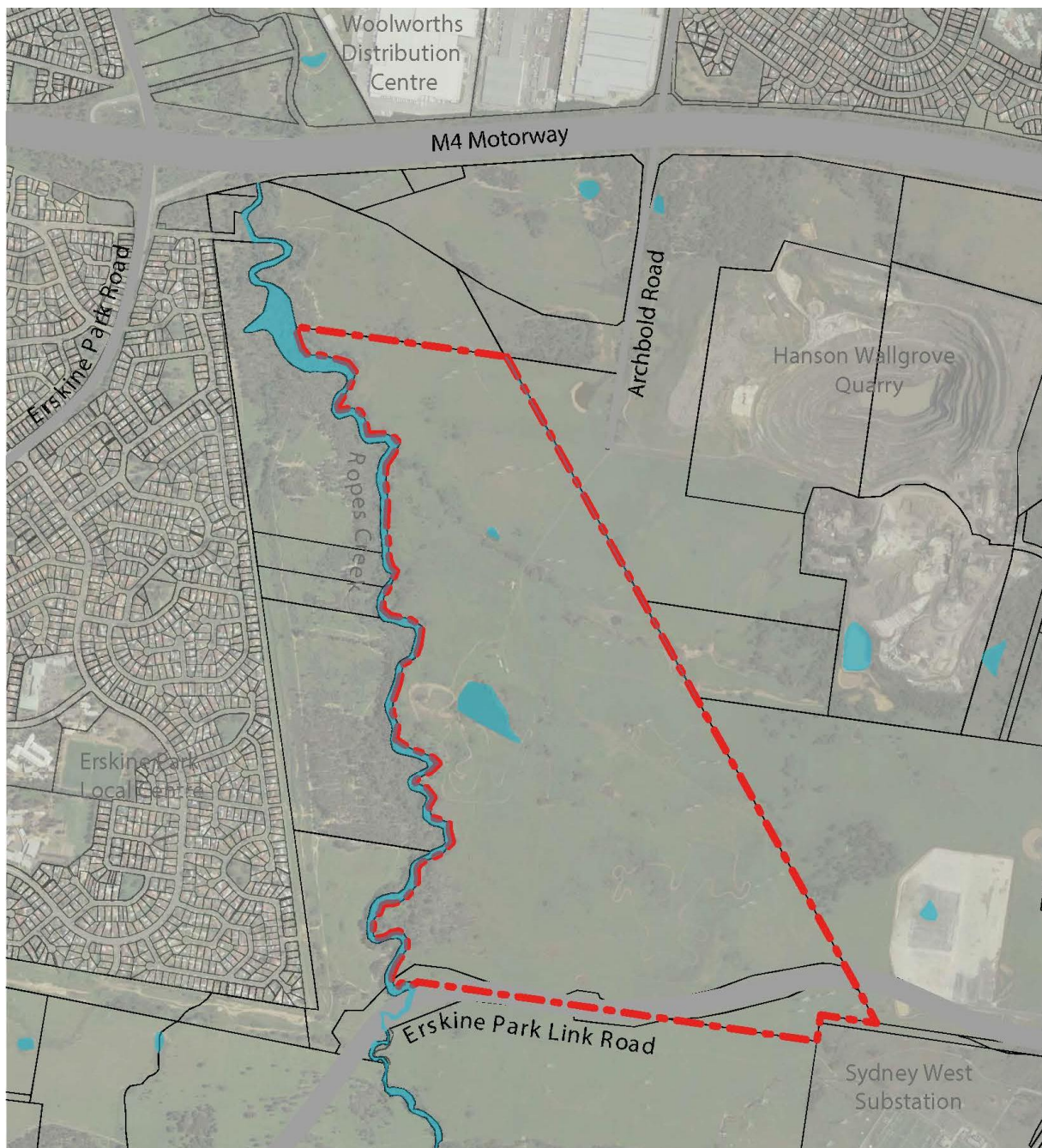


# Ropes Creek Precinct

## Traffic and Transport Assessment



**DRAFT****Ropes Creek Precinct**

## Traffic and Transport Assessment

Client: Department of Planning and Environment

ABN: 38755709681

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			Name/Position	Signature
A	30-Apr-2014	Draft Report	Mark Cure	
B	08-Apr-2016	Revised Draft Report	Andy Yung Associate Director	
C	27-May-2016	Draft Final Report	Andy Yung Associate Director	

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## Executive summary

### Introduction

AECOM has been commissioned by the Department of Planning & Environment (DPE) to undertake a traffic and transport assessment for the Ropes Creek Precinct, in support of a Development Control Plan (DCP) for the Ropes Creek Precinct.

The Ropes Creek Precinct is located within the Western Sydney Employment Area (WSEA), which roughly borders the northern edge of the Western Sydney Priority Growth Area (WSPGA). Both of the WSEA and WSPGA were formerly a part of the Broader Western Sydney Employment Area (BWSEA). While discussion and assessment within this Traffic and Transport Assessment utilises materials and reports which were part of previous planning for the BWSEA, as they were the most recent and relevant studies. It is noted that these previous reports / proposals may subject to further changes as DPE is currently working closely with Liverpool City Council and Penrith City Council to prepare a Draft Land Use and Infrastructure Strategy for the WSPGA.

This traffic and transport assessment has been informed by *Archbold Road Upgrade and Widening Review of Environmental Factors (REF) – Traffic and Transport Impact Assessment* (Jacobs 2016) and *Broader Western Sydney Employment (BWSEA) Area Draft Structure Plan Transport Planning Preliminary Analysis Report* (GHD 2013) as well as a number of other strategic studies, guidelines and publications.

### Context

The Ropes Creek Precinct is approximately a 130 hectare site located within the northern extent of the WSEA. The precinct is expected to accommodate significant industrial development, the site is close to important transport links including the M4 and M7 Motorways, and the Western heavy rail commuter train line. There is little existing development within the Ropes Creek Precinct, which is currently zoned for industrial development. A belt of environmental conservation zoned land runs through the northern section of the precinct. The *BWSEA Draft Structure Plan* (June 2013) also indicates that the precinct is located directly to the west of the proposed future Western Sydney Intermodal Terminal and freight rail alignment, and to the east of the potential Outer Sydney Orbital Multi Modal Corridor.

### Indicative Concept Plan (ICP)

The ICP for the Ropes Creek Precinct has been developed based on the following principles:

- Typical building envelopes of approximately 100 x 150m.
- Minimum clearance of 20m between building envelopes and lot boundaries.
- Minimum offset of 45m from Ropes Creek (Riparian corridor) to edge of future road.
- Consideration of 1 in 100 year flood level boundary.
- Assumption that the existing dam in the precinct can be filled.

The proposed ICP would provide approximately 68 hectares of developable industrial land. To the east of the Archbold Road Extension corridor the ICP has been developed to enable a relatively even distribution of lots, considering the constraints imposed by the multiple electricity transmission lines in this area.

### Road network

There is minimal existing road infrastructure within the Ropes Creek Precinct, however there are major arterial road connections including the M4 Motorway to the north and Erskine Park Link Road (EPLR) to the south of the precinct.

Archbold Road is proposed to be extended to provide a key regional route for traffic travelling between the M4 Motorway and the EPLR (and future SLRN) through the Ropes Creek Precinct, as well as providing access between the precinct and these major regional routes. The proposed Archbold Road Extension would include east-facing ramps to connect to the M4 Motorway. Generally the road network within the precinct would consist of industrial standard roads, providing direct access to lots within the precinct. The proposed Southern Link Road Network (SLRN) would provide an arterial road network to, from, and through the southern portion of the existing WSEA. The SLRN would include an eastern north-south link which would directly extend from the Archbold Road Extension to the south of the EPLR.

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Traffic modelling was undertaken by Jacobs as part of the *Archbold Road Upgrade and Widening Review of Environmental Factors – Traffic and Transport Impact Assessment*, February 2016. The Aimsun and SIDRA intersection modelling results has informed the Traffic and Transport Assessment for the Ropes Creek Precinct. The modelling results indicate that in 2031, all nearby intersections (including accesses) along Archbold Road operate at a LoS C or better with the exception of the Great Western Highway | Archbold Road intersection which operates at an acceptable LoS D. Accordingly, the road network within the Precinct including Archbold Road extension would be able to support development at Ropes Creek.

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## Public transport network

The existing site is not directly serviced by public transport services; however bus routes currently operate in the surrounding region. Existing bus routes service the established residential area in Erskine Park to the west of the precinct as well as the residential and industrial areas around Minchinbury and Eastern Creek to the north and east. Each route provides one to three services per hour on weekday peaks.

Located in the WSEA, the Ropes Creek Precinct is closest to Mt Druitt and St Marys train stations. Mt Druitt is around 4km directly north of the site, while St Marys is around 6km to the north-west. Mt Druitt and St Marys stations are currently serviced by the Blacktown to Emu Plains section of the T1 Western Line with a service every 10 to 20mins during peak periods.

The proposed bus network within the WSEA consists of regional bus routes supplemented by connecting local bus routes. Public transport provision to and from the Ropes Creek Precinct would be directly facilitated by the following local bus services:

- Through the precinct travelling north-south along the Archbold Road Extension.
- Along the southern boundary of the precinct travelling east-west along the EPLR.

The resulting catchment would result in the majority of the Ropes Creek Precinct being within 400m of a local bus route. Outside of the precinct, these local bus routes would connect to regional bus routes and rail lines (transit corridors) at major interchange points at key locations including:

- Development centres.
- Existing train stations at St Marys and Mt Druitt.
- Crossings with Liverpool-Parramatta T-way bus services.
- Future SWRL train stations.

It is recommended that detailed interchange locations, requirements, and layouts are developed and confirmed as the planning and design of public transport network of the precinct – and the broader area, including the WSEA and WSPGA – progresses.

## Walking and cycling network

There is no existing infrastructure which provides dedicated active transport links through the Ropes Creek Precinct. The EPLR traverses the southern boundary of the precinct in an east-west alignment, providing a dedicated shared use path for pedestrians and cyclists between Lenore Drive and Old Wallgrove Road. The M7 Cycleway (off-road shared path) and M4 Cycle Link (on-road, shoulder separated lane) are major existing cycle routes near the precinct. The existing cycling network in the area surrounding the Ropes Creek Precinct provides connections to Mt Druitt and St Marys train stations.

Consistent with the *BWSEA Draft Structure Plan*, the proposed walking and cycling network for the Ropes Creek Precinct includes dedicated shared use path for pedestrians and cyclists along the Archbold Road Extension between the M4 Motorway and EPLR to provide a strategic north-south connection to, from, and through the precinct. In addition, the access roads are proposed to provide a dedicated shared use path for pedestrians and cyclists, which would provide local connections between areas within the precinct, and to and from the Archbold Road Extension regional connection.

In addition to pedestrian and cycling facilities along proposed road corridors, detailed planning and design would also investigate the potential for additional active transport corridors within the precinct. These corridors could enhance the integration of the proposed active and transport networks – for example providing direct corridors to and from bus stops – and consequently increase active transport and public transport demand within the precinct.



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## 1.0 Introduction

### 1.1 Background

A *Plan for Growing Sydney* targets that 689,000 new jobs will be created in Sydney by 2031, and that half of these will be located in Western Sydney. The development of the Western Sydney Employment Area (WSPGA) and the Western Sydney Priority Growth Area (part of which was formerly known as the Broader Western Sydney Employment Area) will play a key role in delivering this goal.

