APPENDIX F
TRANSPORT IMPACT ASSESSMENT

Transport Impact Assessment

HOME FIRE SCREEN PRODUCTION FACILITY

LOT 811 MARSHALL ROAD, WHITEMAN

PROJECT	Home Fire Screen Production Facility – Transport Impact Assessment
FILE NAME	81113-716-FLYT-TIA-0009_Rev6

Revision	Description	Originator	Review	Date
0	Draft based on 60% SD	MDR	CAS	28/04/2022
1	Final based on 90% SD	MDR	CAS	05/05/2022
2	Final based on 100% SD – with naming conventions	MDR	CAS	26/05/2022
3	Updated Final based on 100% SD – with naming conventions	MDR	CAS	27/05/2022
4	DA Draft based on DA Plans	MDR	CAS	24/01/2023
5	DA Final based on DA Plans	MDR	CAS	08/02/2023
6	DA Submission based on Updated DA Plans	MDR	CAS	09/03/2023

Contents

1. INTRODUCTION

1.1 Development Introduction

This Transport Impact Assessment (TIA) has been prepared in support of an application for development approval for the Screen Production Facility proposed at Lot 811 (No. 233) Drumpellier Drive, Whiteman. This Screen Production Facility comprises a total of four separate sound stage areas with dedicated workshops, and supporting amenities and facilities. The objective of this project is to deliver, develop and operate a globally competitive film and television studio screen production facility within Western Australia, to develop the local screen industry and attract domestic and international screen productions to the State.

The location of the proposed Screen Production Facility (referred to in this report as the Malaga Site) is shown in Figure 1.

Figure 1 Location of the Malaga Site (source of aerial image: MetroMap)

1.2 Transport Impact Assessment

This TIA has been prepared in accordance with the WA Planning Commission's (WAPC) Transport Impact Assessment Guidelines (Volume 4 – Individual Developments). The Guidelines promote a three level assessment process, where the required level of assessment is dependent on the likely level of impact, as follows (and as shown in Figure 2):

- Low impact – less than 10 peak hour trips, no assessment required.
- Moderate impact – between 10 and 100 peak hour trips, Transport Impact Statement required.
- High impact – more than 100 peak hour trips, full Transport Impact Assessment required.

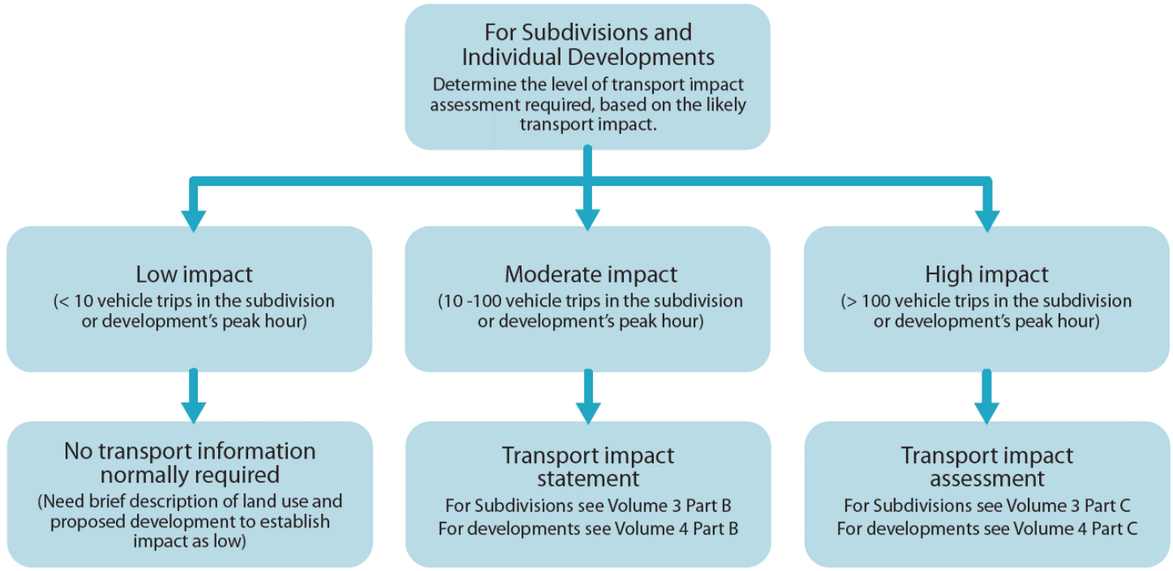

Figure 2 Level of transport impact assessment required (source: WAPC Transport Impact Assessment Guidelines, 2016)

As set out in Section 6, the traffic attributable to the proposed development has been determined to have a high impact with more than 100 vehicle trips generated by the proposed Screen Production Facility during the developments peak hour, therefore the required level of assessment is a TIA.

1.3 Report Structure

The report is structured as required by the WA Planning Commission's (WAPC) Transport Impact Assessment Guidelines (Volume 4 – Individual Developments), with the following items addressed:

- Surrounding major transport infrastructure projects (Section 2)
- Development proposals and site context (Section 3)
- Vehicle access and parking (Section 4)
- Provision for service vehicles (Section 5)

- Traffic volumes and vehicle types (Section 6)
- Pedestrian access and amenity (Section 6.1)
- Bicycle access and amenity (Section 8)
- Public transport access (Section 9)
- Summary (Section 10).

2. SURROUNDING MAJOR TRANSPORT INFRASTRUCTURE PROJECTS

2.1 Malaga Station Precinct (METRONET)

As part of the Morley-Ellenbrook Line, the new Malaga Station will connect the suburbs of Landsdale, Alexander Heights, Ballajura, Malaga and Bennett Springs to Central Perth via Bayswater. The new Malaga Station will be at the centre of a new community planned over the next 30 years.

2.1.1 Precinct Structure Plan

To make the most of the investment in Malaga Station, a precinct structure plan is being developed in consultation with key stakeholders. The Malaga Station Precinct Structure Plan will guide future roads, community facilities, schools, open space and land use in the area surrounding the station. It will also include detail on zoning for transit-orientated residential and employment development opportunities.

A draft of the precinct structure plan is currently in development by the METRONET led team and is expected to be released for public comment in due course, with an expectation that the precinct structure plan is approved by the Western Australian Planning Commission (WAPC) following the period of public comment and finalisation of the precinct structure plan.

Figure 3 shows a 1km catchment from the location of the Malaga Station site and the location of the proposed Screen Production Facility. The plan shows that the largescale Screen Production Facility would be on the edge of the 1km station catchment.

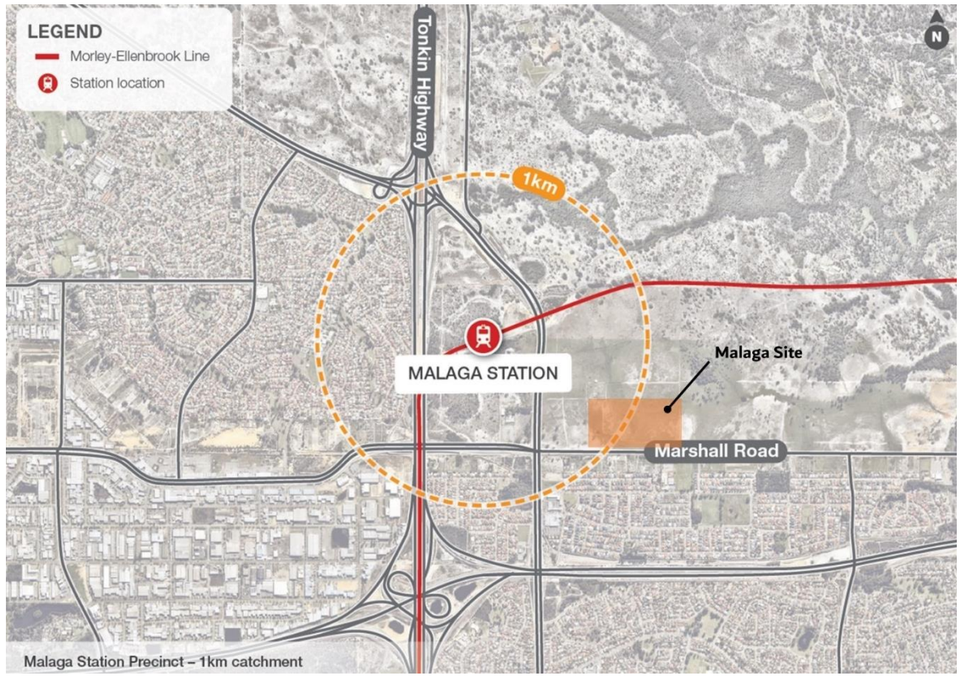

Figure 3 Malaga Site location (base plan source: METRONET Malaga Station Precinct Structure Plan Fact Sheet, September 2021)

Figure 4 shows the location of the Malaga Site in context to the Malaga Station and broader Station Precinct.

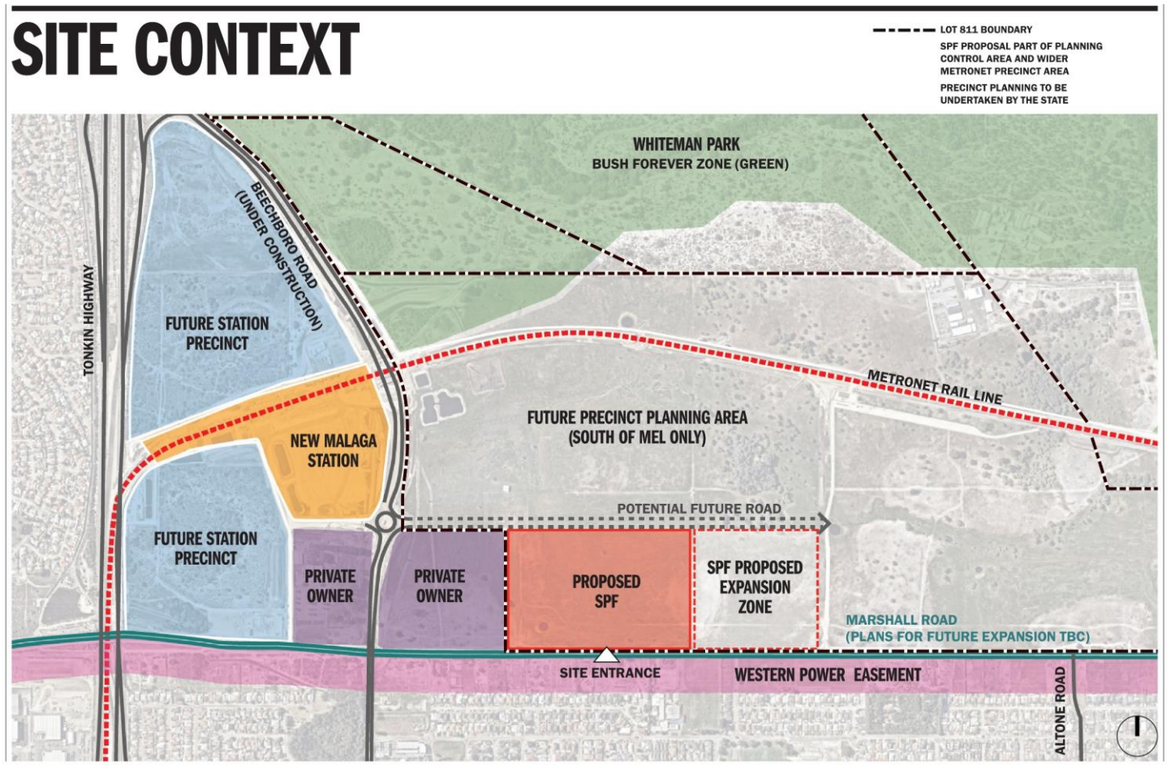

Figure 4 Malaga Site location in context to the Malaga Station Precinct (source: Hassell, March 2023)

2.1.2 Station Overview

Malaga Station will provide connections to the suburbs of Landsdale, Alexander Heights, Ballajura, Malaga and Bennett Springs. The travel time between Malaga Station and Perth Station will be 21 minutes and the new Malaga Station transport hub will connect passengers to the Malaga industrial and employment centre.

Malaga Station is to be designed as a 'station within a park', the design draws on the surrounding parklands and banksia bushlands. The station will be the first significant building in the future Malaga town centre, the architecture and scale considers the future opportunities for the Malaga Station Precinct.

METRONET provide the following overview of facilities to be provided at the new Malaga Station:

- Car Parking
  - 1,100 car parking bays will be provided (including universal access bays)
  - Station car parking will cater for the large number of people living and working in vicinity of the station
  - Station will feature a dedicated drop-off area
  - Vehicle access to the station car parking will be via Beechboro Road North
- Bus interchange
  - 12 bus stand interchange will be provided
  - Buses will provide a regular and reliable transport link from the station to surround suburbs
  - Buses will enter and exit the bus interchange using a separate traffic signal controlled priority lane from Beechboro Road North
- Bike shelters
  - Secure bike shelters will be provided at the station
  - No information is currently publicly available regarding the capacity of secure bike parking to be provided at the station
  - Planning is on-going in relation to walking and cycling connections between the station and the surrounding path network – to ensure a high degree of connectivity between the station and surrounding suburbs
- Journey time and fares
  - A journey between Malaga Station and Perth Station will take 21 minutes – a similar journey time between Perth Station and Whitfords Station on the Joondalup Line or Aubin Grove Station on the Mandurah Line or Mosman Park Station on the Fremantle Line.

Figure 5 shows the indicative Malaga Station Plan.

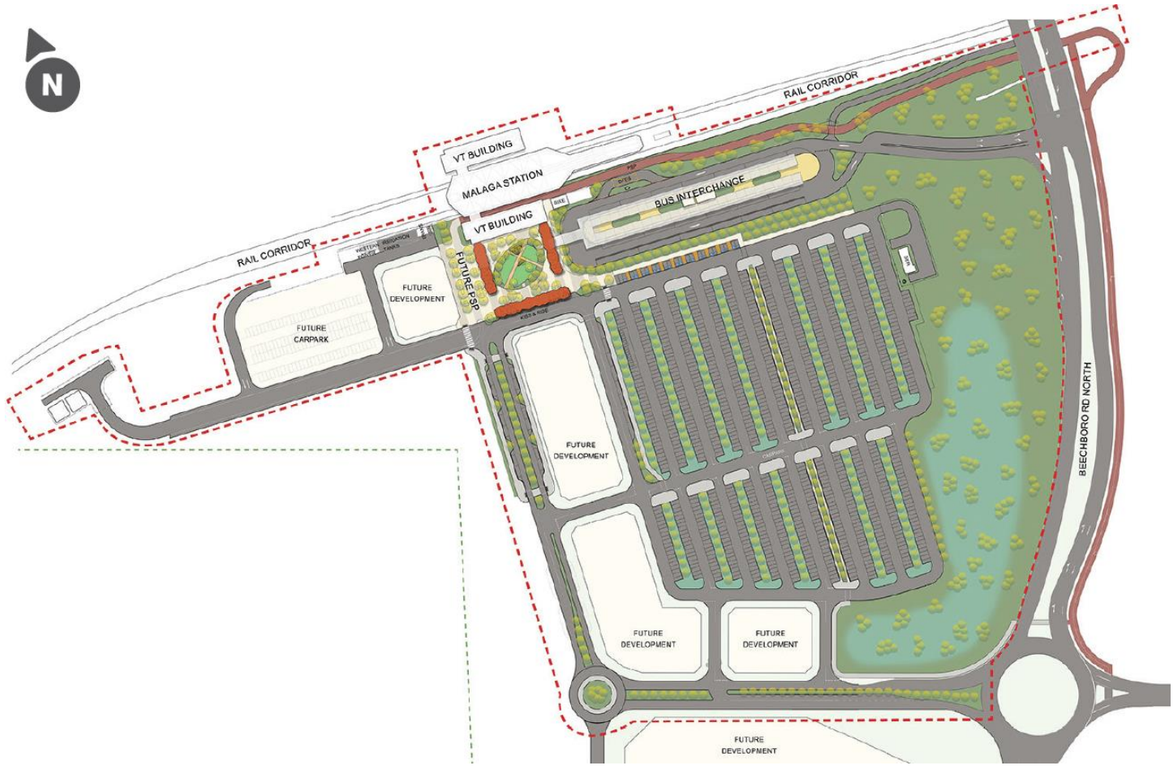

Figure 5 Indicative Malaga Station Plan (source: METRONET Malaga Station Plan Fact Sheet, October 2021)

2.2 Marshall Road Duplication (City of Swan)

Marshall Road is currently a single carriageway road with 1 lane in each direction.

Marshall Road is classified as a District Distributor A road to the west of Beechboro Road North, providing a high degree of connectivity to primary and/or other distributor roads. It serves as an important link between Tonkin Highway and the Malaga Industrial Area. Marshall Road is classified as a Local Distributor road between Beechboro Road North and Drumpellier Drive – past the subject site – and is managed by the City of Swan.

The City has noted that congestion is a regular occurrence during peak hours and is expected to further increase with the urban expansion of surrounding suburbs and completion of the METRONET Morley-Ellenbrook line – and that traffic volumes will shortly exceed 15,000 vehicles per day which is the traffic threshold where duplication is recommended.

2.2.1 Project Background

Traffic counts conducted in September 2019 indicate that 12,850 vehicles per day travel on the single carriage way road. Increasing traffic on recently constructed major connecting roads such as Drumpellier Drive and NorthLink Stage 2 has further increased demand on Marshall Road.

The City intends to stage the duplication over several years. The first stage of the project is the proposed construction of a dual lane roundabout at the intersection of Marshall Road and Beechboro Road North. The City has received $2.5M from the State Government for the construction of the roundabout, which had been intended to commence in due course to possibly coincide with METRONET's upgrade of Beechboro Road North – although indications from the City of Swan in early 2023 suggest that construction of the roundabout at the intersection of Marshall Road and Beechboro Road North will not be completed for another few years.

The timing of further stages of the duplication of Marshall Road (after the construction of the roundabout at the intersection of Marshall Road and Beechboro Road North) is also yet to be determined by the City, with details to be progressed following the development of detailed design and approvals. This will enable detailed cost estimates to be prepared and a suitable funding approach developed – this will go before Council for further consideration through the Long Term Financial Plan and Annual Budgeting processes.

The City has completed a 15% concept design for the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive in Bennett Springs – and the City has consulted with the local community. Indications from the City of Swan in early 2023 suggests that the detailed design for the duplication of Marshall Road is expected to be completed by the end of 2023.

2.2.2 Council Resolution

The City is in the process of planning for detailed design of the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive – with the introduction of a roundabout at the intersection of Beechboro Road North and Marshall Road (currently a traffic signal controlled intersection).

At the City's August 2021 Ordinary Council Meeting, Elected Members resolved (9/6 in favour) to:

1) *Proceed with the planning and detailed design for the roundabout at Beechboro Road North and Marshall Road, and the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive, including intersection upgrades.*
2) *Note that construction of the above roundabout is not planned to be undertaken in 2021/22.*
3) *Undertake the following actions as part of the design process:*
    a. review the need for the pre-deflections on the above roundabout
    b. meet with Main Roads WA, METRONET and landowners, whose property access is impacted by the above roundabout, with an objective of facilitating suitable access to these properties.
4) *Continue to update the Long Term Financial Plan as further detailed estimates are conducted.*
5) *Advise submitters of Council's decision accordingly.*

2.2.3 City of Swan Concept Design

The City's 15% concept design for the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive is shown in Figure 6 and Figure 7. The City's concept design does not provide for access to the proposed Malaga Site for the Screen Production Facility – with the City unaware of the proposals for the site at the time the concept design for the duplication of Marshall Road was developed.

The City's concept design includes an unbroken central median along the frontage to the proposed Malaga Site – as shown in Figure 8. With dual lane roundabouts to the west and east of the site at Marshall Road intersections with Beechboro Road North (Figure 6) and Silver Swan Road (Figure 7).

Figure 6 Marshall Road duplication 15% concept design – Beechboro Road North to Silver Swan Road – western section (source: City of Swan Ordinary Council Meeting, 28 July 2021 – Officers Report Item 5.1)

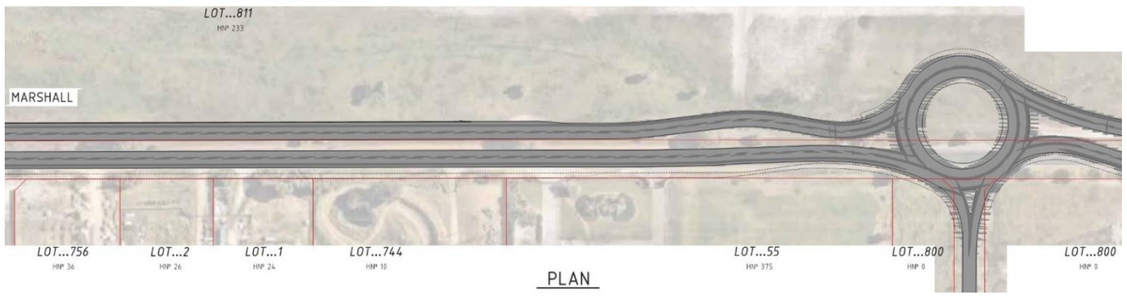

Figure 7 Marshall Road duplication 15% concept design – Beechboro Road North to Silver Swan Road – eastern section (source: City of Swan Ordinary Council Meeting, 28 July 2021 – Officers Report Item 5.1)

Figure 8 also shows that the duplication of Marshall Road requires the widening of the existing road reserve to the north of the current road reserve alignment. As such, the road reserve would be widened into the subject site to facilitate the duplication.

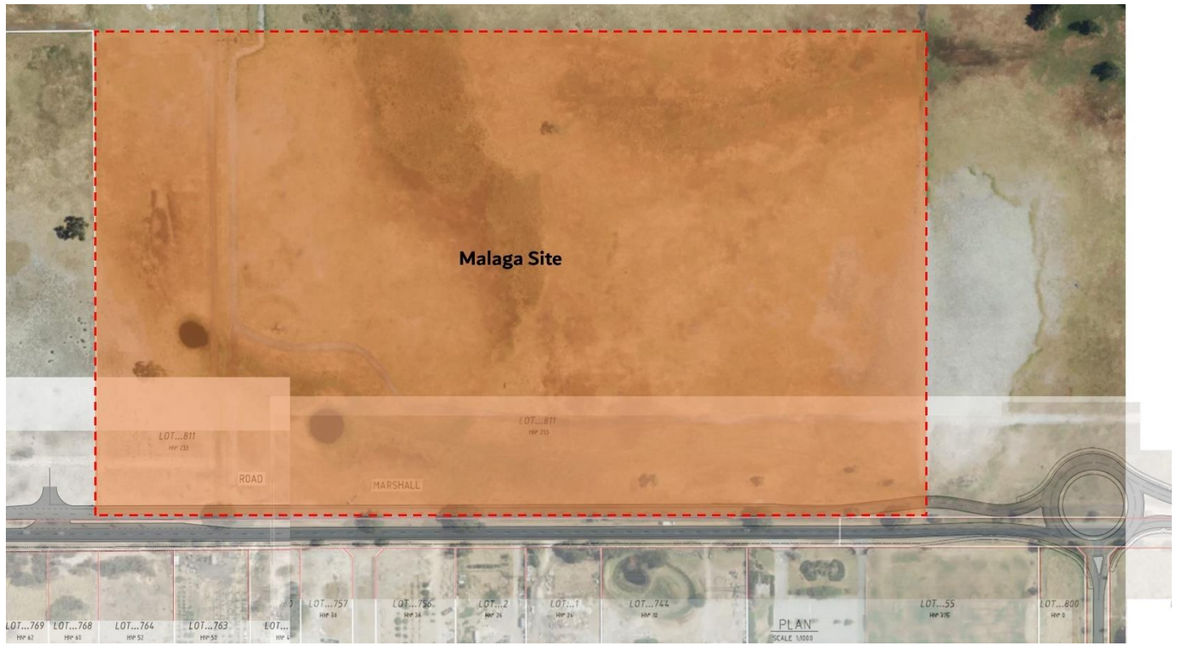

Figure 8 Malaga Site in relation to the Marshall Road duplication 15% concept design (base plan source: City of Swan)

During December 2022 and January 2023 the Home Fire Screen Production Facility project team has undertaken engagement with a range of City of Swan Officers via a number of meetings, in order to better understand the details of the City's design for the duplication of Marshall Road, and to work together to progress both projects and ensure alignment.

2.2.4 METRONET Works

To facilitate future access into the Malaga Station Precinct, recent METRONET works have begun on Beechboro Road North. The road corridor was closed at the end of February 2022 and is scheduled to re-open in late 2023.

This temporary closure of Beechboro Road North between Hennessey Road and Marshall Road will enable the construction of the Morley-Ellenbrook Line and associated key intersection upgrades.

Figure 9 shows the current traffic management in place in proximity of the Malaga Site (current as of late March 2022).

Figure 9 Traffic management in proximity of the Malaga Site (source: METRONET, March 2022)

3. PROPOSED DEVELOPMENT AND SITE CONTEXT

3.1 Development Site Context

The proposed Malaga Site for the development of a largescale Screen Production Facility (Lot 811 Marshall Road, Whiteman) covers approximately 16ha. The site is reserved as Parks and Recreation under the Metropolitan Region Scheme (MRS) as shown in Figure 10.

The Malaga Site is bound by Whiteman Park to the north and east, Marshall Road to the south and land reserved for 'Industrial Development' and Beechboro Road North to the west.

An MRS Amendment is underway to rezone the land to allow for the development of the Malaga Site.

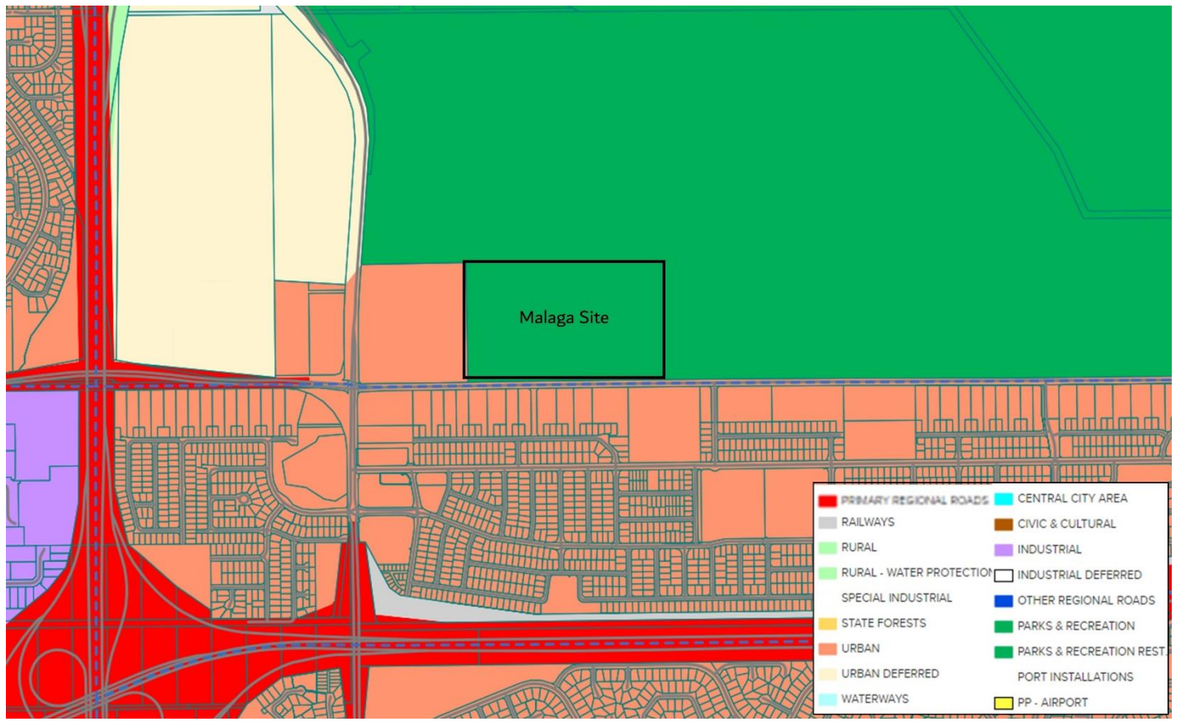

Figure 10 Metropolitan Region Scheme extract showing the location of the Malaga Site (source: City of Swan)

The area within and surrounding the Malaga Site consists of degraded former agricultural land and is devoid of any native vegetation (as shown in Figure 11). South of Marshall Road is a 90m wide Western Power easement running east-west and further south is the residential suburb of Bennett Springs.

The Malaga Site is also within proximity to the Malaga Light Industrial Area located to the south-west of the site, to the west of Tonkin Highway.

Figure 11 Aerial image of the Malaga Site (source: MetroMap)

The Malaga Site is situated at the southern boundary of Whiteman Park, close to the intersection of Tonkin Highway and Reid Highway. The expansion of the rail network under the METRONET led program will run to the north of the site and a new Malaga Station will be built to the northwest of the site.

The Whiteman Park Strategic Plan (2017-2021) identifies that the Malaga Site is within the Marshall Road lands (shown in Figure 12), which is considered non-essential to the operation and integrity of Whiteman Park. Any development on the Marshall Road lands must complement and support the core Whiteman Park land, incorporating developments that will act as an integrator as well as a buffer between the Park and the suburban development to the south.

A range of development options are possible except for residential uses. The Whiteman Park Strategic Plan is proposed to be updated as part of the recommendations from the new Morley-Ellenbrook Line METRONET stations.

