	24%	10%	10%	20%	37%

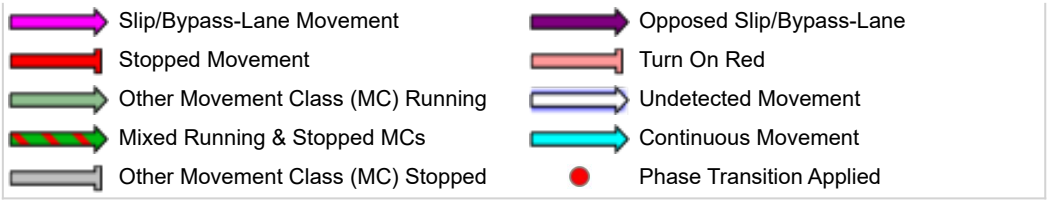
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 109 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.245	17.5	LOS B	5.7	41.5	0.59	0.70	0.59	46.2
2	T1	12	9.1	0.245	11.9	LOS A	5.7	41.5	0.59	0.70	0.59	40.2
3	R2	23	9.1	0.079	40.4	LOS C	1.0	7.4	0.86	0.69	0.86	35.4
Approach		244	5.6	0.245	19.4	LOS B	5.7	41.5	0.61	0.70	0.61	44.7
East: Captain Cook Dr												
4	L2	24	4.3	0.882	58.8	LOS E	25.0	177.4	1.00	1.04	1.24	31.4
5	T1	807	1.2	0.882	53.2	LOS D	25.0	177.4	1.00	1.04	1.24	32.0
6	R2	8	12.5	0.042	41.6	LOS C	0.4	2.8	0.84	0.68	0.84	26.4
Approach		840	1.4	0.882	53.3	LOS D	25.0	177.4	1.00	1.03	1.24	31.9
North: Woolooware Rd												
7	L2	2	50.0	0.021	47.7	LOS D	0.2	1.9	0.88	0.61	0.88	24.6
8	T1	2	50.0	0.021	43.4	LOS D	0.2	1.9	0.88	0.61	0.88	26.0
9	R2	2	50.0	0.014	59.4	LOS E	0.1	0.6	0.96	0.59	0.96	21.3
Approach		6	50.0	0.021	50.2	LOS D	0.2	1.9	0.91	0.61	0.91	23.8
West: Captain Cook Dr												
10	L2	4	0.0	0.004	6.9	LOS A	0.0	0.1	0.10	0.58	0.10	47.1
11	T1	1116	1.5	0.564	5.7	LOS A	8.2	58.0	0.30	0.27	0.30	54.9
12	R2	543	1.9	0.823	25.1	LOS B	20.8	148.2	0.86	0.87	0.96	41.6
Approach		1663	1.6	0.823	12.0	LOS A	20.8	148.2	0.48	0.46	0.51	49.7
All Vehicles		2754	2.0	0.882	25.4	LOS B	25.0	177.4	0.65	0.66	0.74	42.1

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	38.1	LOS D	0.1	0.1	0.84	0.84
P2	East Full Crossing	53	48.8	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	18.8	LOS B	0.1	0.1	0.59	0.59
P4	West Full Crossing	53	48.8	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	38.6	LOS D			0.83	0.83

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 109 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

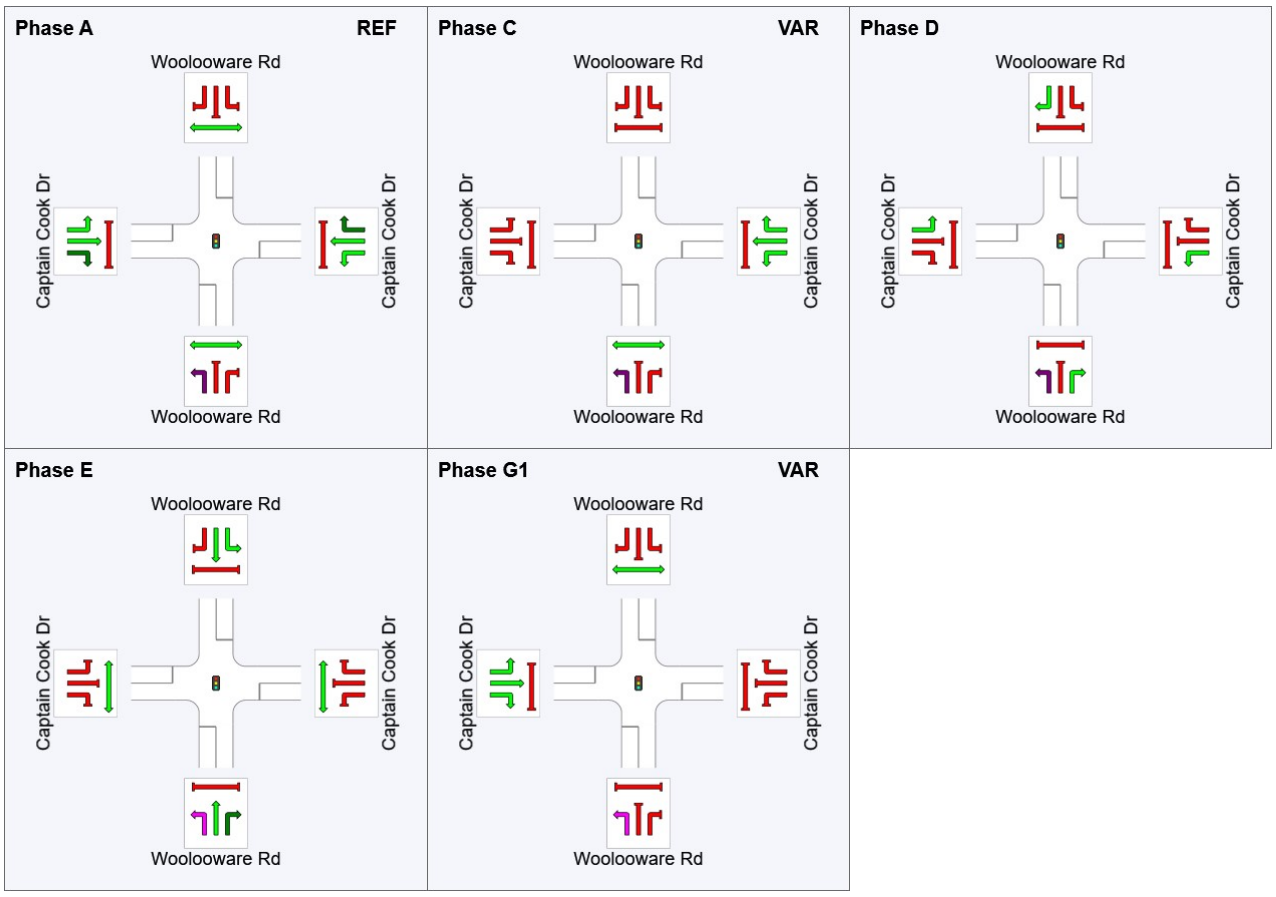
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	21	33	45	68
Green Time (sec)	15	6	6	17	35
Phase Time (sec)	21	12	12	23	41
Phase Split	19%	11%	11%	21%	38%

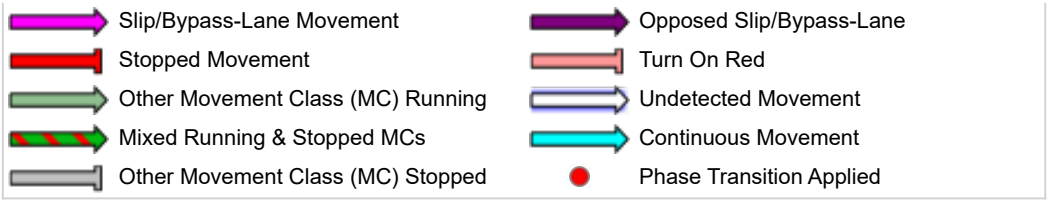
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 135 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	338	1.6	0.360	15.7	LOS B	8.6	61.2	0.60	0.73	0.60	47.3
2	T1	11	0.0	0.360	10.1	LOS A	8.6	61.2	0.60	0.73	0.60	41.6
3	R2	15	0.0	0.049	51.7	LOS D	0.8	5.6	0.85	0.67	0.85	32.0
Approach		363	1.4	0.360	17.0	LOS B	8.6	61.2	0.61	0.73	0.61	46.3
East: Captain Cook Dr												
4	L2	14	0.0	0.729	30.8	LOS C	21.5	169.8	0.92	0.81	0.92	41.5
5	T1	963	15.1	0.729	25.6	LOS B	21.7	171.2	0.92	0.81	0.92	42.2
6	R2	5	0.0	0.022	45.9	LOS D	0.3	1.8	0.87	0.65	0.87	25.1
Approach		982	14.8	0.729	25.8	LOS B	21.7	171.2	0.92	0.81	0.92	42.1
North: Woolooware Rd												
7	L2	2	50.0	0.019	55.4	LOS D	0.2	2.3	0.86	0.61	0.86	22.6
8	T1	2	50.0	0.019	51.1	LOS D	0.2	2.3	0.86	0.61	0.86	23.7
9	R2	2	50.0	0.017	74.0	LOS F	0.1	0.7	0.97	0.59	0.97	18.5
Approach		6	50.0	0.019	60.2	LOS E	0.2	2.3	0.90	0.60	0.90	21.4
West: Captain Cook Dr												
10	L2	25	20.1	0.173	51.1	LOS D	1.3	10.9	0.96	0.71	0.96	23.5
11	T1	933	3.0	0.737	37.0	LOS C	28.1	202.0	0.89	0.78	0.89	37.3
12	R2	180	2.9	0.418	27.1	LOS B	6.1	43.9	0.82	0.78	0.82	40.7
Approach		1138	3.4	0.737	35.7	LOS C	28.1	202.0	0.88	0.78	0.88	37.6
All Vehicles		2489	7.7	0.737	29.1	LOS C	28.1	202.0	0.85	0.78	0.85	40.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	23.0	LOS C	0.1	0.1	0.73	0.73
P2	East Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	33.5	LOS D	0.1	0.1	0.71	0.71
P4	West Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	45.0	LOS E			0.84	0.84

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 135 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

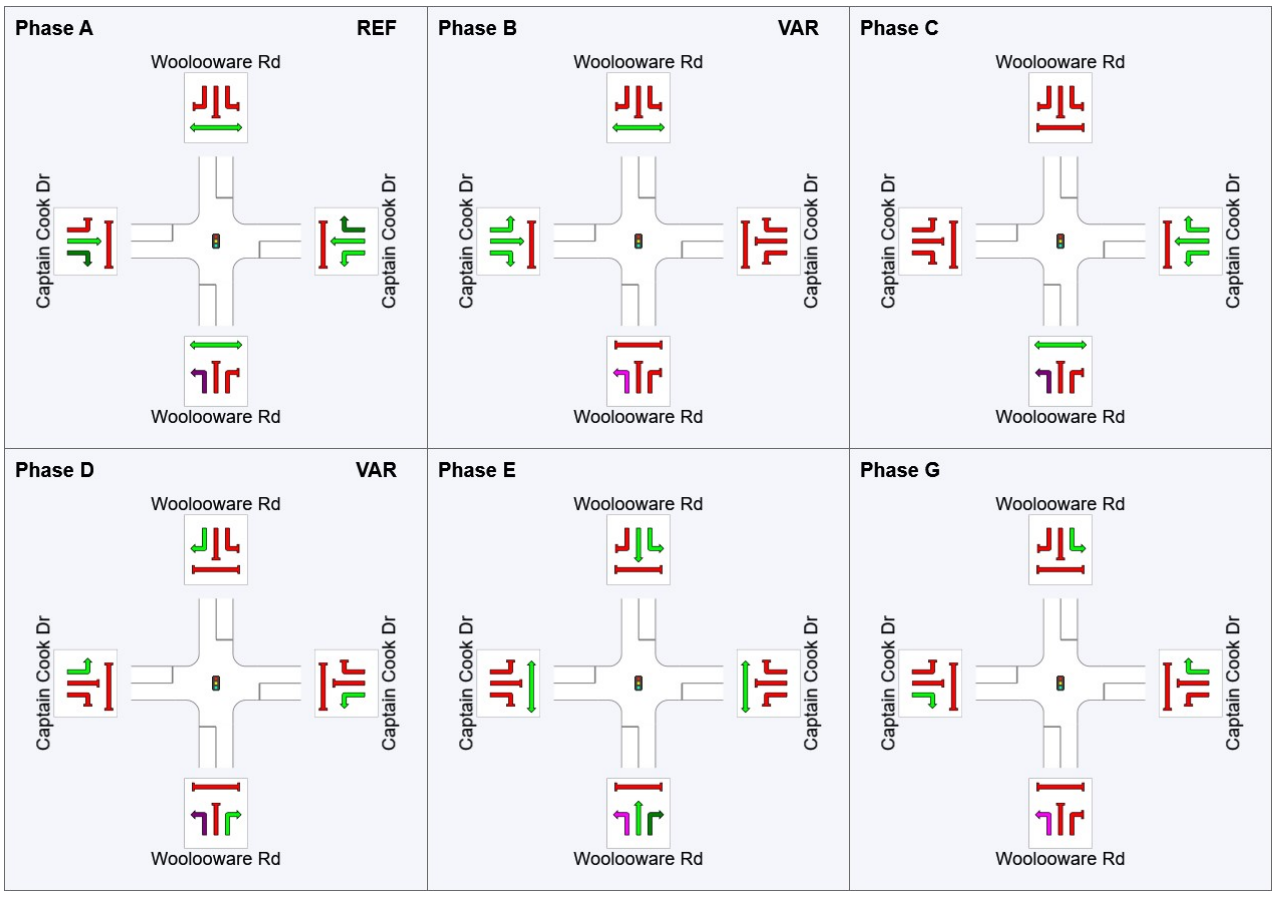
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C, D*, E, G
Output Phase Sequence: A, B*, C, D*, E, G
(* Variable Phase)