Bordered roughly by the M4 Motorway to the north and Bringelly Road to the south, the M7 Motorway to the east and the Northern Road to the west, the WSPGA and the WSEA cover an area that was previously identified as the BWSEA.

The Ropes Creek Precinct is a 130 hectare site located within the northern extent of the WSEA. The precinct is expected to accommodate significant industrial development, and is close to important transport links including the M4 and M7 Motorways, and the Sydney Trains T1 Western Line. The *BWSEA Draft Structure Plan* (June 2013) also indicates that the precinct is located directly to the west of the proposed future Western Sydney Intermodal Terminal and freight rail alignment, and to the east of the potential Outer Sydney Orbital Multi Modal Corridor. The location of the precinct within the proposed WSEA, and in relation to the WSPGA is shown in **Figure 1**.

The *BWSEA Draft Structure Plan* was released in mid-2013 which guides future land use planning and future provision of infrastructure to service the BWSEA area. The accompanying *BWSEA Structure Plan Transport Planning - Preliminary Analysis Report* was released with the intention that it would form the basis of the transport planning process to be undertaken during subsequent planning stages. This report has been used to guide the development and analysis undertaken and is referred to throughout this document.

### 1.2 Purpose and scope

AECOM has been appointed by the Department of Planning & Environment to prepare a traffic and transport assessment for the Ropes Creek Precinct, in support of a Development Control Plan (DCP) for the Ropes Creek Precinct. Key elements of this traffic and transport assessment include:

- The development of proposed intersection arrangements providing access between the Archbold Road Extension and the Ropes Creek Precinct.
- The development of public and active transport arrangements travelling to, from, and through the Ropes Creek Precinct.
- An assessment of the performance and impacts of the proposed road network arrangement.

### 1.3 Report structure

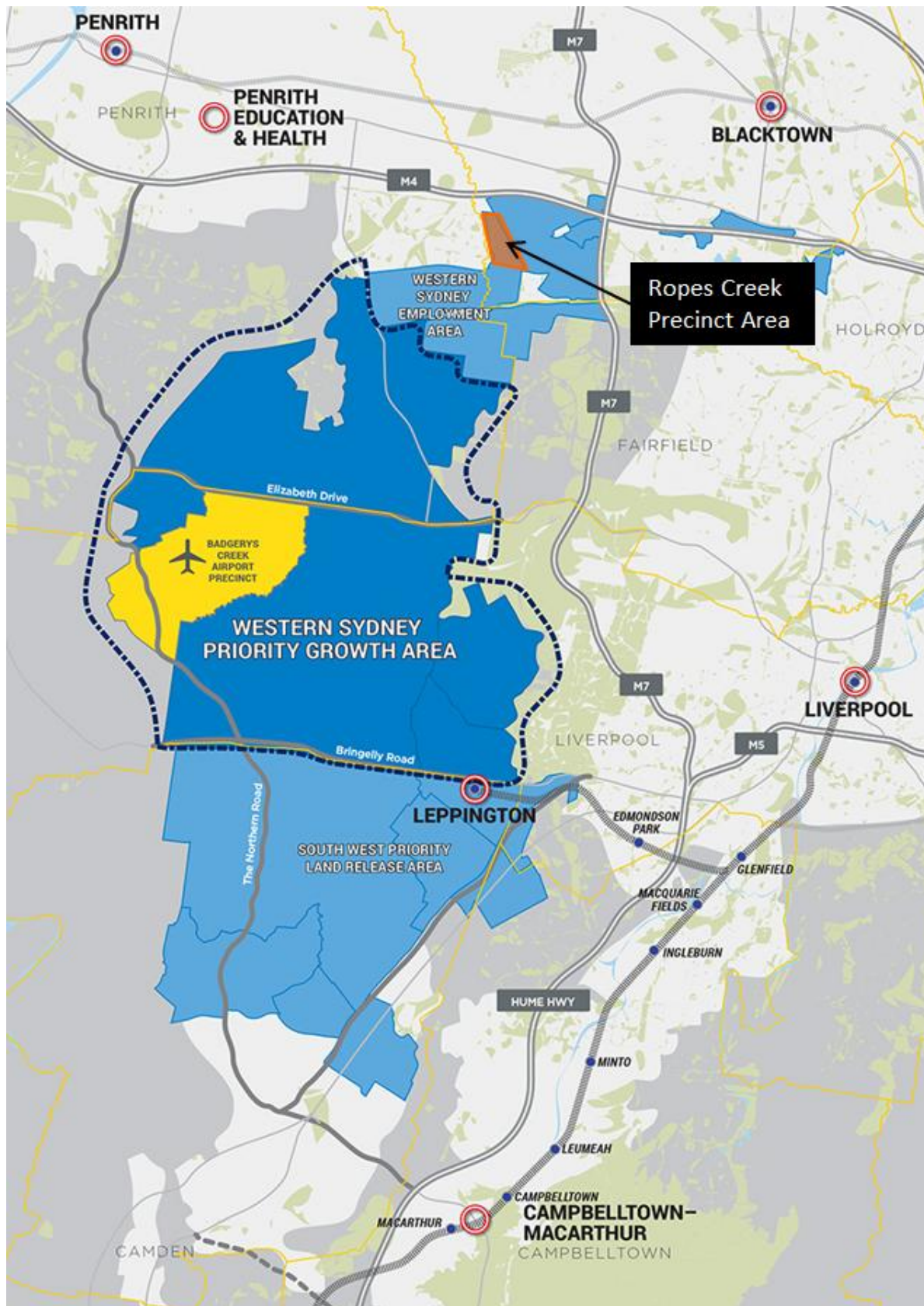
The report is structured as follows:

- **Section 2** presents an overview of the Ropes Creek Precinct in the context of the existing WSEA, and the proposed Indicative Concept Plan (ICP).
- **Section 3** summarises the existing road network, provides a traffic modelling assessment of the proposed road network and undertakes intersection assessments to review future traffic impacts to the Ropes Creek Precinct.
- **Section 4** outlines the existing public transport conditions and future public transport requirements associated with the Ropes Creek Precinct.
- **Section 5** assesses the existing and proposed walking and cycling networks.
- **Section 6** summarises the key findings and recommendations from the assessment.



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Figure 1 Ropes Creek Precinct in the context of WSEA and WSPGA



Source: Department of Planning and Environment website, accessed May 2016.

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## 2.0 Indicative Concept Plan

### 2.1 Location

The Ropes Creek Precinct falls within the Local Government Area (LGA) of Blacktown City Council (BCC). It is located on the south-western edge of this LGA, bordered by Ropes Creek and Penrith City Council (PCC) LGA directly to the west. To the south the precinct is roughly bounded by the Erskine Park Link Road (EPLR), and the northern precinct boundary is located approximately 0.4km south of the M4 Motorway. The proposed future extension of Archbold Road between the M4 Motorway and EPLR runs north-south through the precinct.

Figure 2 Ropes Creek Study Area in the context of the Western Sydney Employment Area



Source: Base map from Department of Planning and Environment website, accessed May 2016.

Regionally, the Precinct is located approximately 50km west of the Sydney CBD, and 10km southwest of Blacktown and 13km southeast of Penrith regional centres.

### 2.2 Land use and built form

There is little existing development within the Ropes Creek Precinct. The *BWSEA Draft Structure Plan* indicates that the existing WSEA precinct – within which Ropes Creek is located – is currently zoned for industrial development. A belt of environmental conservation zoned land runs through the northern section of the precinct. The *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report* estimates that the existing WSEA precinct will provide for 36,944 industrial jobs.

# DRAFT

## 2.3 Indicative Concept Plan

The ICP for the Ropes Creek Precinct is shown in **Figure 3**, which has been developed based on the following principles:

- Typical building envelopes of approximately 100 x 150m.
- Minimum clearance of 20m between building envelopes and lot boundaries.
- Minimum offset of 45m from Ropes Creek (Riparian corridor) to edge of future road.
- Consideration of 1 in 100 year flood level boundary.
- Assumption that the existing dam in the precinct can be filled.

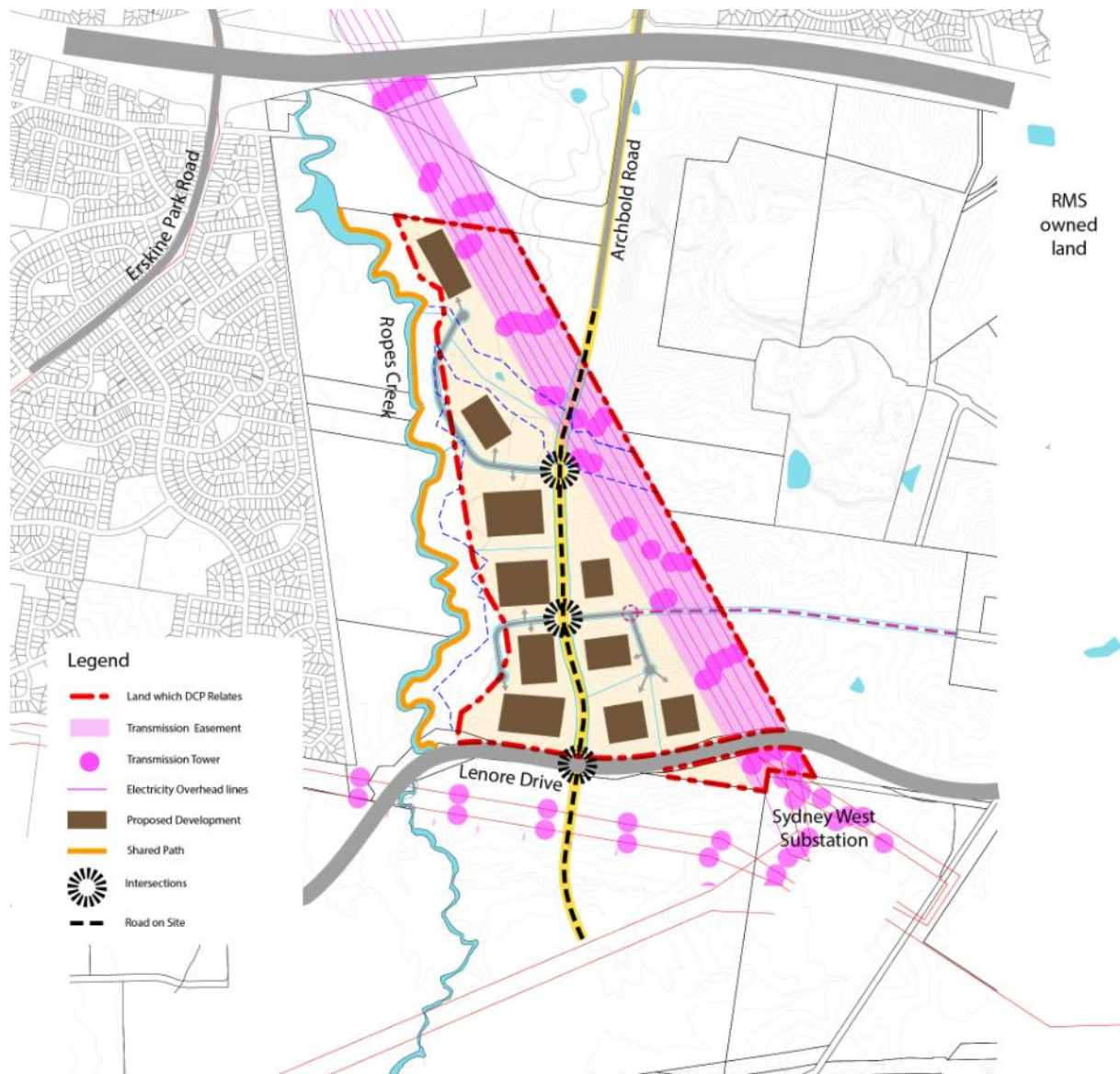
The proposed ICP would provide 68 hectares of developable industrial land. To the east of the Archbold Road Extension corridor the ICP has been developed to enable a relatively even distribution of lots, considering the constraints imposed by the multiple electricity transmission lines in this area.