The site is within the Transperth Transit Zone 2 and is serviced by existing bus routes.

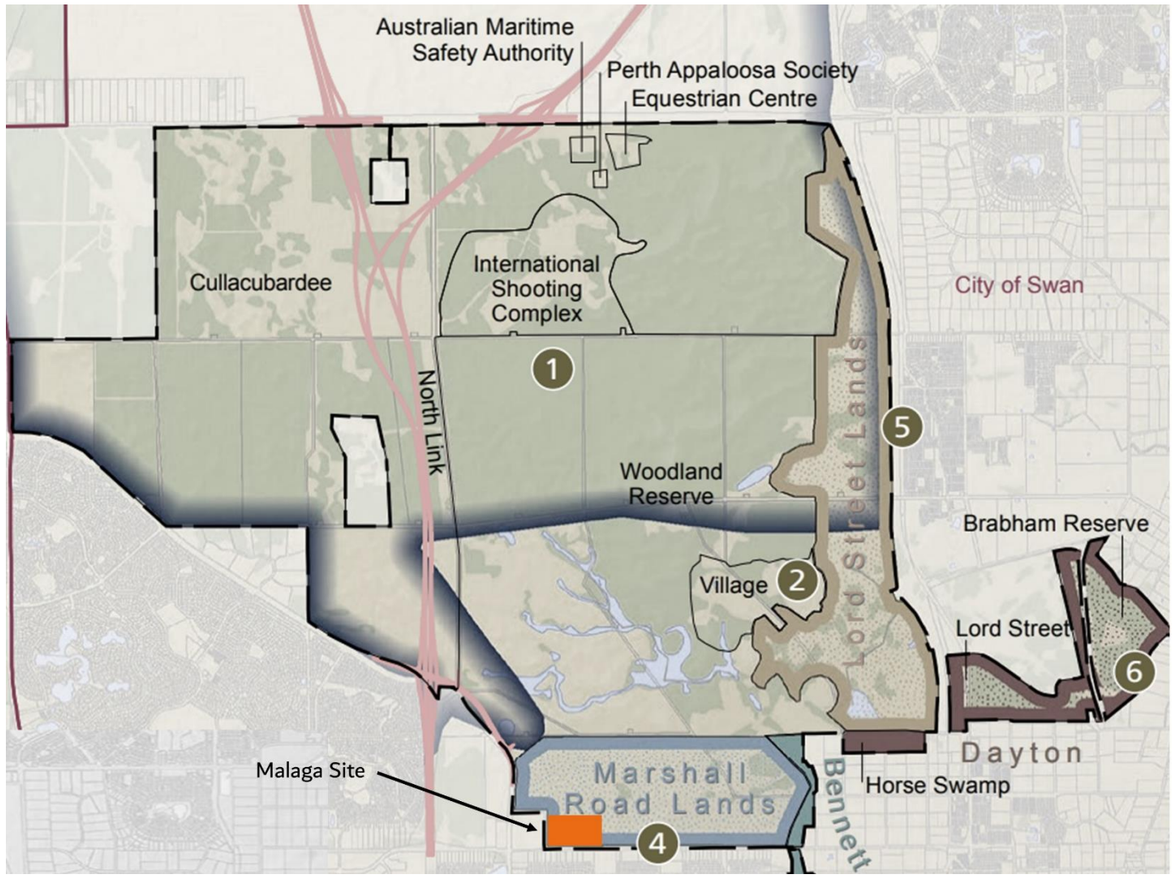

Figure 12 Malaga Site within Marshall Road lands, Whiteman Park (source: Whiteman Park Strategic Plan)

3.2 Development Site Current Usage

The proposed development site consists of degraded former agricultural land and is devoid of any native vegetation – as such there are no existing traffic movements associated with the site.

3.3 Proposed Development

The proposed development of a largescale Screen Production Facility at the Malaga Site includes the following facilities:

- 4 x sound stages (2 x 1,929m^2 / 2 x 2,386m^2 / total of 8,630m^2)
- 4 x 1,837m^2 annex and production offices (total of 7,348m^2)
- 4 x construction workshops and lock-up facilities (total of 6,960m^2)
- 23,172m^2 backlot
- 4,548m^2 boneyard
- 1,055m^2 administration office building
- Combined site entry and exit road
- Land set aside for drainage, irrigation and swales.

The proposed development plan for the Screen Production Facility is shown in Figure 13 – other site details are referred to throughout this TIA where required.

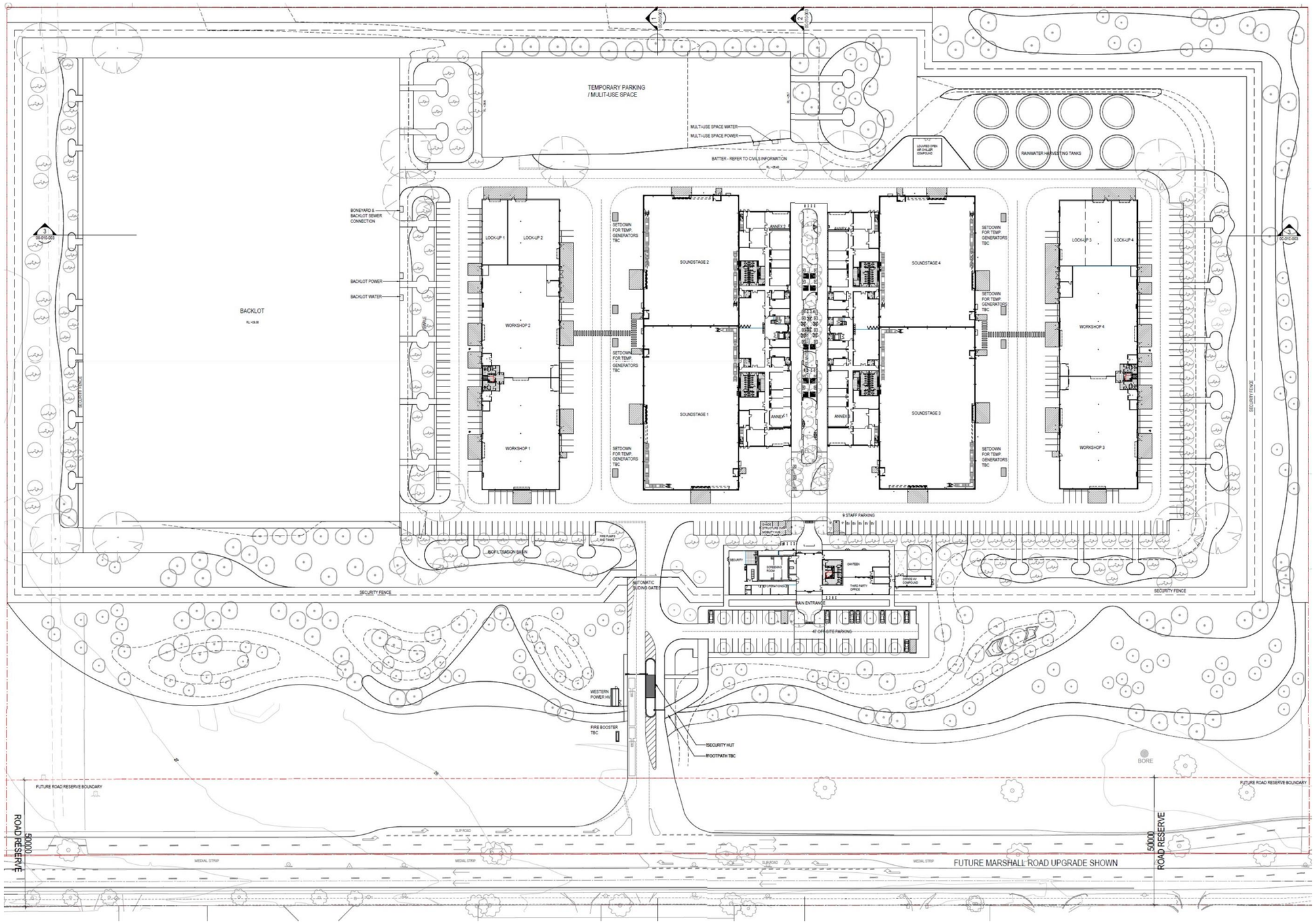

Figure 13 Malaga Site development plan (source: Hassell, March 2023)

4. VEHICLE ACCESS AND PARKING

4.1 Existing Road Network

Figure 14 shows the hierarchy categorisation of roads surrounding the Malaga Site, these can be summarised as:

- Tonkin Highway and Reid Highway are categorised as a **Primary Distributor** under the control of Main Roads WA and should carry the highest volume of traffic in the road network in vicinity of the subject site.
- Beechboro Road, Beechboro Road North and Marshall Road (to the west of Beechboro Road) are categorised as a **District Distributor A** road under the control of the City of Swan and should carry traffic volumes above 8,000 vehicles per day.
- Marshall Road (between Beechboro Road and Drumpellier Road) and Bennett Spring Drive are categorised as a **Local Distributor** under the control of the City of Swan and should carry between 3,000-6,000 vehicles per day.
- All other roads in vicinity of the site are categorised as **Access Road** under the control of the City of Swan – these roads should carry less than 3,000 vehicles per day.

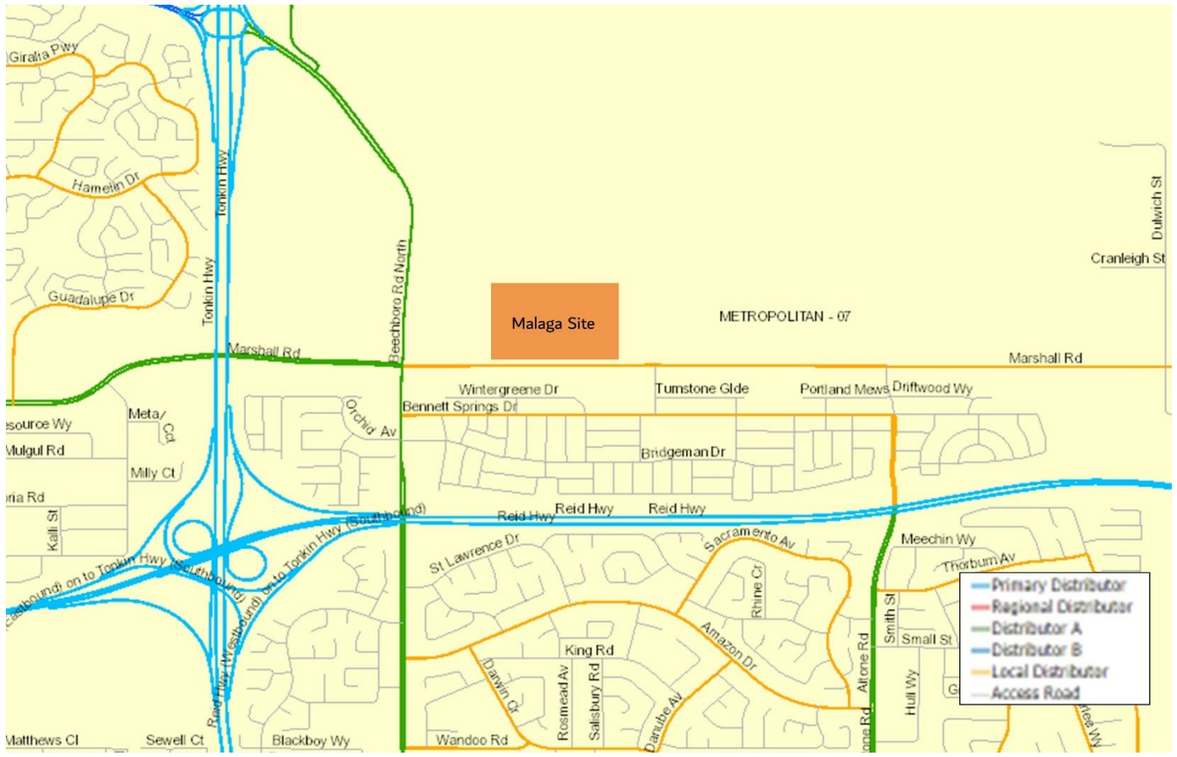

Figure 14 Road hierarchy surrounding the Malaga Site (source: Main Roads WA)

Figure 15 shows the posted speed limits on the roads surrounding the Malaga Site, these can be summarised as:

- Tonkin Highway and Reid Highway operate with a 100km/h posted speed limit – reflecting the corridors higher order movement function. Reid Highway to the east of Altone Road transitions to a 90km/h posted speed limit.
- Marshall Road adjacent to the subject site operates with a 70km/h posted speed limit – reflecting the corridors movement function between Tonkin Highway and Drumpellier Road.
- The section of Marshall Road adjacent to Beechboro Christian School operates under a 40km/h school speed zone between 7.30am-9am and 2.30pm-4pm on school days.
- Beechboro Road North (north of Marshall Road) operates with an 80km/h posted speed limit and Beechboro Road (south of Marshall Road) operates with a 60km/h posted speed limit.
- All other roads within vicinity of the Malaga Site operate with a default 50km/h posted speed limit for urban areas – reflecting that these are primarily local residential streets providing access to residential properties across Bennett Springs Drive.

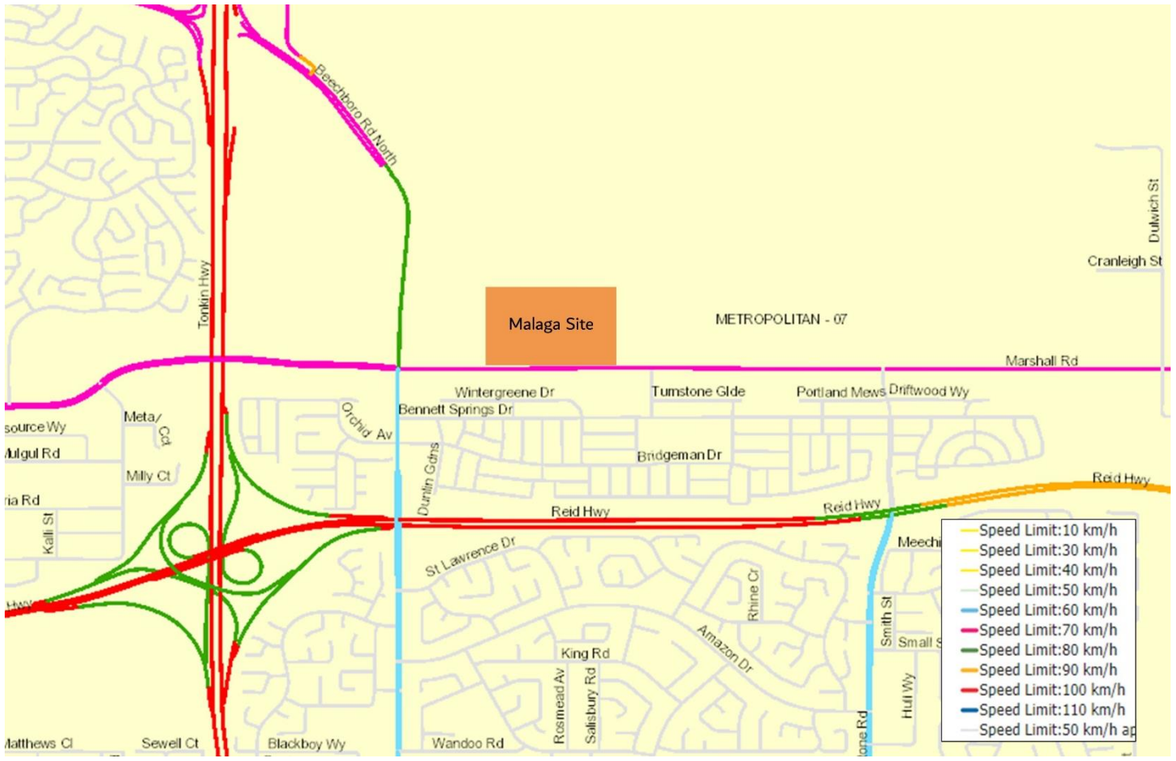

Figure 15 Speed zoning surrounding the Malaga Site (source: Main Roads WA)

4.2 Frontage Streets

Main Roads WA collects traffic count information at all signalised intersections thorough SCATS loops. MRWA also collect and collate count information at non-signalised intersections with current and historical data being made available through https://trafficmap.mainroads.wa.gov.au/map. The following section details the characteristics of the frontage streets and includes relevant traffic volumes where available.

4.2.1 Marshall Road

Adjacent to the Malaga Site Marshall Road is classified as a Local Distributor road with a posted speed limit of 70km/hr. Marshall Road runs east-west between Drumpellier Drive to the east and Malaga Drive to the west and is constructed to a width of 7.6m, within a 21m road reserve, accommodating one lane in each direction.

On-street parking is not permitted on either side of Marshall Road and there are no footpaths along the section of Marshall Road adjacent to the Malaga Site.

Marshall Road adjacent to the Malaga Site is under the control of the City of Swan – a cross section of Marshall Road adjacent to the Malaga Site is shown in Figure 16.

Figure 16 Marshall Road (adjacent to the Malaga Site) cross section looking west (source: Google Streetview)

Marshall Road is classified as a District Distributor A road to the west of Beechboro Road North, providing a high degree of connectivity to primary and/or other distributor roads. It serves as an important link between Tonkin Highway and the Malaga Industrial Area.

The City has noted that congestion is a regular occurrence during peak hours and is expected to further increase with the urban expansion of surrounding suburbs and completion of the METRONET Morley-Ellenbrook line – and that traffic volumes will shortly exceed 15,000 vehicles per day which is the traffic threshold where duplication is recommended.

The City is in the process of planning for detailed design of the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive – with the introduction of a roundabout at the intersection of Beechboro Road North and Marshall Road (currently a traffic signal controlled intersection). The City intends to stage the duplication across several years with construction of a roundabout at the intersection of Marshall Road and Beechboro Road North to form part of the first stage of the duplication project – indications from the City of Swan in early 2023 suggest that construction of the roundabout will not be completed for another few years. The road reserve for Marshall Road would be widened into the subject site to facilitate the duplication.

The project includes the construction of two dual lane roundabouts, one to the west and one to the east of the site at Marshall Road intersections with Beechboro Road North (Figure 17) and Silver Swan Road (Figure 18).

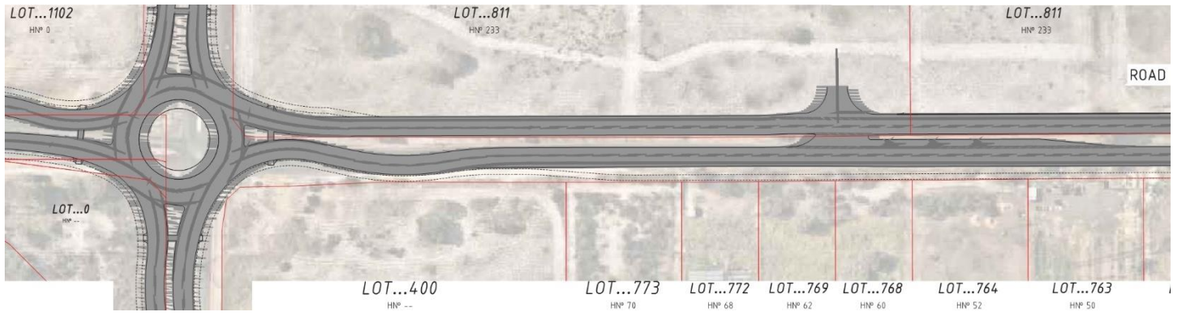

Figure 17 Marshall Road duplication 15% concept design – Beechboro Road North to Silver Swan Road – western section (source: City of Swan Ordinary Council Meeting, 28 July 2021 – Officers Report Item 5.1)

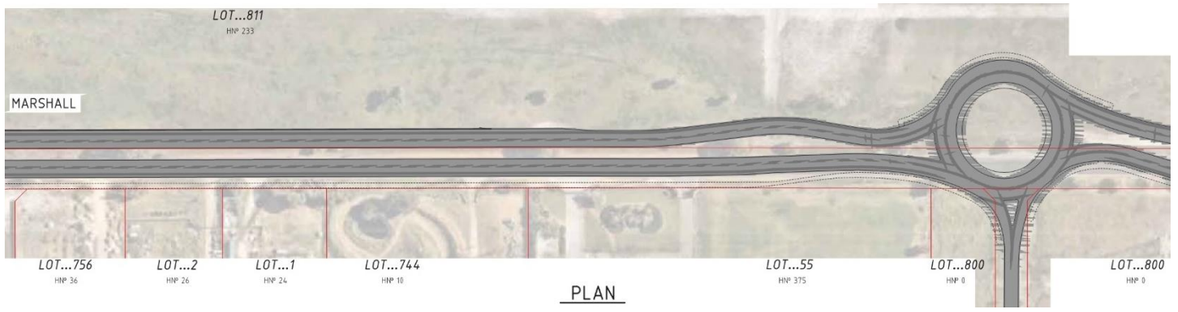

Figure 18 Marshall Road duplication 15% concept design – Beechboro Road North to Silver Swan Road – eastern section (source: City of Swan Ordinary Council Meeting, 28 July 2021 – Officers Report Item 5.1)

Figure 19 shows the existing average two-way vehicle traffic volumes on Marshall Road adjacent to the Malaga Site. The data shows that this section of Marshall Road has approximately 10,150 vehicle movements on an average weekday.

The figure also shows the profile of vehicle traffic movements across the day – with clear morning and afternoon commuter peaks – the morning peak is concentrated into an early 1-2 hour period (6am-8am) and higher volumes of vehicles in the afternoon peak, which is dispersed across a longer 2-3 hour period (3pm-6pm). 85th percentile vehicle speeds at the data collection point on Marshall Road shows that typical vehicle speeds exceed the 70km/h posted speed limit by around 5km/h between the two peak periods (8am-3pm) and exceed the 70km/h posted speed limit by 10km/h or more during the early hours of the morning (1am-4am).

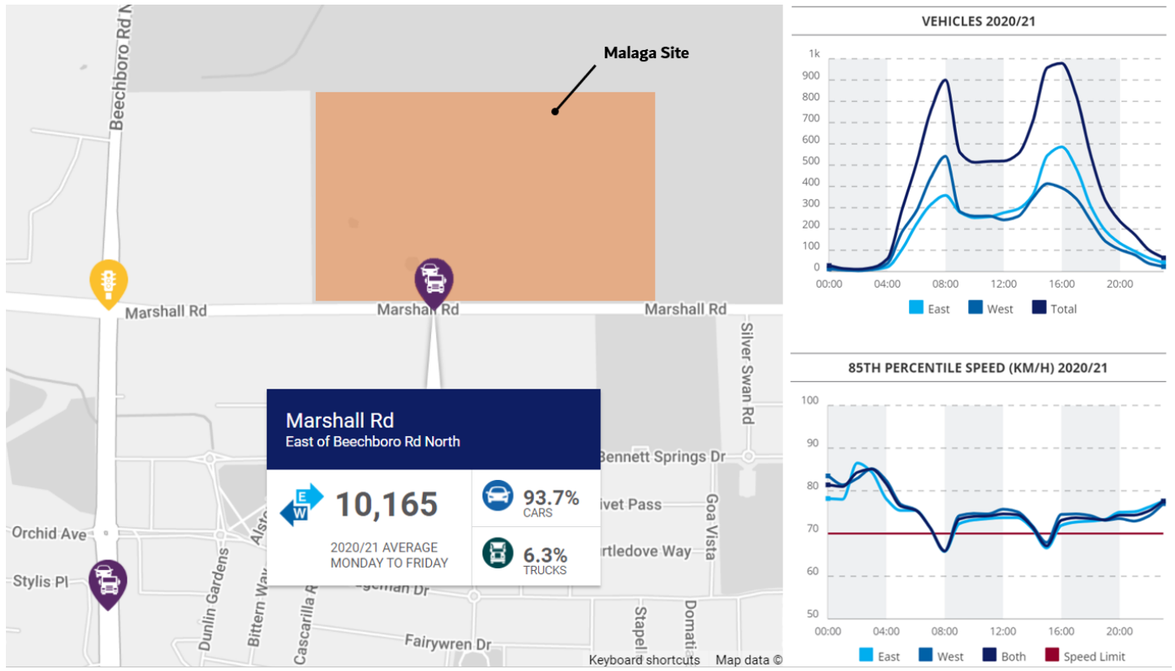

Figure 19 Vehicle traffic count data – Marshall Road adjacent to the Malaga Site (source: Main Roads WA)

Between 2018-2020 the Department of Transport worked with 33 local governments across Perth and Peel on the Long Term Cycle Network (LTCN) project.

The identified LTCN in the vicinity of the Malaga Site shows Secondary Routes along the Marshall Road corridor and Beechboro Road/Beechboro Road North corridor – as shown in Figure 20.

Planning for the inclusion of a Secondary Route and its alignment would form part of the City led Marshall Road duplication project and METRONET led new Malaga Station Precinct project and would provide a high quality path along this route with access to the proposed development.

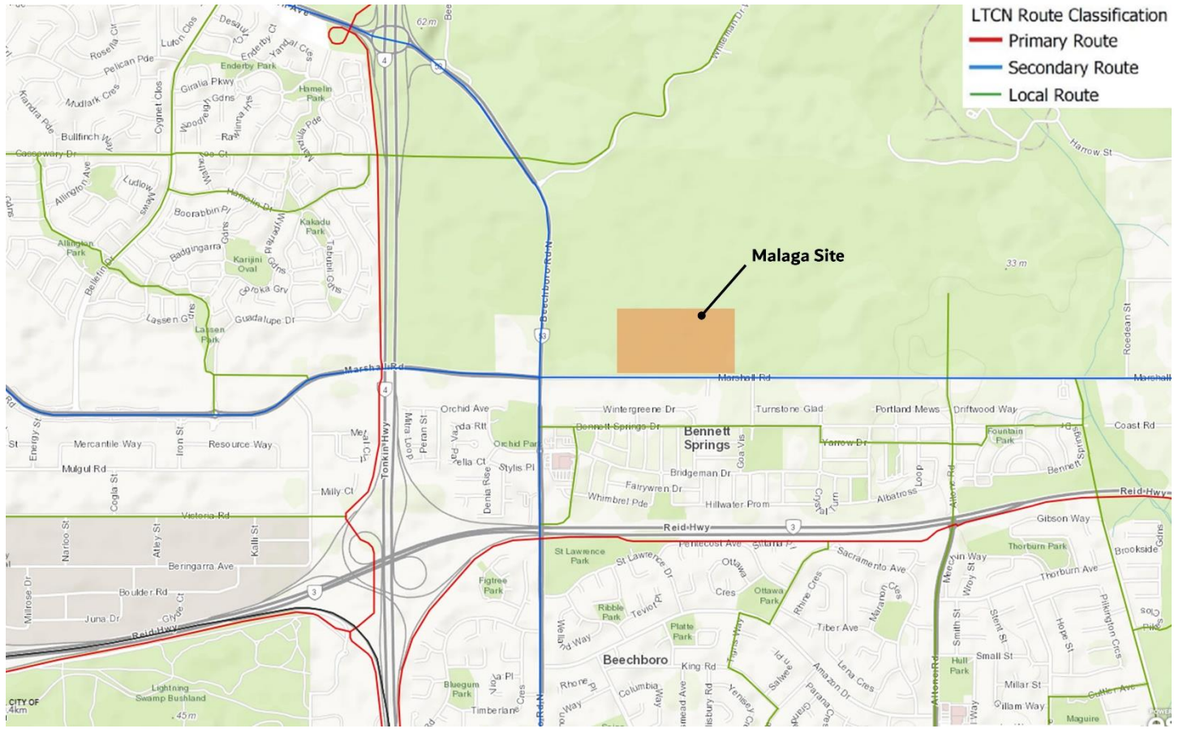

Figure 20 Long Term Cycle Network in vicinity of the Malaga Site (source: Department of Transport)

4.2.2 Beechboro Road North

Beechboro Road North is classified as Distributor A Road under the control of the City of Swan and has a varied posted speed limit of 70km/hr at the northern alignment, 80km/hr north of Marshall Road and 60km/h to the south. Beechboro Road North runs north-south where it connects into Tonkin Highway to the north and abuts the Tonkin Highway road reserve to the south in Morley.

South of the Marshall Road intersection, it is constructed to a width of 17m within a 27m road reserve with two lanes in each direction separated by a hard median / or painted lines. On-street parking is not permitted.

As part of the METRONET suite of works, Beechboro Road North (to the north of Marshall Road) will be upgraded to a dual lane carriageway. The intersection with Marshall Road is expected to become a dual lane roundabout as part of the first stage of the Marshall Road duplication project as shown in Figure 17.

A cross section of Beechboro Road North south of Marshall Road is shown in Figure 21.

Figure 21 Beechboro Road North cross section looking north (source: Google Streetview)

Figure 22 shows the available traffic counts for Beechboro Road North, taken at site 6726 south of Marshall Road recorded approximately 14,449 vehicle movements on an average weekday between 2021/2022.

Southbound volumes were slightly higher than northbound volumes, where peak travel occurs in line with typical commuting travel times. Beechboro Road North shows that typical vehicle speeds exceed the 60km/h posted speed limit by around 10km/h between the two peak periods (8am-5pm) and exceed the 60km/h posted speed limit by 15km/h or more during the early hours of the morning (11pm-3am).