Phase Timing Summary

Phase	A	B	C	D	E	G
Phase Change Time (sec)	0	45	57	75	87	112
Green Time (sec)	39	6	12	6	19	17
Phase Time (sec)	45	12	18	12	25	23
Phase Split	33%	9%	13%	9%	19%	17%

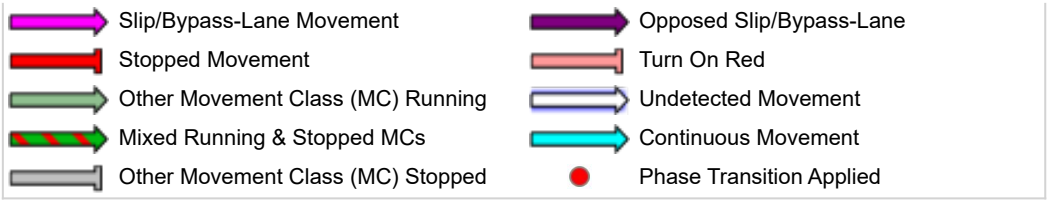
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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Breen SSD Application: New Resource Recovery Facility and Marang Parklands

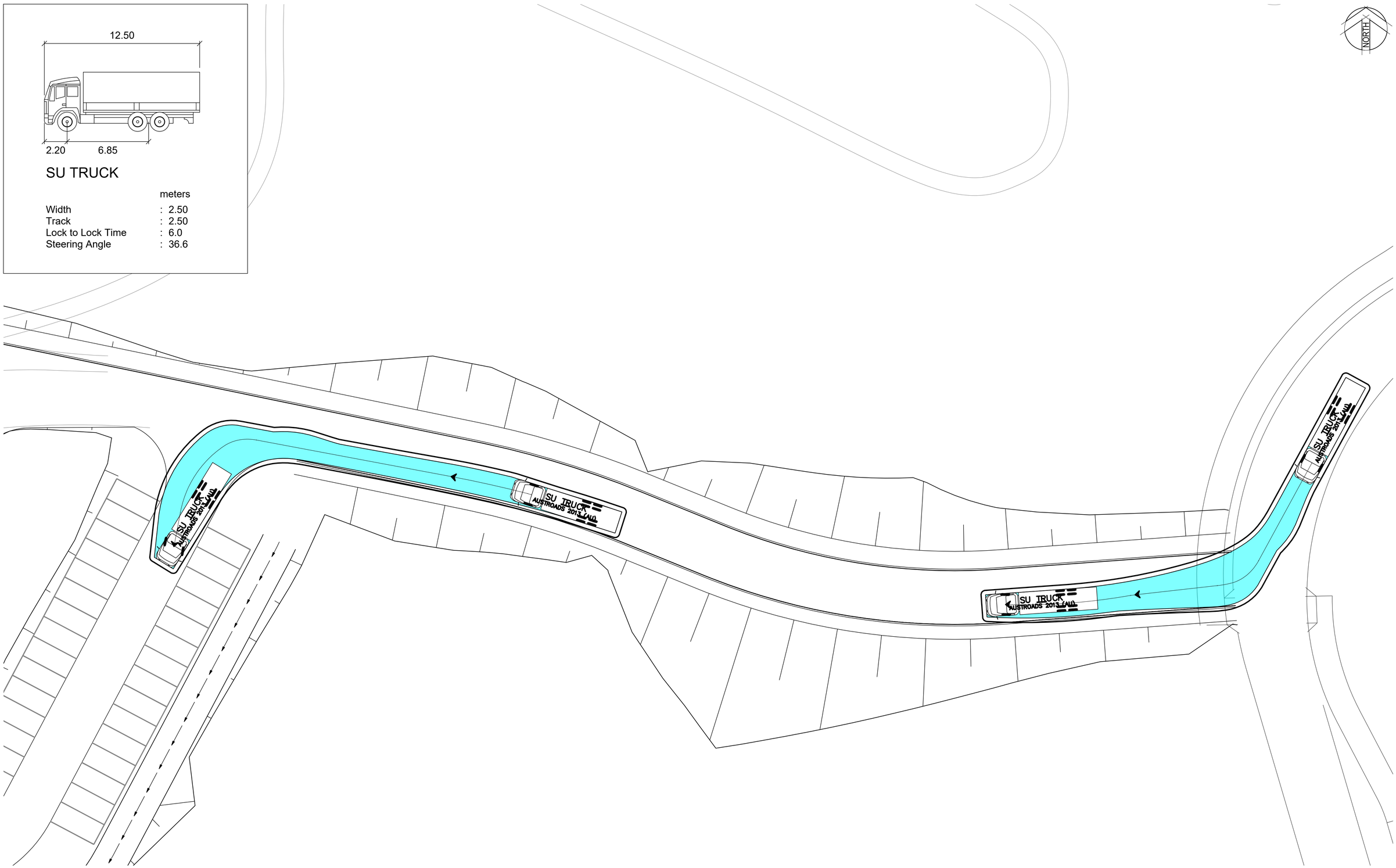
APPENDIX D

SWEPT PATHS

DATE PLOTTED: 22 October 2020 2:56 PM BY: HAYDEN DAVENPORT

SU TRUCK

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6



Rev.	Date	Description	Des.	Verif.	Appd.
1	22/10/2020	ISSUED FOR INFORMATION			

0 5 10 15 20m
SCALE 1:200 @A1

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		Date
Drawn	HLD	22/10/2020
Checked		Date
Designed		Date
Verified		Date
Approved		

Client: BREEN RESOURCES

Project: KURNELL RESOURCE RECOVERY FACILITY EIS

Title: MERANG PARKLANDS CAR PARK
TURN PATHS
SHEET 1 OF 5

Status: FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

Datum	Date	Scale	Size
AHD	OCT'20	1:200	A1

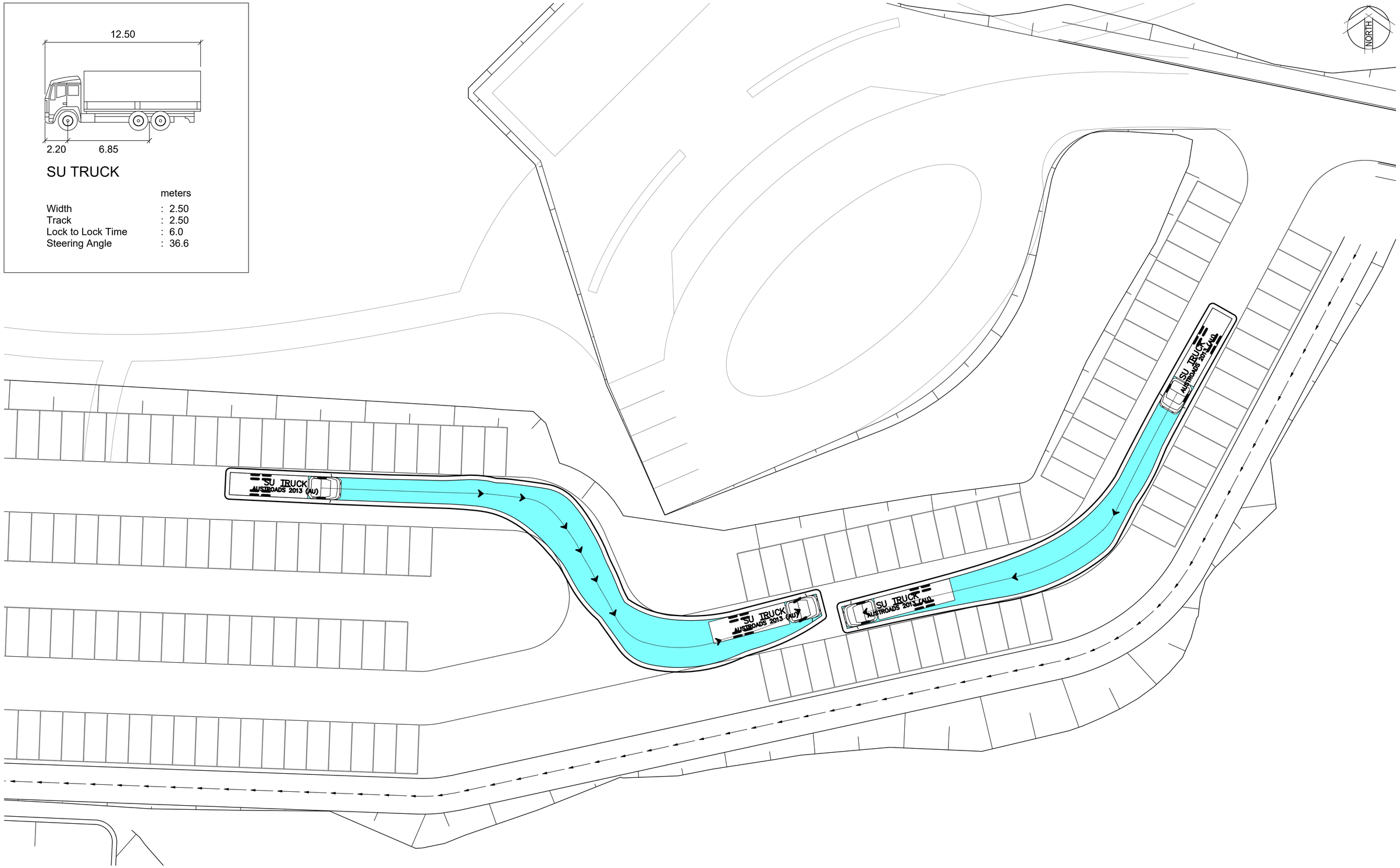
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Revision: 1

XREFs: XR-80221001-DESIGN, XR-80221001-DES CONT 1000, XR-80221001-ARCH LAYOUT, XR-80221001-WMF LAYOUT
CAD File: N:\Projects\802\FY21\001 EIS-Kurnell Recycling Facility\Drawings\Build\Sketches\80221001-001-SK012-SK016.dwg

DATE PLOTTED: 22 October 2020 2:57 PM BY - HAYDEN DAVENPORT

SU TRUCK

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6



Rev.	Date	Description	Des.	Verif.	Appd.
1	22/10/2020	ISSUED FOR INFORMATION			

0 5 10 15 20m
SCALE 1:200 @A1

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Checked		Date
Designed		Date
Verified		Date
Approved		

Client: BREEN RESOURCES

Project: KURNELL RESOURCE RECOVERY FACILITY EIS

Title: MERANG PARKLANDS CAR PARK
TURN PATHS
SHEET 2 OF 5

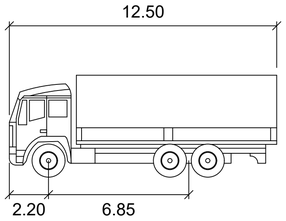
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Revision: 1