Key elements of the proposed road network for the precinct – shown in **Figure 3** – are:

- Archbold Road Extension: An arterial road providing access through the precinct, and to and from precinct access roads ('Future road').
- 'Future road': Industrial standard roads which would provide direct access to lots within the precinct.
- Archbold Road | 'Access Road 4' intersection: A 4-way signalised intersection which would provide access between the Archbold Road Extension and the industrial access roads.
- Archbold Road | 'Access Road 5' intersection: A 4-way signalised intersection which would provide access between the Archbold Road Extension and the industrial access roads.

**Figure 3** also indicates a potential future road – as an extension of Eastern Creek Drive – parallel to the eastern boundary of the precinct. It is noted that alternative / additional access options via this road for the precinct to the east of Archbold Road could be used to enable alternative ICP options.



**DRAFT****Figure 3 Ropes Creek Precinct ICP**

Source: AECOM, 2016

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## 3.0 Road network

### 3.1 Principles and guidelines

Guidelines for road network design can be allocated into three main categories:

- Road classification (road hierarchy):
  - How will traffic move through the precincts?
  - Is the network appropriately planned and designed to enable the intended function?
- Road mid-block capacity and performance – are adequate lanes provided to accommodate traffic without significant congestion?
- Intersection mid-block capacity and performance – are delays at intersections acceptable?

#### 3.1.1 Road classification

Roads fall into a hierarchy of functional classes. The standards relating to each road are dependent upon this classification. The road classifications detailed in the *BWSEA Structure Plan Transport Planning Preliminary Analysis Report* – summarised in **Table 1** and **Table 2** – have been used to guide this process.

**Table 1** BWSEA road classifications and functions

Road classification	Function
Motorways	The highest form of arterial road, considered separately due primarily to traffic function and strict access control via grade separated interchanges. Motorways provide high speed transportation and serve regional movement trends with sign-posted travel speeds of up to 110km/h. They interface with the arterial road network through grade-separated intersections (interchanges) and access is restricted.
Arterial roads	Enable major regional and inter-regional traffic movement in a safe and operationally efficient manner. They provide the link between motorways and the sub arterial road system and serve regional commuter and freight movement. The sign-posted travel speed is typically 80km/h or 70km/h and is largely dependent on its transport function, impacted by centres and access from frontage property. Access is typically controlled through the rationalisation of intersections and conflict is managed through signalisation or grade separation.
Sub-arterial roads	Roads of a higher order serving the BWSEA which provide a support role to the surrounding arterial roads for the movement of traffic during peak periods and access for freight. They provide the link between the arterial road network and industrial roads servicing the subdivisions within the employment areas. They distribute traffic and bus services between the surrounding road network and the commercial and industrial zones.
Transit boulevards	Provide for dedicated bus priority along routes within the developed area. They connect with arterial and sub-arterial roads, with posted speeds of 60km/h and 50km/h. They provide access to a mix of transport and land service functions in varying degrees along their lengths. These corridors are strongly associated with residential and commercial activities to support public transport and vice versa.
Industrial roads	Roads within the employment areas providing direct access to businesses. They are generally wider than local roads within residential areas and are designed for freight movements. The road networks for industrial roads do not form part of the Structure Plan as they are a subset better defined with sub-division of lands and the development of DCPs for the area.

Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013

**DRAFT****Table 2** BWSEA typical characteristics of road types

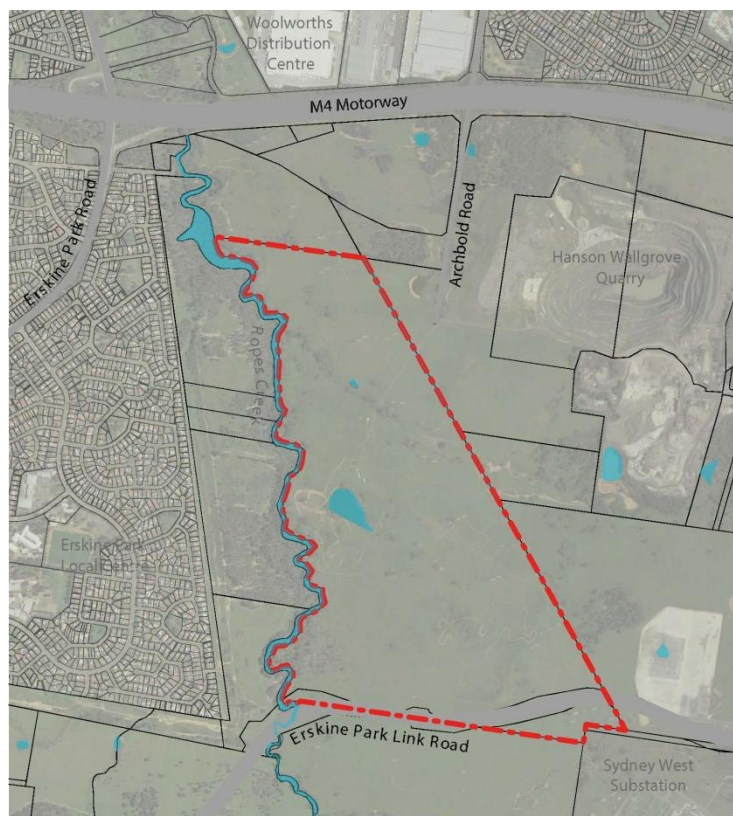
Road classification	Posted speed limit (km/h)	Design capacity (vehicles / hour / lane)	Lanes (each way)	Inter-section spacing (km)	Road reserve width (m)	Median	Cycling provision
Motorways	100 to 110	1,800	2 to 3+	3 to 5	80-120	Wide	Off road
Arterial roads	80	1,400	2 to 3	1	45-70	Wide	Off road adjacent
Sub-arterial roads	60 to 80	1,200	1 to 2	0.5	+/-45	Up to 5m	On/Off road
Transit boulevards	60	1,200	1 + transit lane	0.5	35-45	Up to 5m	On/Off road
Industrial roads	50	800	1	N/A	30-35	None	On road

Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013

**3.2 Existing road network**

With minimal existing road infrastructure within the Ropes Creek Precinct, there are major arterial road connections located immediately north and south of the precinct:

- Motorways: M4 Motorway provides a high-speed, high-capacity east-west road corridor to the north.
- Arterial Roads: Erskine Park Link Road (EPLR) is located along the southern boundary of the precinct, this road has recently been constructed and opened to traffic, providing an east-west arterial route between the intersections of Erskine Park Road | Lenore Drive, and Old Wallgrove Road | M7 Motorway.

**Figure 4** Existing roads

Source: Department of Planning and Infrastructure, 2013

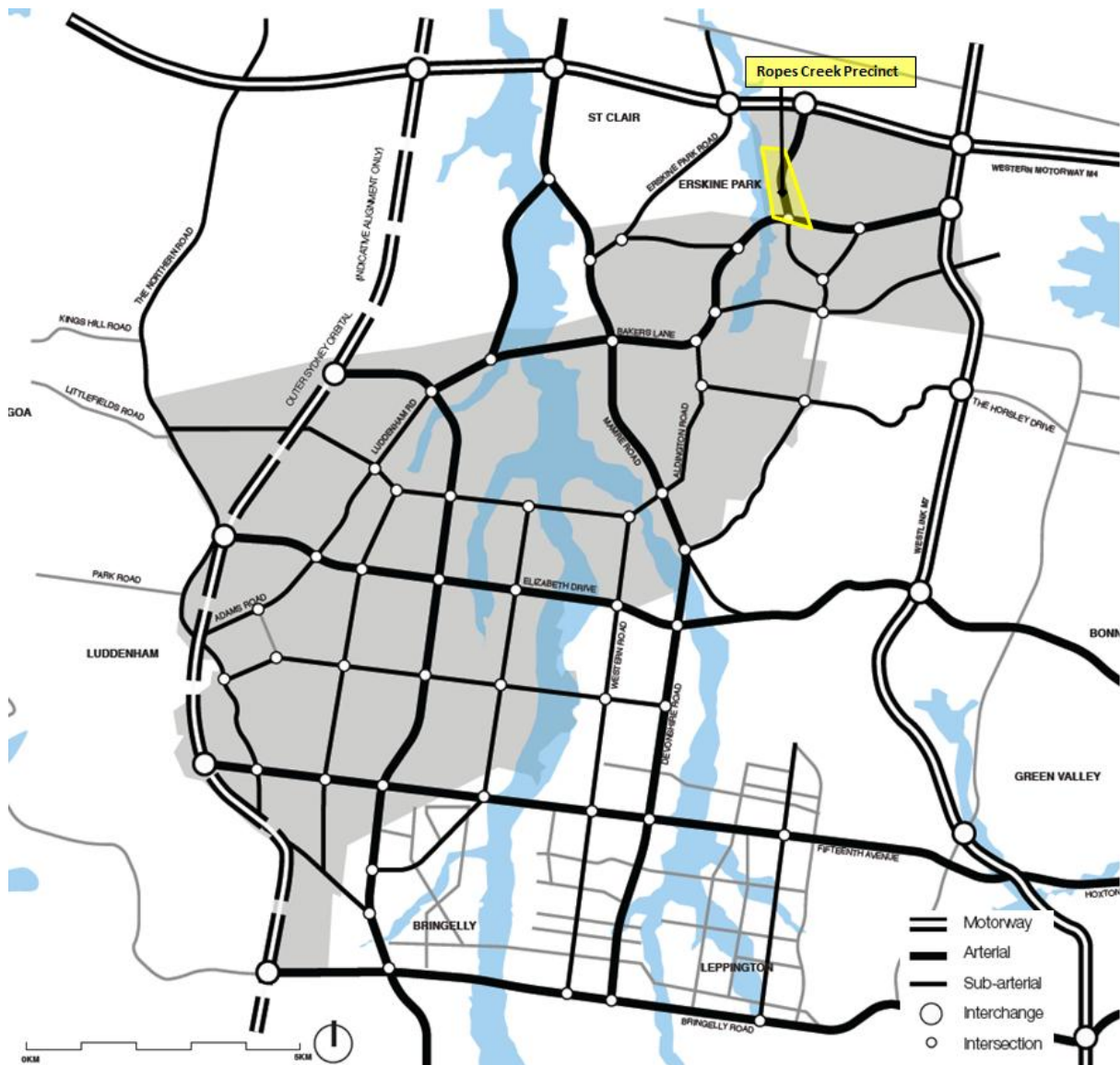
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## 3.3 Future road network

### 3.3.1 BWSEA Draft Structure Plan road network

The existing proposed roads through and connecting to the Ropes Creek Precinct Study area are consistent with, and has been discussed in the context of the road network as proposed in the *BWSEA Draft Structure Plan*, as shown in **Figure 5**. It should be noted however that this road network may subject to changes as DPE is currently preparing a draft land use and Infrastructure Strategy for the Western Sydney Priority Growth Area. The new Strategy will take into account Western Sydney Airport and other major infrastructure announcements.