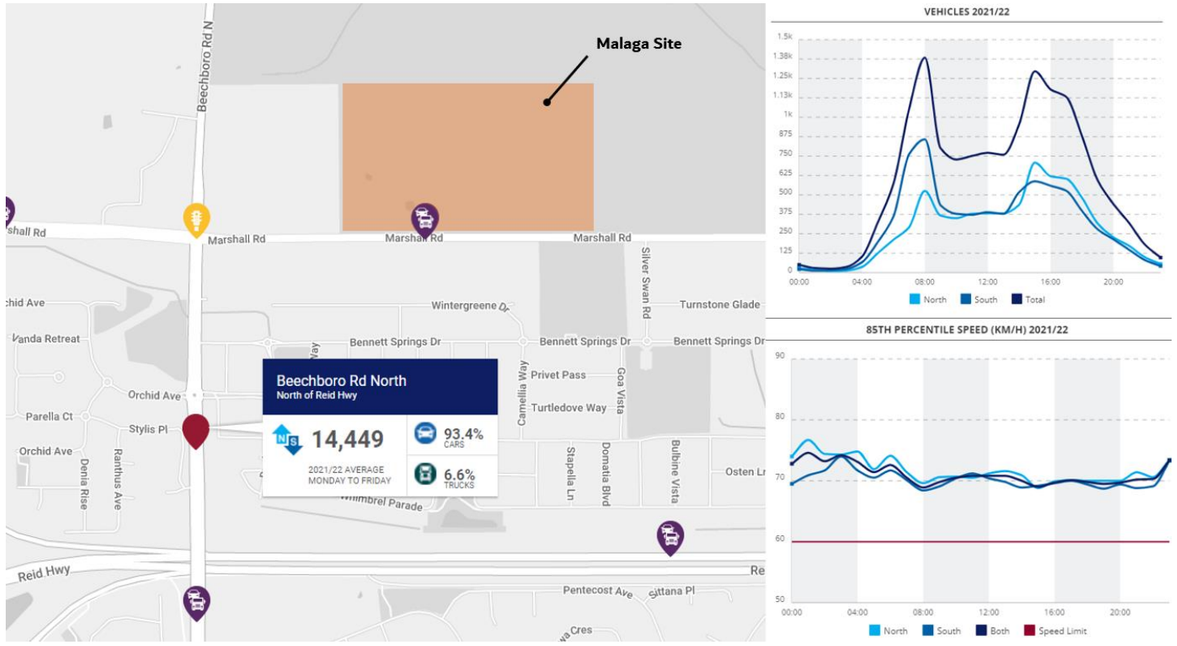

Figure 22 Beechboro Road North hourly traffic volumes (source: Main Roads WA Trafficmap)

There is one 2.3m footpath along the eastern side of Beechboro Road North (south of Marshall Road) and one proposed path along the eastern alignment north of Marshall Road which will be constructed as part of the METRONET station works.

The existing footpath to the south of Marshall Road is located adjacent to the carriageway without an adequate buffer from moving vehicles. The footpath deviates from main pedestrian desire lines and there is no visual interest or shade along this route. The area is hostile for people walking as a result of the form of development, abundance of roads and associated traffic noise and wide unprotected intersections.

4.3 Intersection Volumes

The key intersections relative to the site are:

- Marshall Road and Beechboro Road North
- Marshall Road and Silver Swan Road.

4.3.1 Marshall Road and Beechboro Road North

This four-way intersection is traffic signal controlled (LM00584), with the site plan shown in Figure 23. There is a dedicated left turn lane on Beechboro Road North on the southern approach. All right hand turns have a dedicated arrow signal except for the southern approach of Beechboro Road North.

Figure 23 TCS plan – Beechboro Road North and Marshall Road (source: Main Roads WA)

Figure 24 shows an aerial image of the four-way traffic signal controlled intersection of Beechboro Road North and Marshall Road. As discussed in Section 2.2.4, the section of Beechboro Road North to the north of this intersection was closed at the end of February 2022 and is scheduled to re-open in late 2023 – the closure is to facilitate METRONET works.

Figure 24 Beechboro Road North and Marshall Road intersection (source of aerial image: MetroMap)

As part of the Marshall Road duplication, this intersection will become a dual lane roundabout, as shown in Figure 17 and discussed in Sections 2.2.3 and 4.2.1. The dual lane roundabout is considered necessary for vehicle safety and projected capacity purposes.

4.3.2 Marshall Road and Silver Swan Road

The intersection of Silver Swan Road and Marshall Road operates as a T-intersection under give-way control with Marshall Road having priority. Silver Swan Road has a single northbound and southbound lane and Marshall Road also has a single eastbound and westbound lane -the intersection is shown in Figure 25.

Also shown in Figure 25 are the access road intersections of Marshall Road with the Beechboro Christian School site and Cracovia Junior Soccer Club site – both of these access roads are opposite the Malaga Site. It should be noted that the Beechboro Christian School site is anticipated to be relocating 400m to the southeast to a vacant lot adjacent to Bennett Springs Sportsfield Oval accessed off Bennett Springs Drive.

Figure 25 Silver Swan Road and Marshall Road intersection and Marshall Road adjacent to the Malaga Site (source of aerial image: MetroMap)

As part of the Marshall Road duplication, access to and from Silver Swan Road will be facilitated by a new dual lane roundabout, replacing the existing uncontrolled T-intersection. The proposed alignment of this intersection is shown in Figure 18 and discussed in Sections 2.2.3 and 4.2.1. If vehicles exiting the subject site are restricted to left out turning movements only, this roundabout will provide essential U-turn movements for westbound travel.

4.4 Existing On-Site Parking

The site is currently undeveloped and there is no existing parking located on-site.

Parking on-street is not permitted in accordance with Main Roads WA criteria for Local Distributors in non-built-up areas.

4.5 Proposed Vehicle Access

The proposed site for the Screen Production Facility is currently undeveloped and therefore there is no existing access into the subject site. It is proposed a new single combined entry and exit road will be created providing access to the site from Marshall Road.

Ultimate Site Access: It is proposed that the ultimate site access will permit left-in and left-out movements only and a break in the median island formed by the duplication of Marshall Road will permit right-in movements.

Interim Site Access: It is proposed that an interim site access would be required if the Screen Production Facility was to operate prior to the duplication of Marshall Road – the interim site access will be formed by localised road widening to permit left-in and left-out movements and a break in a new median island will permit right-in and right-out (light vehicles only, with all 19m semi-trailer movements restricted to turn left out from the site).

The location of the proposed access road is shown in Figure 26. The location of the proposed Malaga Site access road is approximately 405m from the Silver Swan Road intersection to the east and approximately 560m from the Beechboro Road North intersection to the west.

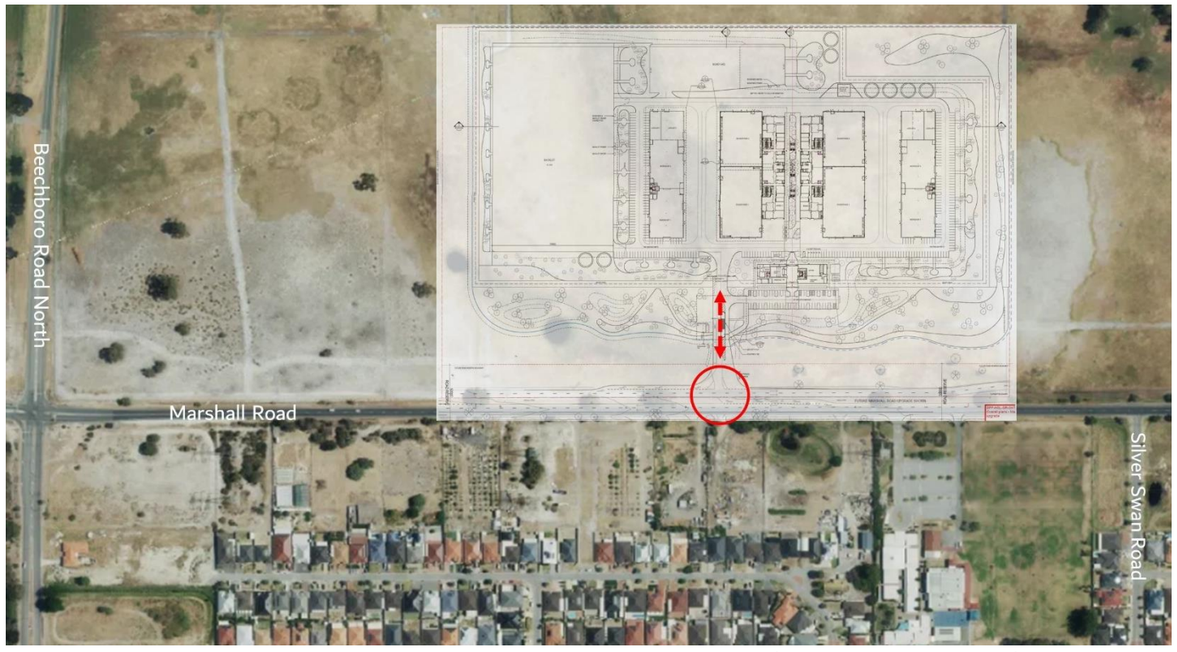

Figure 26 Location of the proposed combined Malaga Site entry and exit road on Marshall Road (source: Hassell, January 2023)

4.5.1 Screen Production Facility Interim Site Access with Existing Single Lane Marshall Road

The interim site access into the Malaga Site with the existing single lane Marshall Road arrangement in operation, is proposed to be via a new single combined entry and exit road from Marshall Road into the site. The proposed form of intersection between the site access road and Marshall Road is shown in Figure 27 with the existing single lane Marshall Road arrangement. The proposed intersection layout includes:

- Inbound vehicle movements
  - Left-in slip lane of approximately 100m in length – to ensure the safe deceleration of vehicles upon entry into the site, in particular 19m semi-trailer movements accessing the site.
  - Right-in turn pocket of approximately 100m in length – to ensure the safe storage of right turning vehicles waiting to cross Marshall Road eastbound lanes to access the site.
- Outbound vehicle movements
  - Right-out movement restricted to light vehicles only (suitable signage and pavement markings on exit from the site will show the right-out turn restrictions in place) – this enables a two stage right turn using the median and permits light vehicle egress from the site via Marshall Road to the west towards Beechboro Road North.
  - Left-out movement from the site will accommodate both light vehicle and all heavy vehicle movements from the site. Heavy vehicles seeking to access routes to the west of the Malaga Site will travel to the east via Marshall Road and then to the south via Drumpellier Drive and to the west via Reid Highway to access the Tonkin Highway corridor – approximately an 8km route.
    In the future the duplication of Marshall Road will include a future dual lane roundabout of Silver Swan Road and Marshall Road, which would permit heavy vehicles from the Malaga Site to U-turn and travel westbound on Marshall Road to Beechboro Road North to access the Tonkin Highway corridor – approximately an 2.5km route.

The proposed Malaga Site access road will accommodate all vehicle movements into and out from the site, including staff, visitor, service, delivery and waste vehicles – with the site designed to accommodate 19m semi-trailer movements.

As shown in Figure 27 to the north of the site access road and Marshall Road intersection, is the proposed site security hut and entry/exit barriers. The access road network around the security hut has been designed to split general traffic and large service vehicle traffic. The approach to vehicle access is outlined below:

Note: when referring to the site proposals 'on-site' refers to elements within the secure fence line of the proposed Screen Production Facility and 'off-site' refers to elements located on the Malaga Site but outside of the secure fence line.

- General traffic entry and exit.
  - General traffic will access the Malaga Site via the site access road and the lane adjacent to the security hut – approved vehicles will be permitted access to either the off-site visitor car park to the east of the security hut or through the sliding gate to access the secure fenced Screen Production Facility and on-site parking.
  - General traffic vehicles which are not approved access to the site will be directed to perform a U-turn around the security hut to leave the site and travel back to Marshall Road.
- Service vehicle traffic entry and exit.
  - Service vehicle traffic, which includes service, delivery and waste vehicles (up to 19m semi-trailers), will access the site via the outside service vehicle lane (on the western side of the security hut). Approved vehicles will be permitted access through the sliding gate to access the secure fenced Screen Production Facility and on-site set down areas.
  - Service vehicles which are not approved access to the site will be directed to perform a U-turn loop on-site before travelling back to Marshall Road. These service vehicles will be temporarily permitted access through the sliding gate to access the secure fenced Screen Production Facility, these service vehicles will be monitored by security personnel while they are directed to perform a U-turn loop via the service roads between the sound stages and workshops, before they leave the site and travel back to Marshall Road.

The inbound service vehicle lane can accommodate the safe storage of two 19m semi-trailer vehicles without blocking back into the inbound general traffic lane. The outbound vehicle lane can accommodate the safe storage of one 19m semi-trailer vehicles without blocking general traffic exiting the off-site visitor car park.

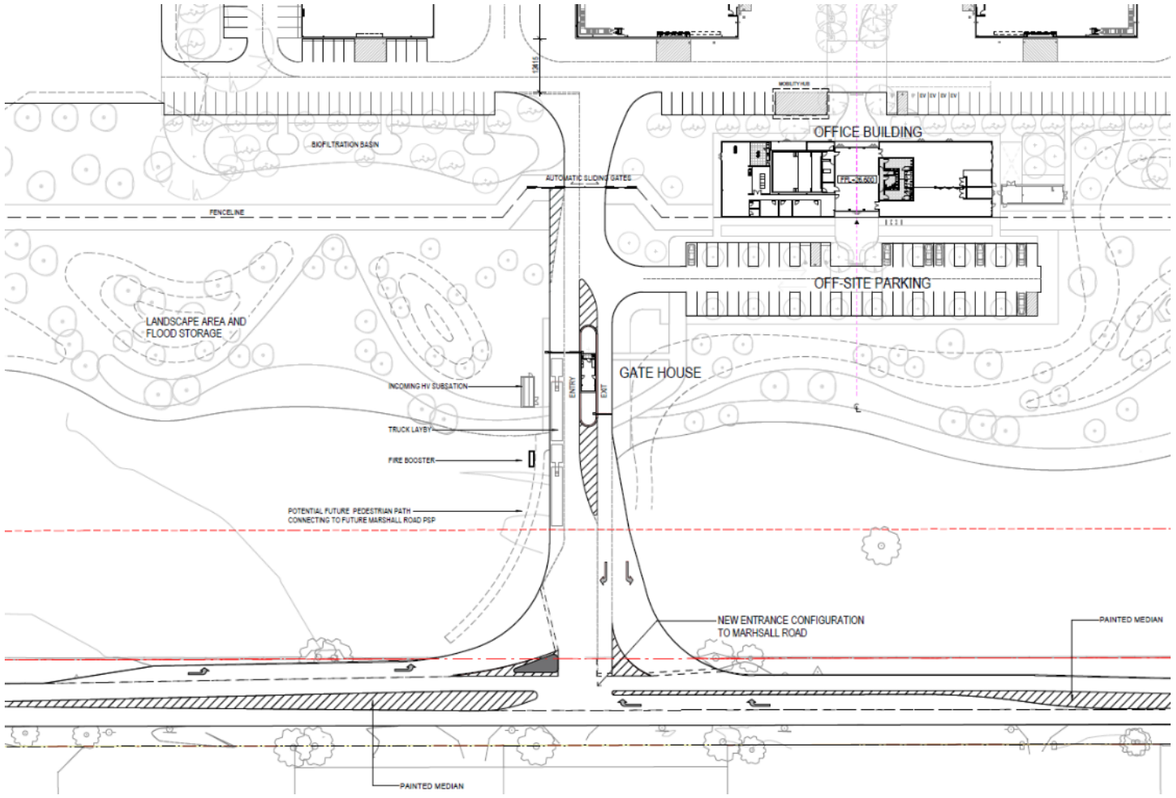

Figure 27 Proposed interim site access with combined Malaga Site entry and exit road layout and existing single lane Marshall Road arrangement (source: Hassell, March 2023)

4.5.2 Screen Production Facility Ultimate Site Access with Future Dual Lane Marshall Road

The ultimate site access into the Malaga Site with the duplication of Marshall Road completed, is proposed to be via a new single combined entry and exit road from Marshall Road into the site. The proposed form of intersection between the site access road and Marshall Road is shown in Figure 28 with the duplication of Marshall Road. The proposed intersection layout includes:

- Inbound vehicle movements
  - Left-in slip lane of approximately 100m in length – to ensure the safe deceleration of vehicles upon entry into the site, in particular 19m semi-trailer movements accessing the site.
  - Right-in turn pocket of approximately 100m in length – to ensure the safe storage of right turning vehicles waiting to cross Marshall Road eastbound lanes to access the site.
- Outbound vehicle movements
  - Left-out only movement from the site and use of the future dual lane roundabout of Silver Swan Road and Marshall Road to permit for vehicles to U-turn and travel westbound on Marshall Road.

The proposed Malaga Site access road will accommodate all vehicle movements into and out from the site, including staff, visitor, service, delivery and waste vehicles – with the site designed to accommodate 19m semi-trailer movements.

As shown in Figure 28 to the north of the site access road and Marshall Road intersection, is the proposed site security hut and entry/exit barriers. The access road network around the security hut has been designed to split general traffic and large service vehicle traffic. The approach to vehicle access is outlined below:

Note: when referring to the site proposals 'on-site' refers to elements within the secure fence line of the proposed Screen Production Facility and 'off-site' refers to elements located on the Malaga Site but outside of the secure fence line.

- General traffic entry and exit.
  - General traffic will access the Malaga Site via the site access road and the lane adjacent to the security hut – approved vehicles will be permitted access to either the off-site visitor car park to the east of the security hut or through the sliding gate to access the secure fenced Screen Production Facility and on-site parking.
  - General traffic vehicles which are not approved access to the site will be directed to perform a U-turn around the security hut to leave the site and travel back to Marshall Road.
- Service vehicle traffic entry and exit.
  - Service vehicle traffic, which includes service, delivery and waste vehicles (up to 19m semi-trailers), will access the site via the outside service vehicle lane (on the western side of the security hut). Approved vehicles will be permitted access through the sliding gate to access the secure fenced Screen Production Facility and on-site set down areas.
  - Service vehicles which are not approved access to the site will be directed to perform a U-turn loop on-site before travelling back to Marshall Road. These service vehicles will be temporarily permitted access through the sliding gate to access the secure fenced Screen Production Facility, these service vehicles will be monitored by security personnel while they are directed to perform a U-turn loop via the service roads between the sound stages and workshops, before they leave the site and travel back to Marshall Road.

The inbound service vehicle lane can accommodate the safe storage of two 19m semi-trailer vehicles without blocking back into the inbound general traffic lane. The outbound vehicle lane can accommodate the safe storage of one 19m semi-trailer vehicles without blocking general traffic exiting the off-site visitor car park.

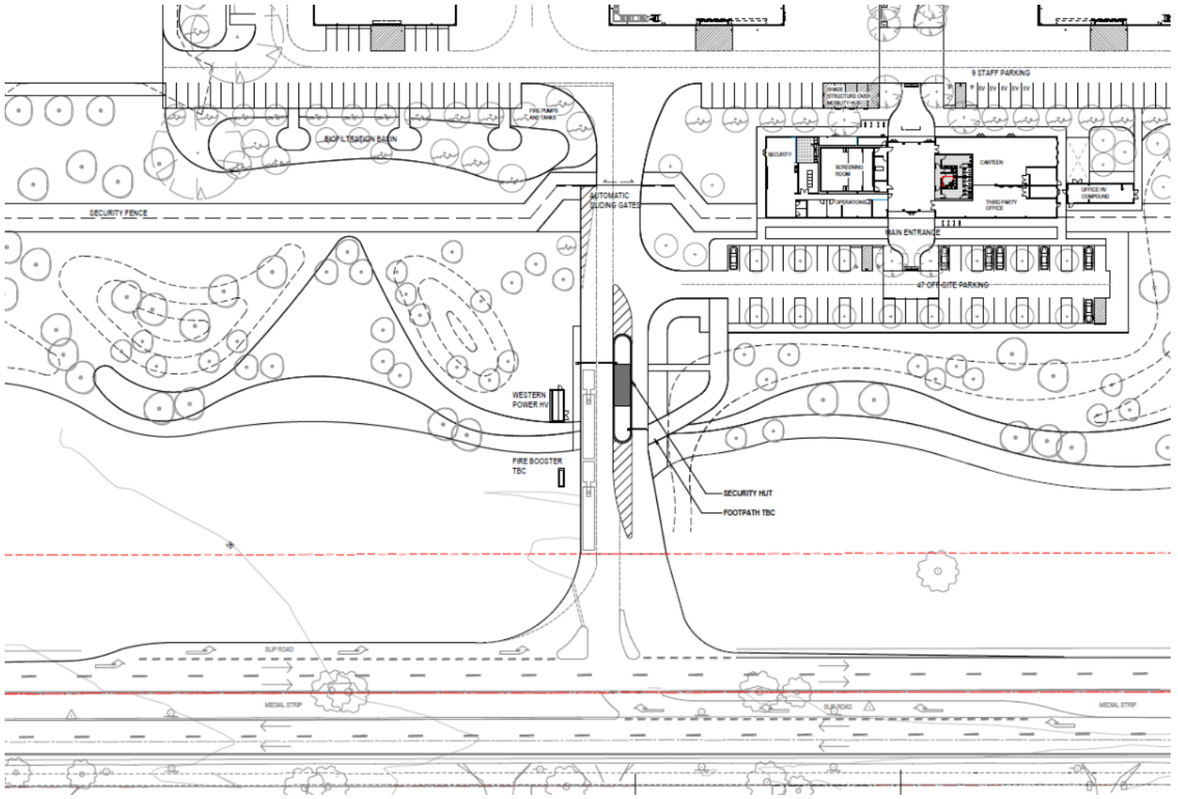

Figure 28 Proposed ultimate site access with combined Malaga Site entry and exit road layout and future duplication of Marshall Road (source: Hassell, March 2023)

4.5.3 Proposed Site Speed Limit

It is proposed that the entire Malaga Site operates under an advisory 10km/h speed limit, to ensure the safe and efficient movement of all vehicles and goods around the site, including staff, visitors, deliveries, service vehicles and large 19m semi-trailer vehicles.

It is proposed that appropriate 10km/h road signs are installed on approach to the security hut (i.e. on entry to the Malaga Site from Marshall Road), within the visitor car park, at the sliding gate to access the secure fenced Screen Production Facility, and at regular intervals within the secure fenced Screen Production Facility.

4.6 Proposed On-site Parking

Typical industry parking requirements for a Screen Production Facility of the scale proposed, would allow for approximately 70 car parking bays per studio and 10 truck parking bays per studio – with an additional approximately 40 off-site visitor car parking bays.

The development proposals for the Screen Production Facility accommodates a total of 336 parking bays allocated as follows:

- On-site 289 car parking bays accommodated within the secure fence line of the Screen Production Facility
  - 70 car parking bays for each of the four studios (280 bays in total)
  - 9 staff car parking bays for permanent on-site Screen Production Facility office staff and security staff (including 2 universal access bays)
  - Of the total 289 on-site parking bays there will be 5 electric vehicle (EV) charging bays provided
  - Truck parking/set down areas will be located adjacent to the four studios along the two wide north-south operational/back of house areas between the sound stages and workshops – accommodating up to 40 trucks
- Off-site 47 visitor car parking bays accommodated outside of the secure fence line of the Screen Production Facility (including 2 universal access bays).

The sites boneyard and backlot can accommodate additional on-site parking as required. Figure 29 shows the indicative allocation of parking across the proposed Malaga Site.

4.6.1 Site Operations and Parking Demands

At this stage in the planning for the Screen Production Facility, Flyt understands that the facility could operate under a range of scenarios with the following forecast personnel on-site under each of them:

1. Administration / Office Staff Only Scenario
   - The administration office building would accommodate approximately 10-15 permanent staff on-site
   - Permanent staff would utilise the 9 office parking bays on-site and between 1-6 visitor parking bays off-site (leaving at least 40 visitor parking bays available).
2. Production Scenario
   - The occupancy levels of the Screen Production Facility during operations will vary dependent on the number and size of productions utilising the facility at any one time.
   - The average range is expected to be between approximately 50 production staff on-site (i.e. small production utilising one sound stage) up to approximately 400 production staff on-site (i.e. one large production utilising entire facility).

Based on the production scenarios outlined, it is anticipated that the Screen Production Facility will regularly accommodate 200 production staff under base case operations and occasionally up to 400 staff under maximum operations.

- Proposed Parking Allocation for Base Case Operations (200 Staff)
  - Based on conservative assumptions that all production staff drive to the site and do so independently
  - All 200 production staff would park on-site and utilise one of the 280 on-site car parking bays
- Proposed Parking Allocations for Maximum Operations (400 Staff)
  - Based on conservative assumptions that all production staff drive to the site and do so independently
  - The maximum of 400 production staff could be accommodated across the site – 280 staff would park on-site and 120 staff could be accommodated as required in the Screen Production Facility's backlot area.

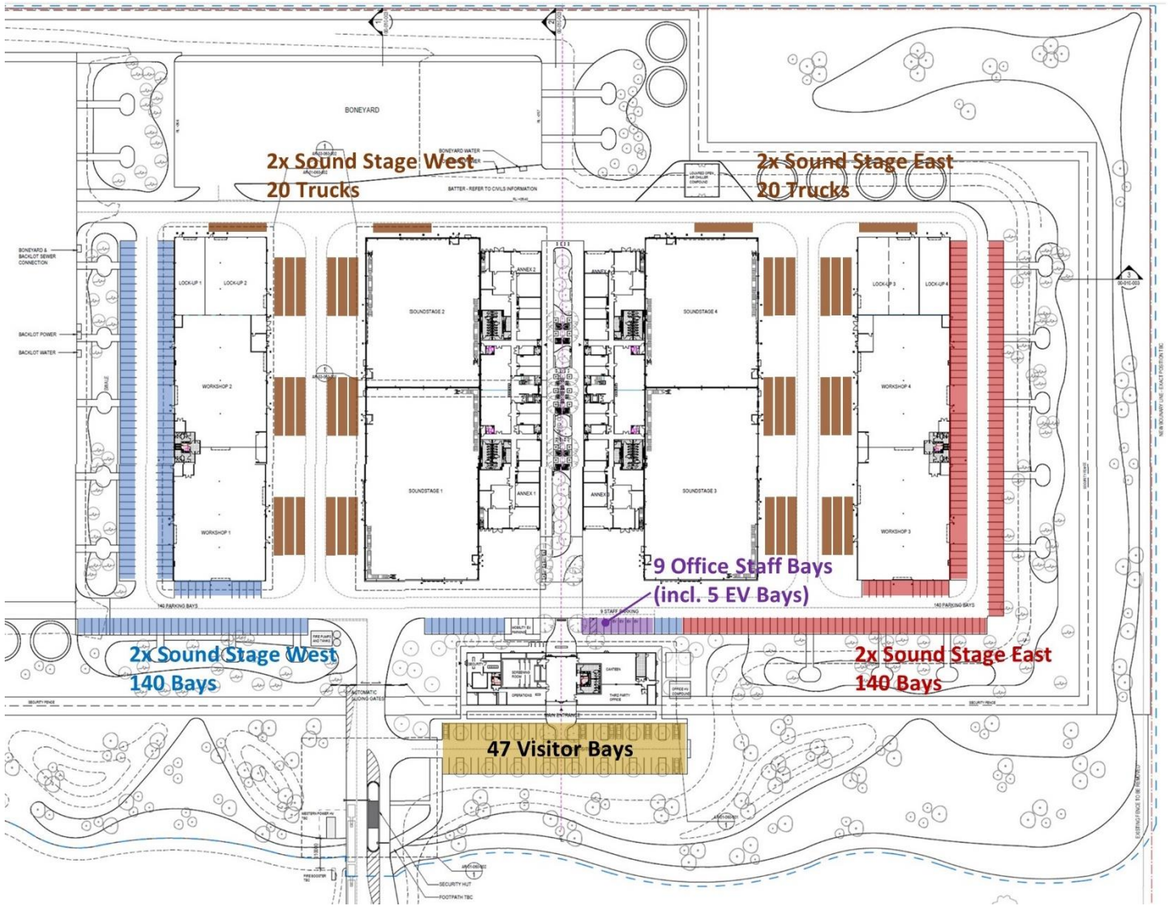

Figure 29 Indicative allocation of parking across the proposed Malaga Site (source: Hassell, January 2023)

5. PROVISION FOR SERVICE VEHICLES

Typical industry requirements for a Screen Production Facility of the scale proposed, would be required to be serviced by 19m semi-trailers on a regular basis – as such the site has been designed to accommodate the vehicle swept path of a 19m semi-trailer as shown in Figure 30, Figure 31 and Figure 32.

Marshall Road currently does not form part of the Restricted Access Vehicle (RAV) Network and therefore can only be accessed by vehicles up to 19m in length and with a maximum width of 2.5m. The proposed Screen Production Facility is required to be accessed by an as of right vehicle with a maximum length of 19m (19m semi-trailers) – as such the proposed development does not require any amendments to the existing RAV network for access by the proposed 19m long as of right vehicle.

The following key 19m semi-trailer swept paths are accommodated in the concept design:

- Left turn into the site from the Marshall Road slip lane
- Right turn into the site from the Marshall Road right turn auxiliary lane
- Left turn out from the site onto Marshall Road (note: no right turn out from the site will be permitted for heavy vehicles)
- Inbound service vehicle lane on approach to the security hut and entry barrier
- Outbound vehicle lane on approach to the security exit barrier
- 19m semi-trailer left turn in and left turn out at the intersection of the site access road and sites perimeter road
- 19m semi-trailer right turn clockwise movements around the sites perimeter road.

It is anticipated that all servicing of the Malaga Site will occur via private contractor, including disposal of all waste products.