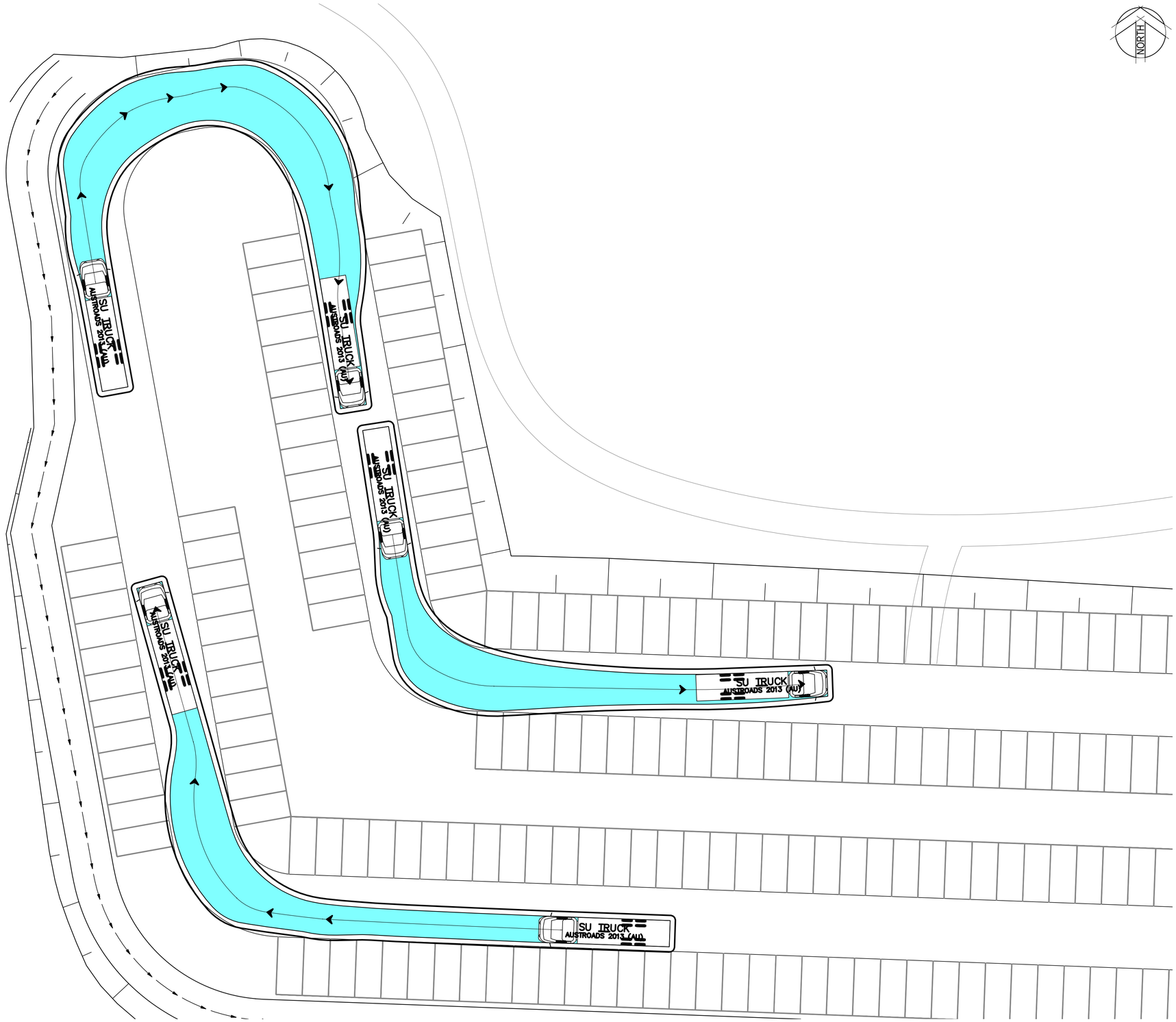
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DATE PLOTTED: 22 October 2020 2:57 PM BY: - HAYDEN DAVENPORT



SU TRUCK

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 36.6



Rev.	Date	Description	Des.	Verif.	Appd.
1	22/10/2020	ISSUED FOR INFORMATION			

0 5 10 15 20m
SCALE 1:200 @A1

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Checked	Date
Designed	Date
Verified	Date
Approved	

Client: BREEN RESOURCES

Project: KURNELL RESOURCE RECOVERY FACILITY EIS

Title: MERANG PARKLANDS CAR PARK
TURN PATHS
SHEET 3 OF 5

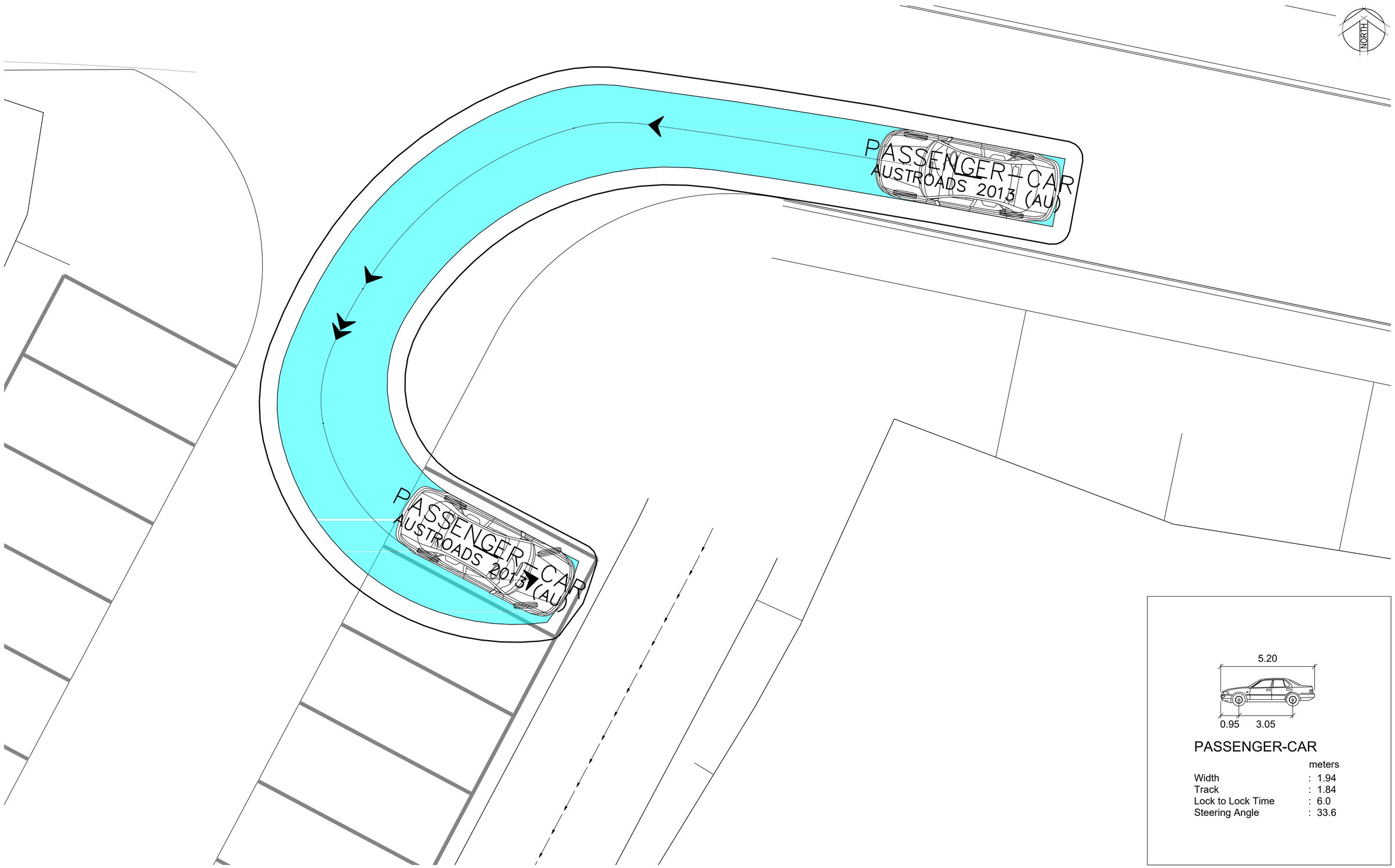
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Drawing Number: 80221001-001-SK014
Revision: 1

XREF's: XR-80221001-DESIGN; XR-80221001-DES CONT 1000; XR-80221001-ARCH LAYOUT; XR-80221001-WMF LAYOUT
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DATE PLOTTED: 22 October 2020 2:58 PM BY: HAYDEN DAVENPORT



PASSENGER-CAR

	meters
Width	: 1.94
Track	: 1.84
Lock to Lock Time	: 6.0
Steering Angle	: 33.6

Rev.	Date	Description	Des.	Verif.	Appd.
1	22/10/2020	ISSUED FOR INFORMATION			

0 1 2 3 4 5m

SCALE 1:50 @A1

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Checked		Date
Designed		Date
Verified		Date
Approved		

Client: BREEN RESOURCES

Project: KURNELL RESOURCE RECOVERY FACILITY EIS

Title: MERANG PARKLANDS CAR PARK TURN PATHS SHEET 4 OF 5

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Datum	Date	Scale	Size
AHD	OCT'20	1:50	A1

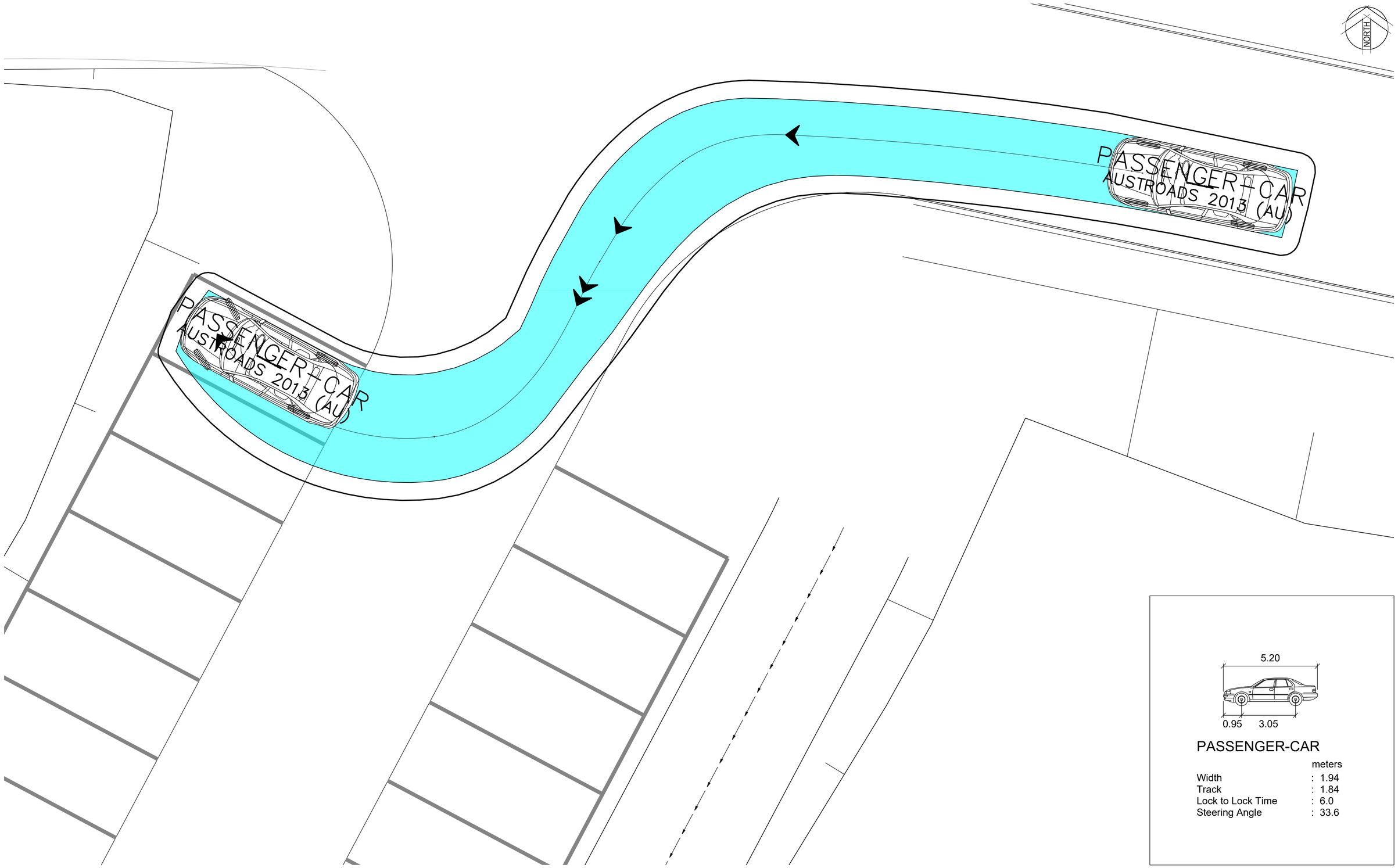
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Revision: 1

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DATE PLOTTED: 22 October 2020 2:58 PM BY: HAYDEN DAVENPORT

XREFs: XR-80221001-DESIGN; XR-80221001-DES CONT 1000; XR-80221001-ARCH LAYOUT; XR-80221001-WMF LAYOUT
CAD File: N:\Projects\802\PY21001_EIS-Kurnell Recycling Facility\Drawings\Build\Sketches\80221001-001-SK012-SK016.dwg



PASSENGER-CAR

		meters
Width	:	1.94
Track	:	1.84
Lock to Lock Time	:	6.0
Steering Angle	:	33.6

Rev.	Date	Description	Des.	Verif.	Appd.
1	22/10/2020	ISSUED FOR INFORMATION			

0 1 2 3 4 5m
SCALE 1:50 @A1

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Drawn	HLD	Date 22/10/2020
Checked		Date
Designed		Date
Verified		Date
Approved		