Figure 5 BWSEA Draft Structure Plan road network structure



Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013. As mentioned in section 3.3.1, the above road network is subject to change.

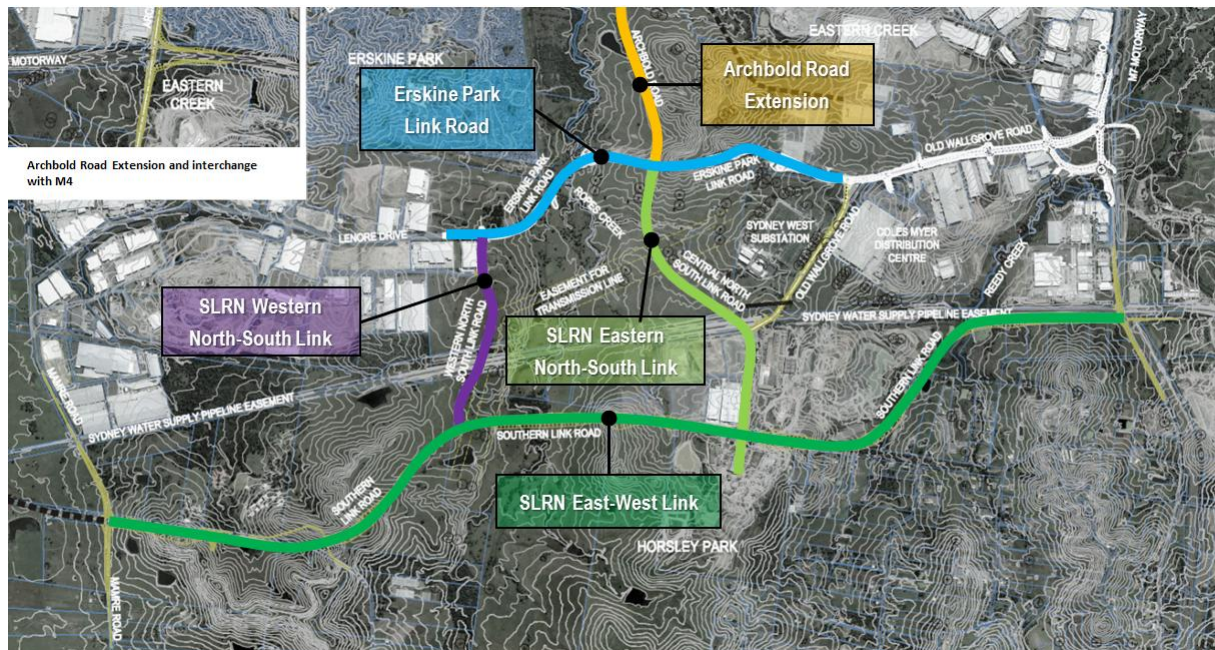


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## 3.3.2 Proposed Southern Link road network

The proposed Southern Link Road Network (SLRN) would provide an arterial road connection to the southern portion of the existing WSEA. The SLRN would include an eastern north-south link which would directly extend from the Archbold Road Extension to the south of the EPLR. An overview of the proposed SLRN in relation to the Archbold Road Extension is shown in **Figure 6**.

**Figure 6 Proposed Southern Link Road Network and surrounds**



Source: Southern Link Road Network Concept Design, AECOM, 2014

## 3.3.3 Proposed Ropes Creek Precinct road network

The proposed road network includes:

- Arterial roads:
  - Archbold Road Extension would provide a key regional route for traffic travelling between the M4 Motorway and the EPLR (and future SLRN) through the Ropes Creek Precinct, as well as providing access between the precinct and these major regional routes. The proposed Archbold Road Extension would include east-facing ramps to connect to the M4 Motorway. This is consistent with the proposed road network of the *BWSEA Draft Structure Plan*, as shown in **Figure 5**.
- Industrial roads:
  - Generally the road network within the precinct would consist of industrial standard roads, providing direct access to lots within the precinct.
  - Access Road 4 and 5 are connections to the arterial network located within the Ropes Creek Precinct. Access Roads 6 and 7 are located to the north of the Precinct which may also be used to access the arterial road network.



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The proposed road network for the precinct and surrounding road network are illustrated in **Figure 7**.

**Figure 7** Ropes Creek Precinct road network overview



Source: Archbold Road Upgrade and Widening Review of Environmental Factors, Jacobs, 2016

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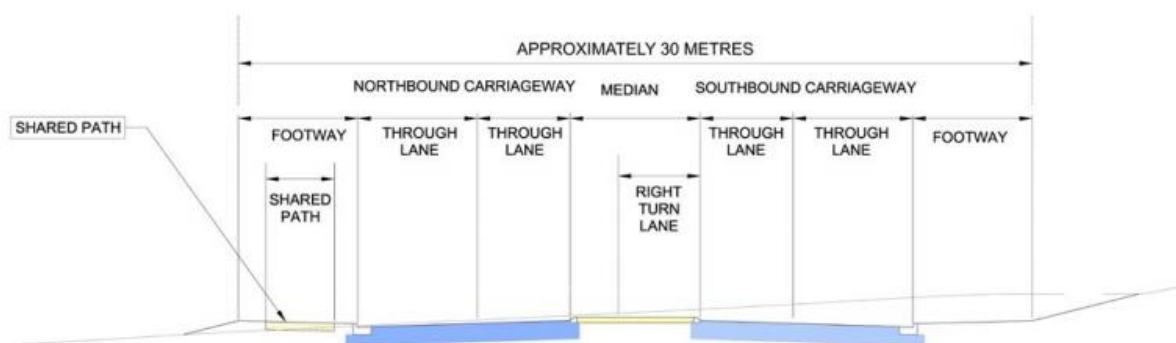
## 3.3.4 Road cross-sections

Concept planning and design of the ICP road network has adopted the following cross-sections:

- Arterial roads such as Archbold Road Extension:
  - Consistent with planning and design standards used to develop the adjoining arterial road network (EPLR and SLRN) in the existing WSEA.
  - Indicative cross-section shown in **Figure 8**.
- Industrial roads:
  - Consistent with planning and design standards in *State Environmental Planning Policy 59 – Eastern Creek Precinct Plan* (BCC, 2005) for local roads.
  - Indicative cross-section shown in **Figure 9**.

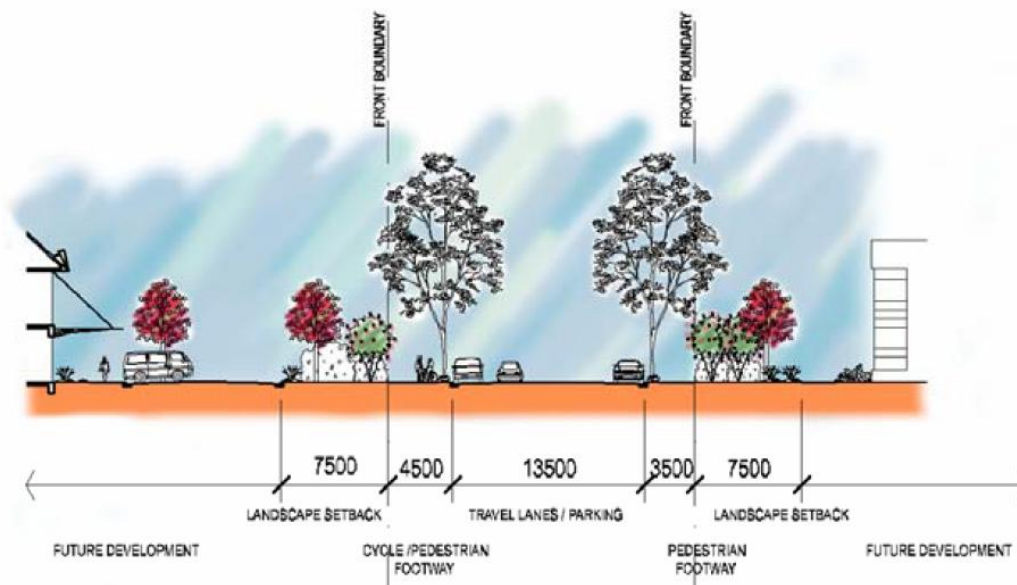
**Figure 8** Arterial road indicative cross-section

### Typical Section – Archbold Road



Source: Roads and Maritime Services, 2016

**Figure 9** Industrial road indicative cross-section



Source: SEPP 59 – Eastern Creek Precinct Plan (Stage 3), BCC, 2005



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## 3.4 Traffic modelling overview

This section provides an overview of the following key elements of modelling undertaken by Jacobs as part of the *Archbold Road Upgrade and Widening Review of Environmental Factors – Traffic and Transport Impact Assessment*, February 2016. It is understood that the trip generation and traffic modelling undertaken as part of the REF has used the potential development yield of the Ropes Creek Precinct and therefore the modelling results have in turn informed the Traffic and Transport Assessment for the Ropes Creek Precinct.

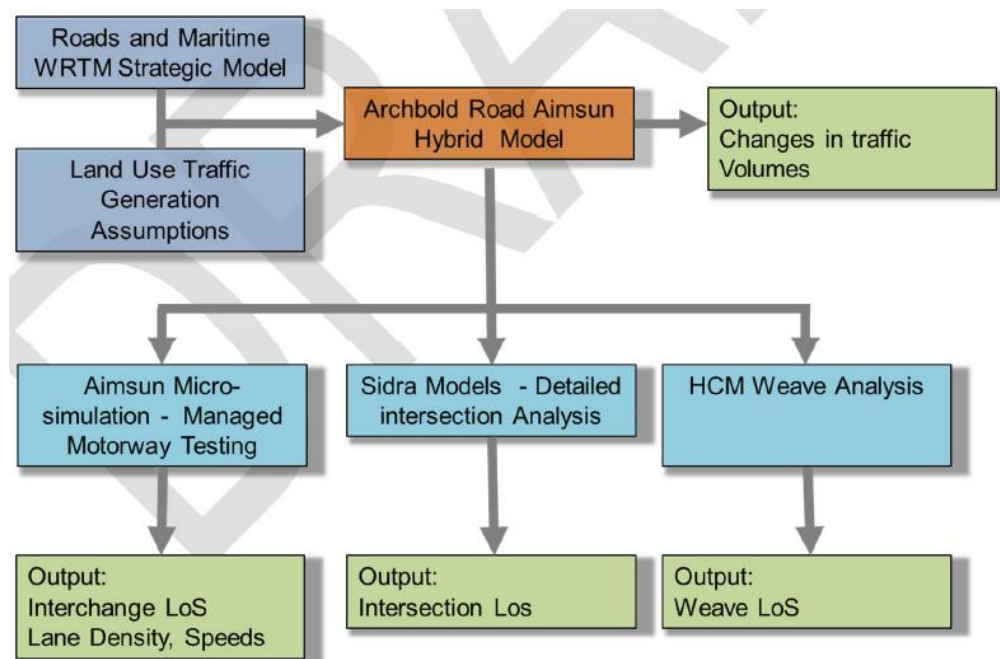
### 3.4.1 Traffic modelling methodology

Traffic modelling was undertaken by Jacobs as a component of the appraisal of the project and was used to forecast and evaluate the traffic impacts of future land use and planned road network improvements for the WSEA. The traffic modelling approach for the Archbold Road upgrade and widening involved the following:

- Development of an Aimsun hybrid traffic model of the WSEA under existing traffic conditions
- Development of future year (2021 and 2031) forecasts for WSEA and testing of these forecasts in the hybrid simulation model
- Testing of the Archbold Road ramps under Smart Motorways operation in future years (2021 and 2031) in the hybrid simulation model using SCATS Ramp Metering System (SRMS)
- Assessment of intersection operation of all intersections along Archbold Road using SIDRA intersection modelling informed by future traffic demands from the hybrid simulation model.