Service vehicle site entry and exit arrangements are outlined below:

- Service vehicle traffic, which includes service, delivery and waste vehicles (up to 19m semi-trailers), will access the site via the outside service vehicle lane (on the western side of the security hut). Approved vehicles will be permitted access through the sliding gate to access the secure fenced Screen Production Facility and on-site set down areas.
- Service vehicles which are not approved access to the site will be directed to perform a U-turn loop on-site before travelling back to Marshall Road. These service vehicles will be temporarily permitted access through the sliding gate to access the secure fenced Screen Production Facility, these service vehicles will be monitored by security personnel while they are directed to perform a U-turn loop via the service roads between the sound stages and workshops, before they leave the site and travel back to Marshall Road.

The inbound service vehicle lane can accommodate the safe storage of two 19m semi-trailer vehicles without blocking back into the inbound general traffic lane. The outbound vehicle lane can accommodate the safe storage of one 19m semi-trailer vehicles without blocking back into the outbound general traffic exiting the off-site visitor car park.

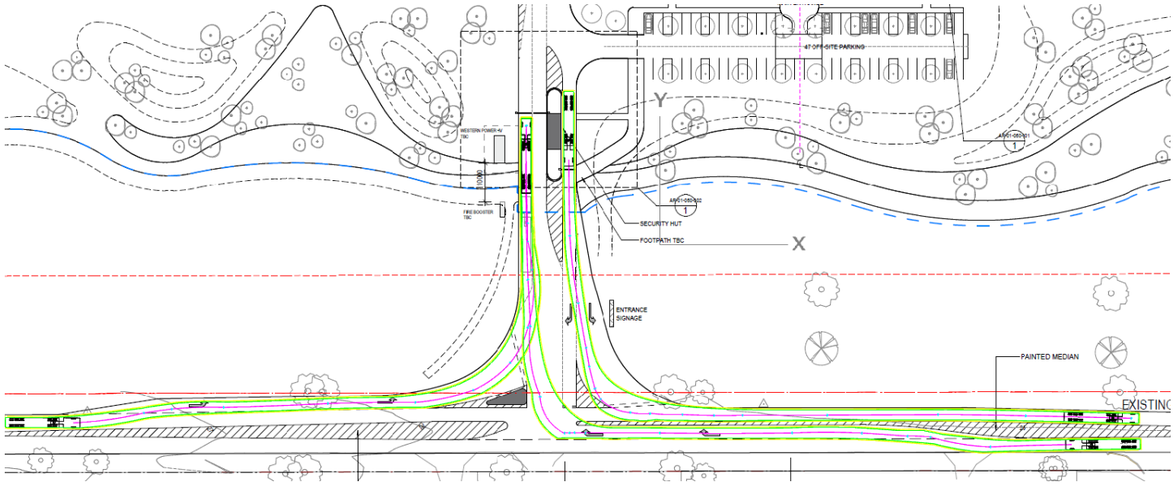

Figure 30 Service vehicle movements through the proposed interim site access with combined Malaga Site entry and exit road layout and existing single lane Marshall Road arrangement (source: Hassell, January 2023)

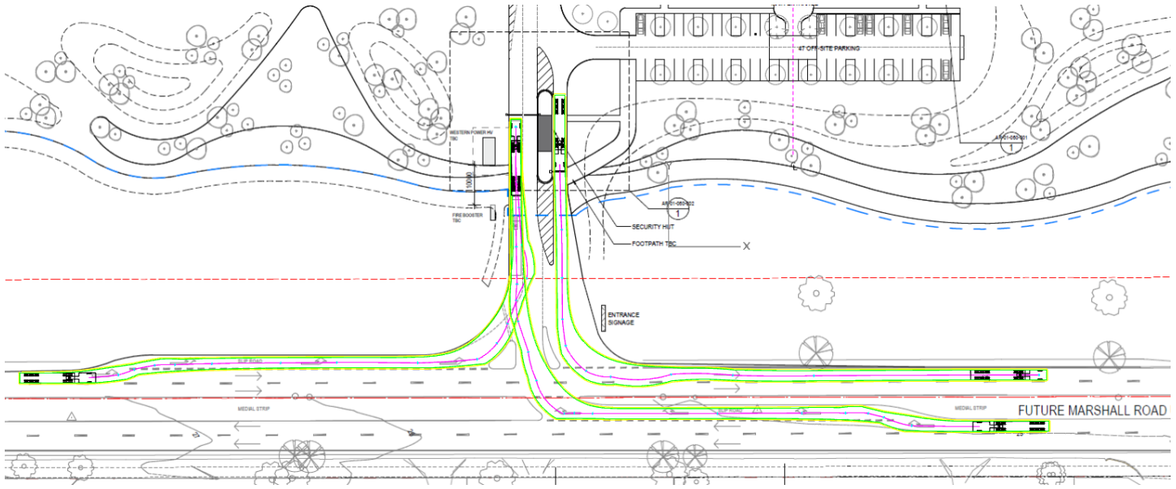

Figure 31 Service vehicle movements through the proposed ultimate site access with combined Malaga Site entry and exit road layout and future duplication of Marshall Road (source: Hassell, January 2023)

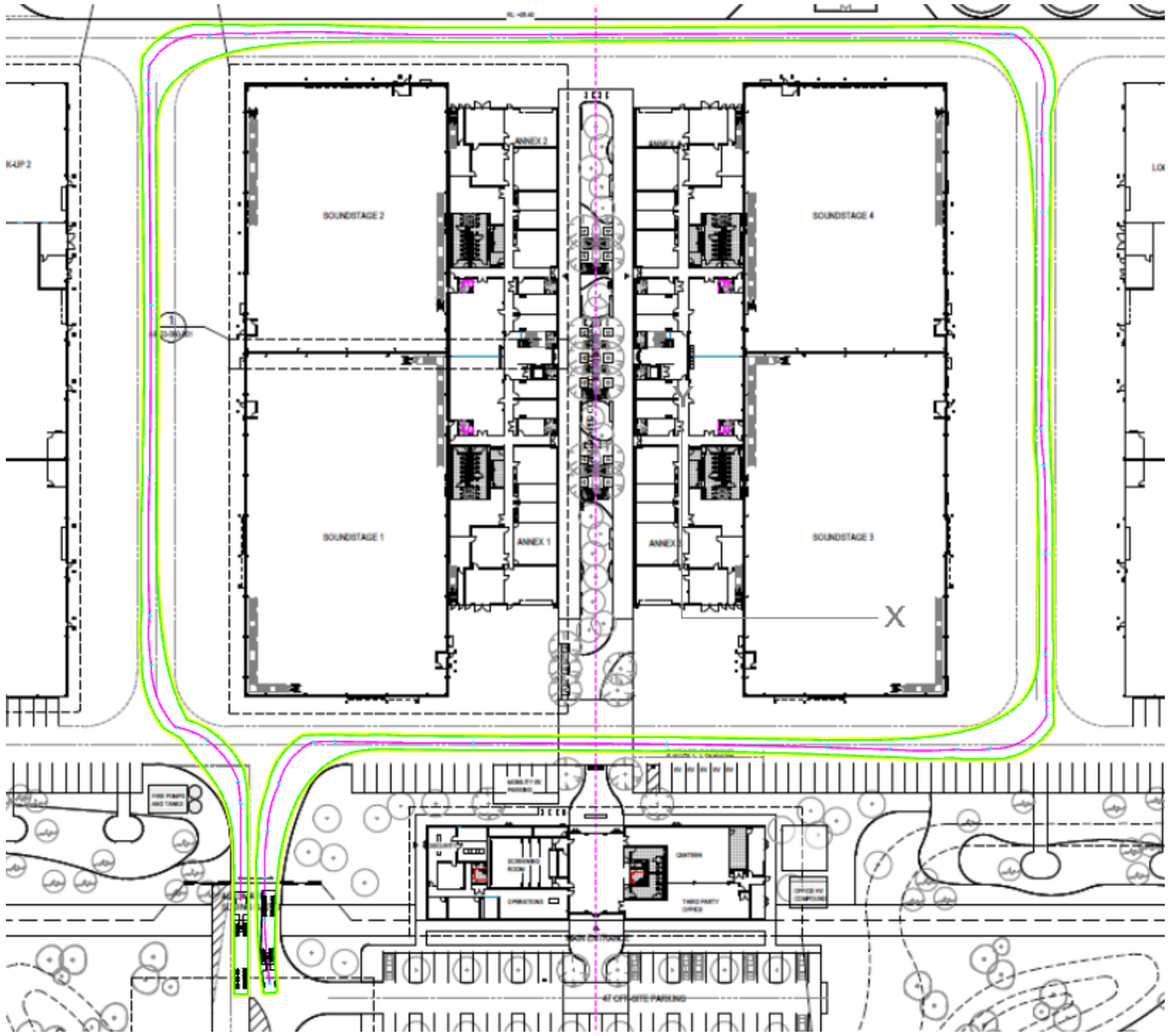

Figure 32 Service vehicle movements around the Malaga Site perimeter road with entry and exit via the secure sliding gate

(source: Hassell, January 2023)

6. TRAFFIC VOLUMES AND VEHICLE TYPES

6.1 Assessment Introduction

To determine the traffic impacts of the proposed Screen Production Facility, the performance of Malaga Road between the intersections with Beechboro Road North and Silver Swan Road has been assessed under four scenarios, as follows:

Note: the 2021 data referred to below was provided in December 2022 by Main Roads WA. Turning traffic volume data and traffic signal operations data (phases and timings) were provided for the Marshall Road and Beechboro Road North intersection. In January 2023 the City of Swan also provided link volume traffic data for the road network in vicinity of the Malaga Site. However, the Main Roads WA data was the more detailed and enables accurate assessment of the operation of the Marshall Road corridor and above intersection – as such the Main Roads WA data was used as the basis of the traffic assessment.

- 2025 Base (AM and PM peak hours). Turning traffic volumes were collected for the year 2021 (the last period when the intersection of Marshall Road and Beechboro Road North was fully operational) and increased at a rate of 2% per annum to determine base 2025 volumes. The 2025 Base road network includes Marshall Road in its existing configuration with a single lane in each direction. The intersection of Marshall Road and Beechboro Road North is assumed to be a four arm traffic signal controlled intersection (with signal phase times based on 2021 values, and optimised to match the increased volumes), with the intersection of Marshall Road and Silver Swan Road modelled as a T-intersection under priority control.
- 2025 Screen Production Facility Opening (AM and PM peak hours). This scenario is essentially the same as the 2025 Base model with the addition of the Screen Production Facility forecast traffic volumes and site access intersection at Marshall Road (left turn in access with auxiliary left turn lane, right turn in access with auxiliary right turn lane, left out access for all vehicles and right out movements restricted to light vehicles only). As with the 2025 Base road network, Marshall Road is in its existing configuration with a single lane in each direction. The intersection of Marshall Road and Beechboro Road North is assumed to be a four arm traffic signal controlled intersection, with the intersection of Marshall Road and Silver Swan Road modelled as a T-intersection under priority control.
- 2035 Base (AM and PM peak hours). Turning traffic volumes collected for the year 2021 (the last period when the intersection of Marshall Road and Beechboro Road North was fully operational) and increased at a rate of 2% per annum between 2021-2025 and 3% per annum between 2025-2035 to determine base 2035 volumes (see Section 6.2 for details of background traffic growth calculations). The 2035 Base road network includes Marshall Road in its future configuration of two lanes in each direction. The intersection of Marshall Road and Beechboro Road North is assumed to be a four arm dual lane roundabout controlled intersection, with the intersection of Marshall Road and Silver Swan Road modelled as a 3 arm roundabout. This scenario does not include the Screen Production Facility.
- 2035 Screen Production Facility 10 Year Post Opening (AM and PM peak hours). This scenario is essentially the same as the 2035 Base model with the addition of the Screen Production Facility forecast traffic volumes and ultimate site access intersection at Marshall Road (left turn in access with auxiliary left turn lane, right turn in access with auxiliary right turn lane, with all exit movements restricted to left out only). As with the 2035 Base road network, Marshall Road is in its future configuration of two lanes in each direction. The intersection of Marshall Road and Beechboro Road North is assumed to be a four arm dual lane roundabout controlled intersection, with the intersection of Marshall Road and Silver Swan Road modelled as a 3 arm roundabout. Any vehicles exiting the facility and wanting to head westbound along Marshall Road could perform a u-turn at the Marshall Road / Silver Swan Road roundabout.

The demands derived from the existing Beechboro Christian School site opposite the proposed development have been retained. It is understood that the school will be relocating, however demands on the network have been retained to reflect some use of that site during peak period after its relocation. The demands for the site, and the turning movements at the intersection of Marshall Road and Silver Swan Road have been taken directly from the Transport Impact Assessment report for that proposed relocation.

6.2 Background Traffic Growth

A background traffic growth rate of 3% per annum has been applied for this assessment. Between 2025 and 2035 the 3% per annum growth rate is the equivalent to an increase of 34% over the 10 year period, which is consistent with the uplift in background traffic set out in the approved Malaga Station DA reporting, which had the benefit of outputs from strategic transport models. The Malaga Station DA Transport Impact Assessment report outlines the following in relation to background traffic growth:

"Background traffic demands have been based on STEM link volumes on an all-day level. These all-day STEM link volumes have been provided for the following years:

- *2016 (Base)*
- *2021*
- *2026*
- *2031*
- *2041*

Based on the all-day STEM link volumes the Main Roads WA Urban Road Planning (URP) approach has been utilised to assess peak hour forecast volumes from all-day STEM forecasts. The step-by-step process used to determine the background traffic growth for each relevant year is detailed as follows:

1. *Compare the all-day STEM 2016 and 2021 outputs using linear growth to create an all-day STEM 2020 demand (on a link level), adopted from STEM (MULFS v1.6.1).*
2. *Compare calculated all-day STEM 2020 to the all-day observed traffic volumes obtained from the video survey (on a link level) to identify the all-day flow differences for each link volume to obtain the calibrated STEM adjustment factor.*
3. *Apply the calibrated STEM adjustment factor to the provided all-day STEM demands (on a link level). This creates an all-day project demand (on a link level).*
4. *Apply the identified peak one-hour factors (on a link level) based on 2020 video survey* to the all-day project demands to create link volume AM and PM peak hour project demands.*
5. *Apply the turning distribution as defined in the 2020 video survey, to the link AM and PM peak project demands, resulting in the AM and PM peak hour turning movements by approach.*

**Base modelling was completed utilising existing counts retrieved for December 2019. As part of the forecast assessment, these counts were considered more reflective of 2020 conditions, hereafter referred to as 2020 video survey counts.*

Following consultation with the METRONET team, the traffic forecasts for the Malaga Station precinct were endorsed on the 7th September 2020."

Note: for METRONET endorsed turning movement diagrams see Appendix A in the Morley-Ellenbrook Line, Malaga Station Transport Impact Assessment report (MEL-MLCX-MO-RPT-000080) dated 06/09/2021.

The METRONET endorsed turning movement diagrams developed for the approved Malaga Station precinct DA, show the following annual increase in traffic along Marshall Road to the east of Beechboro Road North:

- AM peak hour annual increase in traffic from 2025 to 2035
  - Marshall Road eastbound traffic – 2.0% per annum increase
  - Marshall Road westbound traffic – 2.4% per annum increase
  - Combined eastbound & westbound traffic – 2.3% per annum increase
- PM peak hour annual increase in traffic from 2025 to 2035
  - Marshall Road eastbound traffic – 1.9% per annum increase
  - Marshall Road westbound traffic – 3.0% per annum increase
  - Combined eastbound & westbound traffic – 2.4% per annum increase

For the purposes of this assessment of the proposed Screen Production Facility, a background traffic growth rate of 3% per annum has been applied. This is a conservative assumption adopting the highest traffic growth rate from the METRONET endorsed turning movements and applying the 3% background traffic growth rate to all traffic across both AM and PM peak hours.

It should be noted that recent 2021-2022 1 year growth in traffic on some roads in vicinity of the proposed Screen Production Facility site have seen an increase of 4%-9% in a year. The larger annual increase in traffic volumes across 2021-2022 would likely be a result of a combination of factors including:

1) Traffic re-routing as a result of the Malaga Station works and closure of Beechboro Road North for the station construction.
2) Changing working arrangements and travel behaviour as a result of the COVID pandemic, and it is still unknown as to when these impacts on travel behaviour will diminish and by how much.

Both of the above factors do not override the States long term planning and assessment represented by the STEM model and the approach to background traffic growth rate calculation outlined in the Malaga Station DA Transport Impact Assessment report and traffic volumes endorsed by METRONET for the Malaga Station precinct in September 2020.

For consistency of assessment the turning movements generated by the endorsed background traffic growth rate calculation for the Malaga Station precinct, have been adopted for this assessment of the proposed Screen Production Facility.

6.3 Modelling Timeframes and Network

Network modelling has been undertaken in SIDRA Intersection 9.0 Plus version 9.0.3.9771 for the following periods:

- 2025 Base AM Peak
- 2025 Base PM Peak
- 2025 Screen Production Facility Opening AM Peak
- 2025 Screen Production Facility Opening PM Peak
- 2035 Base AM Peak
- 2035 Base PM Peak
- 2035 Screen Production Facility 10 Year Post Opening AM Peak
- 2035 Screen Production Facility 10 Year Post Opening PM Peak

The layout of the modelled network for the base years is shown in Figure 33. The network layouts for the Screen Production Facility opening year, and ten years post opening, are shown in Figure 34.

The most likely configuration of Marshall Road and its intersections with Beechboro Road North and Silver Swan Road for the years 2025 and 2035 have been agreed with the City of Swan.

Figure 33 SIDRA Network for Base Year 2025 and 2035

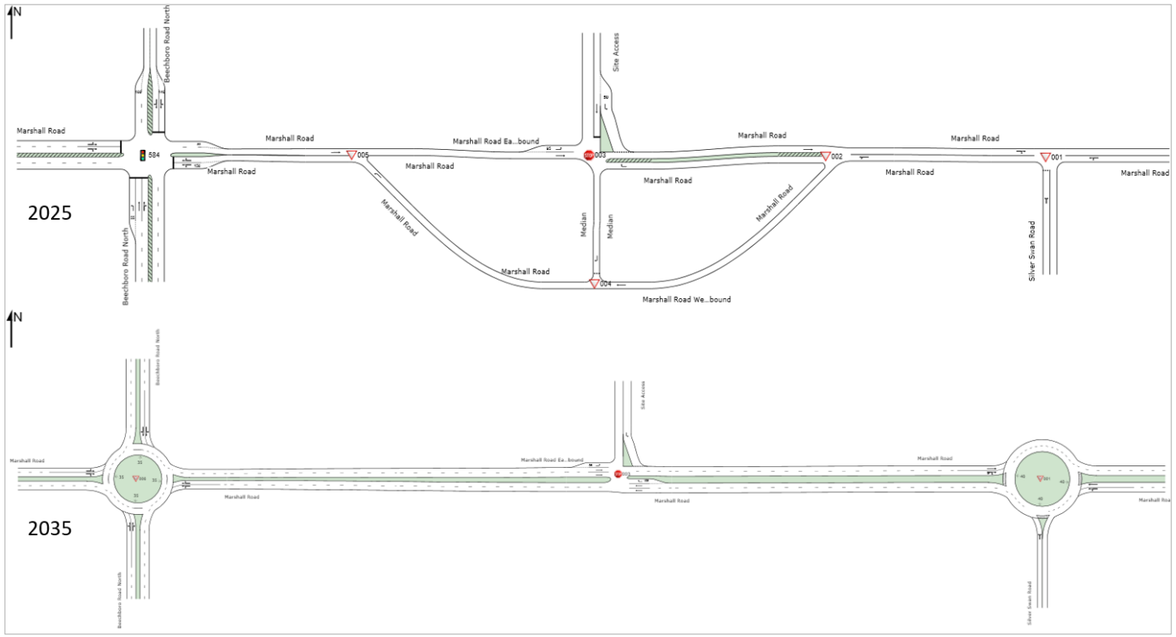

Figure 34 SIDRA Network for Screen Production Facility Opening and 10 Years Post Opening

6.4 Trip Generation

To inform the trip generation of the Screen Production Facility, two separate exercises were undertaken:

- Best practice review of resources available in other jurisdictions
- First principles approach.

The review of other examples involved researching similar locations around the world. The locations found were:

- Ford Theatres project in Los Angeles, USA
- Warner Brothers Studios, Warner Drive Leavesden, UK
- Silverlight Studios in Wanaka, NZ
- Founders Square in Georgia, USA
- Studio Centre, Toronto, Canada
- Pinewood Studios Global Growth Hub, UK.

These projects ranged in scale and approach to assessment. The Silverlight Studio in Wanaka included substantial tourism elements, however there was an assessment of trip generation rates from other sites listed above which are set out below (all based on 100m^2 GFA):

- Shepperton Studies (London, UK), average day:
  - 7am to 8am: 0.447 vehicles arriving / 0.041 vehicles departing
  - 5pm to 6pm: 0.065 vehicles arriving / 0.258 vehicles departing

- Shepperton Studies (London, UK), 90th percentile day:
  - 7am to 8am: 0.618 vehicles arriving / 0.056 vehicles departing
  - 5pm to 6pm: 0.088 vehicles arriving / 0.357 vehicles departing

- Warner Bros Leavesden (Watford, UK):
  - Morning peak hour: 0.178 vehicles arriving / 0.056 vehicles departing
  - Evening peak hour: 0.054 vehicles arriving / 0.520 vehicles departing

- TriBro Studios (Ottawa, Canada):
  - Morning peak hour: 0.86 vehicles arriving / 0.13 vehicles departing
  - Evening peak hour: 0.13 vehicles arriving / 0.73 vehicles departing

- Cape Town Film Studios (Cape Town, South Africa):
  - Morning peak hour: 0.34 vehicles arriving / 0.06 vehicles departing
  - Evening peak hour: 0.06 vehicles arriving / 0.34 vehicles departing

- Founders Studio (Georgia, USA):
  - Morning peak hour: 0.37 vehicles arriving / 0.10 vehicles departing
  - Evening peak hour: 0.1 vehicles arriving / 0.29 vehicles departing

- Pinewood East (London, UK):
  - Morning peak hour: 0.789 vehicles arriving / 0.05 vehicles departing;
  - Evening peak hour: 0.038 vehicles arriving / 0.612 vehicles departing.

These sites provide a range of rates, all intrinsically linked to other movements patterns in the local area. Based on the land use yield proposed for the subject site, the average of these values provided the following vehicle trip generation rates per peak hour, set out in Table 1.

Table 1 Proposed Malaga Site Screen Production Facility vehicle trip generation – based on average of industry examples found

Period	Vehicle Trips In	Vehicle Trips Out
AM Peak Hour	123	17
PM Peak Hour	18	106

The second trip generation exercise was to undertake a first principles approach to the volume of parking on the site and its occupancy. Typically within industrial areas, there is a pronounced peak period where the on-floor workforce all arrive within a typical period of time, every weekday. This tends to lead to a more noticeable peak on the local network. Based on occupancy studies of parking and review of other locations, the occupancy of bays within a peak hour in the AM peak is closer to 70% of capacity. The take up of parking is typically earlier than normal commercial / office peak periods however for the purposes of this exercise, absolute peaks have been used to reflect a conservative position.

Using the trip generation rates from other sites, the example from Canada provided the nearest applicable example, with the trips rates from that site reflecting 60% of the bays at the proposed development being occupied in the AM peak hour. The average weekday trip generation rates used in the assessment for the Malaga Site are set out in Table 2.

Table 2 Proposed Malaga Site Screen Production Facility vehicle trip generation – based on combined first principles approach with nearest applicable industry example site – vehicle trip generation values used for intersection assessment

Period	Vehicle Trips In	Vehicle Trips Out
AM Peak Hour	205	31
PM Peak Hour	31	174

6.5 Trip Distribution

Trip distribution applied to the assessment was based on the following:

- All trip distribution and movements for the opening of Malaga Station were taken explicitly from the Malaga Station DA submitted in 2022.
- Turning movements for the intersection of Marshall Road and Silver Swan Road were taken explicitly from the TIS for the Beechboro Christian School Relocation project submitted in 2021.
- Proportional distribution of site traffic was then based on the existing movements on network taking into account the above. The proportion of all these turning movements were based on existing movements in the network and apportioned accordingly.

6.6 Vehicle Classification

Vehicle classification data for Main Roads count site 6713 (Marshall Road east of Beechboro Road North) from 2020/2021 was used to split up the non-development forecast traffic into the appropriate vehicle types for input to SIDRA. The peak hour vehicle classifications for eastbound and westbound traffic are summarised in Table 3.

Table 3 Vehicle Classification Profile for Marshall Road Traffic

Direction	Peak Hr	Vehicle Classification				
		1	2	3-5	6-9	10
Eastbound	AM Peak	91.6%	1.1%	6.4%	0.8%	0%
	PM Peak	94.7%	0.9%	4.3%	0.2%	0%
Westbound	AM Peak	93.9%	1.1%	4.8%	0.2%	0%
	PM Peak	93.6%	1.3%	4.6%	0.5%	0%

Peak hour development traffic was assumed to be 95% light vehicles (class 1) and 5% heavy vehicles (assumed to be Austroads Vehicle Class 6-9).

6.7 Forecast Volumes 2025

The forecast 2025 Base AM and PM peak hour vehicle trips are set out in Figure 35 and Figure 36. The forecast Screen Production Facility opening year trips for the AM and PM peak hour are illustrated in Figure 37 and Figure 38.

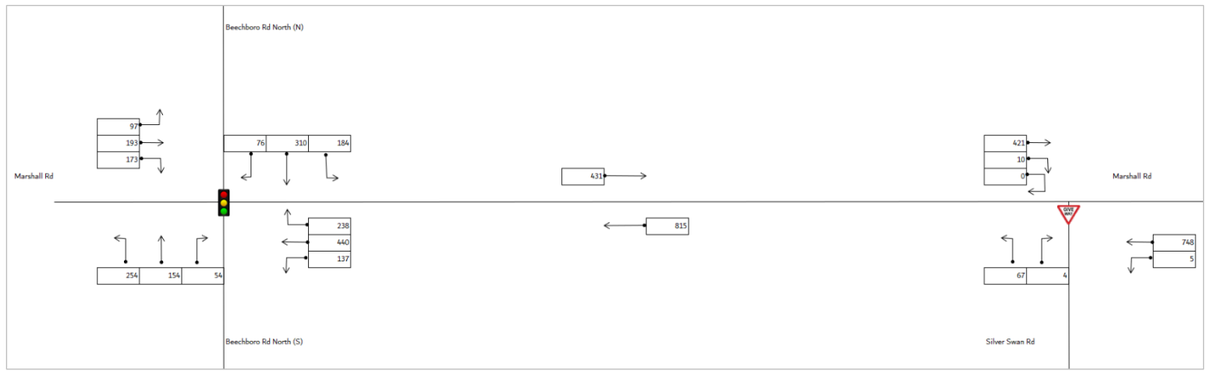

Figure 35 Forecast 2025 Base AM peak hour traffic movements

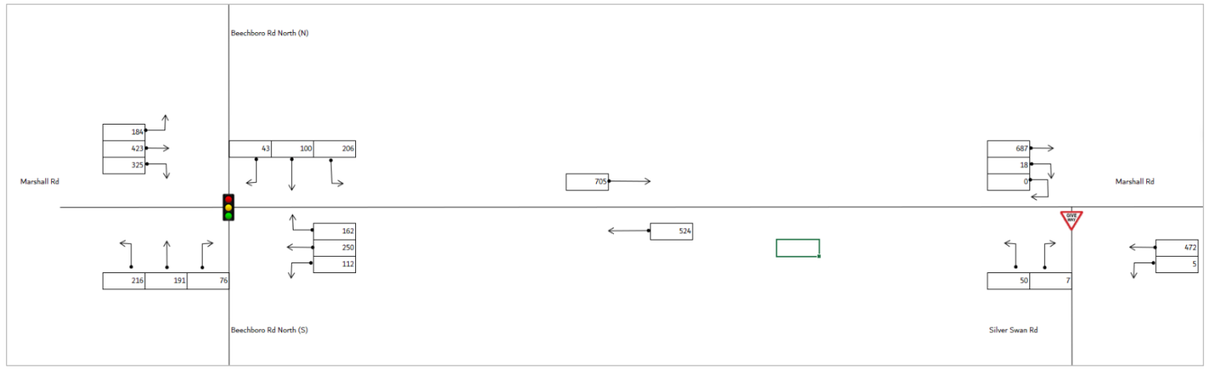

Figure 36 Forecast 2025 Base PM peak hour traffic movements

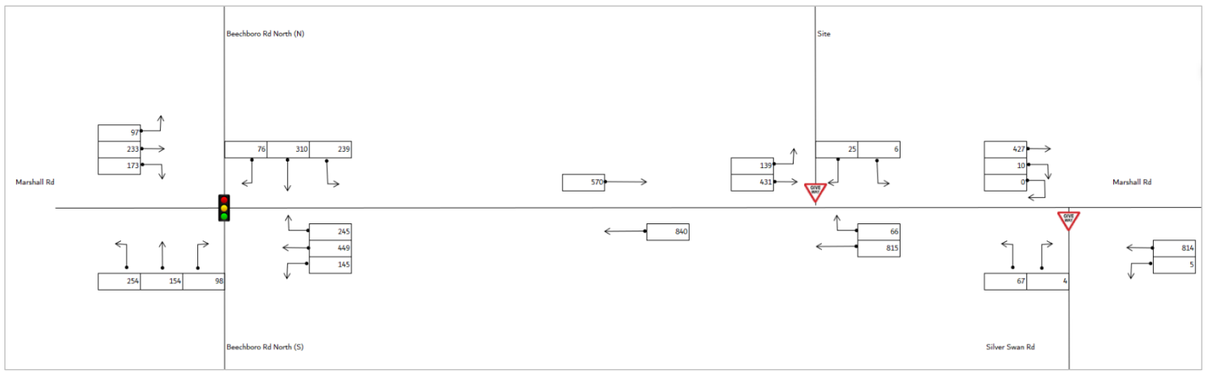

Figure 37 Forecast 2025 Screen Production Facility Opening Year AM peak hour traffic movements

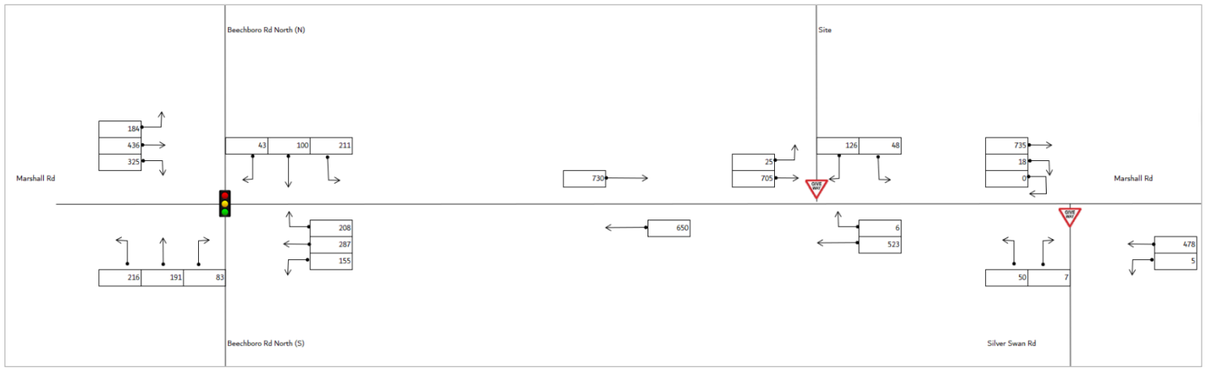

Figure 38 Forecast 2025 Screen Production Facility Opening Year PM peak hour traffic movements

6.8 Forecast Volumes 2035

The forecast 2035 Base AM and PM peak hour vehicle trips are set out in Figure 39 and Figure 40. The forecast trips for the period 10 years post opening of the Screen Production Facility for the AM and PM peak hour are illustrated in Figure 41 and Figure 42.