Client: BREEN RESOURCES

Project: KURNELL RESOURCE RECOVERY FACILITY EIS

Title: MERANG PARKLANDS CAR PARK
TURN PATHS
SHEET 5 OF 5

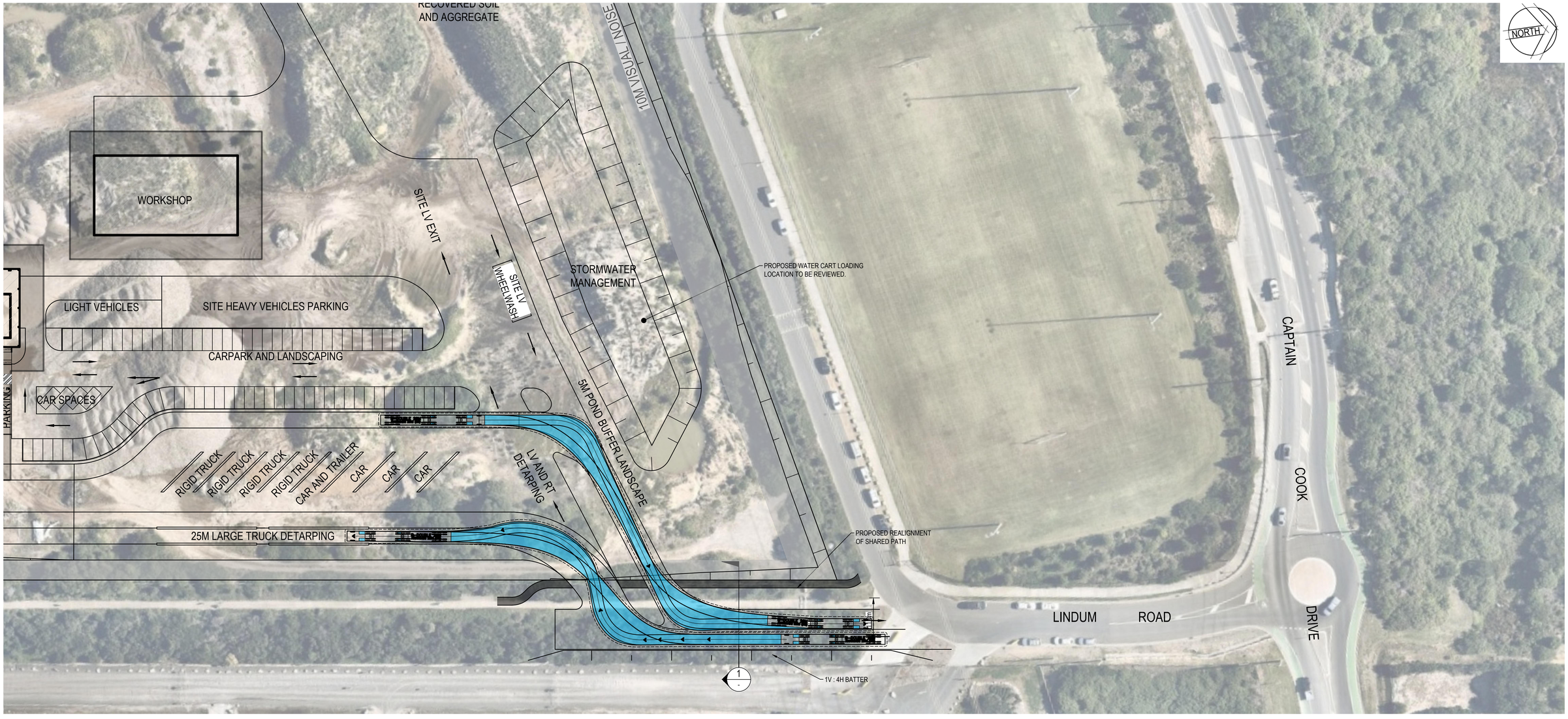
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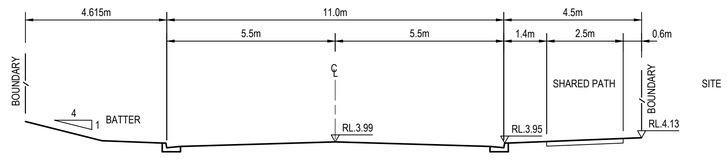
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AHD	OCT'20	1:50	A1

Drawing Number: 80221001-001-SK016

Revision: 1

DATE PLOTTED: 29 October 2020 4:04 PM BY: HAYDEN DAVENPORT





SECTION 1 / -
SCALE 1:100

Rev.	Date	Description	Des.	Verif.	Appd.
1	29/10/2020	ISSUED FOR INFORMATION			

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SCALE 1:500 @A1

0 1 2 4 6 8 10m
SCALE 1:100 @A1

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		Date
Drawn	HLD	29/10/2020
Checked		Date
Designed		Date
Verified		Date
Approved		

Client: BREEN RESOURCES
Project: KURNELL RESOURCE RECOVERY FACILITY EIS
Title: NEW RESOURCE RECOVERY FACILITY
SITE ACCESS
TURPATHS PLAN

Status: FOR INFORMATION ONLY
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Datum	Date	Scale	Size
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Drawing Number: 80221001-001-SK026
Revision: 1

XREFs: XR-80221001-WMF LAYOUT; XR-80221001-DESIGN; XR-80221001-AERIAL IMAGE
CAD File: N:\Projects\8022\FY21001 EIS-Kurnell Recycling Facility\Drawings\Build\Sketches\80221001-001-SK026.dwg

Image Date	Day	Observed Vehicles on Nearmap
19 January 2018	Friday	119
15 March 2018	Thursday	31
23 October 2018	Tuesday	19
27 December 2018	Thursday	68
27 January 2019	Sunday	76
25 April 2019	Thursday	16
01 September 2019	Sunday	28
22 October 2019	Tuesday	14
22 January 2020	Wednesday	26

Breen SSD Application: New Resource Recovery Facility and Marang Parklands

APPENDIX F

PROPOSAL SIDRA RESULTS

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 109 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

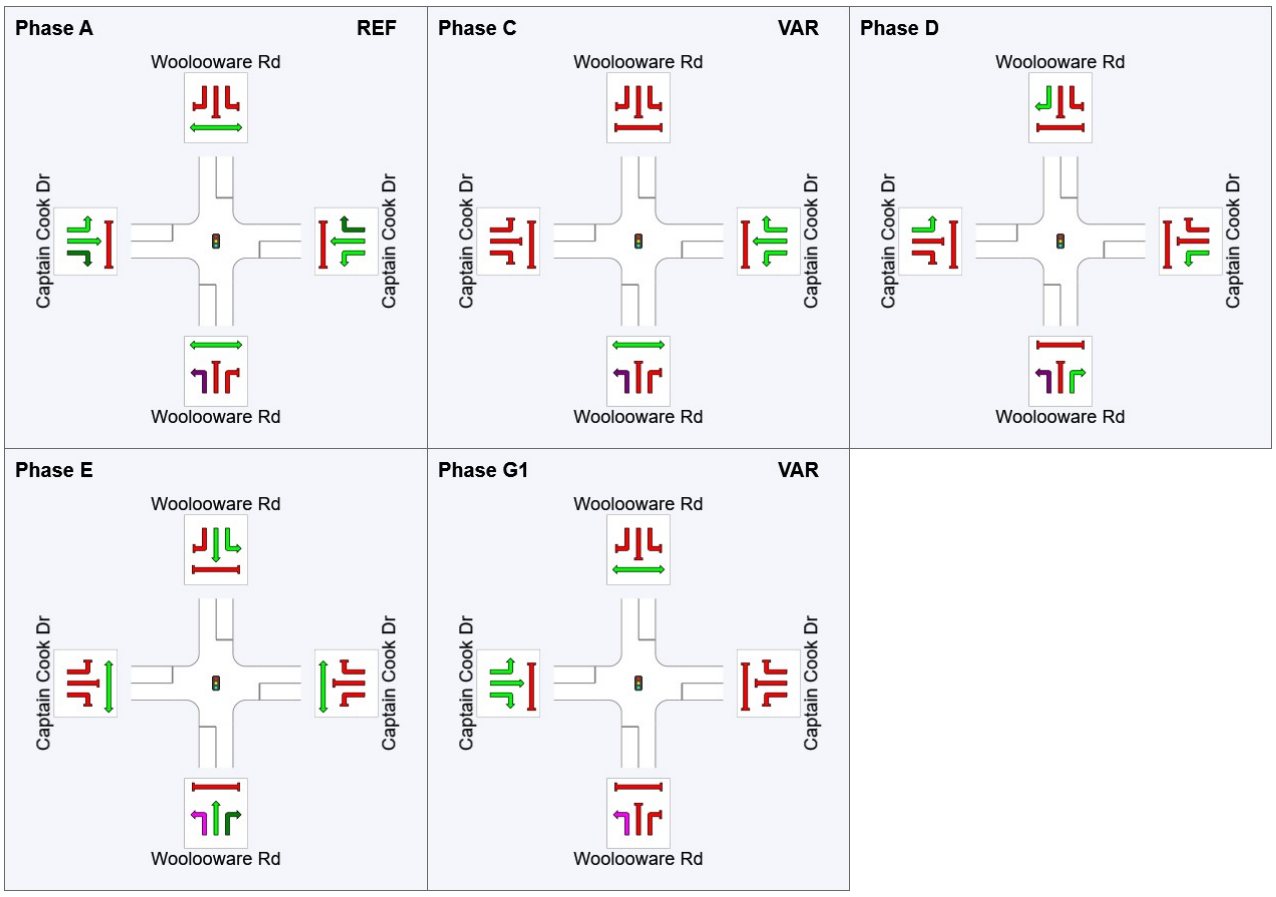
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	22	36	48	71
Green Time (sec)	16	8	6	17	32
Phase Time (sec)	22	14	12	23	38
Phase Split	20%	13%	11%	21%	35%

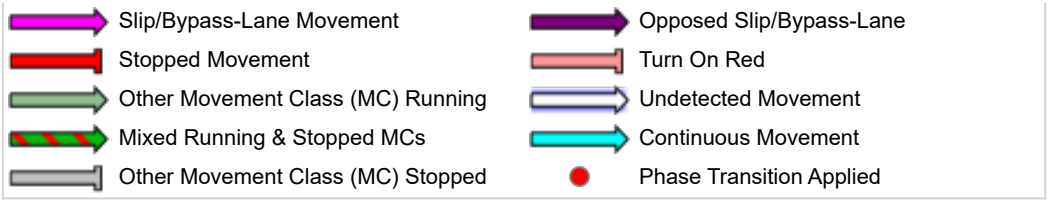
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 111 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	211	1.0	1.000	63.5	LOS E	30.3	214.2	1.00	1.09	1.64	22.3
2	T1	238	1.1	1.000	57.9	LOS E	30.3	214.2	1.00	1.09	1.64	15.3
3	R2	20	1.0	0.117	39.3	LOS C	0.8	5.6	0.96	0.69	0.96	35.9
Approach		469	1.0	1.000	59.6	LOS E	30.3	214.2	1.00	1.07	1.61	19.4
East: Captain Cook Dr												
4	L2	23	4.5	1.041	123.6	LOS F	40.8	309.9	1.00	1.47	1.85	20.0
5	T1	757	10.2	1.041	119.6	LOS F	40.8	309.9	1.00	1.45	1.88	20.0
6	R2	229	0.0	0.770	59.3	LOS E	12.2	85.3	1.00	1.04	1.61	21.6
Approach		1009	7.7	1.041	106.0	LOS F	40.8	309.9	1.00	1.36	1.82	20.2
North: Woolooware Rd												
7	L2	152	0.0	1.016	107.3	LOS F	31.7	222.1	1.00	1.34	1.75	14.7
8	T1	226	0.0	1.016	103.0	LOS F	31.7	222.1	1.00	1.34	1.75	14.9
9	R2	40	0.0	0.199	61.8	LOS E	1.1	7.7	0.99	0.70	0.99	21.3
Approach		418	0.0	1.016	100.6	LOS F	31.7	222.1	1.00	1.28	1.68	15.3
West: Captain Cook Dr												
10	L2	79	0.0	0.098	10.8	LOS A	0.8	5.4	0.31	0.64	0.31	43.3
11	T1	1262	2.2	0.948	33.9	LOS C	35.7	254.3	0.78	0.87	1.00	38.6
12	R2	496	0.2	0.818	28.2	LOS B	20.7	145.2	0.89	0.86	0.94	40.2
Approach		1837	1.5	0.948	31.4	LOS C	35.7	254.3	0.79	0.86	0.95	39.1
All Vehicles		3733	3.0	1.041	62.9	LOS E	40.8	309.9	0.90	1.07	1.35	26.4

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	39.9	LOS D	0.1	0.1	0.85	0.85
P2	East Full Crossing	53	47.9	LOS E	0.2	0.2	0.93	0.93
P3	North Full Crossing	53	26.8	LOS C	0.1	0.1	0.70	0.70
P4	West Full Crossing	53	49.8	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	41.1	LOS E			0.86	0.86

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 111 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