A flow diagram of the approach is presented in **Figure 10**.

**Figure 10 Traffic Modelling Approach**



Source: Jacobs, 2016.

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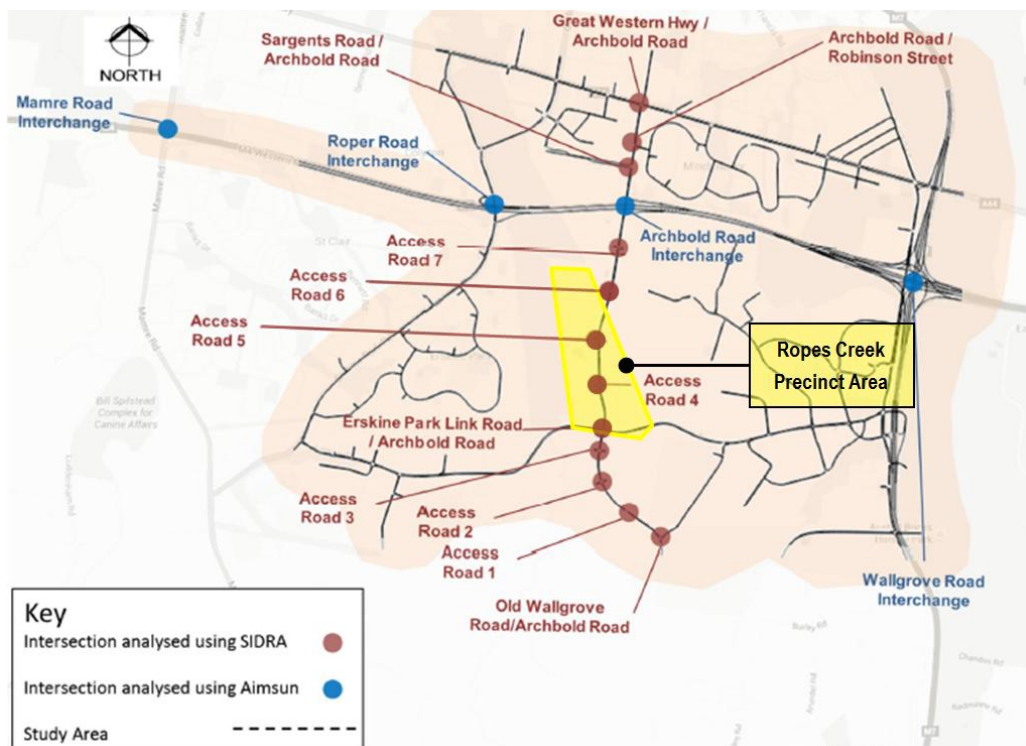
The following steps were documented by Jacobs for the development of the base hybrid model:

- Create a sub network model based on a sub-area traversal from the Broader Western Sydney Employment Area (BWSEA) mesoscopic model.
- Disaggregate the travel zone system from the STM TZ06 system to include greater detail around the Western Sydney Employment Area.
- Undertake a departure adjustment process to refine the 4 hour matrices to 15 minute time slices.
- Calibrate the mesoscopic assignment to a suitable level.
- Calibrate the hybrid assignment to the final calibration standards.
- Import growth matrices from the WRTM model for 2021 and 2031.
- Update WRTM growth matrices with local traffic generation from the known developments and adjust the matrix to match the trip ends using the Furness method.
- Develop two (2) future scenarios – with and without Archbold Road extension.
- Run and optimise future models under mesoscopic simulation.
- Undertake detailed modelling of individual intersection using SIDRA Intersection to report on operation based on mesoscopic modelled flows.
- Export subarea microsimulation model of the M4 for testing of Smart Motorways conditions.

All traffic assignment was undertaken using Dynamic User Equilibrium (DUE) in order to allow for the redistribution of traffic as a result of congestion to ensure that vehicles are assigned to routes with minimum travel times within the model.

The capacity and Level of Service analysis along Archbold Road has been carried out using SIDRA intersection modelling and the Archbold Road Aimsun model for the motorway interchanges. The Aimsun model extents are from Mamre Road / Erskine Park Road / Roper Road to the M7 Westlink and from the Great Western Highway to The Horsley Drive, as presented in **Figure 11**. The model was extended to include the Mamre Road interchange.

**Figure 11 Model extents and future road network**



Source: Jacobs, 2016.

Revision CCB – 27-May-2016

Prepared for – Department of Planning and Environment – ABN: 38755709681

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## 3.4.2 Future road network assumptions

The Archbold Road extension and upgrade from the Sydney Catchment Authority Warragamba Pipeline to the Great Western Highway (the Project) consists of a 5km road through primarily greenfield sites, with east facing ramps to the M4 Motorway. A number of road upgrades have been planned along with the proposed Archbold Road extension and have been included as part of the analysis of the future road network operation. Key future road network changes include:

- Upgrade of the existing 2km of road south of the Great Western Highway including the duplication of the existing bridge over the M4 Motorway and east facing ramps
- Extension of Archbold Road further south for another 2km through Department of Planning and Environment (DPE) and Jacfin land to meet with the existing Erskine Park Link Road
- Extension of Archbold Road further south for another 1km to meet with Old Wallgrove Road southern extension near the Warragamba pipeline including the crossing of this pipeline
- Provision of signalised intersections at key access points to existing and proposed employment land adjacent to Archbold Road.

This assessment has been undertaken for the purpose of assessing the Project and therefore focuses on the traffic and transport impacts in study area. Based on advice from Roads and Maritime Services, the following assumptions have been made:

- An additional lane will be provided on the M4 Motorway between Roper Road and the M7 Westlink in both directions by 2021.
- Smart Motorways will be implemented on the M4 Motorway by 2021
- Old Wallgrove Road upgrade will be completed by 2021
- Southern Link Road connection will be completed by 2031
- Traffic forecasts have been based on travel demand provided by Roads and Maritime Services and traffic generation based on established local rates and forecast level of development in the area.
- The majority of new developments in the area will be industrial in nature and employment based. These traffic forecasts pre-date the announcement of the Western Sydney Airport (WSA) Provision of bus priority measures.

## 3.4.3 Traffic demand

Jacobs adopted future traffic demand for their assessment based on two data sources:

- Background traffic growth – traffic that does not originate from or is not destined to land within the study area, has been derived using the WestConnex Toll Road Model (WRTM).
- Study area traffic growth: for land use within the study area, including land within the Western Sydney Employment Area (WSEA). Traffic generation for these lots was based on existing traffic impact assessment or the agreed trip generation rates for the area (21 trips per hectare per 2 hours agreed by Blacktown City Council).

Background growth and development trip generation were combined and then added to existing travel demand to derive the 2021 and 2031 horizon year traffic demand. The WRTM model includes the effects of future projects in the surrounding regional area such as the Werrington Arterial Road and the WestConnex project. A summary of the growth in the number trips over the 4 hour peak period is presented in **Table 3**. The demand summary indicates a substantial growth in traffic generation over the forecast 15 years, the majority of which is a result of increased development within the WSEA.

**Table 3** Traffic demand

Peak	2015 (base)	2021	2031
Morning	102,174	120,290 (18% growth)	143,911 (41% growth)
Evening	110,096	129,215 (17% growth)	158,297 (44% growth)

Source: Jacobs, 2016.

# DRAFT

Forecast traffic flows from the WRTM have been used to provide the background traffic growth for external trips. The future traffic demands have been provided by Roads and Maritime Services and assume the WestConnex project and associated tolls. The net growth in trips from these demands has been added to the base traffic demand, profiled over four (4) hours and disaggregated to the Aimsun centroid configuration.

## 3.4.4 Traffic generation

Detailed forecasts for the employment lands within the study area were based on the land use assumptions and traffic generation rates Jacobs had agreed with Blacktown City Council. The trip distribution for these zones were derived by a matrix 'Furness' process using the existing trip distribution as the basis for the distribution of future demand.

Key development sites in the study area of the traffic model have been divided into the following four precincts:

- Eastern Creek
- Ropes Creek (consists of Ropes Creek and Jacfin Ropes Creek)
- Erskine Park Employment Area
- Land South of the Pipeline

Trip generation rates and road network assumptions were agreed with stakeholders including DP&E, landowners and Councils as suitable inputs for modelling. These rates are consistent with those used for other assessments in the vicinity of the study area including Erskine Park Link Road and Wallgrove Road / Old Wallgrove Road upgrade.

The development areas and assumed trip generation rates for future years are summarised in **Table 4**. An 80 / 20 per cent split between arriving / leaving traffic was assumed for the morning peak and transposed for the evening peak. As identified in **Table 4**, the modelling incorporates up to 173 hectares of developable land in the calculation of traffic generated by development at Ropes Creek Precinct.

**Table 4 Land Use Traffic Generation Summary**

Precinct	Trip rate (per hectare per 2hrs)	Developable land (ha) 2021	2021 Trips / 2hrs	Developable land (ha) 2031	2031 Trips / 2hrs
Eastern Creek	21	550	11,550	550	11,550
Ropes Creek	21	115	2,415	173	3,633
<b>Ropes Creek</b>	<b>21</b>	<b>45</b>	<b>945</b>	<b>68</b>	<b>1,428</b>
Jacfin Ropes Creek	21	70	1,470	105	2,205
Erskine Park Employment Area	10	326	3,260	326	3,260
Land South of the Pipeline	21	270	5,670	507	10,647

Source: Jacobs, 2016.



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## 3.5 Road network performance

### 3.5.1 Midblock

#### *Level of service (LoS) assessment criteria*

Mid-block performance for the proposed road network has been determined using the *Austrroads Guide to Traffic Management – Part 3: Traffic Studies and Analysis* (2009). The analysis has been undertaken to confirm the proposed arrangements would provide sufficient mid-block capacity to achieve an acceptable Level of Service (LoS). An overview of mid-block LoS definitions is provided in **Table 5** – typically LoS D or better is considered acceptable.

**Table 5** Mid-block Level of Service overview

Level of Service (LoS)	Indicative volume-capacity (V/C) ratio	Description
A	<0.60	A condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.
B	0.60-0.75	In the zone of stable flow where drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is a little less than with LoS A.
C	0.75-0.90	Also in the zone of stable flow, but most drivers are restricted to some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.
D	0.90-0.95	Close to the limit of stable flow and approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational problems.
E	0.95-1.00	Traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.
F	>1.00	In the zone of forced flow, where the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdown occurs, and queuing and delays result.

Source: AustRoads Guide to Traffic Management – Part 3: Traffic Studies and Analysis, 2009; Guide to Traffic Engineering Practice – Part 2 Roadway Capacity, 1988

#### 3.5.1.1 Mid-block performance

Mid-block capacity requirements for the proposed Ropes Creek Precinct road network have been determined for the key network links. The analysis shown in **Table 6** and **Table 7** demonstrates that based on typical road capacity assumptions, the proposed road network configuration would provide sufficient mid-block capacity for forecast peak hour demand. Based on forecast traffic volumes presented in the network would operate at LoS A on Archbold Road in both the AM and PM peak periods.