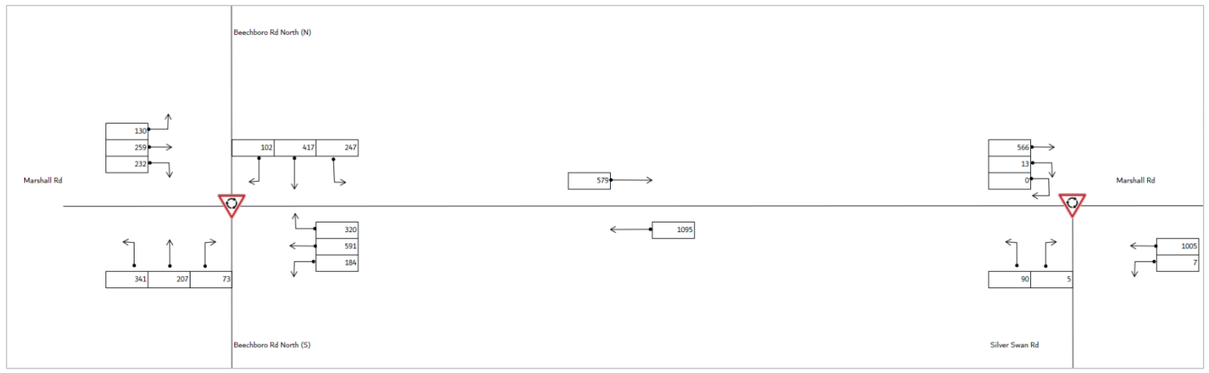

Figure 39 Forecast 2035 Base AM peak hour traffic movements

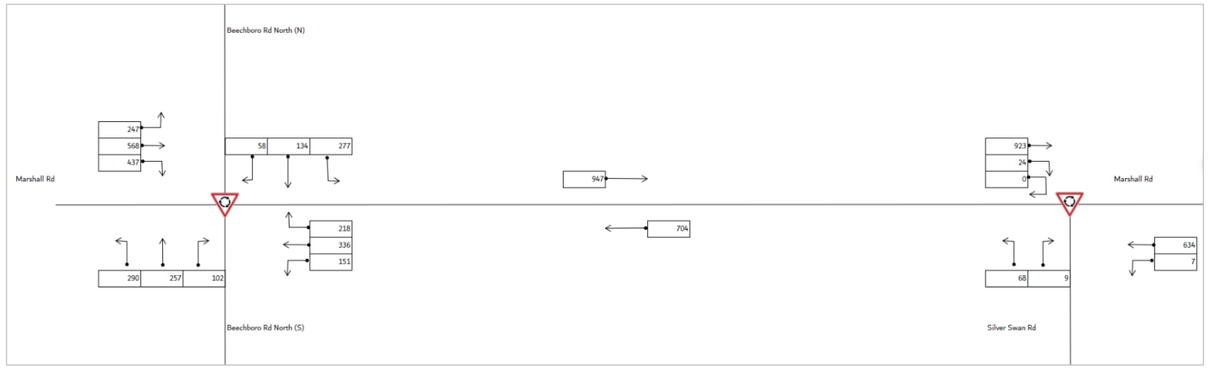

Figure 40 Forecast 2035 Base PM peak hour traffic movements

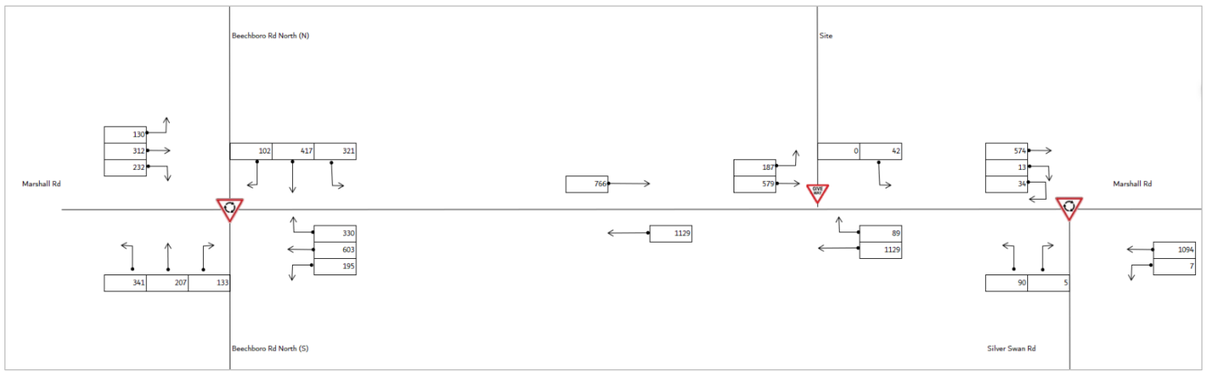

Figure 41 Forecast 2035 10 Years Post Screen Production Facility Opening AM peak hour traffic movements

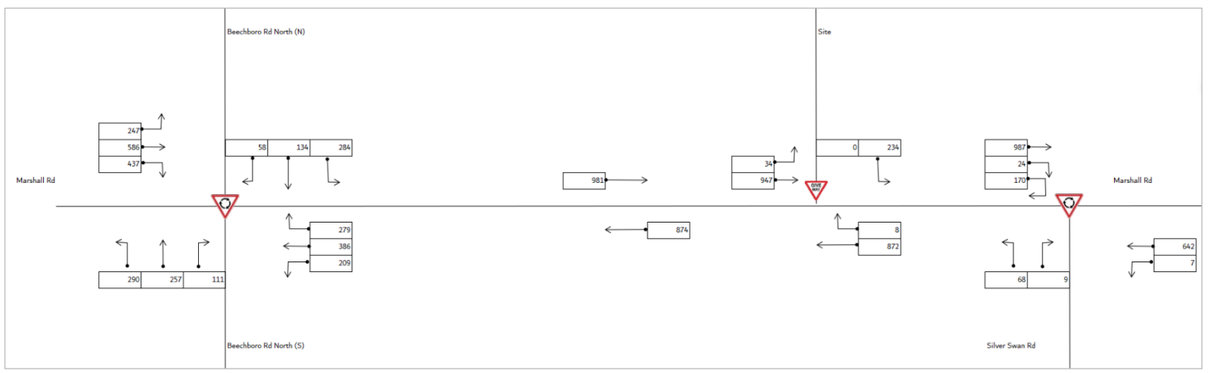

Figure 42 Forecast 2035 10 Years Post Screen Production Facility Opening PM peak hour traffic movements

6.9 Model Outcomes

The network outcomes for Level of Service (LOS) are shown for the following scenarios:

- 2025 Base AM Peak – Figure 43
- 2025 Base PM Peak – Figure 44
- 2025 Screen Production Facility Opening AM Peak – Figure 45
- 2025 Screen Production Facility Opening PM Peak – Figure 46
- 2035 Base AM Peak - Figure 47
- 2035 Base PM Peak - Figure 48
- 2035 Screen Production Facility 10 Year Post Opening AM Peak – Figure 49
- 2035 Screen Production Facility 10 Year Post Opening PM Peak – Figure 50

Full outputs, including movement summaries for all intersections, are in Appendix A.

SIDRA predicts the opening of the Screen Production Facility will not impact the overall performance of the road network, with the network level of service remaining at D for all 2025 scenarios (base and opening year) and at a LOS B for the 2035 scenarios (base and 10 years post opening), where volumes have been increased by 34% on opening year peak volumes. The improvement in overall network level of service between 2025 and 2035 is explained by the construction of a second carriageway for Marshall Road and the introduction of roundabout control at the intersection of Marshall Road with Beechboro Road North.

To accommodate increased eastbound traffic volumes along Marshall Road in the PM peak hour, in the 2025 Base and 2025 Screen Production Facility Opening scenarios, the length of Phase B (Marshall Road eastbound traffic) had to increase beyond what was recorded in March 2021. No other traffic signal phase times were altered from what was recorded in March 2021.

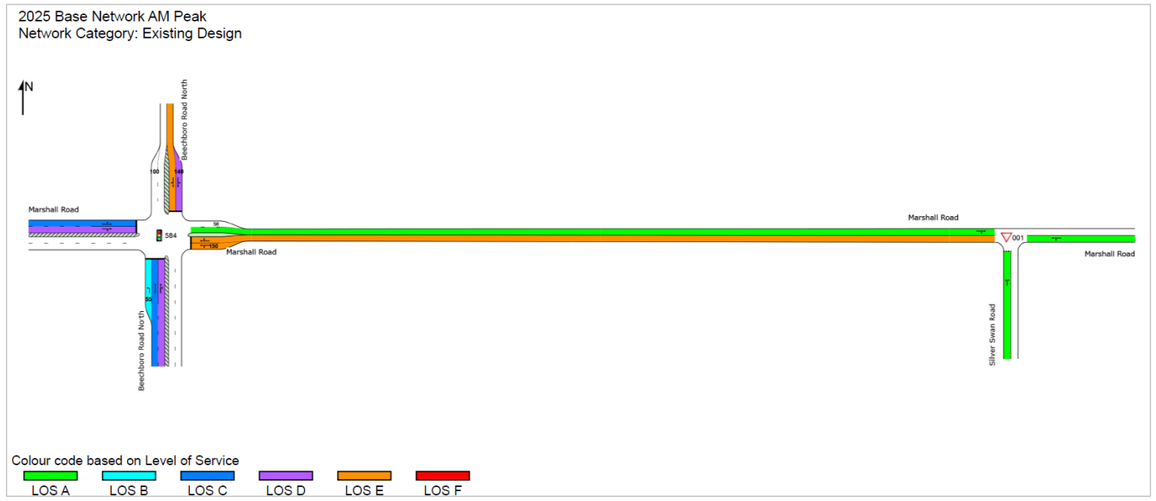

Figure 43 Network level of service lane displays – 2025 Base AM Peak

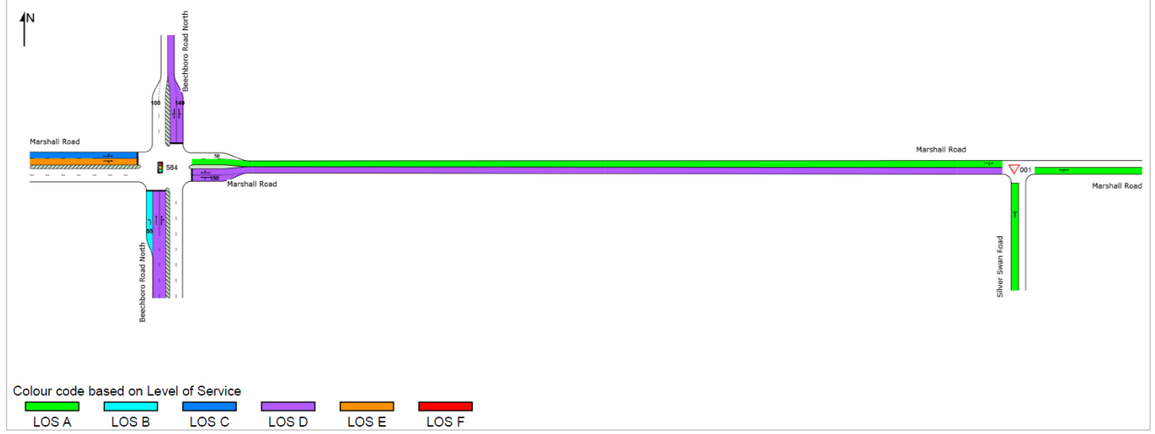

Figure 44 Network level of service lane displays – 2025 Base PM Peak

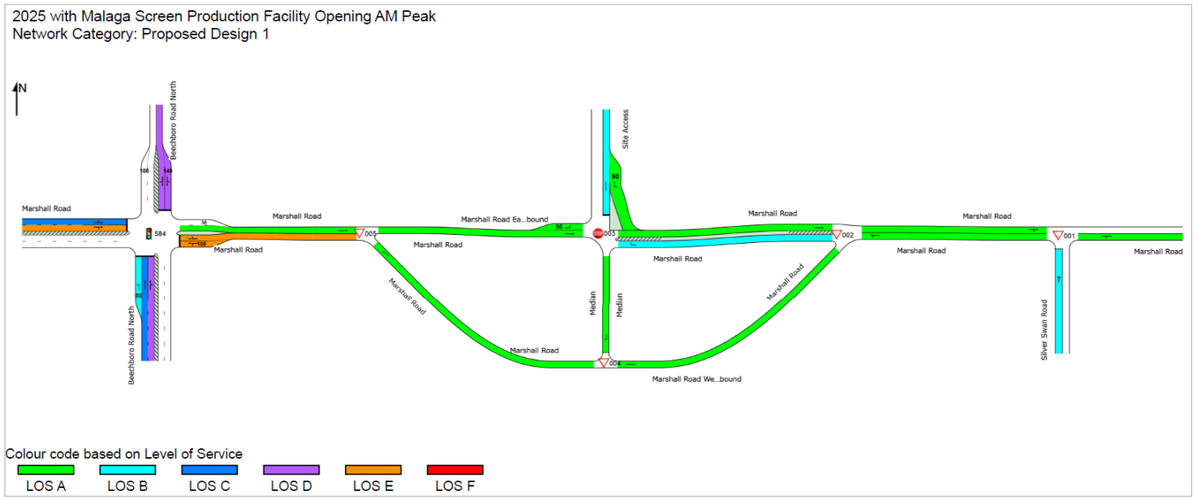

Figure 45 Network level of service lane displays – 2025 Screen Production Facility Opening AM Peak

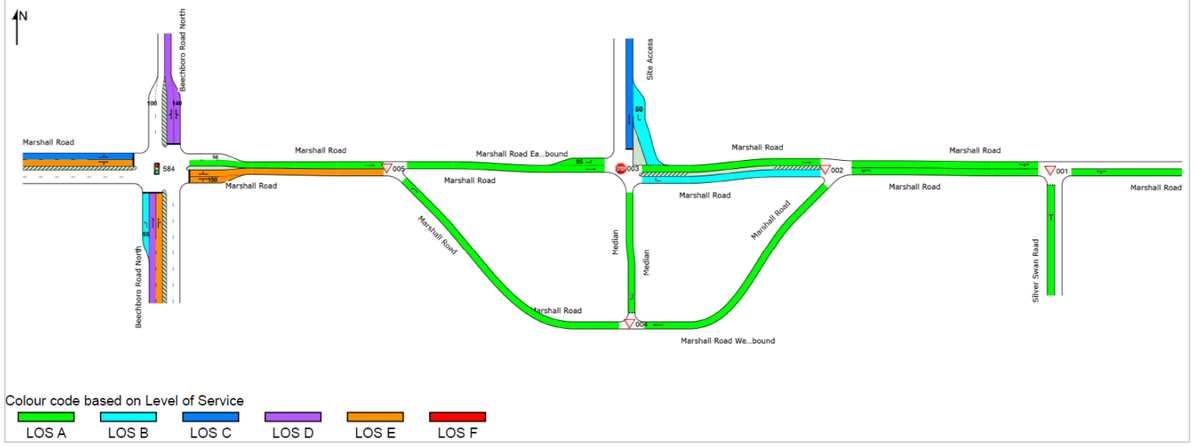

Figure 46 Network level of service lane displays – 2025 Screen Production Facility Opening PM Peak

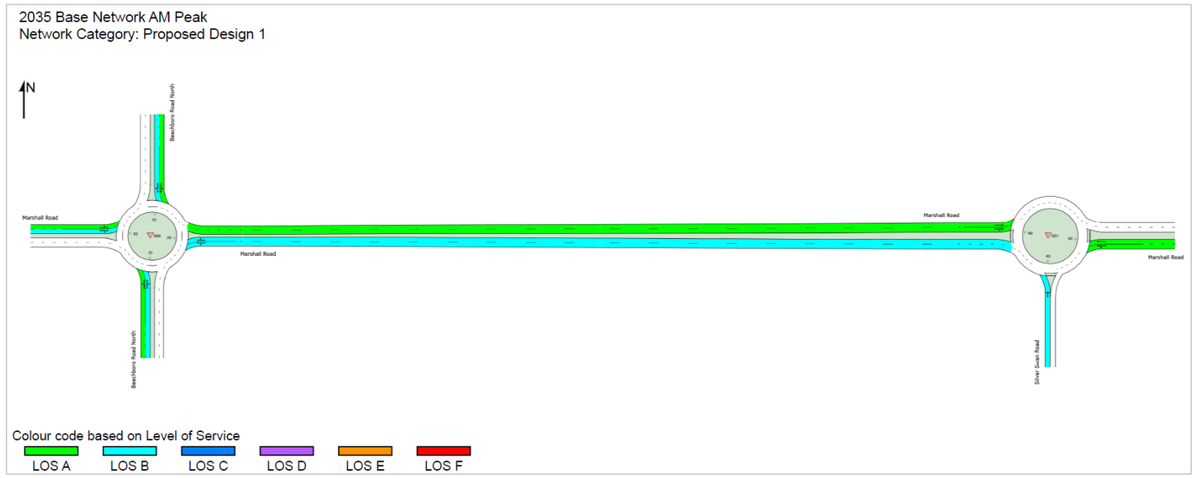

Figure 47 Network level of service lane displays – 2035 Base AM Peak

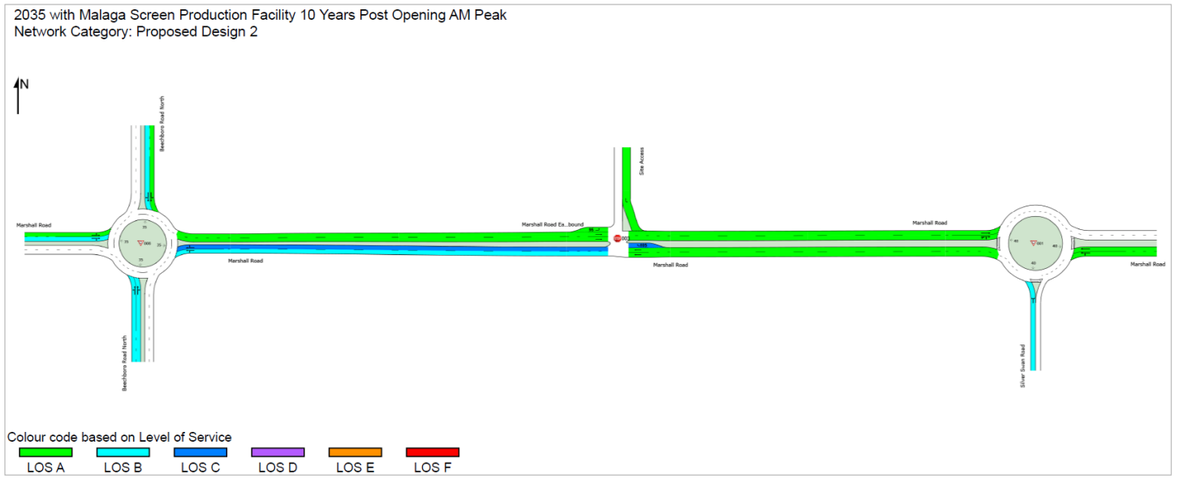

Figure 49 Network level of service lane displays – 2035 Screen Production Facility 10 Year Post Opening AM Peak

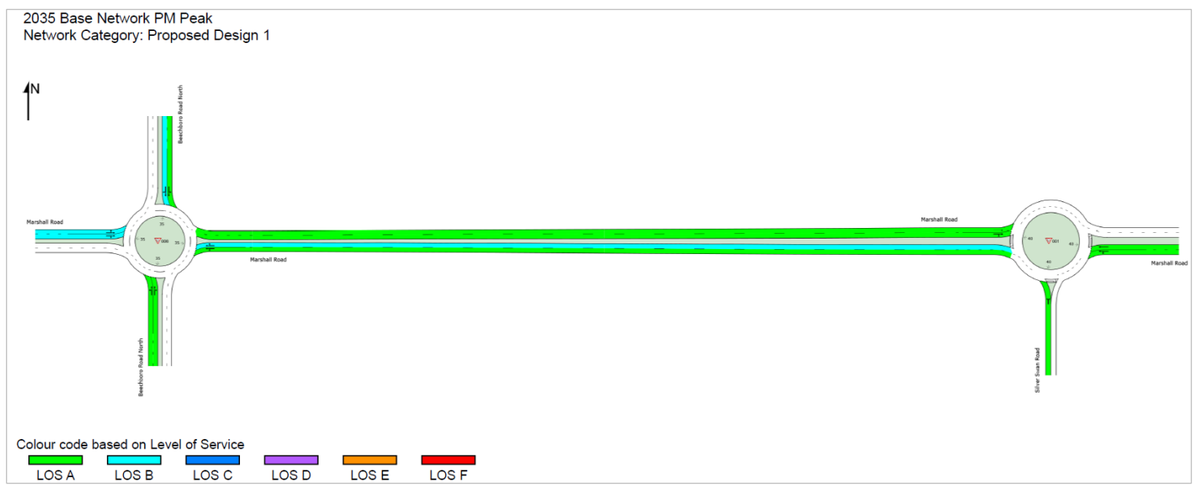

Figure 48 Network level of service lane displays – 2035 Base PM Peak

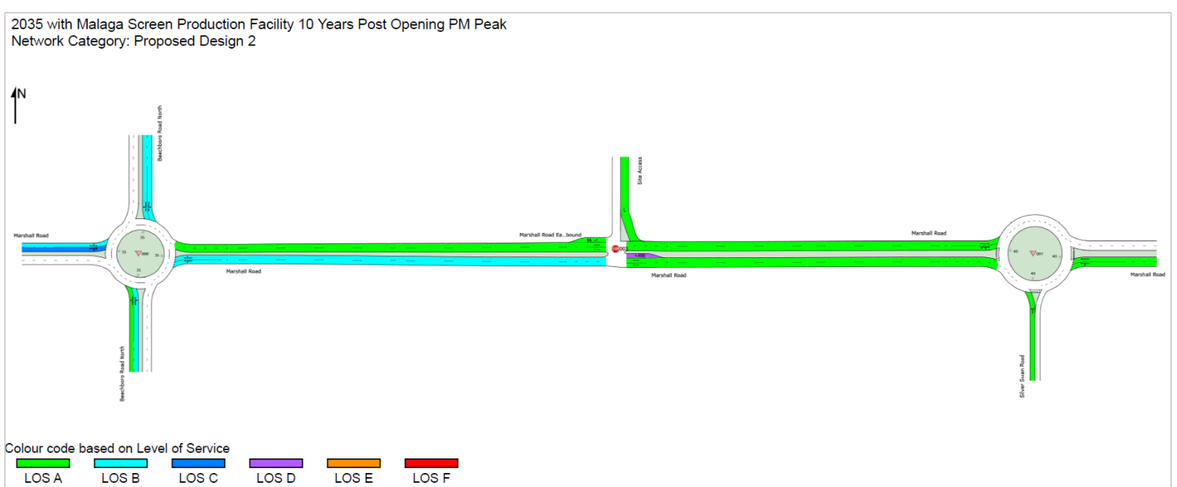

Figure 50 Network level of service lane displays – 2035 Screen Production Facility 10 Year Post Opening PM Peak

The impact of the Screen Production Facility on the operation of the intersection of Marshall Road with Beechboro Road North is illustrated in Table 4 (for 2024/2025) and Table 5 (for 2034/2035). This table compares output from the SIDRA modelling of the Screen Production Facility with modelling undertaken as part of the Malaga Station DA Transport Impact Assessment for the new Morley-Ellenbrook Line station.

Table 4 Comparison of SIDRA Output for Marshall Road/ Beechboro Road North Intersection 2024/2025

Model Scenario	Malaga Station (Traffic Signals) Opening Year 2024		Screen Production Facility (Traffic Signals) Base 2025		Screen Production Facility (Traffic Signals) Opening Year 2025	
	AM	PM	AM	PM	AM	PM
Overall LOS	D	D	D	D	D	E
Worst LOS	E	E	E	E	E	E
Average Intersection delay (s)	45.1	42.6	46.2	47.8	48.7	58.0
Worst approach intersection delay (s)	71.1	58.0	63.8	70.3	74.1	79.8
Worst Degree of Saturation	0.866	0.850	0.953	0.971	0.979	0.985

The modelling undertaken as part of the Malaga Station DA Transport Impact Assessment shows that the signalised intersection of Marshall Road with Beechboro Road North has some spare capacity in 2024, although the worst performing movements are predicted to operate at a LOS E. These results are similar to those of the 2025 Screen Production Facility Base (although for the Screen Production Facility modelling the PM peak hour is the busiest hour whilst the AM peak is the most congested in the Malaga Station model). The Malaga Station modelling predicts that in its current configuration, the signalised intersection of Marshall Road with Beechboro Road North will reach capacity by 2029.

The traffic associated with the Screen Production Facility is predicted to add 2.5 seconds to the overall intersection delay in the AM peak hour, and 10.2 seconds in the PM peak hour over the 2025 base case.

Table 5 Comparison of SIDRA Output for Marshall Road/ Beechboro Road North Intersection 2034/2035

Model Scenario	Malaga Station (Traffic Signals No upgrades) 2034		Malaga Station (Traffic Signals with upgrades) 2034		Screen Production Facility Base (Roundabout) 2035		Screen Production Facility Ten Years Post Opening (Roundabout) 2035	
	AM	PM	AM	PM	AM	PM	AM	PM
Overall LOS	F	F	D	C	B	B	B	B
Worst LOS	F	F	E	E	C	C	C	C
Average Intersection delay (s)	116.8	84.9	44.6	33.1	12.3	12.2	13.7	14.2
Worst approach intersection delay (s)	186.8	129.3	52.0	47.4	22.0	20.3	24.0	23.1
Worst Degree of Saturation	1.110	1.017	0.887	0.771	0.741	0.744	0.781	0.792

By 2035, the Malaga Station DA Transport Impact Assessment modelling showed that the intersection of Marshall Road with Beechboro Road North would operate at a LOS F under the existing configuration with traffic signal control. With the intersection converted to a dual lane roundabout a LOS B is predicted.

The traffic associated with the Screen Production Facility is predicted to add 1.4 seconds to the overall intersection delay in the AM peak hour, and 2.0 seconds in the PM peak hour over the 2035 base case.

The SIDRA Intersection modelling for all scenarios shows that there are no underlying issues with the network performance at opening or within the 10-year period when volumes have been increased by at least 34% on opening year peak volumes and with Marshall Road and Beechboro Road North intersection converted to a dual lane roundabout in 2035.

7. PEDESTRIAN ACCESS AND AMENITY

7.1 Existing Pedestrian Network

The Malaga Site is currently undeveloped and made up of a number of open grass paddocks. Marshall Road between Beechboro Road North and Drumpellier Drive currently has limited development with direct frontage into the corridor, and there is no formal footpath network on neither the northern nor southern side of the corridor. Any pedestrians wishing to walk along this section of Marshall Road would currently have to walk along the hard shoulder or verge – as shown in Figure 51.