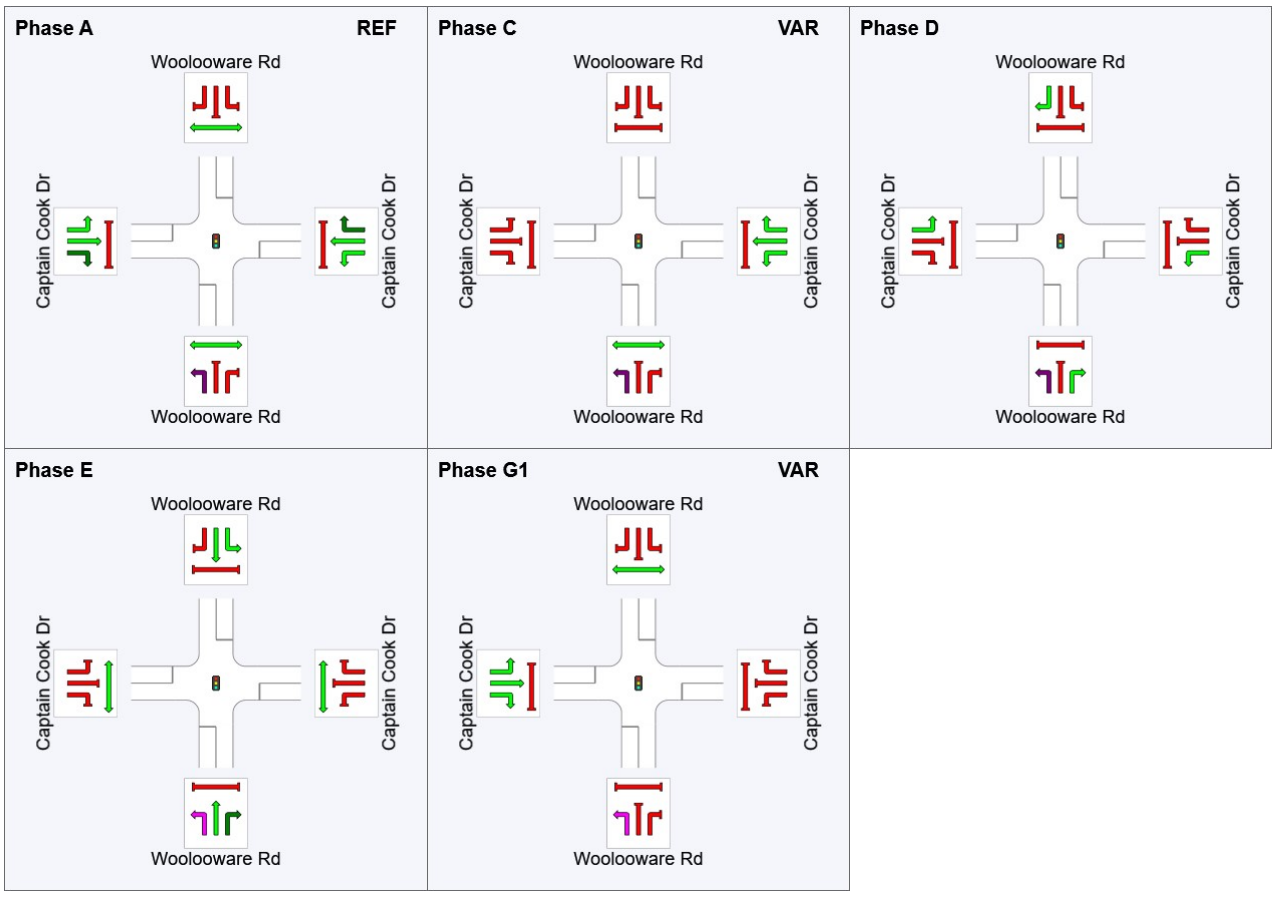
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	13	32	44	73
Green Time (sec)	7	13	6	23	32
Phase Time (sec)	13	19	12	29	38
Phase Split	12%	17%	11%	26%	34%

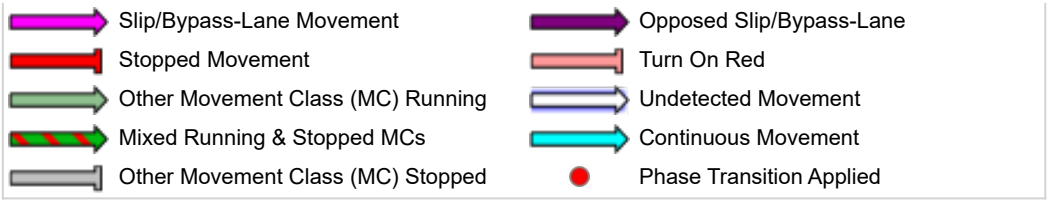
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 113 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	333	0.0	1.027	88.8	LOS F	38.6	269.9	1.00	1.20	1.71	20.8
2	T1	253	0.0	1.027	83.2	LOS F	38.6	269.9	1.00	1.20	1.71	14.0
3	R2	15	0.0	0.071	35.6	LOS C	0.6	3.9	0.91	0.68	0.91	37.3
Approach		600	0.0	1.027	85.1	LOS F	38.6	269.9	1.00	1.19	1.69	18.5
East: Captain Cook Dr												
4	L2	14	0.0	1.025	95.6	LOS F	33.5	244.6	1.00	1.28	1.76	21.1
5	T1	853	5.2	1.025	90.2	LOS F	33.5	244.6	1.00	1.28	1.76	21.3
6	R2	233	0.0	1.067	110.0	LOS F	19.5	136.7	1.00	1.17	2.07	11.2
Approach		1099	4.0	1.067	94.5	LOS F	33.5	244.6	1.00	1.25	1.83	19.0
North: Woolooware Rd												
7	L2	153	0.0	0.747	46.2	LOS D	19.8	138.7	0.97	0.87	1.01	26.1
8	T1	229	0.0	0.747	41.8	LOS C	19.8	138.7	0.97	0.87	1.01	26.6
9	R2	40	0.0	0.203	63.0	LOS E	1.1	7.9	0.99	0.70	0.99	21.1
Approach		422	0.0	0.747	45.4	LOS D	19.8	138.7	0.98	0.86	1.01	25.8
West: Captain Cook Dr												
10	L2	97	5.2	0.509	43.1	LOS D	4.4	31.8	0.99	0.77	0.99	25.8
11	T1	931	4.8	1.075	142.3	LOS F	49.0	357.0	1.00	1.58	2.00	17.7
12	R2	177	0.6	0.515	34.3	LOS C	6.9	48.3	0.94	0.80	0.94	37.7
Approach		1204	4.2	1.075	118.5	LOS F	49.0	357.0	0.99	1.40	1.77	19.6
All Vehicles		3325	2.9	1.075	95.3	LOS F	49.0	357.0	0.99	1.24	1.68	19.6

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	48.9	LOS E	0.2	0.2	0.93	0.93
P2	East Full Crossing	53	43.5	LOS E	0.1	0.1	0.88	0.88
P3	North Full Crossing	53	40.0	LOS E	0.1	0.1	0.84	0.84
P4	West Full Crossing	53	45.2	LOS E	0.2	0.2	0.90	0.90
All Pedestrians		211	44.4	LOS E			0.89	0.89

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal SAT]

New Site
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 113 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

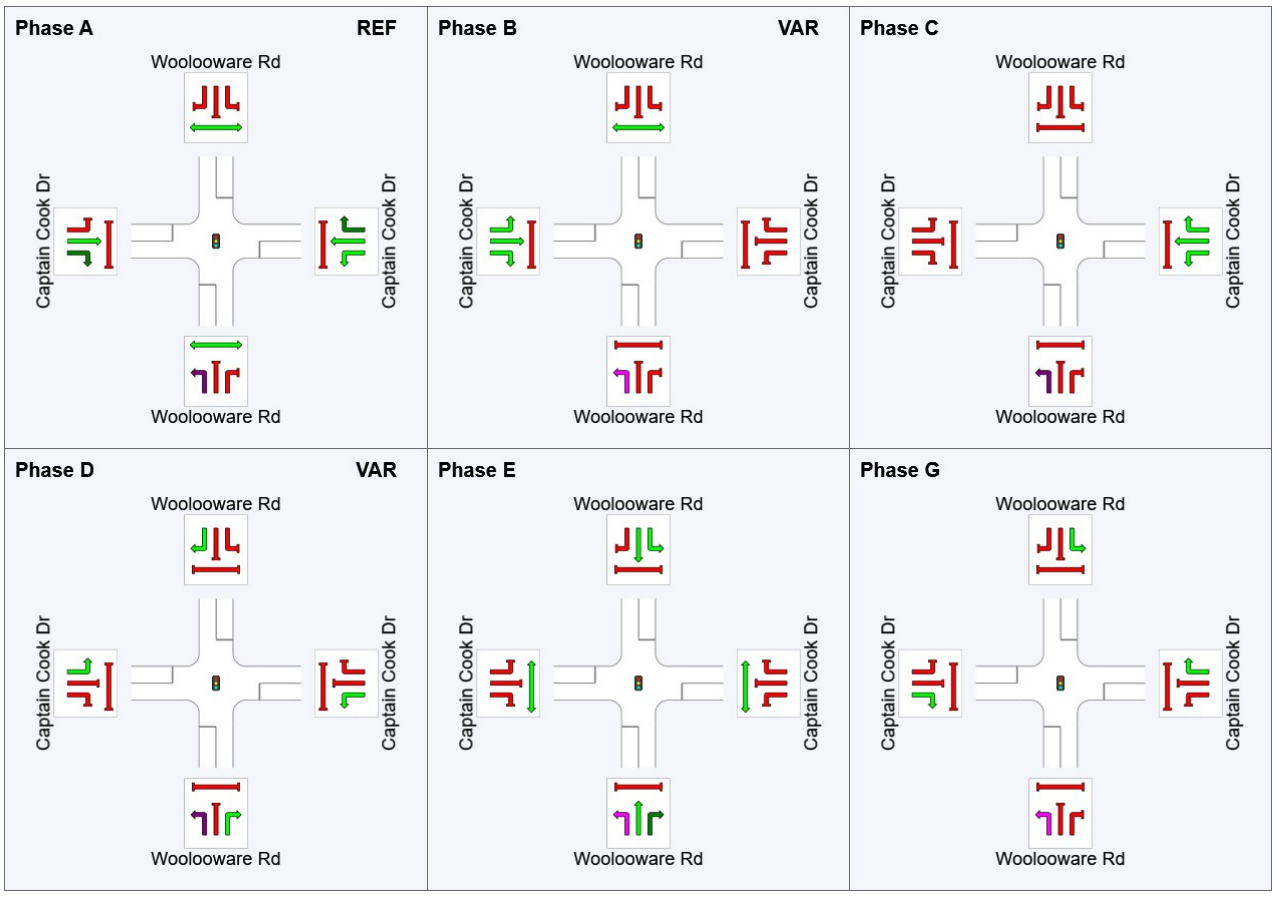
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C, D*, E, G
Output Phase Sequence: A, B*, C, D*, E, G
(* Variable Phase)

Phase Timing Summary

Phase	A	B	C	D	E	G
Phase Change Time (sec)	0	23	35	50	62	97
Green Time (sec)	17	6	9	6	29	10
Phase Time (sec)	23	12	15	12	35	16
Phase Split	20%	11%	13%	11%	31%	14%

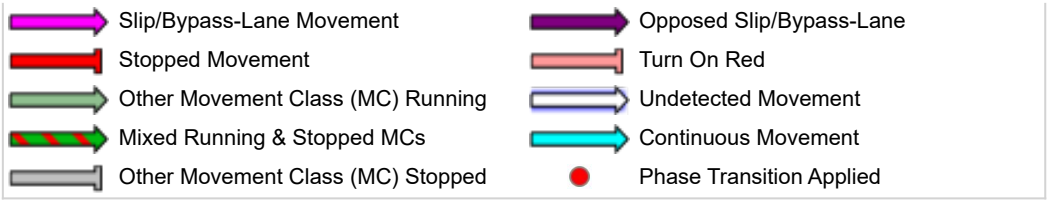
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2031 Base + Proposal AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	569	5.4	0.501	7.0	LOS A	6.0	44.3	0.62	0.80	0.68	52.0
3	R2	136	10.1	0.501	15.8	LOS B	6.0	44.3	0.62	0.80	0.68	52.9
3u	U	1	0.0	0.501	17.4	LOS B	6.0	44.3	0.62	0.80	0.68	54.5
Approach		706	6.3	0.501	8.7	LOS A	6.0	44.3	0.62	0.80	0.68	52.2
East: RoadName												
4	L2	172	9.8	0.203	6.9	LOS A	1.2	8.8	0.60	0.67	0.60	53.1
5	T1	541	27.0	0.499	6.9	LOS A	3.8	32.9	0.71	0.67	0.71	53.1
Approach		713	22.9	0.499	6.9	LOS A	3.8	32.9	0.68	0.67	0.69	53.1
West: Captain Cook Dr												
11	T1	536	21.4	0.385	5.0	LOS A	2.9	24.2	0.42	0.47	0.42	54.7
12	R2	408	4.6	0.324	9.8	LOS A	2.3	16.5	0.41	0.62	0.41	52.0
12u	U	3	0.0	0.324	11.8	LOS A	2.3	16.5	0.41	0.62	0.41	53.0
Approach		947	14.1	0.385	7.1	LOS A	2.9	24.2	0.42	0.53	0.42	53.5
All Vehicles		2366	14.4	0.501	7.5	LOS A	6.0	44.3	0.56	0.65	0.58	53.0