**DRAFT****Table 6 Proposed road network mid-block performance (AM Peak)**

Location	Direction	Capacity (Vehicles per hour)	2036 AM peak period		2036 PM peak period	
			Maximum demand (Vehicles per hour)	V/C Ratio   LoS	Maximum demand (Vehicles per hour)	V/C Ratio   LoS
Archbold Road (North)	Northbound	2,800 (2-lane arterial road)	583	0.21 (A)	900	0.32 (A)
	Southbound		929	0.33 (A)	890	0.32 (A)
Archbold Road (South of Erskine Park Link Road)	Northbound		142	0.05 (A)	409	0.15 (A)
	Southbound		866	0.31(A)	671	0.24 (A)

Source: AECOM, based on Jacobs 2016 forecast traffic volumes.

**Table 7 Proposed road network mid-block performance (PM Peak)**

Location	Direction	Capacity (Vehicles per hour)	2036 AM peak period		2036 PM peak period	
			Maximum demand (Vehicles per hour)	V/C Ratio   LoS	Maximum demand (Vehicles per hour)	V/C Ratio   LoS
Archbold Road (North)	Northbound	2,800 (2-lane arterial road)	1,491	0.53 (A)	1,408	0.50 (A)
	Southbound		658	0.24 (A)	852	0.30 (A)
Archbold Road (South of Erskine Park Link Road)	Northbound		801	0.29 (A)	995	0.36 (A)
	Southbound		163	0.06 (A)	162	0.06 (A)

Source: AECOM, based on Jacobs 2016 forecast traffic volumes.

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## 3.5.2 Intersection

### 3.5.2.1 Level of service (LoS) assessment criteria

Intersection performance has been determined using *Roads and Maritime Services' Guide to Traffic Generating Developments* (2002). The analysis has been undertaken to confirm that the proposed intersection arrangement would provide the capacity to achieve an acceptable LoS. An overview of intersection LoS definitions is provided in **Table 8** – typically LoS D or better is considered acceptable. Degree of Saturation (DoS) – the ratio of flow to capacity for intersections – is also an important metric. It is generally accepted that intersections should have a degree of saturation of less than 0.9.

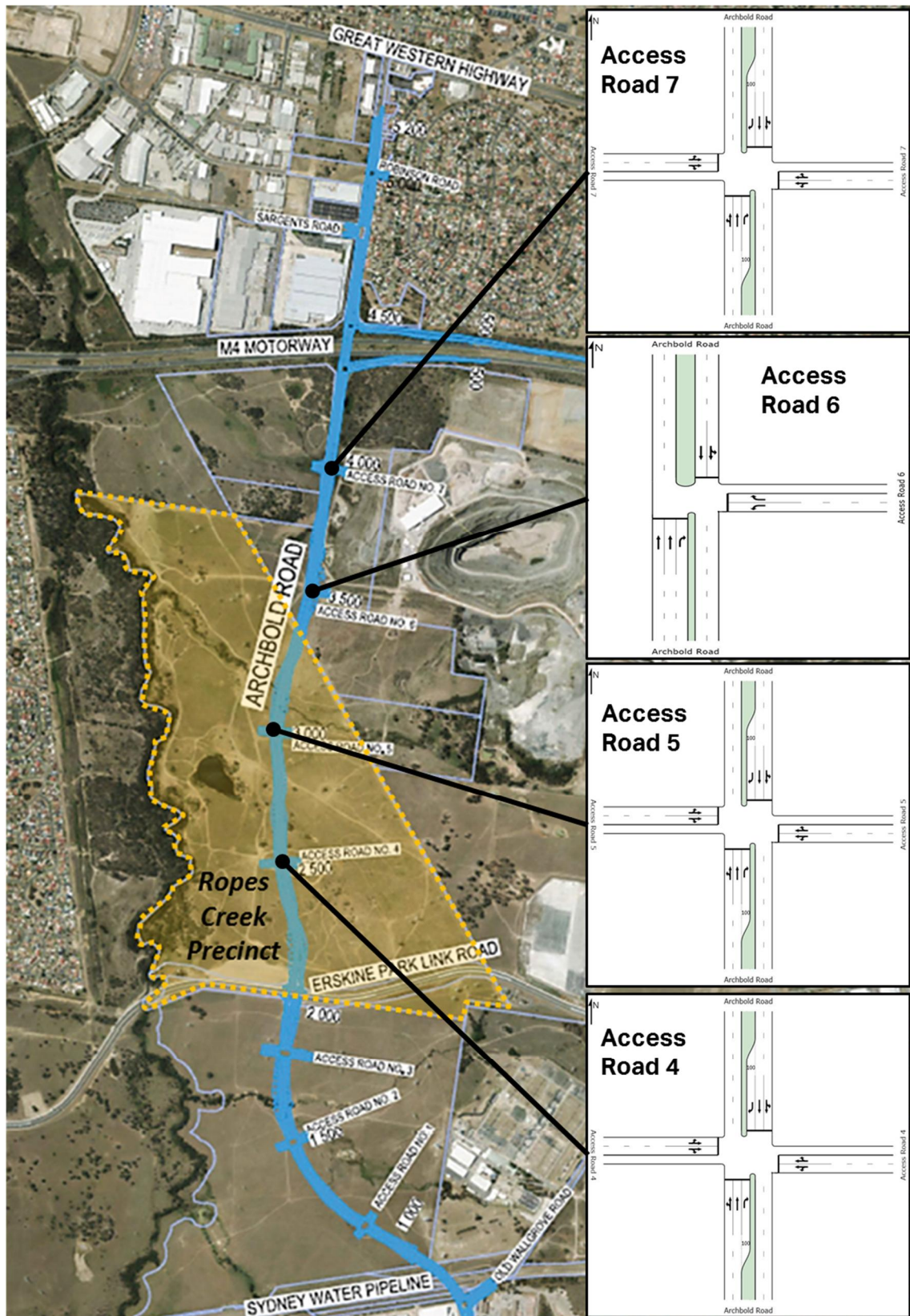
**Table 8** Intersection Level of Service overview

Level of Service (LoS)	Average delay / Vehicle (Seconds)	Traffic signals and roundabouts	Give way and stop signs
A	Less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory, but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays.	At capacity; requires other control mode.
F	>70	Roundabouts require other control mode.	At capacity; requires other control mode.

Source: Guide to Traffic Generating Developments, RMS, 2002

### 3.5.2.2 Access intersection layouts

As identified in **Section 3.3.2**, there are two available access points from Archbold Road to Ropes Creek Precinct, the two access points are Access Road 4 and Access Road 5. In addition, two access intersections are present along Archbold Road, north of the Precinct. The layouts for the intersections of Archbold Road with these access roads are presented in **Figure 12**.

**DRAFT****Figure 12 Access intersection layouts**

Source: Jacobs, 2016.

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## 3.5.2.3 Intersection performance

The capacity of urban roads is typically controlled by the performance of intersections within that network. The proposed road network for the Ropes Creek Precinct includes two access intersections along Archbold Road, via Access Road 4 and Access Road 5. Access Road 6 and 7 are located north of the Precinct, which may also provide access to the Precinct.

Results of the SIDRA assessment completed by Jacobs for some of the key intersections along Archbold Road have been summarised in **Table 9**. The results indicate that in 2031, all intersections operate at a LoS C or better with the exception of the Great Western Highway | Archbold Road intersection which operates at an acceptable LoS D. Accordingly, the surrounding road network would be able to support development at Ropes Creek, under the configuration in **Figure 11**.

**Table 9** Intersection performance summary in future year – 2031

Intersection	2031 AM peak			2031 PM peak		
	Demand (Vehicles)	Average delay (Seconds)	Level of Service (LoS)	Demand (Vehicles)	Average delay (seconds)	Level of Service (LoS)
Archbold Road   Old Wallgrove Road	1,956	21.3	C	1,498	16.5	B
Archbold Road / Erskine Park Link Road	2,335	34.9	C	2,953	42.4	C
Archbold Road   Access Road 4	1,776	20.6	B	2,273	15.8	B
Archbold Road   Access Road 5	1,918	13.6	A	2,409	19.7	B
Archbold Road   Access Road 6	1,957	14.7	B	2,425	22.2	B
Archbold Road   Access Road 7	2,078	15.5	B	2,534	15.4	B
Great Western Highway   Archbold Road	4,626	31.7	C	4,761	48.5	D

Source: Jacobs, 2016.



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## 4.0 Public transport network

### 4.1 Principles and guidelines

Efficient public transport networks are influenced by four primary factors<sup>1</sup>:

- Density: The number of people within a given area.
  - Density directly affects patronage potential.
  - The more people within the service catchment, the more opportunity for a successful service.
- Diversity: The mix of land uses present.
  - A mix of origins and destinations within a service area presents the opportunity for public transport services to collect passengers at different points in the network.
  - Diverse land uses also generate public transport demand at different times of the day.
- Design: The quality of the urban form.
  - The urban form can be considered through the availability of footpaths to enable passengers to easily walk to bus stops, and the connectivity of the street network (grid coverage, cul-de-sacs and/or curvilinear road forms).
  - Footpaths should be provided on all roads to enable pedestrians to access public transport services.
- Driving Deterrents: Reasons why people would choose public transport over driving.
  - Major factors in travel choice are travel time and cost of parking.
  - Networks should be designed to provide public transport priority wherever required and possible.

Other factors that influence the use of public transport systems include:

- Building orientation, pedestrian access and provision of free parking.
- Location of bus stops and availability of pedestrian crossing points.
- Quality of the urban infrastructure, including bus stop facilities (shelters, seating, timetables, etc).
- Streetscapes that discourage walking or limit access to facilities (rear fences, noise walls, etc).

The development of public transport options for the Ropes Creek Precinct has considered all these factors.

### 4.2 Existing public transport services

#### 4.2.1 Bus services

The precinct is located in Region 1 of the 15 bus contract regions in Sydney. Bus routes in the region are operated by Busways, which currently does not provide services to the precinct. Existing routes service the established residential area within Erskine Park to the west of the precinct as well as the residential and industrial areas around Minchinbury and Eastern Creek to the north and east, as shown in **Figure 13**.

Four bus routes currently provide services in the vicinity of Ropes Creek Precinct. Route details and frequencies for these services are summarised in **Table 10**.