Figure 51 Marshall Road adjacent to the Malaga Site – subject site on left of image (source: Google Streetview)

The Walk Score walkability assessment tool considers the address of 375 Marshall Road (the address of Beechboro Christian School site – located opposite the Malaga Site) to be "car-dependent" where most errands require a car, with a walk score of 34 out of 100. The 10-minute, 15-minute and 20-minute walkable catchments from the Malaga Site are shown in Figure 52, which includes destinations such as:

- 10-minute walk catchment destinations:
  - Beechboro Christian School site – located between Marshall Road and Bennett Springs Drive
  - Bennett Springs Sportsfield Oval – located at the southern end of Silver Swan Road
- 15-minute walk catchment destinations:
  - All 10-minute walk catchment destinations
  - Residential properties across the Bennett Springs suburb – down to Hillwater Promenade
  - Marshall Road – through to the intersection with Beechboro Road North
- 20-minute walk catchment destinations:
  - All 15-minute walk catchment destinations
  - The Potter's House Christian Centre – located at Marshall Road and Beechboro Road North
  - Springs Shopping Centre – located at Beechboro Road North and Bridgeman Drive
  - Residential properties across Bennett Springs – between Beechboro Road North and Altone Road
  - Proposed Malaga Station.

It is not expected that the Malaga Site would generate significant walking trips, other than occasional pedestrian movements between the subject site and the new Malaga Station being delivered by METRONET.

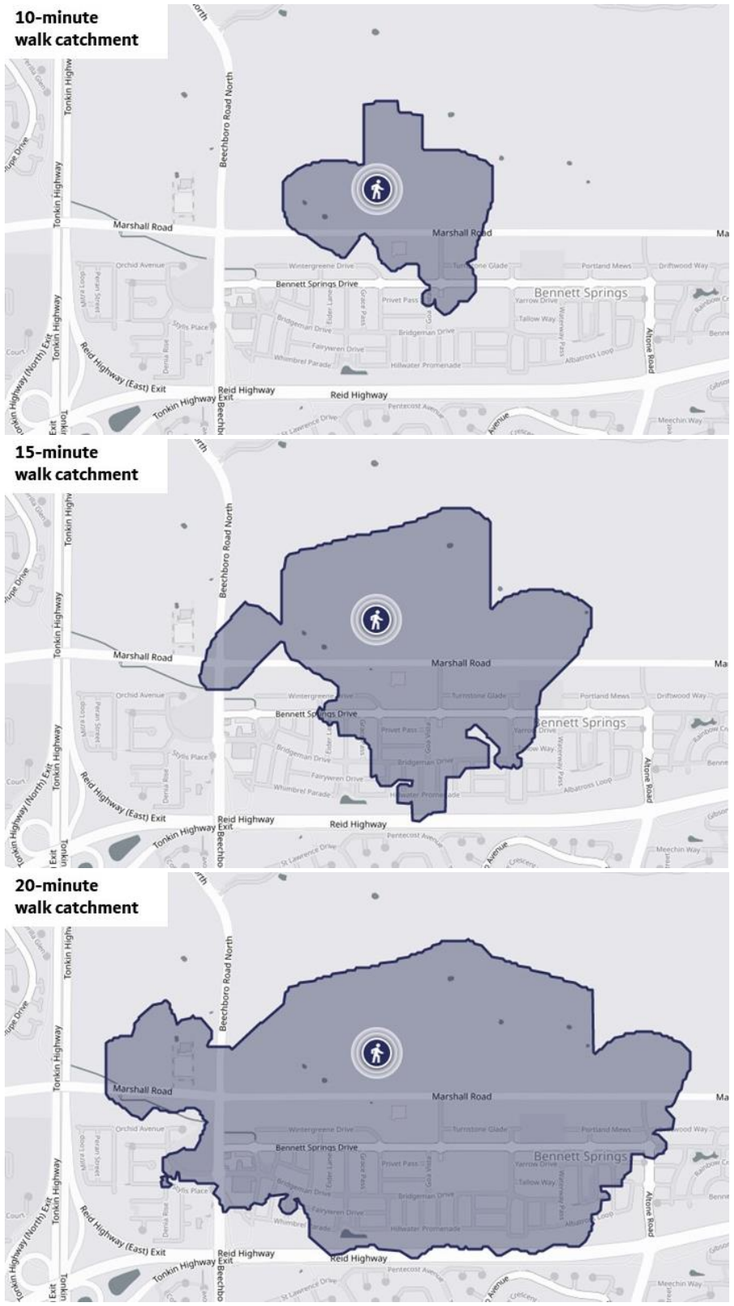

Figure 52 Walking catchments from the Malaga Site (source: TravelTime)

The Department of Planning, Lands and Heritage (DPLH) recently released the Urban Tree Canopy Dashboard which provides an interactive snapshot of the extent of tree canopy coverage across the Perth and Peel regions. The urban tree canopy is an essential part of creating healthy, liveable neighbourhoods, where more dense and mature tree canopies can support active travel along walking and cycling paths.

In 2018, the street blocks in the City of Swan had 10% canopy cover from trees over 3m tall, resulting in 90% of the street block area without any canopy cover (as shown in Figure 53). The Perth Metropolitan area also has an average of 12% canopy cover from trees over 3m tall in street blocks.

Retaining street trees and planting additional green landscaping would reduce the heat throughout summer and create a more inviting and pleasant pedestrian environment. The Malaga Site and the Marshall Road and Beechboro Road North corridors have limited tree canopy cover (between 0%-5% tree canopy coverage) – therefore the pedestrian and bicycle route between the future Malaga Station Precinct and subject site has very limited tree canopy coverage and these routes are likely to be very hot during the summer months and likely to have a significant impact on people choosing to walk or cycle to the site from the future Malaga Station.

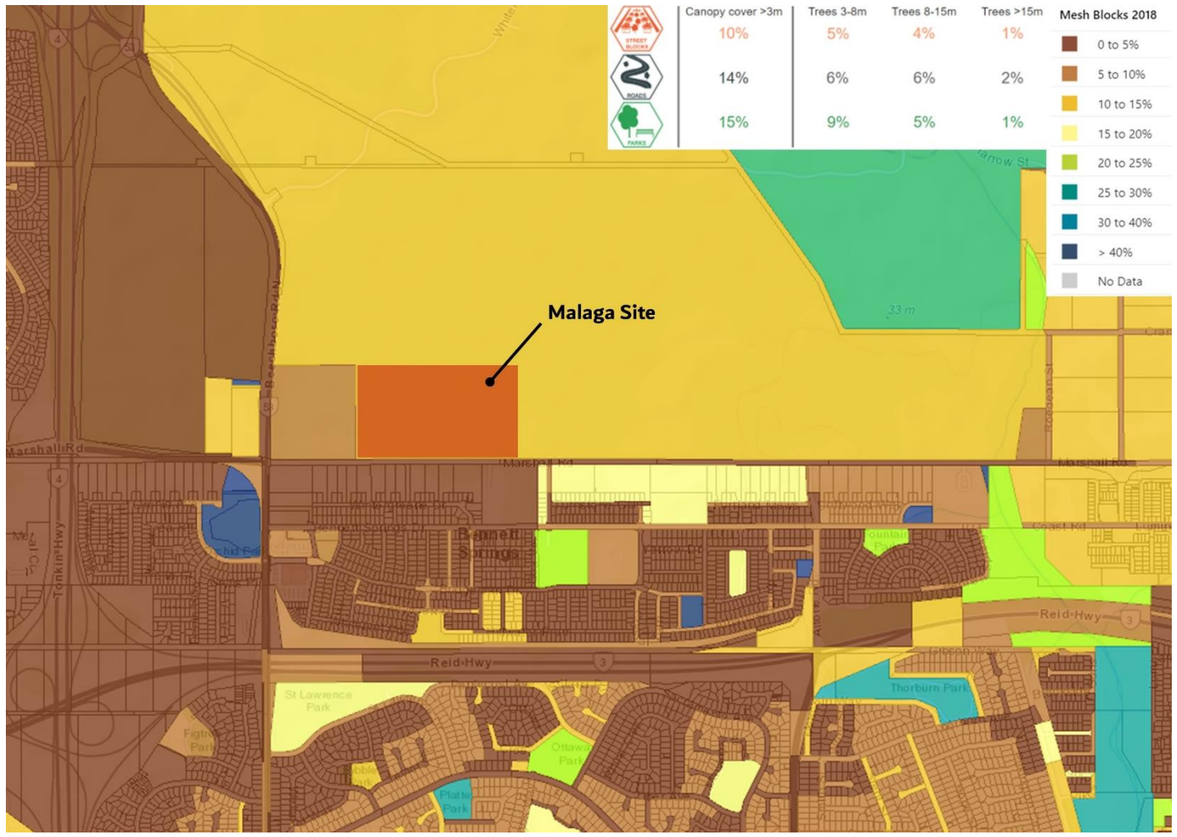

Figure 53 Urban tree canopy in proximity to the Malaga Site (source: Department of Planning, Lands and Heritage)

7.2 Development Proposals Pedestrian Network/Facilities

Given the location of the proposed Screen Production Facility and the nature of the on-site screen production activities – it is not expected that the site will generate a high number of pedestrian movements.

Whilst it is noted that there is no formal footpath along either side of the existing Marshall Road corridor, it is possible that as part of the Marshall Road duplication project that a footpath or shared path is provided along either the northern or southern sides of the Marshall Road corridor.

Indications from the City of Swan in early 2023 suggest that the City will investigate the possibility of constructing a path along the Marshall Road corridor (northern or southern side of the corridor) as part of the Marshall Road duplication project. During discussions with the City of Swan, the Home Fire Screen Production Facility project team have outlined that the preference is for any future shared path to be constructed along the northern side of the Marshall Road corridor – it is understood that the City f Swan are currently investigating this aspect of the Marshall Road duplication project.

If a footpath or shared path is provided along the Marshall Road corridor the proposed Malaga Site would include a connecting path from Marshall Road to the site office building of the Screen Production Facility, with the path expected to run along the eastern side of the site access road – as indicatively shown in Figure 54 – with a possible connection across to the western side of the site access road to the south of the site security hut.

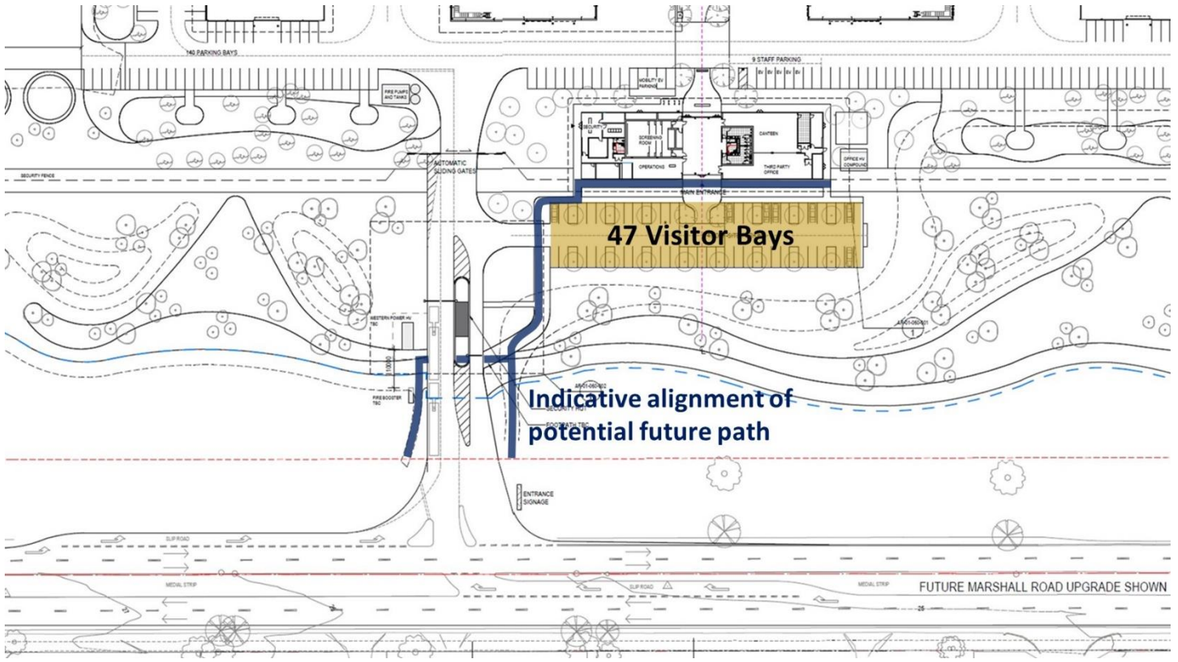

Figure 54 Indicative alignment of a connecting path from Marshall Road to the Malaga Site office building (source: Hassell, January 2023)

Figure 55 shows the indicative routes of potential future pedestrian and cycling paths between the Malaga Site and the surrounding Malaga Station Precinct and beyond. The potential future routes identified include:

- Path along the northern side of Marshall Road (as a minimum between Beechboro Road North and the Malaga Site)
- Path along the eastern side of Beechboro Road North between Marshall Road and Malaga Station
- Path connection from Malaga Station to the Principal Shared Path on the western side of Tonkin Highway (via a new bridge)
- Potential path connection to the northwest of the Malaga Site via a future road connection (if constructed) to the north of the Malaga Site to connect to Beechboro Road North at Malaga Station.

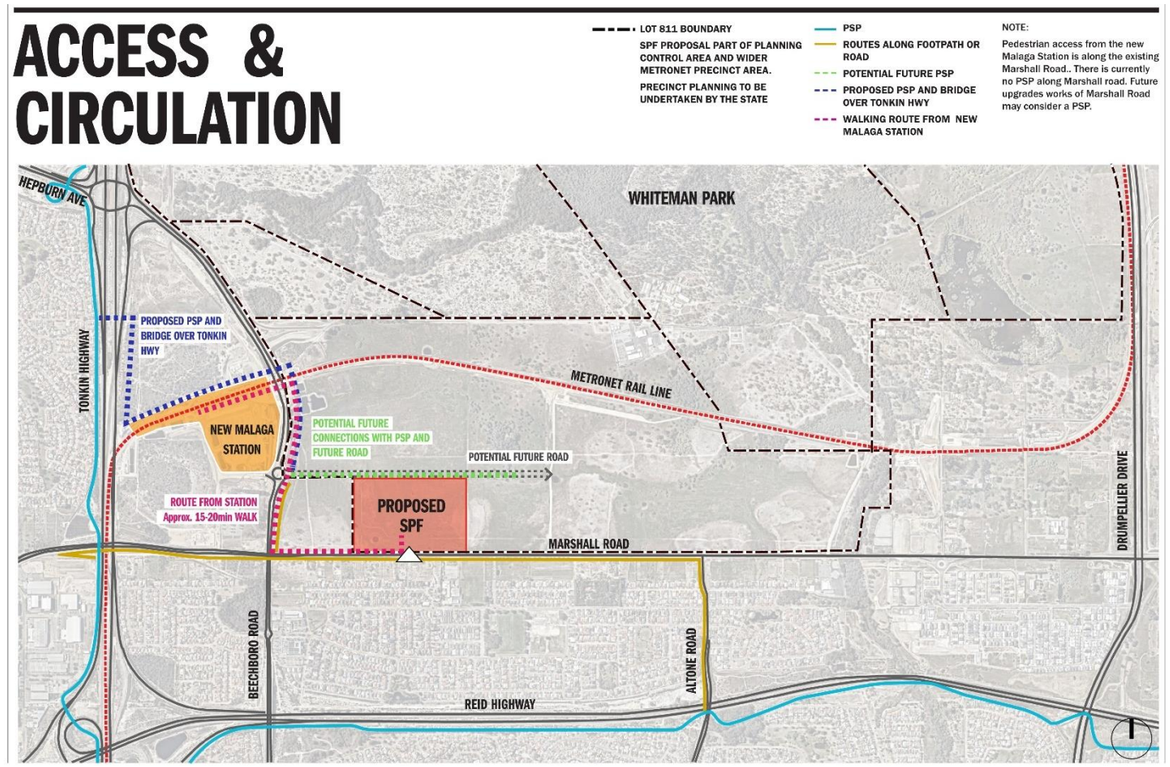

Figure 55 Indicative routes of potential future pedestrian and cycling paths between the Malaga Station Precinct and the Malaga Site (source: Hassell, March 2023)

8. BICYCLE ACCESS AND AMENITY

8.1 Existing Bicycle Network

The existing bicycle network in proximity of the Malaga Site is shown in Figure 56. The Department of Transport's existing bicycle network mapping has not yet been updated to show the NorthLink Principal Shared Path (PSP) extension alongside the Tokin Highway corridor – the mapping has been manually amended to reflect the new sections of PSP.

The Malaga Site is currently poorly served in relation to direct access to the site from bicycle infrastructure. The nearest bicycle routes are Bennett Springs Road and Bridgeman Drive through the residential suburban areas of Bennett Springs. These routes are categorised as 'good road riding' routes – with no formal bicycle infrastructure. Both routes provide an east-west connection through Bennett Springs to the Springs Shopping Centre.

The NorthLink project resulted in the extension of Tonkin Highway north of Reid Highway and a continuous PSP on the western side of Tonkin Highway. The Tonkin Highway PSP is approximately 1.25km to the west of the Malaga Site.

In addition, the bicycle infrastructure along the Reid Highway corridor has been upgraded since the Department of Transport's bicycle network map was produced. There is now a Shared Path along the southern side of Reid Highway – the Shared Path is approximately 800m to the south of the Malaga Site, but both the Marshall Road and Reid Highway corridors are between the subject site and the Shared Path, making efficient access between the two impossible.

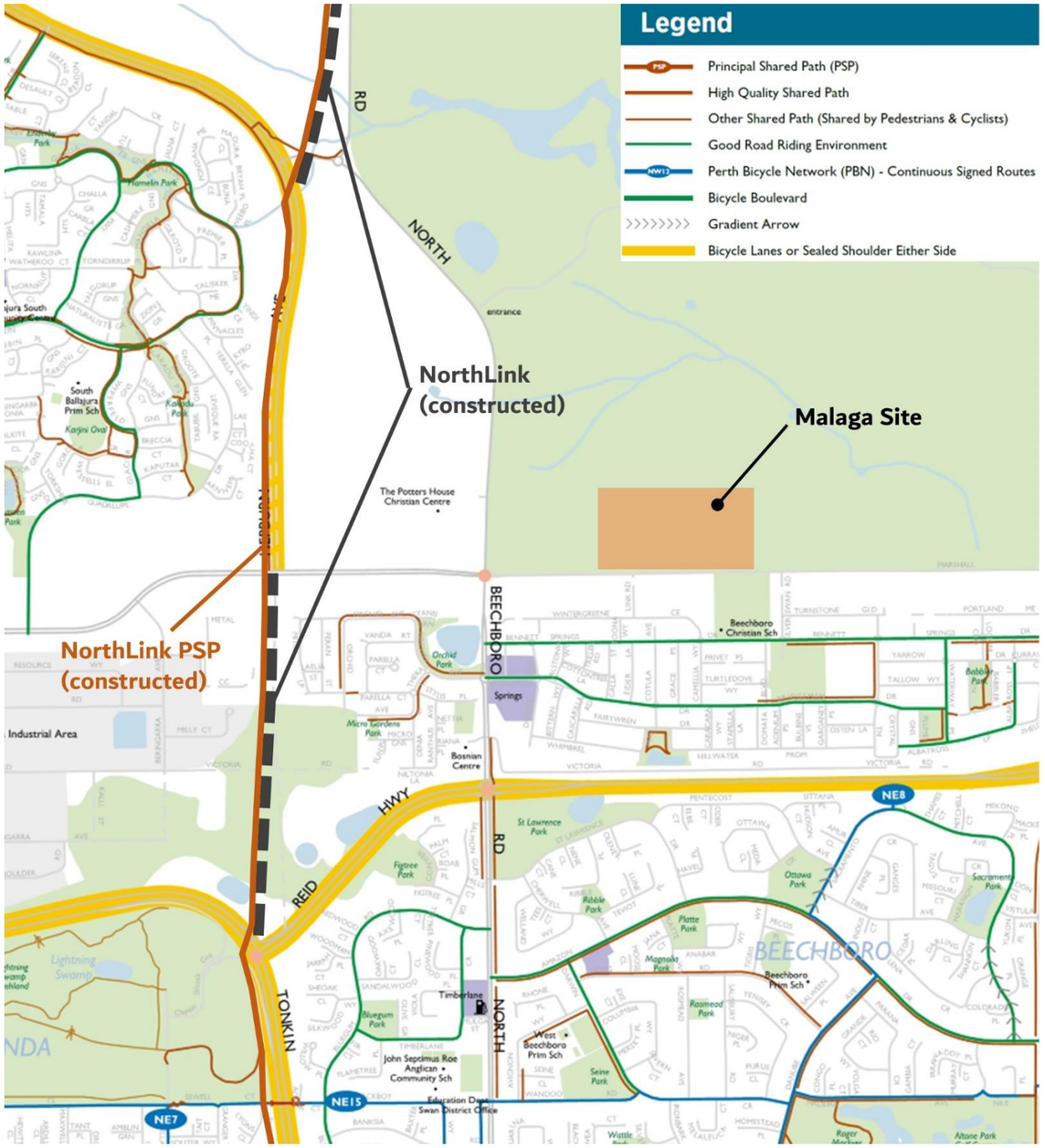

Figure 56 Existing bicycle network in proximity to the Malaga Site (source: Department of Transport)

A heatmap of bicycle activity in the vicinity of the Malaga Site is shown in Figure 57. This is produced by cyclists tracking their trips using the commercial product Strava.

The heatmap data shows that those bicycle riders using the Strava software to track their rides, has the highest levels of cycling along the Tonkin Highway PSP and Reid Highway Shared Path, with some use of Beechboro Road North to access Whiteman Park paths and Tonkin Highway PSP.

There are lower levels of cycling shown through the residential areas of Bennett Springs and along Marshall Road adjacent to the Malaga Site.

Figure 57 Strava heatmap for cycling activity in vicinity of the Malaga Site (source: Strava.com)

8.2 Proposed Bicycle Network

8.2.1 Long Term Cycle Network

The Long Term Cycle Network (LTCN) project has been a collaboration between State and local governments to agree on an aspirational network of bicycle routes that link parks, schools, community facilities and transport services, to make cycling a convenient and viable option for more people and more journeys.

In July 2020 the City of Swan Council endorsed their LTCN – from July 2020 the LTCN is eligible for the City to seek grant funding support from the Department of Transport to deliver bicycle infrastructure along the identified routes – as shown in Figure 58 .

The identified LTCN in the vicinity of the Malaga Site shows Secondary Routes along the Marshall Road corridor and Beechboro Road/Beechboro Road North corridor. These two future identified Secondary Routes would significantly transform access to the site by bicycle – with safe routes to/from the Malaga Site to the new Malaga Station Precinct, the Marshall Road corridor through to the Tonkin Highway PSP and connection to the Springs Shopping Centre commercial precinct on Beechboro Road.

Planning for the inclusion of a Secondary Route and its alignment would form part of the City led Marshall Road duplication project and METRONET led new Malaga Station Precinct project.

Figure 58 Long Term Cycle Network in vicinity of the Malaga Site (source: Department of Transport)

Also see Figure 55 and the supporting commentary, which outlines the indicative routes of potential future pedestrian and cycling paths between the Malaga Site and the surrounding Malaga Station Precinct and beyond.

8.3 Development Proposals Bicycle Network/Facilities

Given the location of the proposed Screen Production Facility and the nature of the on-site screen production activities – it is not expected that the site will generate a high number of bike movements.

Whilst it is noted that there is no formal bicycle infrastructure along the existing Marshall Road corridor, it is identified in the LTCN as a corridor to accommodate a future Secondary Route and it is possible that as part of the Marshall Road duplication project that a shared path is provided along either the northern or southern sides of the Marshall Road corridor.

If a shared path is provided along the Marshall Road corridor the proposed Malaga Site would include a connecting path from Marshall Road to the site office building of the Screen Production Facility, with the path expected to run along the eastern side of the site access road and a possible connection across to the western side of the site access road to the south of the site security hut – as indicatively shown in Figure 54 and discussed in Section 7.2.

The Screen Production Facility is expected to accommodate approximately 10-15 permanent staff on-site in the administration office building. The Screen Production Facility is also expected to accommodate approximately 200 production staff on-site under base case operations and up to 400 production staff on-site under maximum operations.

8.3.1 Facilities for Permanent Staff and Visitors

The sites administration office building will include facilities for permanent staff as detailed below.

- Bicycle parking:
  - Long term parking (staff) – 7.5% of total regular occupants and associated end-of-trip facilities
  - Short term parking (visitors) – 5% of peak patron numbers
- End-of-trip facilities:
  - Long term users (staff) – lockers at 1.2 lockers per bays / showers at 1 for 1-12 bike bays & 2 for 13-39 bike bays
  - Short term parking (visitors) – no requirement.

8.3.2 Facilities to Support Site Mobility

It is expected that the Screen Production Facility will have a Mobility EV Parking hub which may include a fleet of precinct golf buggies, bicycles and scooters – these mobility devices would be used by production staff to travel around the Screen Production Facility and between the site administration office building and the various sound stages and workshops.

The intentions for bicycle facilities and mobility devices across the site can be summarised as follows:

- A secure Mobility EV Parking hub would be located within the secure fence line of the facility. The Mobility EV Parking hub may include:
  - Precinct golf buggy fleet parking and recharge
  - Precinct bicycle fleet parking and recharge
  - Precinct scooter fleet parking and recharge
- Identified parking areas for precinct mobility devices (golf buggy, bicycle, scooter) at key locations across the site, including at all four sound stages and all four workshops.
- Staff end-of-trip facilities including showers and lockers will be provided within the secure site administration office building.
- Staff bicycle parking to the rear of the site administration office building adjacent to the secure Mobility EV Parking hub
- Visitor bike parking outside of the secure fence line at the entrance to the site administration office building.

Figure 59 shows the indicative location of bicycle and mobility device facilities across the Malaga Site.

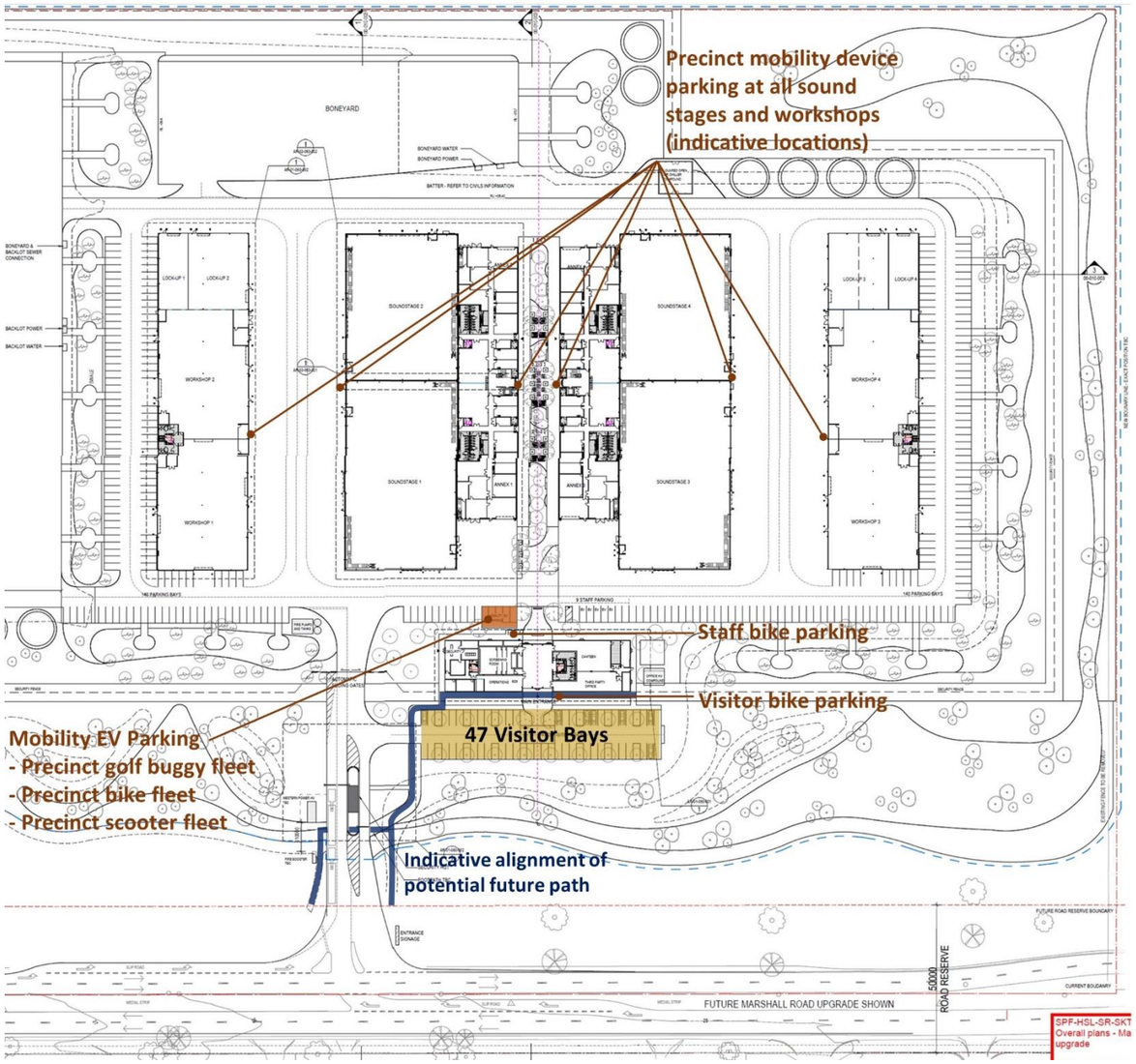

Figure 59 Indicative location of bicycle and mobility device facilities across the Malaga Site (source: Hassell, January 2023)

9. PUBLIC TRANSPORT ACCESS

9.1 Existing Services

The Malaga Site on the northern side of Marshall Road is currently surrounded by vacant lots made up of open grass paddocks. As such, the existing public transport network is not designed to provide high levels of accessibility to this urban fringe location.