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2031 Base + Proposal SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	660	0.8	0.757	16.3	LOS B	20.5	144.8	1.00	1.16	1.42	45.8
3	R2	236	1.8	0.757	24.6	LOS B	20.5	144.8	1.00	1.16	1.42	46.6
3u	U	1	0.0	0.757	26.6	LOS B	20.5	144.8	1.00	1.16	1.42	47.6
Approach		897	1.1	0.757	18.5	LOS B	20.5	144.8	1.00	1.16	1.42	46.0
East: RoadName												
4	L2	246	4.3	0.320	7.9	LOS A	2.1	15.3	0.74	0.78	0.74	52.5
5	T1	736	10.0	0.704	10.8	LOS A	9.2	70.0	0.94	0.98	1.21	51.6
Approach		982	8.6	0.704	10.1	LOS A	9.2	70.0	0.89	0.93	1.09	51.8
West: Captain Cook Dr												
11	T1	749	9.8	0.563	5.6	LOS A	5.5	41.5	0.67	0.54	0.67	53.8
12	R2	548	1.3	0.481	10.5	LOS A	4.1	29.0	0.64	0.69	0.64	51.4
12u	U	3	0.0	0.481	12.6	LOS A	4.1	29.0	0.64	0.69	0.64	52.3
Approach		1301	6.2	0.563	7.7	LOS A	5.5	41.5	0.66	0.60	0.66	52.7
All Vehicles		3180	5.5	0.757	11.5	LOS A	20.5	144.8	0.83	0.86	1.01	50.4

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

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base + Proposal AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	23	0.0	0.017	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.012	45.1	LOS D	0.0	0.2	0.92	0.97	0.92	33.8
Approach		24	0.0	0.017	7.3	LOS A	0.0	0.2	0.04	0.57	0.04	52.9
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	554	35.7	0.350	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		555	35.7	0.350	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	703	27.4	0.428	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	23	0.0	0.035	9.3	LOS A	0.1	0.9	0.56	0.74	0.56	50.8
Approach		726	26.5	0.428	0.4	NA	0.1	0.9	0.02	0.02	0.02	59.5
All Vehicles		1305	29.9	0.428	0.4	NA	0.1	0.9	0.01	0.02	0.01	59.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base + Proposal PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	134	0.0	0.100	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.009	34.1	LOS C	0.0	0.2	0.89	0.94	0.89	37.7
Approach		135	0.0	0.100	5.8	LOS A	0.0	0.2	0.01	0.55	0.01	54.1
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	746	1.7	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		747	1.7	0.387	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	454	2.6	0.239	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	134	0.0	0.241	11.5	LOS A	0.9	6.6	0.68	0.88	0.73	49.3
Approach		587	2.0	0.241	2.6	NA	0.9	6.6	0.15	0.20	0.17	57.1
All Vehicles		1469	1.6	0.387	1.6	NA	0.9	6.6	0.06	0.13	0.07	58.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2031 Base + Proposal SAT]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	245	0.0	0.184	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.007	26.7	LOS B	0.0	0.1	0.86	0.88	0.86	40.7
Approach		246	0.0	0.184	5.7	LOS A	0.0	0.1	0.00	0.55	0.00	54.2
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	507	6.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		508	6.0	0.270	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	482	9.0	0.264	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	245	0.0	0.307	9.2	LOS A	1.4	10.0	0.58	0.84	0.66	50.9
Approach		727	5.9	0.307	3.1	NA	1.4	10.0	0.20	0.28	0.22	56.5
All Vehicles		1482	5.0	0.307	2.5	NA	1.4	10.0	0.10	0.23	0.11	57.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2031 Base + Proposal PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	42	0.0	0.298	35.2	LOS C	1.0	7.0	0.91	0.99	1.04	37.2
Approach		43	0.0	0.298	34.5	LOS C	1.0	7.0	0.88	0.98	1.01	37.5
East: Captain Cook Dr (E)												
4	L2	42	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	746	1.7	0.387	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		788	1.6	0.387	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: Captain Cook Dr (W)												
11	T1	454	2.6	0.237	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.002	10.5	LOS A	0.0	0.0	0.63	0.65	0.63	50.0
Approach		455	2.5	0.237	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1286	1.9	0.387	1.4	NA	1.0	7.0	0.03	0.05	0.03	58.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2031 Base + Proposal SAT]

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

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	84	0.0	0.407	28.0	LOS B	1.6	11.2	0.88	1.02	1.14	40.2
Approach		85	0.0	0.407	27.7	LOS B	1.6	11.2	0.87	1.01	1.12	40.3
East: Captain Cook Dr (E)												
4	L2	84	0.0	0.045	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	524	9.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		608	7.8	0.285	0.8	NA	0.0	0.0	0.00	0.08	0.00	59.0
West: Captain Cook Dr (W)												
11	T1	478	9.0	0.259	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	1	0.0	0.001	8.7	LOS A	0.0	0.0	0.54	0.60	0.54	51.2
Approach		479	9.0	0.259	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1173	7.7	0.407	2.4	NA	1.6	11.2	0.06	0.12	0.08	57.4

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base + Proposal AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	101	93.8	0.211	11.0	LOS A	1.1	13.8	0.67	0.80	0.67	47.0
3	R2	3	66.7	0.211	13.5	LOS A	1.1	13.8	0.67	0.80	0.67	48.1
Approach		104	92.9	0.211	11.0	LOS A	1.1	13.8	0.67	0.80	0.67	47.0
East: Captain Cook Dr (E)												
4	L2	7	57.1	0.423	7.5	LOS A	2.8	22.5	0.51	0.59	0.51	50.4
5	T1	419	18.6	0.423	6.5	LOS A	2.8	22.5	0.51	0.59	0.51	52.8
Approach		426	19.3	0.423	6.5	LOS A	2.8	22.5	0.51	0.59	0.51	52.8
West: Captain Cook Dr (W)												
11	T1	459	5.7	0.409	4.6	LOS A	3.5	29.8	0.07	0.50	0.07	54.8
12	R2	152	79.2	0.409	9.0	LOS A	3.5	29.8	0.07	0.50	0.07	51.3
Approach		611	24.0	0.409	5.7	LOS A	3.5	29.8	0.07	0.50	0.07	53.9
All Vehicles		1141	28.5	0.423	6.5	LOS A	3.5	29.8	0.29	0.56	0.29	52.8

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base + Proposal PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	61	0.0	0.093	8.4	LOS A	0.5	3.6	0.66	0.72	0.66	51.1
3	R2	8	0.0	0.093	12.1	LOS A	0.5	3.6	0.66	0.72	0.66	51.7
Approach		69	0.0	0.093	8.8	LOS A	0.5	3.6	0.66	0.72	0.66	51.2
East: Captain Cook Dr (E)												
4	L2	9	0.0	0.454	4.7	LOS A	3.4	24.0	0.23	0.45	0.23	53.5
5	T1	642	2.5	0.454	4.9	LOS A	3.4	24.0	0.23	0.45	0.23	54.4
Approach		652	2.4	0.454	4.9	LOS A	3.4	24.0	0.23	0.45	0.23	54.4
West: Captain Cook Dr (W)												
11	T1	424	2.5	0.295	4.6	LOS A	2.2	15.7	0.08	0.47	0.08	54.8
12	R2	47	0.0	0.295	8.1	LOS A	2.2	15.7	0.08	0.47	0.08	54.5
Approach		472	2.2	0.295	4.9	LOS A	2.2	15.7	0.08	0.47	0.08	54.7
All Vehicles		1193	2.2	0.454	5.1	LOS A	3.4	24.0	0.20	0.48	0.20	54.3

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

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2031 Base + Proposal SAT]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	53	34.0	0.096	9.1	LOS A	0.5	4.3	0.63	0.73	0.63	49.5
3	R2	11	0.0	0.096	11.4	LOS A	0.5	4.3	0.63	0.73	0.63	51.3
Approach		63	28.3	0.096	9.5	LOS A	0.5	4.3	0.63	0.73	0.63	49.8
East: Captain Cook Dr (E)												
4	L2	11	0.0	0.410	4.8	LOS A	2.9	21.0	0.24	0.46	0.24	53.5
5	T1	556	5.3	0.410	4.9	LOS A	2.9	21.0	0.24	0.46	0.24	54.3
Approach		566	5.2	0.410	4.9	LOS A	2.9	21.0	0.24	0.46	0.24	54.3
West: Captain Cook Dr (W)												
11	T1	514	5.5	0.362	4.6	LOS A	2.9	21.5	0.10	0.47	0.10	54.7
12	R2	49	23.4	0.362	8.4	LOS A	2.9	21.5	0.10	0.47	0.10	53.5
Approach		563	7.1	0.362	5.0	LOS A	2.9	21.5	0.10	0.47	0.10	54.6
All Vehicles		1193	7.3	0.410	5.2	LOS A	2.9	21.5	0.20	0.48	0.20	54.2

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

MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2021 Base + Proposal AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	516	5.3	0.473	7.0	LOS A	5.5	40.7	0.63	0.80	0.69	52.0
3	R2	136	10.1	0.473	15.5	LOS B	5.5	40.7	0.63	0.80	0.69	52.9
3u	U	1	0.0	0.473	17.1	LOS B	5.5	40.7	0.63	0.80	0.69	54.4
Approach		653	6.3	0.473	8.8	LOS A	5.5	40.7	0.63	0.80	0.69	52.2
East: Captain Cook Dr (E)												
4	L2	172	9.8	0.196	6.6	LOS A	1.1	8.4	0.57	0.65	0.57	53.3
5	T1	536	32.8	0.493	6.7	LOS A	3.7	33.3	0.68	0.64	0.68	53.1
Approach		707	27.2	0.493	6.7	LOS A	3.7	33.3	0.66	0.64	0.66	53.2
West: Captain Cook Dr (W)												
11	T1	533	26.5	0.393	5.0	LOS A	3.0	25.7	0.43	0.47	0.43	54.6
12	R2	368	4.3	0.296	9.7	LOS A	2.0	14.6	0.40	0.62	0.40	52.1
12u	U	3	0.0	0.296	11.8	LOS A	2.0	14.6	0.40	0.62	0.40	53.1
Approach		904	17.3	0.393	7.0	LOS A	3.0	25.7	0.42	0.53	0.42	53.5
All Vehicles		2264	17.2	0.493	7.4	LOS A	5.5	40.7	0.55	0.64	0.57	53.0

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

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2021 Base + Proposal AM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	23	0.0	0.017	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.008	30.1	LOS C	0.0	0.2	0.88	0.91	0.88	39.3
Approach		24	0.0	0.017	6.7	LOS A	0.0	0.2	0.04	0.57	0.04	53.4
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	509	36.8	0.324	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		511	36.7	0.324	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	571	32.1	0.357	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
12	R2	23	0.0	0.033	8.9	LOS A	0.1	0.8	0.54	0.72	0.54	51.1
Approach		594	30.9	0.357	0.4	NA	0.1	0.8	0.02	0.03	0.02	59.5
All Vehicles		1128	32.8	0.357	0.4	NA	0.1	0.8	0.01	0.03	0.01	59.5

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2021 Base + Proposal AM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	101	93.8	0.201	10.4	LOS A	1.0	13.0	0.64	0.78	0.64	47.3
3	R2	3	66.7	0.201	13.0	LOS A	1.0	13.0	0.64	0.78	0.64	48.4
Approach		104	92.9	0.201	10.5	LOS A	1.0	13.0	0.64	0.78	0.64	47.3
East: Captain Cook Dr (E)												
4	L2	8	62.5	0.388	7.6	LOS A	2.4	19.9	0.49	0.59	0.49	50.3
5	T1	380	18.6	0.388	6.5	LOS A	2.4	19.9	0.49	0.59	0.49	52.9
Approach		388	19.5	0.388	6.5	LOS A	2.4	19.9	0.49	0.59	0.49	52.8
West: Captain Cook Dr (W)												
11	T1	418	6.3	0.385	4.6	LOS A	3.2	27.2	0.06	0.50	0.06	54.8
12	R2	152	79.2	0.385	9.0	LOS A	3.2	27.2	0.06	0.50	0.06	51.3
Approach		569	25.7	0.385	5.8	LOS A	3.2	27.2	0.06	0.50	0.06	53.8
All Vehicles		1062	30.0	0.388	6.5	LOS A	3.2	27.2	0.28	0.56	0.28	52.7

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

MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base + Proposal AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 135 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.283	25.8	LOS B	8.3	61.1	0.67	0.73	0.67	41.9
2	T1	13	8.3	0.283	20.1	LOS B	8.3	61.1	0.67	0.73	0.67	34.8
3	R2	23	9.1	0.090	52.8	LOS D	1.3	9.6	0.88	0.69	0.88	31.6
Approach		245	5.6	0.283	28.0	LOS B	8.3	61.1	0.69	0.73	0.69	40.4
East: Captain Cook Dr												
4	L2	24	4.3	0.892	65.4	LOS E	35.4	290.2	1.00	1.03	1.19	29.7
5	T1	931	20.7	0.892	59.9	LOS E	35.4	290.2	1.00	1.04	1.19	30.2
6	R2	8	12.5	0.046	42.0	LOS C	0.4	3.1	0.76	0.69	0.76	26.3
Approach		963	20.2	0.892	59.9	LOS E	35.4	290.2	1.00	1.03	1.19	30.2
North: Woolooware Rd												
7	L2	2	50.0	0.023	59.5	LOS E	0.2	2.4	0.89	0.62	0.89	21.6
8	T1	2	50.0	0.023	55.2	LOS D	0.2	2.4	0.89	0.62	0.89	22.6
9	R2	2	50.0	0.017	74.0	LOS F	0.1	0.7	0.97	0.59	0.97	18.5
Approach		6	50.0	0.023	62.9	LOS E	0.2	2.4	0.92	0.61	0.92	20.8
West: Captain Cook Dr												
10	L2	4	0.0	0.004	5.9	LOS A	0.0	0.0	0.02	0.58	0.02	48.3
11	T1	1199	11.6	0.558	0.9	LOS A	1.7	13.2	0.05	0.04	0.05	59.2
12	R2	543	1.9	0.846	33.3	LOS C	27.5	195.7	0.89	0.92	1.10	38.1
Approach		1746	8.6	0.846	11.0	LOS A	27.5	195.7	0.31	0.32	0.38	50.4
All Vehicles		2961	12.2	0.892	28.4	LOS B	35.4	290.2	0.57	0.58	0.67	40.7