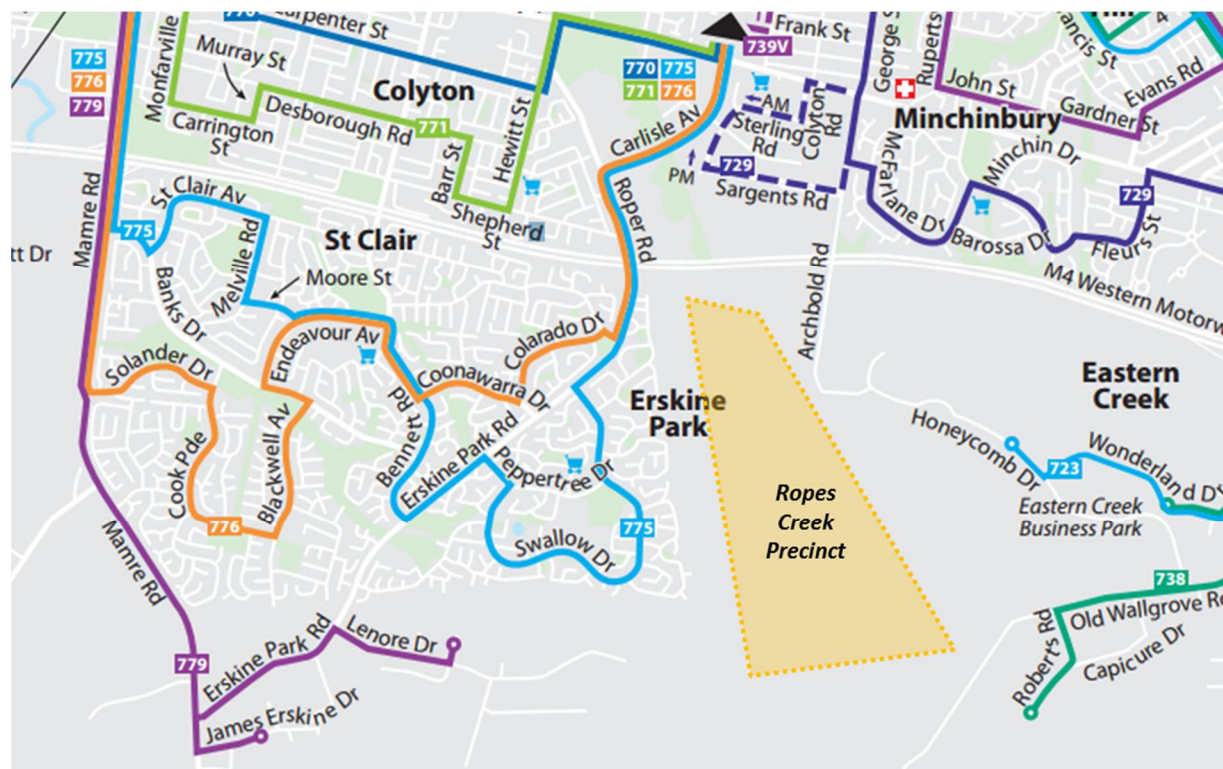
- Route 723 connects to Eastern Creek at Honeycomb Drive near Archbold Road.
- Route 738 can be accessed from Old Wallgrove Road at the eastern end of the EPLR.
- Route 775 connects to Erskine Park to the west.
- Route 779 connects to the western end of Lenore Drive.

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<sup>1</sup> TCRP Report 116: Guidebook for Evaluating, Selecting and Implementing Suburban Transit Services, TRB, 2006

# DRAFT

Figure 13 Existing bus services



Source: Busways, 2016

Table 10 Number and frequency of existing bus services

Route	Description	Weekday AM Peak (7am – 9am)		Weekday PM Peak (4pm – 6pm)		Weekday Off Peak (10am – 3pm)	
		Services	Frequency (Average)	Services	Frequency (Average)	Services	Frequency (Average)
723	Blacktown to Eastern Creek & Mt Druitt	6	20 mins	6	20 mins	6	50 mins
	Mt Druitt to Eastern Creek & Blacktown	6	20 mins	6	20 mins	6	50 mins
738	Eastern Creek to Mt Druitt Station	3	40 mins	4	30 mins	2	180 mins
	Mt Druitt Station to Eastern Creek	4	30 mins	4	30 mins	2	180 mins
775	Penrith to Werrington & Mt Druitt	4	30 mins	4	30 mins	10	30 mins
	Mt Druitt to Werrington & Penrith	4	30 mins	4	30 mins	10	30 mins
779	Erskine Park to St Marys Interchange	-	-	3	40 mins	-	-
	St Marys Interchange to Erskine Park	2	60 mins	-	-	-	-

Source: Busways, 2016



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## 4.2.2 Rail services

Located in the north of the WSEA, the Ropes Creek Precinct is closest to Mt Druitt and St Marys train stations. Mt Druitt is around 4km directly north of the site, while St Marys is around 6km to the north-west. Mt Druitt and St Marys stations are currently serviced by the Blacktown to Emu Plains section of the T1 Western Line which provides express City services and local connection services including all stops between Mt Druitt and Parramatta.

The local area rail interchange and connection context for Mt Druitt and St Marys Stations is shown in **Figure 14**. Local interchange stations are located at Penrith, where passengers can change to the Blue Mountains line, and Blacktown Station, where passengers can interchange to the Cumberland line or the Blacktown to Richmond section of the T1 Western Line. The number and frequency of existing rail services to Mt Druitt and St Marys stations is detailed in **Table 11**.

**Figure 14** Local area rail connections



Source: Sydney Trains, 2016

**Table 11** Number and frequency of existing rail services

Description	Weekday AM Peak (7am – 9am)		Weekday PM Peak (4pm – 6pm)		Weekday Off Peak (10am – 3pm)	
	Services	Frequency (Average)	Services	Frequency (Average)	Services	Frequency (Average)
Mt Druitt to Blacktown and City	14	9 mins	8	15 mins	20	15 mins
Mt Druitt to Emu Plains	7	17 mins	9	13 mins	20	15 mins

Source: Sydney Trains, 2016

According to the *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report*, there is currently excess capacity in the T1 Western Line in the vicinity of the WSEA. However, due to bottlenecks and network complexities, CBD delays can create flow on delays at Blacktown and Penrith, resulting in variability in travel time for Western Line passengers.

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## 4.3 Future public transport services

The planning and assessment of public transport for the Ropes Creek Precinct has been guided by key principles from public transport service planning guidelines and the *BWSEA Draft Structure Plan*. It should be noted however that these guidelines may subject to changes as the DPE is currently preparing a draft land use and Infrastructure Strategy for the Western Sydney Priority Growth Area.

Key considerations are defined in the *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report*, with the aim of providing a consistent, integrated public transport network for the area. A summary of key BWSEA public transport planning principles is provided in **Table 12**.

Table 12 BWSEA public transport planning principles

Principle	Description
<b>Focus on people</b>	Understand and respond to the needs and expectations of the people that will (potentially) choose to use the public transport network.
<b>Integration with land use</b>	Network structure should reflect the land use and intensity of development which is measured by density of population or employment.
<b>Interconnected grid network structure</b>	Ideally constitutes a 1-1.5 km interconnected grid structured on public transport transfer nodes. The links are preferably slightly closer together on radial routes (i.e. towards centres) and slightly further apart on cross-town routes.
<b>Anchors</b>	Anything that gives many people a reason to use a line all the way to its endpoint. Transit lines are much more efficient if they run between anchors.
<b>Network Legibility</b>	If network routes and service characteristics of a quality public transport system can be easily presented on a map, then the community that it serves will readily adopt the public transport system.
<b>Route network alignment</b>	Plays a critical part in achieving high operating speeds and good levels of reliability for public transport. Alignments on the first and second tier public transport network should only make turns when required from a network structure perspective.
<b>Relationship with planned transport infrastructure</b>	Planning for public transport needs to be consistent with current State Government planning and consider the potential of the site beyond the current State Government strategy planning horizon.

Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013. Note that the Department of Planning and Environment is currently preparing a Land Use and Infrastructure Strategy which may update the public transport planning strategy for the area.

As yet, no detailed public transport plans have been developed for the Western Sydney Priority Growth Area. Key considerations and possible routes however have been identified in a range of documents. In addition to future routes and services, key factors integral to maximising public transport attractiveness and resulting patronage include:

- Facilitating interchange between bus and heavy rail.
- Providing quality walking and cycle links to public transport.

The development of the area will occur over many years. Consequently, in order to ensure that public transport mode share and catchment for the area is maximised, a 'riding habit' should be established through the provision of staged public transport services which are visible and accessible through all stages of development of the area.

# DRAFT

## 4.3.1 Future bus network

### 4.3.1.1 NSW Long Term Transport Master Plan

The NSW Long Term Transport Master Plan (LTTMP) identifies two strategic bus corridors / routes to be investigated in proximity to the Ropes Creek Precinct. These include:

- Erskine Park Road – Roper Road – Carlisle Avenue: Orchard Hills to Mt Druitt (pinch point corridor).
- Mamre Road: St Mary's to Kemps Creek (new corridor).

It is assumed that these proposed corridors have been enhanced or superseded with the release of *Sydney's Bus Future* in December 2013. However, they have been provided for reference however as they are referenced in the *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report*.

### 4.3.1.2 Sydney's Bus Future

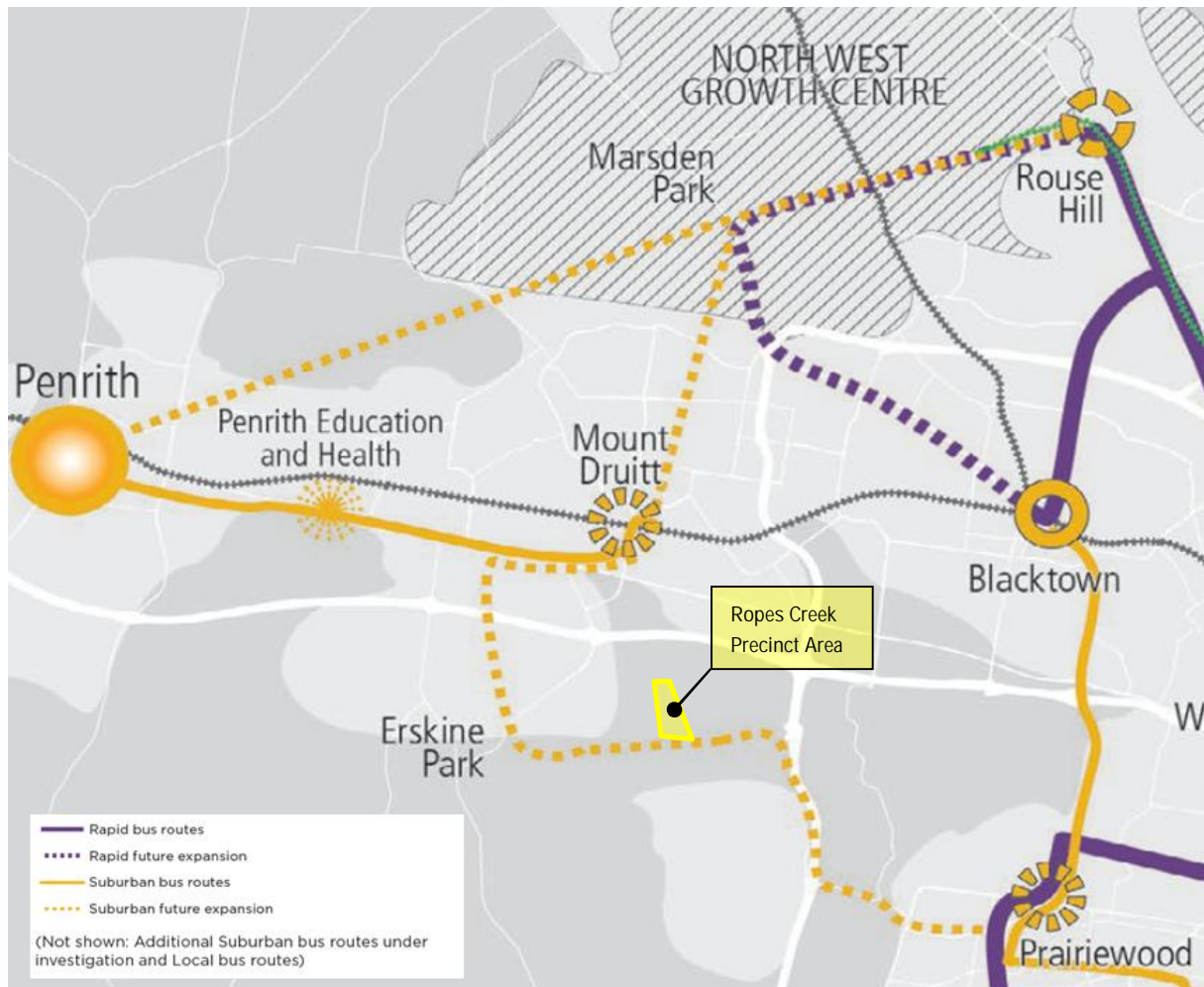
*Sydney's Bus Future*, release in December 2013, outlines a new three-tiered structure for Sydney's bus services. Future bus services will be defined under the following route types:

- Rapid services:
  - Form the backbone of the new bus network, offering fast, reliable bus travel for customers between major centres.
  - Provide customers with mass transit level services between centres which are not linked by trains or light rail.
- Suburban services:
  - Build on the foundation provided by rapid services to improve access to local, neighbourhood destinations.
- Local services:
  - Complete the bus network providing the highest level of accessibility.