The following existing bus routes operate the nearest to the Malaga Site:

- Bus route 345 – operates along Bennett Springs Drive – approximately a 600m walk between the subject site and the bus stops adjacent to Beechboro Christian School via Silver Swan Road. The bus route operates between Morley Bus Station and Bennett Springs via Beechboro Road.
- Bus routes 353 and 955 – operate along Altone Road and Marshall Road between Altone Road and Drumpellier Drive – approximately a 1.2km walk between the subject site and the bus stops on Altone Road juts to the south of Marshall Road.
    - Bus route 353 – operates between Henley Brook Bus Station and Bassendean Station
    - Bus route 955 – operates between Ellenbrook north and Morley Bus Station via Bassendean

The corridors with bus service operating in vicinity of the Malaga Site include:

- Bennett Springs Drive corridor – bus route 345
    - Bus route 345 operates a 30-minute frequency Monday-Saturday between 7.30am-9.30am and between 7pm-10pm and a 15-minute weekday frequency between 9.30am-7pm. Bus route 345 operates a 60-minute frequency on a Sunday between 9.30am-8.30pm.
- Altone Road (Marshall Road between Altone Road and Drumpellier Drive) – bus routes 353 and 955
    - Bus route 353 operates a 20-minute frequency during weekday peak period and 30-minute frequency at other times between 7am-7pm. Bus route 353 operates a 60-minute frequency on Saturdays and Sundays between 8am-6pm.
    - Bus route 955 operates a 15-minute frequency on weekdays between 7am-7pm and then a 60-minute frequency through to 10pm. Bus route 955 operates a 30-minute frequency on Saturdays and Sundays between 8am-7pm.

Figure 60 shows the location of the Malaga Site in relation to existing bus routes.

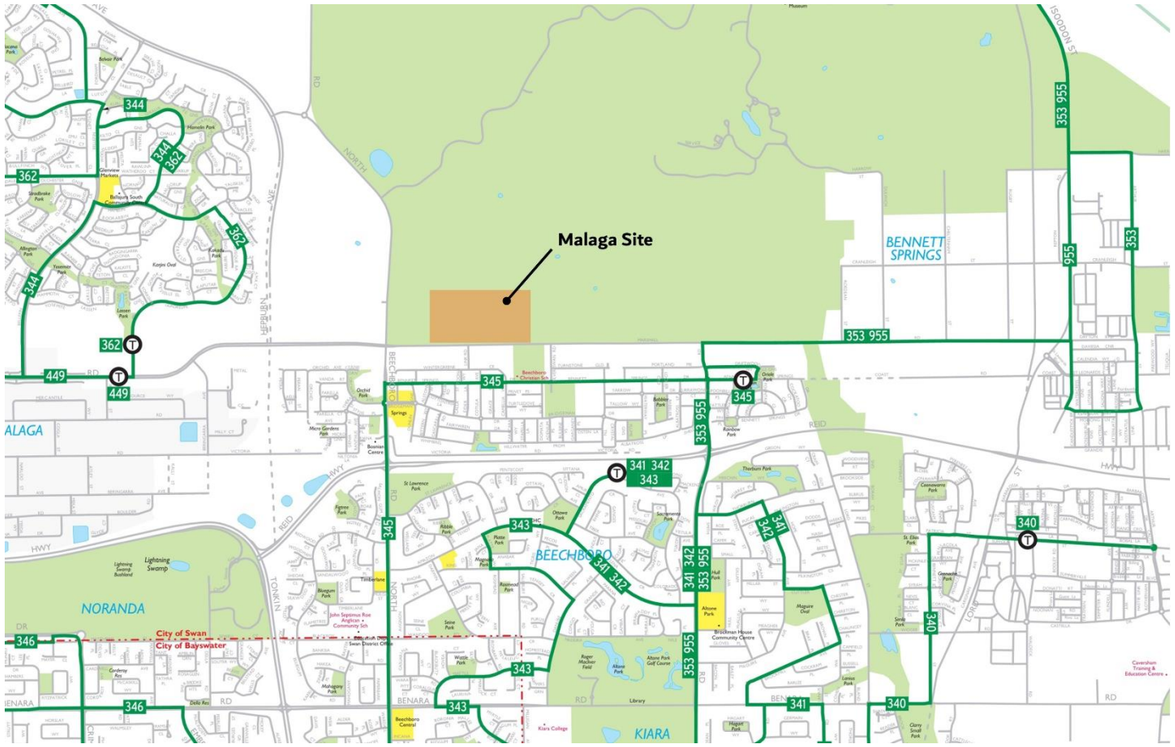

Figure 60 Public transport network in vicinity of the Malaga Site (source: Transperth)

9.2 Future Public Transport Opportunities

As part of the METRONET project to develop the new Malaga Station Precinct, the Public Transport Authority will be working to modify existing bus routes in the area and develop a network of bus routes serving the Malaga Station and surrounding catchments.

The frequency of train services on weekdays during the AM peak at opening in 2024 is planned for five trains every hour, which equates to one train every 12 minutes during peak periods. This drops to four trains per hour during off-peak and two per hour in the evening. The peak hour frequency is planned to increase to 6 trains per hour (one every 10 minutes) in 2031 between Ellenbrook Station and Bayswater Station.

9.2.1 Malaga Station Precinct

It would be expected that the Marshall Road corridor and the Malaga Site would see a significant improvement in public transport accessibility in the future from not only the new Malaga Station (which would be approximately 1.5-2.0km from the Malaga Site) – but also the feeder bus network that would serve the new public transport hub and surrounding residential catchments.

Planning is on-going for the Malaga Station Precinct and the proposal for a Screen Production Facility on the Malaga Site will help shape future planning for the public transport network in vicinity of the site.

10. SUMMARY

10.1 Introduction

This Transport Impact Assessment (TIA) has been prepared in support of an application for development approval for the Screen Production Facility proposed at Lot 811 (No. 233) Drumpellier Drive, Whiteman (referred to in this report as the Malaga Site).

This Screen Production Facility comprises a total of four separate sound stage areas with dedicated workshops, and supporting amenities and facilities. The objective of this project is to deliver, develop and operate a globally competitive film and television studio screen production facility within Western Australia, to develop the local screen industry and attract domestic and international screen productions to the State.

The Malaga Site is reserved as Parks and Recreation under the Metropolitan Region Scheme (MRS). The site is bound by Whiteman Park to the north and east, Marshall Road to the south and land reserved for 'Industrial Development' and Beechboro Road North to the west. An MRS Amendment is underway to rezone the land to allow for the development of the Malaga Site.

10.2 Site Context and Proposed Development

The proposed development site consists of degraded former agricultural land and is devoid of any native vegetation – as such there are no existing traffic movements associated with the site.

The City of Swan (the City) is in the process of planning for detailed design of the duplication of Marshall Road between Beechboro Road North and Drumpellier Drive – with the introduction of a roundabout at the intersection of Beechboro Road North and Marshall Road (currently a traffic signal controlled intersection). The City intends to stage the duplication across several years with construction timeframes yet to be determined by the City. The road reserve would be widened into the subject site to facilitate the duplication. The Marshall Road duplication project includes the construction of two dual lane roundabouts, one to the west and one to the east of the site at Marshall Road intersections with Beechboro Road North and Silver Swan Road.

The proposed development of a largescale Screen Production Facility at the Malaga Site includes the following facilities:

- 4 x sound stages (2 x 1,929m^2 / 2 x 2,386m^2 / total of 8,630m^2)
- 4 x 1,837m^2 annex and production offices (total of 7,348m^2)
- 4 x construction workshops and lock-up facilities (total of 6,960m^2)
- 23,172m^2 backlot
- 4,548m^2 boneyard
- 1,055m^2 administration office building
- Combined site entry and exit road
- Land set aside for drainage, irrigation and swales.

10.3 Proposed Vehicle Access

The proposed site for the Screen Production Facility is currently undeveloped and therefore there is no existing access into the subject site. It is proposed a new single combined entry and exit road will be created providing access to the site from Marshall Road.

Ultimate Site Access: It is proposed that the ultimate site access will permit left-in and left-out movements only and a break in the median island formed by the duplication of Marshall Road will permit right-in movements.

Interim Site Access: It is proposed that an interim site access would be required if the Screen Production Facility was to operate prior to the duplication of Marshall Road – the interim site access will be formed by localised road widening to permit left-in and left-out movements and a break in a new median island will permit right-in and right-out (light vehicles only, with all 19m semi-trailer movements restricted to turn left out from the site).

The location of the proposed Malaga Site access road is approximately 405m from the Silver Swan Road intersection to the east and approximately 560m from the Beechboro Road North intersection to the west.

10.3.1 Interim Site Access

The proposed interim site access road and Marshall Road intersection (with the existing single lane Marshall Road arrangement) layout includes:

- Inbound vehicle movements
  - Left-in slip lane of approximately 100m in length – to ensure the safe deceleration of vehicles upon entry into the site, in particular 19m semi-trailer movements accessing the site.
  - Right-in turn pocket of approximately 100m in length – to ensure the safe storage of right turning vehicles waiting to cross Marshall Road eastbound lanes to access the site.
- Outbound vehicle movements
  - Right-out movement restricted to light vehicles only (suitable signage and pavement markings on exit from the site will show the right-out turn restrictions in place) – this enables a two stage right turn using the median and permits light vehicle egress from the site via Marshall Road to the west towards Beechboro Road North.
  - Left-out movement from the site will accommodate both light vehicle and all heavy vehicle movements from the site. Heavy vehicles seeking to access routes to the west of the Malaga Site will travel to the east via Marshall Road and then to the south via Drumpellier Drive and to the west via Reid Highway to access the Tonkin Highway corridor – approximately an 8km route.
  - In the future the duplication of Marshall Road will include a future dual lane roundabout of Silver Swan Road and Marshall Road, which would permit heavy vehicles from the Malaga Site to U-turn and travel westbound on Marshall Road to Beechboro Road North to access the Tonkin Highway corridor – approximately an 2.5km route.

10.3.2 Ultimate Site Access

The proposed ultimate site access road and Marshall Road intersection (with the duplication of Marshall Road) layout includes:

- Inbound vehicle movements
  - Left-in slip lane of approximately 100m in length – to ensure the safe deceleration of vehicles upon entry into the site, in particular 19m semi-trailer movements accessing the site.
  - Right-in turn pocket of approximately 100m in length – to ensure the safe storage of right turning vehicles waiting to cross Marshall Road eastbound lanes to access the site.
- Outbound vehicle movements
  - Left-out only movement from the site and use of the future dual lane roundabout of Silver Swan Road and Marshall Road to permit for vehicles to U-turn and travel westbound on Marshall Road.

10.4 Proposed On-site Parking

The development proposals for the Screen Production Facility accommodates a total of 336 parking bays allocated across the site as follows:

- On-site 289 car parking bays accommodated within the secure fence line of the Screen Production Facility
  - 70 car parking bays for each of the two eastern studios (140 bays in total)
  - 70 car parking bays for each of the two western studios (140 bays in total)
  - 9 staff car parking bays for permanent on-site Screen Production Facility staff and security staff (including 2 universal access bays)
  - Of the total 289 on-site parking bays there will be 5 electric vehicle (EV) charging bays provided
  - Truck parking/set down areas will be located adjacent to the four studios along the two wide north-south operational/back of house areas between the sound stages and workshops
- Off-site 47 visitor car parking bays accommodated outside of the secure fence line of the Screen Production Facility (including 2 universal access bays).

The sites boneyard and backlot can accommodate additional on-site parking as required.

Based on a range of operational scenarios from a single large scale production occupying the entire site, to four small scale productions simultaneous each occupying one of the four sound stages, it is anticipated that the Screen Production Facility will regularly accommodate 200 production staff under base case operations and occasionally up to 400 staff under maximum operations.

- Proposed Parking Allocation for Base Case Operations (200 Staff)
  - Based on conservative assumptions that all production staff drive to the site and do so independently
  - All 200 production staff would park on-site and utilise one of the 280 on-site car parking bays
- Proposed Parking Allocations for Maximum Operations (400 Staff)
  - Based on conservative assumptions that all production staff drive to the site and do so independently
  - The maximum of 400 production staff could be accommodated across the site – 280 staff would park on-site and 120 staff could be accommodated as required in the Screen Production Facility's backlot area.
- Additional Permanent Administration / Office Staff (10-15 Staff)
  - The administration office building would accommodate approximately 10-15 permanent staff on-site
  - Permanent staff would utilise the 9 office parking bays on-site and between 1-6 visitor parking bays off-site (leaving at least 40 visitor parking bays available).

10.5 Provision for Service Vehicles

The proposed Screen Production Facility is required to be serviced by 19m semi-trailers on a regular basis – as such the site has been designed to accommodate the vehicle swept path of a 19m semi-trailer.

Marshall Road currently does not form part of the Restricted Access Vehicle (RAV) Network and therefore can only be accessed by vehicles up to 19m in length and with a maximum width of 2.5m. The proposed Screen Production Facility is required to be access by an as of right vehicle with a maximum length of 19m (19m semi-trailers) – as such the proposed development does not require any amendments to the existing RAV network for access by the proposed 19m long as of right vehicle.

It is anticipated that all servicing of the Malaga Site will occur via private contractor, including disposal of all waste products.

Service vehicle site entry and exit arrangements are as follows:

- Service vehicle traffic, which includes service, delivery and waste vehicles (up to 19m semi-trailers), will access the site via the outside service vehicle lane (on the western side of the security hut). Approved vehicles will be permitted access through the sliding gate to access the secure fenced Screen Production Facility and on-site set down areas.
- Service vehicles which are not approved access to the site will be directed to perform a U-turn loop on-site before travelling back to Marshall Road. These service vehicles will be temporarily permitted access through the sliding gate to access the secure fenced Screen Production Facility, these service vehicles will be monitored by security personnel while they are directed to perform a U-turn loop via the service roads between the sound stages and workshops, before they leave the site and travel back to Marshall Road.

The inbound service vehicle lane can accommodate the safe storage of two 19m semi-trailer vehicles without blocking back into the inbound general traffic lane. The outbound service vehicle lane can accommodate the safe storage of one 19m semi-trailer vehicles without blocking back into the outbound general traffic exiting the off-site visitor car park.

10.6 Proposed Pedestrian and Bicycle Network/Facilities

Given the location of the proposed Screen Production Facility and the nature of the on-site screen production activities – it is not expected that the site will generate a high number of pedestrian or bicycle movements.

Whilst it is noted that there is no formal footpath along either side of the existing Marshall Road corridor, it is possible that as part of the Marshall Road duplication project that a footpath or shared path is provided along either the northern or southern sides of the Marshall Road corridor.

Indications from the City of Swan in early 2023 suggest that the City will investigate the possibility of constructing a path along the Marshall Road corridor (northern or southern side of the corridor) as part of the Marshall Road duplication project.

If a footpath or shared path is provided along the Marshall Road corridor the proposed Malaga Site would include a connecting path from Marshall Road to the site office building of the Screen Production Facility, with the path expected to run along the eastern side of the site access road – with a possible connection across to the western side of the site access road to the south of the site security hut.

The Screen Production Facility is expected to accommodate approximately 10-15 permanent staff on-site in the administration office building. The Screen Production Facility is also expected to accommodate approximately 200 production staff on-site under base case operations and up to 400 production staff on-site under maximum operations.

10.6.1 Facilities for Permanent Staff and Visitors

The sites administration office building will include facilities for permanent staff as detailed below.

- Bicycle parking:
  - Long term parking (staff) – 7.5% of total regular occupants and associated end-of-trip facilities
  - Short term parking (visitors) – 5% of peak patron numbers
- End-of-trip facilities:
  - Long term users (staff) – lockers at 1.2 lockers per bays / showers at 1 for 1-12 bike bays & 2 for 13-39 bike bays
  - Short term parking (visitors) – no requirement.

10.6.2 Facilities to Support Site Mobility

It is expected that the Screen Production Facility will have a Mobility EV Parking hub which may include a fleet of precinct golf buggy, bicycles and scooters – these mobility devices would be used by production staff to travel around the Screen Production Facility and between the site administration office building and the various sound stages and workshops.

The intentions for bicycle facilities and mobility devices across the site can be summarised as follows:

- A secure Mobility EV Parking hub would be located within the secure fence line of the facility. The Mobility EV Parking hub may include:
  - Precinct golf buggy fleet parking and recharge
  - Precinct bicycle fleet parking and recharge
  - Precinct scooter fleet parking and recharge
- Identified parking areas for precinct mobility devices (golf buggy, bicycle, scooter) at key locations across the site, including at all four sound stages and all four workshops.
- Staff end-of-trip facilities including showers and lockers will be provided within the secure site administration office building.
- Staff bicycle parking to the rear of the site administration office building adjacent to the secure Mobility EV Parking hub
- Visitor bike parking outside of the secure fence line at the entrance to the site administration office building.

10.7 Traffic Assessment

To determine the traffic impacts of the proposed Screen Production Facility, the performance of Malaga Road between the intersections with Beechboro Road North and Silver Swan Road has been assessed for 2025 and 2035, with and without the proposed Screen Production Facility.

Network modelling has been undertaken in SIDRA Intersection 9.0 Plus version 9.0.3.9771 for the following periods:

- 2025 Base AM Peak
- 2025 Base PM Peak
- 2025 Screen Production Facility Opening AM Peak
- 2025 Screen Production Facility Opening PM Peak
- 2035 Base AM Peak
- 2035 Base PM Peak
- 2035 Screen Production Facility 10 Year Post Opening AM Peak
- 2035 Screen Production Facility 10 Year Post Opening PM Peak

The most likely configuration of Marshall Road and its intersections with Beechboro Road North and Silver Swan Road for the years 2025 and 2035 have been agreed with the City of Swan.

SIDRA predicts the opening of the Screen Production Facility will not impact the overall performance of the road network, with the network level of service remaining at D for all 2025 scenarios (base and opening year) and at a LOS B for the 2035 scenarios (base and 10 years post opening), where volumes have been increased by 34% on opening year peak volumes. The improvement in overall network level of service between 2025 and 2035 is explained by the construction of a second carriageway for Marshall Road and the introduction of roundabout control at the intersection of Marshall Road with Beechboro Road North.

To accommodate increased eastbound traffic volumes along Marshall Road in the PM peak hour, in the 2025 Base and 2025 Screen Production Facility Opening scenarios, the length of Phase B (Marshall Road eastbound traffic) had to increase beyond what was recorded in March 2021. No other traffic signal phase times were altered from what was recorded in March 2021.

Full outputs, including movement summaries for all intersections are included in Section 6 and Appendix A.

APPENDIX A – SIDRA OUTPUTS

2025 Movement Summaries

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan Base AM (Site Folder: DA Sites AM Peak)]

Network: N001 [2025 Base AM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2025 Base Year
AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	71	0.0	71	0.0	0.126	9.1	LOS A	0.4	3.1	0.66	0.84	0.66	27.0
3	R2	4	0.0	4	0.0	0.126	16.7	LOS C	0.4	3.1	0.66	0.84	0.66	54.6
Approach		75	0.0	75	0.0	0.126	9.5	LOS A	0.4	3.1	0.66	0.84	0.66	31.7
East: Marshall Road														
4	L2	5	0.0	5	0.0	0.426	6.6	LOS A	0.0	0.0	0.00	0.00	0.00	66.5
5	T1	786	6.0	786	6.0	0.426	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
Approach		792	6.0	792	6.0	0.426	0.3	NA	0.0	0.0	0.00	0.00	0.00	69.6
West: Marshall Road														
11	T1	444	8.5	444	8.5	0.262	0.3	LOS A	0.2	1.7	0.06	0.02	0.07	69.6
12	R2	11	0.0	11	0.0	0.262	12.4	LOS B	0.2	1.7	0.06	0.02	0.07	64.7
Approach		455	8.3	455	8.3	0.262	0.6	NA	0.2	1.7	0.06	0.02	0.07	69.5
All Vehicles		1321	6.5	1321	6.5	0.426	0.9	NA	0.4	3.1	0.06	0.06	0.06	68.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 584 [Marshall Beechboro Base AM (Site Folder: DA Sites AM Peak)]

Network: N001 [2025 Base AM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2025 Base Year
AM Peak
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	267	7.1	267	7.1	0.261	13.9	LOS B	4.9	37.3	0.51	0.72	0.51	54.9
2	T1	162	7.1	162	7.1	0.544	26.1	LOS C	4.7	35.8	0.84	0.68	0.84	49.0
3	R2	57	7.4	57	7.4	0.544	46.5	LOS D	2.7	20.7	1.00	0.78	1.05	13.7
Approach		486	7.1	486	7.1	0.544	21.8	LOS C	4.9	37.3	0.68	0.71	0.68	49.7
East: Marshall Road														
4	L2	145	6.5	145	6.5	0.953	63.7	LOS E	23.5	176.3	1.00	1.20	1.61	34.6
5	T1	463	6.1	463	6.1	* 0.953	57.3	LOS E	23.5	176.3	1.00	1.20	1.61	45.8
6	R2	251	5.9	251	5.9	0.953	63.8	LOS E	23.3	174.1	1.00	1.20	1.62	42.7
Approach		859	6.1	859	6.1	0.953	60.3	LOS E	23.5	176.3	1.00	1.20	1.61	43.4
North: Beechboro Road North														
7	L2	194	8.7	194	8.7	0.902	50.7	LOS D	20.4	156.1	0.99	1.07	1.39	37.3
8	T1	326	6.8	326	6.8	* 0.902	47.2	LOS D	20.4	156.1	1.00	1.06	1.45	39.3
9	R2	80	6.6	80	6.6	0.902	58.2	LOS E	7.6	57.1	1.00	1.02	1.63	46.7
Approach		600	7.4	600	7.4	0.902	49.8	LOS D	20.4	156.1	1.00	1.06	1.45	40.3
West: Marshall Road														
10	L2	102	6.2	102	6.2	0.295	34.0	LOS C	3.9	29.6	0.86	0.76	0.86	53.3
11	T1	203	8.3	203	8.3	* 0.869	39.8	LOS D	16.3	125.3	0.99	1.01	1.28	41.5
12	R2	182	6.9	182	6.9	0.869	47.7	LOS D	16.3	125.3	1.00	1.03	1.33	42.1
Approach		487	7.3	487	7.3	0.869	41.5	LOS D	16.3	125.3	0.96	0.97	1.21	44.7
All Vehicles		2433	6.9	2433	6.9	0.953	46.2	LOS D	23.5	176.3	0.93	1.02	1.31	43.9

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

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan Base PM (Site Folder: DA Sites PM Peak)]

Network: N001 [2025 Base PM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2025 Base Year
PM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	52	0.0	52	0.0	0.078	6.6	LOS A	0.3	1.9	0.52	0.69	0.52	29.6
3	R2	7	0.0	7	0.0	0.078	15.6	LOS C	0.3	1.9	0.52	0.69	0.52	56.0
Approach		59	0.0	59	0.0	0.078	7.7	LOS A	0.3	1.9	0.52	0.69	0.52	38.7
East: Marshall Road														
4	L2	5	0.0	5	0.0	0.272	6.5	LOS A	0.0	0.0	0.00	0.01	0.00	66.6
5	T1	497	6.4	497	6.4	0.272	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	69.7
Approach		502	6.3	502	6.3	0.272	0.2	NA	0.0	0.0	0.00	0.01	0.00	69.7
West: Marshall Road														
11	T1	723	5.2	723	5.2	0.405	0.2	LOS A	0.3	2.4	0.05	0.02	0.06	69.7
12	R2	19	0.0	19	0.0	0.405	9.7	LOS A	0.3	2.4	0.05	0.02	0.06	64.9
Approach		742	5.1	742	5.1	0.405	0.4	NA	0.3	2.4	0.05	0.02	0.06	69.6
All Vehicles		1303	5.3	1303	5.3	0.405	0.7	NA	0.3	2.4	0.05	0.04	0.06	69.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 584 [Marshall Beechboro Base PM (Site Folder: DA Sites PM Peak)]

Network: N001 [2025 Base PM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2025 Base Year
PM Peak
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 92 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	227	5.6	227	5.6	0.190	11.2	LOS B	3.6	27.2	0.39	0.68	0.39	56.7
2	T1	201	5.8	201	5.8	0.790	39.3	LOS D	6.4	47.8	0.94	0.79	1.01	42.2
3	R2	80	5.3	80	5.3	* 0.790	55.3	LOS E	6.2	45.9	1.00	0.93	1.30	12.2
Approach		508	5.6	508	5.6	0.790	29.2	LOS C	6.4	47.8	0.70	0.76	0.78	45.3
East: Marshall Road														
4	L2	118	6.2	118	6.2	0.843	53.4	LOS D	13.7	103.4	1.00	0.98	1.27	37.5
5	T1	262	6.0	262	6.0	* 0.843	46.9	LOS D	13.7	103.4	1.00	0.98	1.27	48.6
6	R2	171	6.2	171	6.2	0.843	53.4	LOS D	13.6	102.5	1.00	0.98	1.27	45.5
Approach		551	6.1	551	6.1	0.843	50.3	LOS D	13.7	103.4	1.00	0.98	1.27	45.8
North: Beechboro Road North														
7	L2	217	5.3	217	5.3	0.671	46.1	LOS D	9.8	73.1	0.96	0.84	1.00	38.5
8	T1	105	5.0	105	5.0	0.671	45.6	LOS D	9.8	73.1	1.00	0.84	1.08	40.0
9	R2	45	4.7	45	4.7	0.671	51.4	LOS D	6.3	46.4	1.00	0.84	1.10	49.2
Approach		367	5.2	367	5.2	0.671	46.6	LOS D	9.8	73.1	0.98	0.84	1.04	41.0
West: Marshall Road														
10	L2	194	6.0	194	6.0	0.330	26.0	LOS C	7.2	54.3	0.71	0.75	0.71	56.6
11	T1	445	5.4	445	5.4	* 0.971	59.2	LOS E	49.0	365.4	0.97	1.16	1.41	35.1
12	R2	342	5.5	342	5.5	0.971	70.3	LOS E	49.0	365.4	1.00	1.21	1.50	35.6
Approach		981	5.6	981	5.6	0.971	56.5	LOS E	49.0	365.4	0.93	1.10	1.30	39.6
All Vehicles		2407	5.6	2407	5.6	0.971	47.8	LOS D	49.0	365.4	0.91	0.96	1.14	42.4

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

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan SPF Opening AM (Site Folder: DA Sites AM Peak)]

Network: N002 [2025 SPF Opening AM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2025 with SPF Traffic
AM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	71	0.0	71	0.0	0.145	10.0	LOS B	0.5	3.4	0.71	0.86	0.71	25.7
3	R2	4	0.0	4	0.0	0.145	20.3	LOS C	0.5	3.4	0.71	0.86	0.71	53.8
Approach		75	0.0	75	0.0	0.145	10.6	LOS B	0.5	3.4	0.71	0.86	0.71	30.3
East: Marshall Road														
4	L2	5	0.0	5	0.0	0.466	6.6	LOS A	0.0	0.0	0.00	0.00	0.00	66.5
5	T1	856	6.0	856	6.0	0.466	0.3	LOS A	0.0	0.0	0.00	0.00	0.00	69.5
Approach		861	6.0	861	6.0	0.466	0.3	NA	0.0	0.0	0.00	0.00	0.00	69.5
West: Marshall Road														
11	T1	451	8.9	451	8.9	0.270	0.4	LOS A	0.3	2.3	0.07	0.02	0.08	69.2
12	R2	11	0.0	11	0.0	0.270	13.7	LOS B	0.3	2.3	0.07	0.02	0.08	56.9
Approach		461	8.7	461	8.7	0.270	0.7	NA	0.3	2.3	0.07	0.02	0.08	69.1
All Vehicles		1397	6.6	1397	6.6	0.466	1.0	NA	0.5	3.4	0.06	0.05	0.06	68.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 003 [Marshall Site Access Part 1 SPF Opening AM (Site Folder: DA Sites AM Peak)]

Network: N002 [2025 SPF Opening AM (Network Folder: DA Networks)]

Marshall Road / Site Access part 1
2025 with SPF Traffic
AM Peak
Site Category: Proposed Design 1
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road														
6	R2	69	6.1	69	6.1	0.108	10.1	LOS B	0.4	3.3	0.57	0.80	0.57	29.2
Approach		69	6.1	69	6.1	0.108	10.1	NA	0.4	3.3	0.57	0.80	0.57	29.2
North: Site Access														
7	L2	6	33.3	6	33.3	0.010	7.5	LOS A	0.0	0.5	0.52	0.61	0.52	22.2
8	T1	26	0.0	26	0.0	0.059	13.5	LOS B	0.2	1.6	0.62	0.99	0.62	14.8
Approach		33	6.5	33	6.5	0.059	12.4	LOS B	0.2	1.6	0.60	0.92	0.60	15.9
West: Marshall Road Eastbound														
10	L2	146	5.0	146	5.0	0.086	5.7	LOS A	0.0	0.0	0.00	0.62	0.00	35.3
11	T1	455	8.6	455	8.6	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		601	7.7	601	7.7	0.253	1.4	NA	0.0	0.0	0.00	0.15	0.00	53.1
All Vehicles		703	7.5	703	7.5	0.253	2.8	NA	0.4	3.3	0.08	0.25	0.08	45.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 004 [Marshall Site Access Part 2 SPF Opening AM (Site Folder: DA Sites AM Peak)]