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	37.9	LOS D	0.2	0.2	0.75	0.75
P2	East Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
P3	North Full Crossing	53	16.2	LOS B	0.1	0.1	0.49	0.49
P4	West Full Crossing	53	61.8	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		211	44.4	LOS E			0.79	0.79

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base + Proposal AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 135 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

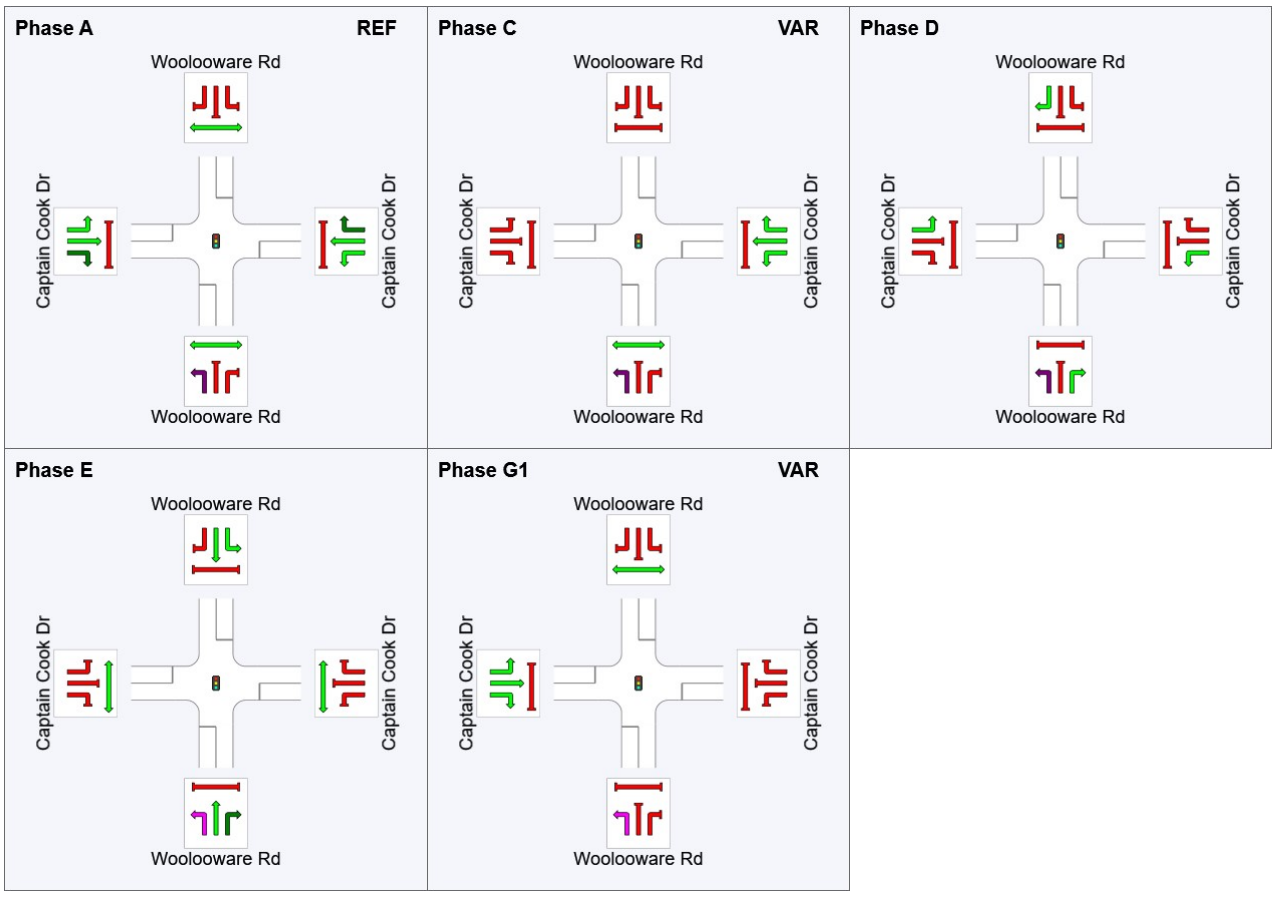
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	37	49	61	86
Green Time (sec)	31	6	6	19	43
Phase Time (sec)	37	12	12	25	49
Phase Split	27%	9%	9%	19%	36%

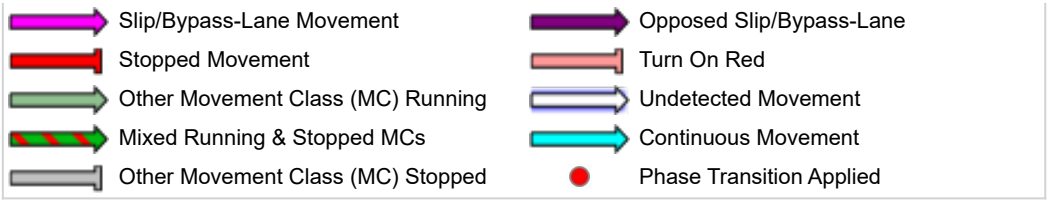
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 102 [Elouera Rd / Captain Cook Dr - 2021 Base + Proposal PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	291	1.4	0.441	7.6	LOS A	5.3	37.9	0.84	0.87	0.87	51.1
3	R2	208	2.0	0.441	13.9	LOS A	5.3	37.9	0.84	0.87	0.87	52.1
3u	U	1	0.0	0.441	16.0	LOS B	5.3	37.9	0.84	0.87	0.87	53.3
Approach		500	1.7	0.441	10.2	LOS A	5.3	37.9	0.84	0.87	0.87	51.5
East: RoadName												
4	L2	292	3.6	0.393	8.8	LOS A	2.8	20.0	0.82	0.84	0.82	51.8
5	T1	596	1.2	0.588	9.7	LOS A	6.3	44.6	0.91	0.92	1.08	52.6
Approach		887	2.0	0.588	9.4	LOS A	6.3	44.6	0.88	0.89	0.99	52.3
West: Captain Cook Dr												
11	T1	511	2.1	0.429	5.4	LOS A	3.4	24.3	0.56	0.53	0.56	54.5
12	R2	664	1.0	0.462	9.9	LOS A	4.0	28.2	0.55	0.64	0.55	51.7
12u	U	3	0.0	0.462	12.0	LOS A	4.0	28.2	0.55	0.64	0.55	52.5
Approach		1178	1.4	0.462	8.0	LOS A	4.0	28.2	0.56	0.59	0.56	52.9
All Vehicles		2565	1.7	0.588	8.9	LOS A	6.3	44.6	0.72	0.75	0.77	52.4

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

MOVEMENT SUMMARY

Site: 101 [Existing Breen Access / Captain Cook Dr - 2021 Base + Proposal PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: RoadName												
1	L2	134	0.0	0.100	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	1	0.0	0.007	27.7	LOS B	0.0	0.2	0.86	0.89	0.86	40.3
Approach		135	0.0	0.100	5.8	LOS A	0.0	0.2	0.01	0.55	0.01	54.2
East: RoadName												
4	L2	1	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	678	1.7	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		679	1.7	0.351	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: RoadName												
11	T1	416	3.5	0.220	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	134	0.0	0.214	10.3	LOS A	0.8	5.7	0.62	0.84	0.63	50.1
Approach		549	2.7	0.220	2.5	NA	0.8	5.7	0.15	0.21	0.15	57.2
All Vehicles		1363	1.9	0.351	1.6	NA	0.8	5.7	0.06	0.14	0.06	58.2

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Hockey Access / Captain Cook Dr - 2021 Base + Proposal PM]

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

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Hockey Field												
1	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.55	0.00	54.3
3	R2	42	0.0	0.235	27.2	LOS B	0.8	5.6	0.87	0.97	0.95	40.5
Approach		43	0.0	0.235	26.7	LOS B	0.8	5.6	0.85	0.96	0.92	40.8
East: Captain Cook Dr (E)												
4	L2	42	0.0	0.023	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
5	T1	678	1.7	0.351	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		720	1.6	0.351	0.4	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: Captain Cook Dr (W)												
11	T1	416	3.5	0.218	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.002	9.7	LOS A	0.0	0.0	0.58	0.63	0.58	50.6
Approach		417	3.5	0.218	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1180	2.2	0.351	1.2	NA	0.8	5.6	0.03	0.06	0.03	58.7

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.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Lindum Rd / Captain Cook Dr - 2021 Base + Proposal PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lindum Road												
1	L2	61	0.0	0.089	7.9	LOS A	0.5	3.4	0.63	0.71	0.63	51.5
3	R2	8	0.0	0.089	11.6	LOS A	0.5	3.4	0.63	0.71	0.63	52.1
Approach		69	0.0	0.089	8.4	LOS A	0.5	3.4	0.63	0.71	0.63	51.5
East: Captain Cook Dr (E)												
4	L2	9	11.1	0.424	4.9	LOS A	3.0	21.4	0.24	0.46	0.24	53.1
5	T1	585	2.3	0.424	4.9	LOS A	3.0	21.4	0.24	0.46	0.24	54.4
Approach		595	2.5	0.424	4.9	LOS A	3.0	21.4	0.24	0.46	0.24	54.4
West: Captain Cook Dr (W)												
11	T1	386	2.2	0.276	4.6	LOS A	2.0	14.3	0.08	0.48	0.08	54.8
12	R2	53	10.0	0.276	8.2	LOS A	2.0	14.3	0.08	0.48	0.08	54.1
Approach		439	3.1	0.276	5.0	LOS A	2.0	14.3	0.08	0.48	0.08	54.7
All Vehicles		1103	2.6	0.424	5.2	LOS A	3.0	21.4	0.20	0.48	0.20	54.3

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

MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base + Proposal PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	209	5.0	0.246	17.9	LOS B	5.8	42.4	0.59	0.70	0.59	46.0
2	T1	12	9.1	0.246	12.3	LOS A	5.8	42.4	0.59	0.70	0.59	39.9
3	R2	23	9.1	0.080	40.9	LOS C	1.0	7.5	0.86	0.69	0.86	35.2
Approach		244	5.6	0.246	19.8	LOS B	5.8	42.4	0.62	0.70	0.62	44.5
East: Captain Cook Dr												
4	L2	24	4.3	0.882	58.7	LOS E	25.9	183.5	1.00	1.04	1.23	31.5
5	T1	829	1.3	0.882	53.1	LOS D	25.9	183.5	1.00	1.04	1.24	32.0
6	R2	8	12.5	0.042	41.2	LOS C	0.4	2.8	0.83	0.68	0.83	26.6
Approach		862	1.5	0.882	53.2	LOS D	25.9	183.5	1.00	1.03	1.23	32.0
North: Woolooware Rd												
7	L2	2	50.0	0.021	48.2	LOS D	0.2	2.0	0.88	0.61	0.88	24.4
8	T1	2	50.0	0.021	43.9	LOS D	0.2	2.0	0.88	0.61	0.88	25.8
9	R2	2	50.0	0.014	59.9	LOS E	0.1	0.6	0.96	0.59	0.96	21.2
Approach		6	50.0	0.021	50.7	LOS D	0.2	2.0	0.91	0.61	0.91	23.6
West: Captain Cook Dr												
10	L2	4	0.0	0.004	6.8	LOS A	0.0	0.1	0.09	0.58	0.09	47.2
11	T1	1123	0.3	0.558	5.4	LOS A	7.9	55.1	0.28	0.25	0.28	55.1
12	R2	543	1.9	0.830	26.0	LOS B	21.4	152.6	0.87	0.88	0.98	41.2
Approach		1671	0.8	0.830	12.1	LOS A	21.4	152.6	0.47	0.46	0.51	49.6
All Vehicles		2783	1.6	0.882	25.6	LOS B	25.9	183.5	0.65	0.66	0.74	42.0

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	37.7	LOS D	0.1	0.1	0.83	0.83
P2	East Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	18.7	LOS B	0.1	0.1	0.58	0.58
P4	West Full Crossing	53	49.3	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	38.7	LOS D			0.83	0.83

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

PHASING SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2021 Base + Proposal PM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