Network: N002 [2025 SPF Opening AM (Network Folder: DA Networks)]

Marshall Road / Site Access part 2
2025 with SPF Traffic
AM Peak
Site Category: Proposed Design 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road Westbound														
5	T1	858	6.1	858	6.1	0.463	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.6
Approach		858	6.1	858	6.1	0.463	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.6
North: Median														
9	R2	26	0.0	26	0.0	0.048	5.3	LOS A	0.1	1.0	0.63	0.72	0.63	7.1
Approach		26	0.0	26	0.0	0.048	5.3	LOS A	0.1	1.0	0.63	0.72	0.63	7.1
All Vehicles		884	6.0	884	6.0	0.463	0.2	NA	0.1	1.0	0.02	0.02	0.02	67.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 584 [Marshall Beechboro SPF Opening AM (Site Folder: DA Sites AM Peak)]

Network: N002 [2025 SPF Opening AM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2025 with SPF Traffic
AM Peak
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 79 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	267	7.1	267	7.1	0.261	13.9	LOS B	4.9	37.3	0.51	0.72	0.51	54.9
2	T1	162	7.1	162	7.1	0.322	25.3	LOS C	5.0	38.4	0.84	0.68	0.84	49.7
3	R2	103	6.1	103	6.1	* 0.710	47.1	LOS D	4.3	33.1	1.00	0.88	1.22	13.4
Approach		533	6.9	533	6.9	0.710	23.8	LOS C	5.0	38.4	0.70	0.74	0.75	47.5
East: Marshall Road														
4	L2	154	6.2	154	6.2	0.979	74.0	LOS E	26.4	197.8	1.00	1.28	1.75	23.9
5	T1	473	6.0	473	6.0	* 0.979	67.6	LOS E	26.4	197.8	1.00	1.28	1.75	39.2
6	R2	258	5.7	258	5.7	0.979	74.1	LOS E	26.2	195.5	1.00	1.28	1.75	35.2
Approach		884	6.0	884	6.0	0.979	70.6	LOS E	26.4	197.8	1.00	1.28	1.75	36.0
North: Beechboro Road North														
7	L2	252	7.9	252	7.9	0.770	38.6	LOS D	13.8	106.4	0.95	0.90	1.07	42.6
8	T1	326	6.8	326	6.8	0.770	35.0	LOS C	13.8	106.4	0.97	0.91	1.12	44.7
9	R2	80	6.6	80	6.6	0.770	41.1	LOS D	11.5	87.1	0.99	0.92	1.15	52.6
Approach		658	7.2	658	7.2	0.770	37.1	LOS D	13.8	106.4	0.96	0.91	1.10	45.5
West: Marshall Road														
10	L2	102	6.2	102	6.2	0.321	34.2	LOS C	4.3	32.4	0.87	0.76	0.87	53.4
11	T1	245	7.7	245	7.7	* 0.943	51.6	LOS D	21.0	161.1	0.98	1.13	1.50	37.4
12	R2	182	6.9	182	6.9	0.943	61.5	LOS E	21.0	161.1	1.00	1.18	1.59	37.9
Approach		529	7.2	529	7.2	0.943	51.6	LOS D	21.0	161.1	0.97	1.07	1.41	41.0
All Vehicles		2604	6.7	2604	6.7	0.979	48.7	LOS D	26.4	197.8	0.92	1.03	1.31	40.7

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

* Critical Movement (Signal Timing)

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan SPF Opening PM (Site Folder: DA Sites PM Peak)]

Network: N002 [2025 SPF Opening PM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2025 with SPF Traffic
PM Peak
Site Category: Existing Design
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	53	0.0	53	0.0	0.086	6.6	LOS A	0.3	2.1	0.54	0.71	0.54	28.9
3	R2	7	0.0	7	0.0	0.086	18.7	LOS C	0.3	2.1	0.54	0.71	0.54	55.7
Approach		60	0.0	60	0.0	0.086	8.1	LOS A	0.3	2.1	0.54	0.71	0.54	38.0
East: Marshall Road														
4	L2	5	0.0	5	0.0	0.276	6.5	LOS A	0.0	0.0	0.00	0.01	0.00	66.6
5	T1	503	6.5	503	6.5	0.276	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	69.7
Approach		508	6.4	508	6.4	0.276	0.2	NA	0.0	0.0	0.00	0.01	0.00	69.7
West: Marshall Road														
11	T1	774	6.1	774	6.1	0.440	0.2	LOS A	0.4	3.0	0.05	0.02	0.07	69.5
12	R2	19	0.0	19	0.0	0.440	10.1	LOS B	0.4	3.0	0.05	0.02	0.07	57.5
Approach		793	6.0	793	6.0	0.440	0.4	NA	0.4	3.0	0.05	0.02	0.07	69.4
All Vehicles		1361	5.9	1361	5.9	0.440	0.7	NA	0.4	3.0	0.05	0.04	0.06	68.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 003 [Marshall Site Access Part 1 SPF Opening PM (Site Folder: DA Sites PM Peak)]

Network: N002 [2025 SPF Opening PM (Network Folder: DA Networks)]

Marshall Road / Site Access part 1
2025 with SPF Traffic
PM Peak
Site Category: Proposed Design 1
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road														
6	R2	6	16.7	6	16.7	0.016	13.7	LOS B	0.1	0.6	0.69	0.80	0.69	25.0
Approach		6	16.7	6	16.7	0.016	13.7	NA	0.1	0.6	0.69	0.80	0.69	25.0
North: Site Access														
7	L2	51	18.8	51	18.8	0.104	10.4	LOS B	0.4	3.8	0.67	0.84	0.67	18.3
8	T1	133	0.0	133	0.0	0.437	23.1	LOS C	2.1	14.5	0.83	1.12	1.15	9.7
Approach		183	5.2	183	5.2	0.437	19.6	LOS C	2.1	14.5	0.78	1.04	1.02	11.3
West: Marshall Road Eastbound														
10	L2	26	4.0	26	4.0	0.015	5.7	LOS A	0.0	0.0	0.00	0.63	0.00	35.4
11	T1	742	5.2	742	5.2	0.397	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.7
Approach		768	5.2	768	5.2	0.397	0.2	NA	0.0	0.0	0.00	0.02	0.00	66.5
All Vehicles		958	5.3	958	5.3	0.437	4.0	NA	2.1	14.5	0.15	0.22	0.20	40.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 004 [Marshall Site Access Part 2 SPF Opening PM (Site Folder: DA Sites PM Peak)]

Network: N002 [2025 SPF Opening PM (Network Folder: DA Networks)]

Marshall Road / Site Access part 2
2025 with SPF Traffic
PM Peak
Site Category: Proposed Design 1
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road Westbound														
5	T1	553	6.5	553	6.5	0.300	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		553	6.5	553	6.5	0.300	0.0	NA	0.0	0.0	0.00	0.00	0.00	69.8
North: Median														
9	R2	133	0.0	133	0.0	0.155	3.1	LOS A	0.5	3.5	0.47	0.58	0.47	9.7
Approach		133	0.0	133	0.0	0.155	3.1	LOS A	0.5	3.5	0.47	0.58	0.47	9.7
All Vehicles		685	5.2	685	5.2	0.300	0.6	NA	0.5	3.5	0.09	0.11	0.09	58.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 584 [Marshall Beechboro SPF Opening PM (Site Folder: DA Sites PM Peak)]

Network: N002 [2025 SPF Opening PM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2025 with SPF Traffic
PM Peak
Site Category: Future Conditions 1
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 92 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	227	5.6	227	5.6	0.193	11.6	LOS B	3.8	28.2	0.40	0.69	0.40	56.5
2	T1	201	5.8	201	5.8	* 0.907	41.2	LOS D	7.1	53.1	0.96	0.81	1.05	41.5
3	R2	87	4.8	87	4.8	0.907	65.5	LOS E	6.5	48.0	1.00	1.04	1.64	10.5
Approach		516	5.5	516	5.5	0.907	32.3	LOS C	7.1	53.1	0.72	0.80	0.86	43.6
East: Marshall Road														
4	L2	147	5.0	147	5.0	0.975	79.7	LOS E	22.2	164.6	1.00	1.22	1.69	22.7
5	T1	333	4.7	333	4.7	* 0.975	73.3	LOS E	22.2	164.6	1.00	1.22	1.69	37.7
6	R2	203	5.2	203	5.2	0.975	79.8	LOS E	22.0	163.4	1.00	1.22	1.69	34.0
Approach		683	4.9	683	4.9	0.975	76.7	LOS E	22.2	164.6	1.00	1.22	1.69	34.1
North: Beechboro Road North														
7	L2	222	5.2	222	5.2	0.729	48.6	LOS D	10.5	78.2	0.98	0.86	1.08	37.4
8	T1	105	5.0	105	5.0	0.729	47.9	LOS D	10.5	78.2	1.00	0.87	1.16	39.1
9	R2	45	4.7	45	4.7	0.729	53.7	LOS D	6.4	47.4	1.00	0.87	1.18	48.4
Approach		373	5.1	373	5.1	0.729	49.0	LOS D	10.5	78.2	0.99	0.86	1.12	40.0
West: Marshall Road														
10	L2	194	6.0	194	6.0	0.335	26.1	LOS C	7.4	55.3	0.71	0.75	0.71	56.6
11	T1	459	5.5	459	5.5	* 0.985	65.3	LOS E	52.4	391.2	0.97	1.20	1.47	33.5
12	R2	342	5.5	342	5.5	0.985	77.4	LOS E	52.4	391.2	1.00	1.26	1.57	34.0
Approach		995	5.6	995	5.6	0.985	61.8	LOS E	52.4	391.2	0.93	1.13	1.36	38.0
All Vehicles		2566	5.3	2566	5.3	0.985	58.0	LOS E	52.4	391.2	0.91	1.05	1.31	37.8

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

* Critical Movement (Signal Timing)

2035 Movement Summaries

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan 2035 Base AM (Site Folder: DA Sites AM Peak)]

Network: N003 [2035 Base AM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2035 Base Traffic
AM Peak
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	95	0.0	95	0.0	0.148	10.6	LOS B	1.1	7.4	0.87	0.79	0.87	26.2
3	R2	5	0.0	5	0.0	0.148	16.2	LOS B	1.1	7.4	0.87	0.79	0.87	57.7
Approach		100	0.0	100	0.0	0.148	10.9	LOS B	1.1	7.4	0.87	0.79	0.87	30.7
East: Marshall Road														
4	L2	7	0.0	7	0.0	0.075	4.3	LOS A	0.4	5.6	0.10	0.36	0.10	61.7
5	T1	1058	6.1	1058	6.1	0.515	4.4	LOS A	4.6	31.9	0.11	0.36	0.11	63.6
Approach		1065	6.0	1065	6.0	0.515	4.4	LOS A	4.6	31.9	0.11	0.36	0.11	63.6
West: Marshall Road														
11	T1	596	8.3	596	8.3	0.181	4.4	LOS A	1.4	11.0	0.06	0.37	0.06	67.5
12	R2	14	0.0	14	0.0	0.181	11.1	LOS B	1.4	10.5	0.07	0.38	0.07	62.1
Approach		609	8.1	609	8.1	0.181	4.5	LOS A	1.4	11.0	0.06	0.37	0.06	67.4
All Vehicles		1775	6.4	1775	6.4	0.515	4.8	LOS A	4.6	31.9	0.14	0.39	0.14	64.8

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

MOVEMENT SUMMARY

Site: 006 [Marshall Beechboro 2035 Base AM (Site Folder: DA Sites AM Peak)]

Network: N003 [2035 Base AM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2035 Traffic
AM Peak
Site Category: Proposed Design 2
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	360	7.3	360	7.3	0.543	8.9	LOS A	4.0	30.3	0.89	1.00	1.07	59.7
2	T1	218	6.8	218	6.8	0.543	10.6	LOS B	4.0	30.3	0.88	1.00	1.09	58.6
3	R2	78	9.5	78	9.5	0.543	17.2	LOS B	3.6	27.5	0.87	1.00	1.09	34.0
Approach		656	7.4	656	7.4	0.543	10.5	LOS B	4.0	30.3	0.88	1.00	1.08	58.2
East: Marshall Road														
4	L2	194	6.0	194	6.0	0.741	13.2	LOS B	8.2	61.6	0.93	1.12	1.38	56.2
5	T1	622	6.1	622	6.1	0.741	14.0	LOS B	8.2	61.6	0.93	1.12	1.39	62.3
6	R2	338	6.2	338	6.2	0.741	22.0	LOS C	7.6	56.9	0.93	1.14	1.43	59.7
Approach		1154	6.1	1154	6.1	0.741	16.2	LOS B	8.2	61.6	0.93	1.13	1.40	60.8
North: Beechboro Road North														
7	L2	260	8.5	260	8.5	0.448	8.1	LOS A	2.8	21.8	0.70	0.74	0.74	65.3
8	T1	440	7.2	440	7.2	0.448	8.9	LOS A	2.8	21.8	0.71	0.78	0.76	64.5
9	R2	107	6.9	107	6.9	0.448	15.7	LOS B	2.8	20.9	0.71	0.80	0.77	66.6
Approach		807	7.6	807	7.6	0.448	9.6	LOS A	2.8	21.8	0.71	0.77	0.75	65.2
West: Marshall Road														
10	L2	137	6.9	137	6.9	0.394	7.9	LOS A	2.7	20.4	0.76	0.74	0.76	64.9
11	T1	273	8.5	273	8.5	0.394	8.3	LOS A	2.7	20.4	0.76	0.76	0.76	60.5
12	R2	245	7.3	245	7.3	0.394	15.2	LOS B	2.5	19.2	0.76	0.87	0.77	59.2
Approach		655	7.7	655	7.7	0.394	10.8	LOS B	2.7	20.4	0.76	0.80	0.76	61.2
All Vehicles		3272	7.0	3272	7.0	0.741	12.3	LOS B	8.2	61.6	0.83	0.95	1.05	61.3

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

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan 2035 Base PM (Site Folder: DA Sites PM Peak)]

Network: N003 [2035 Base PM (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2035 Base Traffic
PM Peak
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	72	0.0	72	0.0	0.084	5.3	LOS A	0.5	3.5	0.66	0.60	0.66	33.8
3	R2	9	0.0	9	0.0	0.084	10.9	LOS B	0.5	3.5	0.66	0.60	0.66	62.2
Approach		81	0.0	81	0.0	0.084	5.9	LOS A	0.5	3.5	0.66	0.60	0.66	42.7
East: Marshall Road														
4	L2	7	0.0	7	0.0	0.054	4.3	LOS A	0.3	3.8	0.14	0.36	0.14	61.4
5	T1	667	6.3	667	6.3	0.329	4.4	LOS A	2.3	16.2	0.13	0.36	0.13	63.4
Approach		675	6.2	675	6.2	0.329	4.4	LOS A	2.3	16.2	0.13	0.36	0.13	63.4
West: Marshall Road														
11	T1	972	5.3	972	5.3	0.291	4.4	LOS A	2.4	18.0	0.09	0.37	0.09	67.5
12	R2	25	0.0	25	0.0	0.291	11.1	LOS B	2.3	17.4	0.10	0.38	0.10	61.9
Approach		997	5.2	997	5.2	0.291	4.5	LOS A	2.4	18.0	0.09	0.37	0.09	67.4
All Vehicles		1753	5.3	1753	5.3	0.329	4.6	LOS A	2.4	18.0	0.13	0.38	0.13	66.0

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

MOVEMENT SUMMARY

Site: 006 [Marshall Beechboro 2035 Base PM (Site Folder: DA Sites PM Peak)]

Network: N003 [2035 Base PM (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2035 Traffic
PM Peak
Site Category: Proposed Design 2
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	305	5.9	305	5.9	0.408	6.0	LOS A	2.5	19.1	0.73	0.70	0.74	61.1
2	T1	286	5.5	286	5.5	0.408	6.5	LOS A	2.5	19.1	0.73	0.75	0.76	61.8
3	R2	107	4.9	107	4.9	0.408	12.9	LOS B	2.5	18.3	0.74	0.76	0.77	37.5
Approach		699	5.6	699	5.6	0.408	7.2	LOS A	2.5	19.1	0.73	0.73	0.75	60.0
East: Marshall Road														
4	L2	126	8.3	126	8.3	0.470	9.5	LOS A	3.9	29.8	0.87	0.86	0.93	58.3
5	T1	354	6.3	354	6.3	0.470	9.9	LOS A	3.9	29.8	0.87	0.88	0.94	64.1
6	R2	229	6.4	229	6.4	0.470	17.1	LOS B	3.7	28.0	0.86	0.94	0.96	62.0
Approach		709	6.7	709	6.7	0.470	12.2	LOS B	3.9	29.8	0.87	0.90	0.94	62.7
North: Beechboro Road North														
7	L2	291	5.1	291	5.1	0.426	9.8	LOS A	2.8	20.7	0.86	0.96	0.95	64.8
8	T1	140	5.3	140	5.3	0.403	11.7	LOS B	2.3	17.5	0.84	0.96	0.94	62.4
9	R2	62	6.8	62	6.8	0.403	18.2	LOS B	2.3	17.5	0.84	0.96	0.94	65.8
Approach		493	5.3	493	5.3	0.426	11.4	LOS B	2.8	20.7	0.85	0.96	0.94	64.3
West: Marshall Road														
10	L2	261	6.0	261	6.0	0.744	12.1	LOS B	8.9	66.3	0.91	1.05	1.29	63.5
11	T1	598	5.3	598	5.3	0.744	12.6	LOS B	8.9	66.3	0.91	1.07	1.30	57.7
12	R2	459	5.5	459	5.5	0.744	20.3	LOS C	8.4	62.5	0.92	1.12	1.35	56.5
Approach		1318	5.5	1318	5.5	0.744	15.2	LOS B	8.9	66.3	0.91	1.08	1.31	58.8
All Vehicles		3219	5.8	3219	5.8	0.744	12.2	LOS B	8.9	66.3	0.85	0.95	1.05	60.7

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

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan 2035 SPF 10 year Post Opening AM (Site Folder: DA Sites AM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2035 with SPF Traffic
AM Peak
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	95	0.0	95	0.0	0.185	14.2	LOS B	1.4	10.1	0.97	0.87	0.97	22.6
3	R2	5	0.0	5	0.0	0.185	19.9	LOS B	1.4	10.1	0.97	0.87	0.97	54.8
Approach		100	0.0	100	0.0	0.185	14.5	LOS B	1.4	10.1	0.97	0.87	0.97	26.9
East: Marshall Road														
4	L2	7	0.0	7	0.0	0.153	4.5	LOS A	0.9	9.2	0.22	0.38	0.22	62.0
5	T1	1152	5.9	1152	5.9	0.536	4.7	LOS A	4.8	33.7	0.25	0.38	0.25	62.6
Approach		1159	5.9	1159	5.9	0.536	4.7	LOS A	4.8	33.7	0.25	0.38	0.25	62.6
West: Marshall Road														
11	T1	604	8.2	604	8.2	0.194	4.4	LOS A	1.6	12.4	0.06	0.39	0.06	65.9
12	R2	14	0.0	14	0.0	0.194	11.1	LOS B	1.5	11.9	0.07	0.44	0.07	53.5
12u	U	36	8.8	36	8.8	0.194	12.1	LOS B	1.5	11.9	0.07	0.44	0.07	54.4
Approach		654	8.1	654	8.1	0.194	4.9	LOS A	1.6	12.4	0.07	0.39	0.07	65.5
All Vehicles		1913	6.3	1913	6.3	0.536	5.3	LOS A	4.8	33.7	0.22	0.41	0.22	62.9

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

MOVEMENT SUMMARY

Site: 003 [Marshall Site Access Part 1 SPF 10 year Post Opening AM (Site Folder: DA Sites AM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Site Access part 1
2035 with SPF Traffic
AM Peak
Site Category: Proposed Design 1
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road														
5	T1	1188	6.2	1188	6.2	0.324	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
6	R2	94	4.5	94	4.5	0.291	17.5	LOS C	1.1	8.4	0.74	0.94	0.87	37.0
Approach		1282	6.1	1282	6.1	0.324	1.4	NA	1.1	8.4	0.05	0.07	0.06	56.9
North: Site Access														
7	L2	44	7.1	44	7.1	0.050	5.8	LOS A	0.2	1.5	0.39	0.59	0.39	25.5
Approach		44	7.1	44	7.1	0.050	5.8	LOS A	0.2	1.5	0.39	0.59	0.39	25.5
West: Marshall Road Eastbound														
10	L2	197	5.3	197	5.3	0.117	6.5	LOS A	0.0	0.0	0.00	0.63	0.00	55.3
11	T1	608	8.3	608	8.3	0.169	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		805	7.6	805	7.6	0.169	1.6	NA	0.0	0.0	0.00	0.15	0.00	65.4
All Vehicles		2132	6.7	2132	6.7	0.324	1.6	NA	1.1	8.4	0.04	0.11	0.05	60.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 006 [Marshall Beechboro 2035 SPF 10 year Post Opening AM (Site Folder: DA Sites AM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2035 with SPF Traffic
AM Peak
Site Category: Proposed Design 2
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	360	7.3	360	7.3	0.617	10.1	LOS B	4.9	37.3	0.92	1.05	1.18	58.9
2	T1	218	6.8	218	6.8	0.617	11.7	LOS B	4.9	37.3	0.91	1.05	1.19	57.2
3	R2	141	7.5	141	7.5	0.617	18.6	LOS B	4.4	33.6	0.90	1.05	1.20	31.4
Approach		719	7.2	719	7.2	0.617	12.2	LOS B	4.9	37.3	0.91	1.05	1.18	56.0
East: Marshall Road														
4	L2	205	6.2	205	6.2	0.781	14.9	LOS B	9.7	72.7	0.96	1.18	1.52	50.4
5	T1	635	6.1	635	6.1	0.781	15.8	LOS B	9.7	72.7	0.96	1.18	1.54	60.0
6	R2	348	6.3	348	6.3	0.781	24.0	LOS C	8.8	66.7	0.96	1.19	1.58	56.5
Approach		1188	6.2	1188	6.2	0.781	18.1	LOS B	9.7	72.7	0.96	1.18	1.55	57.9
North: Beechboro Road North														
7	L2	338	7.8	338	7.8	0.534	9.4	LOS A	3.9	29.8	0.78	0.89	0.90	64.9
8	T1	440	7.2	440	7.2	0.534	10.4	LOS B	3.9	29.8	0.78	0.91	0.93	63.8
9	R2	107	6.9	107	6.9	0.534	17.2	LOS B	3.7	27.8	0.79	0.93	0.94	66.2
Approach		885	7.4	885	7.4	0.534	10.8	LOS B	3.9	29.8	0.78	0.90	0.92	64.6
West: Marshall Road														
10	L2	137	6.9	137	6.9	0.446	8.6	LOS A	3.2	24.4	0.79	0.81	0.84	64.7
11	T1	328	8.0	328	8.0	0.446	9.1	LOS A	3.2	24.4	0.79	0.84	0.85	60.0
12	R2	245	7.3	245	7.3	0.446	16.3	LOS B	3.0	23.1	0.79	0.94	0.88	58.8
Approach		711	7.6	711	7.6	0.446	11.5	LOS B	3.2	24.4	0.79	0.87	0.86	60.8
All Vehicles		3503	7.0	3503	7.0	0.781	13.7	LOS B	9.7	72.7	0.87	1.02	1.18	59.6

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

MOVEMENT SUMMARY

Site: 001 [Marshall Silver Swan 2035 SPF 10 year Post Opening PM (Site Folder: DA Sites PM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Silverswan Road
2035 with SPF Traffic
PM Peak
Site Category: Proposed Design 1
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Silver Swan Road														
1	L2	72	0.0	72	0.0	0.104	7.2	LOS A	0.7	5.0	0.80	0.71	0.80	30.5
3	R2	9	0.0	9	0.0	0.104	12.9	LOS B	0.7	5.0	0.80	0.71	0.80	60.3
Approach		81	0.0	81	0.0	0.104	7.9	LOS A	0.7	5.0	0.80	0.71	0.80	39.5
East: Marshall Road														
4	L2	7	0.0	7	0.0	0.077	5.3	LOS A	0.4	5.3	0.45	0.48	0.45	60.8
5	T1	676	6.4	676	6.4	0.380	5.4	LOS A	2.8	19.4	0.45	0.46	0.45	61.1
Approach		683	6.3	683	6.3	0.380	5.4	LOS A	2.8	19.4	0.45	0.46	0.45	61.1
West: Marshall Road														
11	T1	1039	5.3	1039	5.3	0.365	4.4	LOS A	3.5	25.8	0.10	0.41	0.10	65.4
12	R2	25	0.0	25	0.0	0.365	11.1	LOS B	3.4	25.3	0.11	0.51	0.11	50.6
12u	U	179	5.3	179	5.3	0.365	12.1	LOS B	3.4	25.3	0.11	0.51	0.11	50.5
Approach		1243	5.2	1243	5.2	0.365	5.6	LOS A	3.5	25.8	0.10	0.42	0.10	64.2
All Vehicles		2007	5.3	2007	5.3	0.380	5.6	LOS A	3.5	25.8	0.25	0.45	0.25	62.8

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

MOVEMENT SUMMARY

Site: 003 [Marshall Site Access Part 1 SPF 10 year Post Opening PM (Site Folder: DA Sites PM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Site Access part 1
2035 with SPF Traffic
PM Peak
Site Category: Proposed Design 1
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Marshall Road														
5	T1	920	6.2	920	6.2	0.251	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
6	R2	8	12.5	8	12.5	0.049	25.1	LOS D	0.1	1.3	0.82	0.93	0.82	31.6
Approach		928	6.2	928	6.2	0.251	0.3	NA	0.1	1.3	0.01	0.01	0.01	59.3
North: Site Access														
7	L2	246	5.1	246	5.1	0.348	8.5	LOS A	1.6	13.0	0.58	0.85	0.71	20.8
Approach		246	5.1	246	5.1	0.348	8.5	LOS A	1.6	13.0	0.58	0.85	0.71	20.8
West: Marshall Road Eastbound														
10	L2	36	5.9	36	5.9	0.021	6.5	LOS A	0.0	0.0	0.00	0.63	0.00	55.3
11	T1	997	5.3	997	5.3	0.267	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	69.8
Approach		1033	5.3	1033	5.3	0.267	0.3	NA	0.0	0.0	0.00	0.02	0.00	69.1
All Vehicles		2207	5.7	2207	5.7	0.348	1.2	NA	1.6	13.0	0.07	0.11	0.08	62.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network 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.
Delay Model: SIDRA Standard (Geometric Delay is included).
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 006 [Marshall Beechboro 2035 SPF 10 year Post Opening PM (Site Folder: DA Sites PM Peak)]

Network: N004 [2035 SPF 10 year Post Opening (Network Folder: DA Networks)]

Marshall Road / Beechboro Road North
2035 with SPF Traffic
PM Peak
Site Category: Proposed Design 2
Roundabout

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Beechboro Road North														
1	L2	305	5.9	305	5.9	0.452	6.8	LOS A	3.1	23.0	0.79	0.82	0.86	60.8
2	T1	271	5.8	271	5.8	0.452	7.5	LOS A	3.1	23.0	0.80	0.86	0.88	61.0
3	R2	117	4.5	117	4.5	0.452	13.9	LOS B	2.9	21.6	0.80	0.87	0.89	36.4
Approach		693	5.6	693	5.6	0.452	8.3	LOS A	3.1	23.0	0.80	0.84	0.87	59.3
East: Marshall Road														
4	L2	220	6.2	220	6.2	0.617	12.0	LOS B	6.6	50.3	0.94	1.00	1.19	52.8
5	T1	406	6.2	406	6.2	0.617	12.7	LOS B	6.6	50.3	0.94	1.02	1.19	61.6
6	R2	294	6.1	294	6.1	0.617	20.1	LOS C	6.1	46.6	0.94	1.06	1.21	58.7
Approach		920	6.2	920	6.2	0.617	14.9	LOS B	6.6	50.3	0.94	1.02	1.20	59.3
North: Beechboro Road North														
7	L2	298	4.9	298	4.9	0.455	10.2	LOS B	3.1	22.7	0.88	0.98	0.99	64.3
8	T1	140	5.3	140	5.3	0.423	12.1	LOS B	2.5	18.6	0.86	0.97	0.97	62.0
9	R2	62	6.8	62	6.8	0.423	18.6	LOS B	2.5	18.6	0.86	0.97	0.97	65.5
Approach		500	5.3	500	5.3	0.455	11.8	LOS B	3.1	22.7	0.87	0.97	0.98	63.9
West: Marshall Road														
10	L2	261	6.0	261	6.0	0.792	14.4	LOS B	10.6	79.6	0.96	1.16	1.49	62.3
11	T1	617	5.3	617	5.3	0.792	15.1	LOS B	10.6	79.6	0.96	1.17	1.51	56.0
12	R2	459	5.5	459	5.5	0.792	23.1	LOS C	9.9	73.9	0.96	1.20	1.56	54.9
Approach		1337	5.5	1337	5.5	0.792	17.7	LOS B	10.6	79.6	0.96	1.18	1.52	57.2
All Vehicles		3449	5.7	3449	5.7	0.792	14.2	LOS B	10.6	79.6	0.91	1.04	1.23	58.9

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