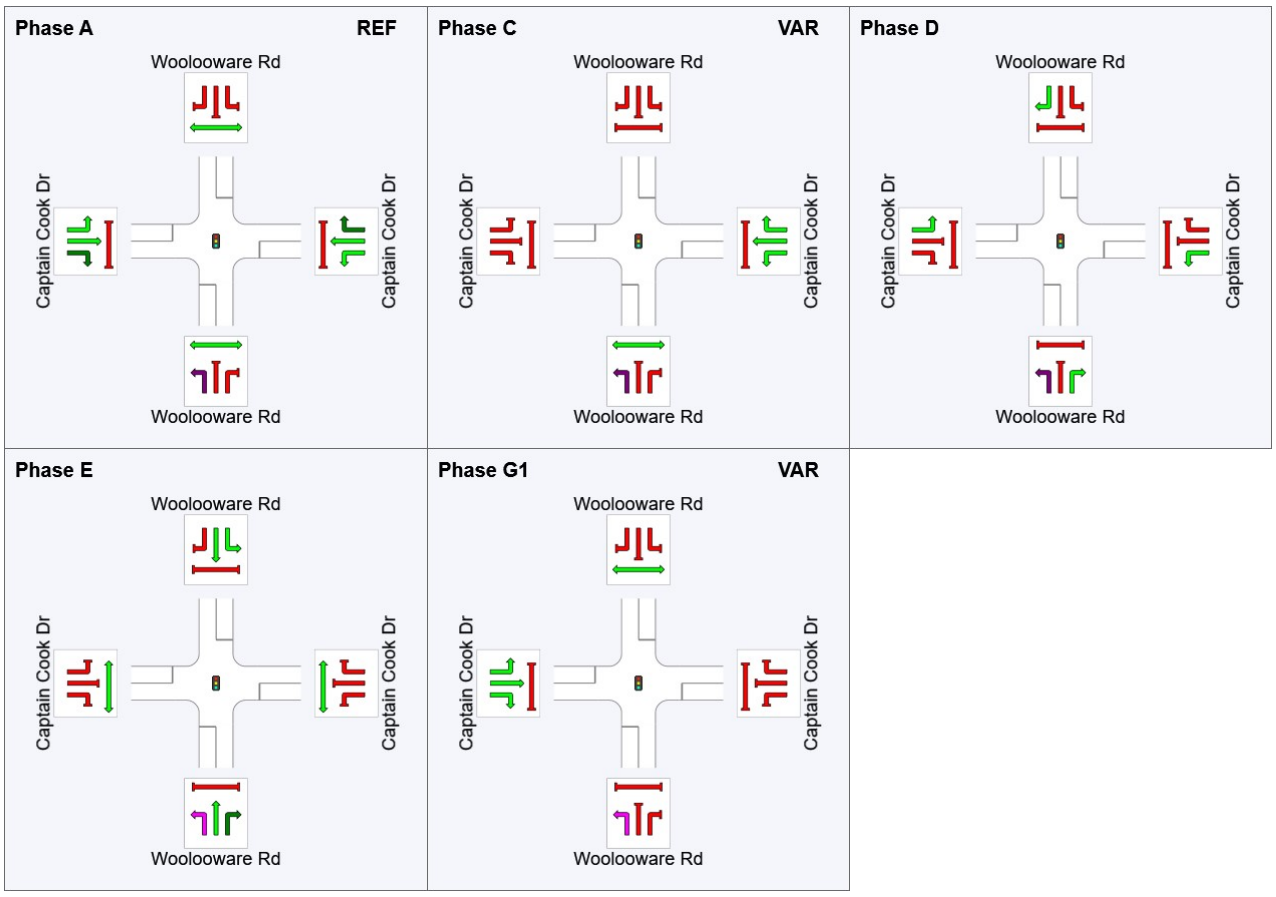
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Green Split Priority has been specified
Phase Sequence: Variable Phasing
Reference Phase: Phase A
Input Phase Sequence: A, B*, C*, D, E, G1*
Output Phase Sequence: A, C*, D, E, G1*
(* Variable Phase)

Phase Timing Summary

Phase	A	C	D	E	G1
Phase Change Time (sec)	0	22	34	46	69
Green Time (sec)	16	6	6	17	35
Phase Time (sec)	22	12	12	23	41
Phase Split	20%	11%	11%	21%	37%

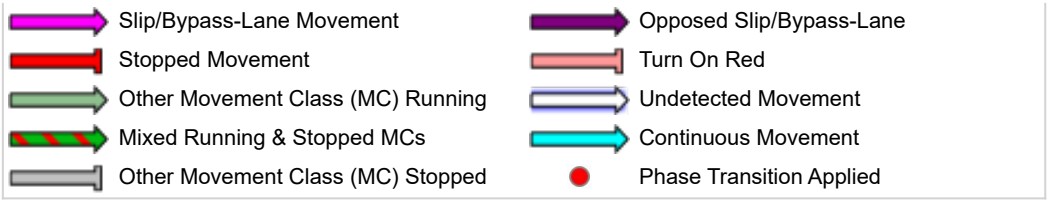
See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency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

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

Normal Movement Permitted/Opposed



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MOVEMENT SUMMARY

Site: 101 [Woolooware Rd / Captain Cook Dr - 2031 Base + Proposal AM]

New Site
Site Category: (None)
Signals - Fixed Time Coordinated Cycle Time = 109 seconds (Site Optimum Cycle Time - Minimum Delay)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Woolooware Rd												
1	L2	206	1.0	0.841	58.2	LOS E	16.4	116.0	1.00	1.09	1.69	31.1
2	T1	128	2.0	0.841	52.6	LOS D	16.4	116.0	1.00	1.09	1.69	23.1
3	R2	21	0.9	0.100	41.0	LOS C	0.9	6.3	0.92	0.69	0.92	35.3
Approach		355	1.4	0.841	55.2	LOS D	16.4	116.0	1.00	1.07	1.64	28.9
East: Captain Cook Dr												
4	L2	24	4.3	0.940	70.1	LOS E	33.3	239.2	1.00	1.16	1.38	28.7
5	T1	837	3.0	0.940	64.7	LOS E	33.3	239.2	0.98	1.15	1.40	29.1
6	R2	119	0.0	0.483	46.0	LOS D	6.0	41.9	0.97	0.82	0.97	25.0
Approach		980	2.7	0.940	62.6	LOS E	33.3	239.2	0.98	1.11	1.35	28.7
North: Woolooware Rd												
7	L2	77	0.0	0.701	54.5	LOS D	10.2	71.3	1.00	0.86	1.07	23.6
8	T1	115	0.0	0.701	50.2	LOS D	10.2	71.3	1.00	0.86	1.07	24.1
9	R2	21	0.0	0.103	60.0	LOS E	0.6	3.9	0.98	0.67	0.98	21.7
Approach		213	0.0	0.701	52.7	LOS D	10.2	71.3	1.00	0.84	1.06	23.7
West: Captain Cook Dr												
10	L2	42	0.0	0.043	7.5	LOS A	0.2	1.3	0.14	0.60	0.14	46.5
11	T1	1184	2.1	0.641	7.4	LOS A	11.9	84.8	0.39	0.35	0.39	53.5
12	R2	515	0.2	0.834	27.7	LOS B	20.7	145.2	0.89	0.88	1.01	40.5
Approach		1741	1.5	0.834	13.4	LOS A	20.7	145.2	0.53	0.51	0.57	48.7
All Vehicles		3289	1.7	0.940	35.1	LOS C	33.3	239.2	0.74	0.77	0.95	36.9

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

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	53	35.6	LOS D	0.1	0.1	0.81	0.81
P2	East Full Crossing	53	48.8	LOS E	0.2	0.2	0.95	0.95
P3	North Full Crossing	53	20.0	LOS C	0.1	0.1	0.61	0.61
P4	West Full Crossing	53	48.8	LOS E	0.2	0.2	0.95	0.95
All Pedestrians		211	38.3	LOS D			0.83	0.83

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: 102 [Elouera Rd / Captain Cook Dr - 2031 Base + Proposal PM]

New Site
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elouera Rd												
1	L2	399	1.3	0.509	8.3	LOS A	7.4	52.2	0.87	0.92	0.96	50.8
3	R2	208	2.0	0.509	15.0	LOS B	7.4	52.2	0.87	0.92	0.96	51.8
3u	U	1	0.0	0.509	17.1	LOS B	7.4	52.2	0.87	0.92	0.96	53.0
Approach		608	1.6	0.509	10.6	LOS A	7.4	52.2	0.87	0.92	0.96	51.1
East: RoadName												
4	L2	292	3.6	0.594	18.9	LOS B	5.9	42.7	1.00	1.14	1.36	45.3
5	T1	606	1.4	0.881	38.4	LOS C	20.4	144.5	1.00	1.57	2.43	37.4
Approach		898	2.1	0.881	32.1	LOS C	20.4	144.5	1.00	1.43	2.08	39.6
West: Captain Cook Dr												
11	T1	673	1.7	0.570	5.7	LOS A	5.3	37.7	0.66	0.56	0.66	54.0
12	R2	962	0.8	0.665	10.3	LOS A	7.4	51.9	0.69	0.65	0.69	51.2
12u	U	3	0.0	0.665	12.4	LOS A	7.4	51.9	0.69	0.65	0.69	52.1
Approach		1638	1.2	0.665	8.4	LOS A	7.4	51.9	0.68	0.61	0.68	52.3
All Vehicles		3144	1.5	0.881	15.6	LOS B	20.4	144.5	0.81	0.91	1.13	47.8

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

Breen SSD Application: New Resource Recovery Facility and Marang Parklands

APPENDIX G

TFNSW CORRESPONDENCE

From: Divna Cvetojevic <Divna.Cvetojevic@transport.nsw.gov.au>
Sent: Friday, 27 November 2020 3:28 PM
To: Hayden Calvey
Cc: Garry Neville; Benjamin Warner
Subject: RE: Breen Resource Recovery Facility - SSD 10412 - Draft Traffic & Transport Report
Attachments: Issued SEARs_14022020_032216_clean.pdf; TfNSW Agency Comments_clean.pdf

Hi Hayden

Thank you for the opportunity to comment on your draft Traffic and Transport Report and please find enclosed below our initial feedback.

While the subject section of Captain Cook Drive (a regional road) and surrounding local road network are under Councils control and no major impacts to the state road network has been projected in your report, suggestions are provided for the following components where TfNSW agreements / approvals will be required:

1. Traffic Modelling
   As the 2018 traffic volumes have been used, for a base case is suggested to use the more recent data and the latest intersection control solutions to be included
   If the "Planning Proposal" is expected to be installed after the proposed "Shark's Development", the associated / generated traffic by this proposal and the Greenhills Beach estate should be included and impacts compered.

2. Construction Traffic Management Plan (CTMP)
   The CTMP provide specific details on the construction program, once know, and in addition to listed information the percentage and size of any heavy vehicles generated as a part of this development in different stages of its delivery should be include as well haulage route (before intersection with Woolooware Road) and as movements through the main intersection Woolooware Road / Captain Cook Drive, considering presented operational level and specifically presented Queue Lengths. (please also see Point 1 above re operation level and queue lengths).

3. Speed Zones and B-Double Routes
   Any proposal related to future B-Doubles street reclassification and the Speed Zone changes proposals, it is suggested to be investigated and discussed with TfNSW relevant teams in an early stage (prior traffic operation and safety options are finalised).

4. General Safety and efficiency
   To ensure the most safer and efficient environment at / in approaches to the access point, an early consultation with Council should be undertaken in relation the right turn from the site onto Captain Cook Drive at the Captain Cook Drive / Existing Breen Resource Facility access.

Please do not hesitate to contact me if any question.

Thank you
Regards

Divna Cvetojevic
Development Assessment Officer
Planning and Programs I Greater Sydney
Transport for NSW

M 0455 515 259
Level 6, 27 Argyle Street, Parramatta NSW2150

From: Hayden Calvey [mailto:hayden.calvey@cardno.com.au]
Sent: Thursday, 12 November 2020 2:22 PM
To: Development Sydney <Development.Sydney@rms.nsw.gov.au>

Cc: Garry Neville <Garry.Neville@cardno.com.au>; Benjamin Warner <benjamin@breen.com.au>
Subject: Breen Resource Recovery Facility - SSD 10412 - Draft Traffic & Transport Report

Hi,

With regard to the subject line State Significant Development (SSD) application and as a consultation requirement of the Environmental Assessment process, I have attached a link below to the draft Traffic & Transport report for the Breen Resource Recovery Facility.
https://fileshare.cardno.com/wl/?id=13CtE1wDijxYERhdYjJzks3GBsEtgLiP
[redacted]

I have also attached the relevant SEARs and TfNSW agency comments for ease of reference.

I note Kerry Ryan is on extended leave (based on her voicemail greeting) as such it would be greatly appreciated if this could be allocated to the relevant assessment officer.

I welcome any comments / feedback on the attached Traffic and Transport report prior to lodgement of the SSD documentation (subject to timing). Alternatively, comments are welcome as part of the referral process from the Department post lodgement of the SSD application.

Kind regards,

Hayden Calvey
TRAFFIC ENGINEERING TEAM LEADER
CARDNO

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Phone Fax +61 2 9439 5170 Direct +61 2 9024 7093 Mobile +61 436 647 763
Address Level 9, The Forum, 203 Pacific Highway, St Leonards, New South Wales 2065 Australia

Email hayden.calvey@cardno.com.au Web www.cardno.com

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