Across Metropolitan Sydney, 13 rapid bus routes will operate and 20 suburban routes have also been confirmed, with more to be added. Bus routes close to the Ropes Creek Precinct are shown in **Figure 15**. Most relevant to the Ropes Creek Precinct is the future suburban route expansion shown between Marsden Park and Prairiewood. This route traverses the southern boundary of the precinct via the EPLR and would provide direct access to the Ropes Creek Precinct from Marsden Park, Mt Druitt Interchange, and Prairiewood.

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Figure 15 Identified Rapid Bus routes and major Suburban bus routes relevant to Ropes Creek



Source: Sydney's Bus Future, 2013

## 4.3.1.3 BWSEA Draft Structure Plan

The *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report* includes high level strategic planning of future bus network provision for the Ropes Creek Precinct area. The proposed transit and local bus service network is shown in **Figure 16**. It should be noted however that this network may subject to changes as DPE is currently preparing a draft land use and Infrastructure Strategy for the Western Sydney Priority Growth Area.

## DRAFT

Figure 16 BWSEA indicative local bus services, transit corridors, and interchanges



Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013. Note that the Department of Planning and Environment is currently preparing a Land Use and Infrastructure Strategy which may update the public transport planning strategy for the area.

The indicative public transport plan proposes the establishment of transit corridors in the vicinity of the Ropes Creek Precinct. The corridor alignments – extending north-south along Mamre Road, and then east-west on The Horsley Drive – are consistent with the proposed suburban route identified in *Sydney's Bus Future*. The following transit corridors promote public transport access between the WSEA and the existing Liverpool to Parramatta Transitway (to the east), and railway services to the north (T1 Western Line) and in the future the South West Rail Link (SWRL):

- Erskine Park Road
- SLRN (Western section)
- Aldington Road
- Mamre Road
- The Horsley Drive.



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Proposed local bus services on the Archbold Road Extension corridor will connect the Ropes Creek Precinct with regional transit corridors. It is expected that the local bus network will generally provide connecting services to nearby rail stations including Mt Druitt and St Marys stations, which are anticipated to provide hubs for bus routes servicing the wider area. The *BWSEA Draft Structure Plan* recommends that these services be integrated with existing bus services in the area to enhance public transport viability by connecting to the surrounding centres.

It is proposed that bus infrastructure and services be staged to complement development in the WSPGA. Four broadly defined stages are outlined, beginning with public transport provision appropriate for initial developments, and progressively expanding as transit demand increases with increasing development density.

## 4.3.1.4 NSW Bus Service Planning Guidelines

**Table 13** provides an overview of the detailed evaluation characteristics and criteria of the *NSW Service Planning Guidelines* which have been incorporated during the development of the proposed bus network for the Ropes Creek Precinct.

**Table 13** Bus network evaluation criteria

Characteristic	Benchmark   Criteria
<b>Network (Area) coverage</b>	<ul style="list-style-type: none"> <li>- 90% of households to be within 400 metres of a rail line and/or a Regional or District bus route during commuter peaks, inter peak and weekend day time.</li> <li>- 90% of households to be within 800m of a rail line and/or a Regional or District bus route at other times.</li> </ul>
<b>Network legibility</b>	<ul style="list-style-type: none"> <li>- Peak and off-peak services use the same routes.</li> </ul>
<b>Route design</b>	<ul style="list-style-type: none"> <li>- Regional Routes to be between 10 and 25 kilometres.</li> <li>- Routes to be between 30 and 60 minutes in duration.</li> <li>- Maximum diversion from the fastest or shortest route (between termini) to be no more than 20%.</li> </ul>
<b>Section points</b>	<ul style="list-style-type: none"> <li>- The range of section point lengths to be between 1.3km and 1.9km.</li> <li>- The average length of section points within each route to be 1.6 km.</li> </ul>

Source: NSW Service Planning Guidelines, NSW Ministry of Transport, 2006

## 4.3.2 Future rail network

The proximity of the precinct to existing and future stations means that rail services could be a key facilitator of access to and from the site. Consequently the integrated planning of appropriate interchanges is critical to ensuring public transport is an attractive travel option for future precinct travel demand.

Key considerations for ensuring optimal interchange between bus and rail in the area are provided in the *BWSEA Transport Planning Preliminary Analysis Report*, and have been summarised in **Section 4.3.3**.

The T1 Western Line is the most congested and complex line on the Sydney Trains rail network. Planned service improvements for the Western Line are outlined in *Sydney's Rail Future* and *Western Sydney Rail Upgrade Program*.

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## 4.3.2.1 Sydney's Rail Future and Western Sydney Rail Upgrade Program

*Sydney's Rail Future* sets out the NSW Government's plan to modernise Sydney's rail system. The document planned changes for T1 Western Line services at St Marys and Mt Druitt to improve service reliability and capacity. The *Western Sydney Rail Upgrade Program* aims to achieve these goals and increase service frequencies on the T1 Western Line. The improvements include additional track, signalling and power supply upgrades to enable more express trains into the CBD, and technology that will allow more trains per hour to travel on the T1 Western Line. As a result, the rail line is expected to be able to service 100,000 more commuters during peak hours and reduce crowding by up to 50 per cent. These upgrades will potentially allow Mt Druitt Station and St Marys Station to accommodate a greater number of services and commuters.

In the longer term *Sydney's Rail Future* indicates that the proposed second Harbour Crossing would allow Western Line services to increase by 35 per cent from the current number of services.

## 4.3.2.2 BWSEA Draft Structure Plan

The *BWSEA Transport Planning Preliminary Analysis Report* identifies that the Western Line and South West Rail Link could provide an excellent first-tier public transport network around the BWSEA. The transit network is proposed to promote access to the Western Line to the north, and in the future the South West Rail Link to the south.

The importance of well-designed interchanges between modes is also recognised. Transfer nodes between the first-tier and second-tier public transport networks constitute a critical consideration in terms of public transport network structure and operation. Transit interchanges at proposed specialised centres and at key transfer nodes, including heavy rail stations, are therefore a key element of the proposed BWSEA public transport network.

It is noted that the BWSEA Draft Structure Plan is currently under review and that DPE is currently preparing a Draft Land Use and Infrastructure Strategy for the area as part of the WSPGA.

## 4.3.3 Future transport interchanges

The provision of effective public transport interchanges in and around the WSEA and WSPGA will be a key factor contributing to the success of the public transport system. Well-designed interchanges between local and regional bus routes – and nearby train stations – will be required to encourage public transport patronage between the Ropes Creek Precinct and the wider Sydney Metropolitan Area. These facilities provide the necessary accessibility and interconnection between bus and train services that would support widespread public transport patronage.

Suggested features of interchanges used by bus services travelling through the Precinct include:

- On-street facilities located on the path of key bus services.
- Co-located facilities at existing and future train stations, where relevant.
- Provision of bus bays, including short-term bus layover and driver break facilities.
- Provision of pedestrian friendly connections to and from interchanges including multiple stops in both directions, zebra and signal controlled pedestrian crossings, and median safety barriers.
- Additional design considerations in the vicinity of interchanges include:
  - Low posted speed limits.
  - Promotion of retail storefronts along connecting bus routes.
  - Avoidance of car-park entrances along connecting bus routes.
  - Appropriately distanced and located supplementary bus stops surrounding key interchanges.



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#### 4.3.4 Proposed Ropes Creek Precinct public transport network

The proposed bus network within the area consists of regional bus routes supplemented by connecting local bus routes. Public transport provision to and from the Ropes Creek Precinct would be directly facilitated by the following local bus services:

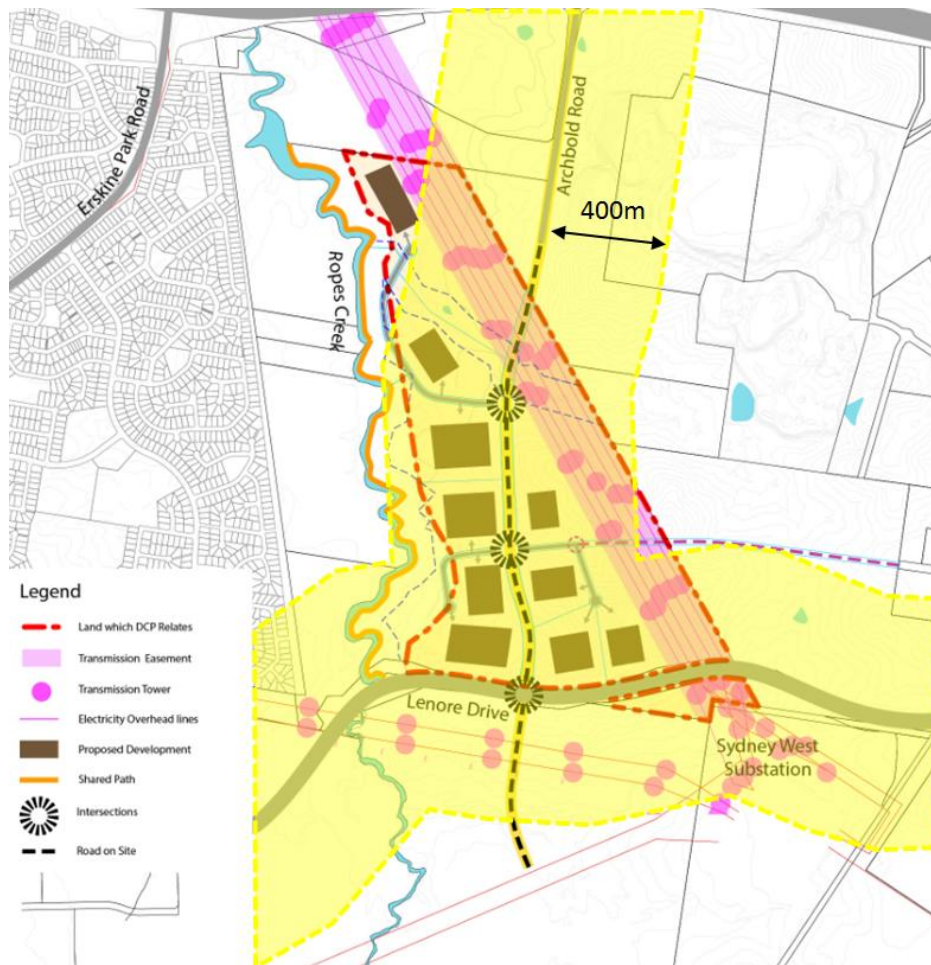
- Through the precinct travelling north-south along the Archbold Road Extension.
- Along the southern boundary of the precinct travelling east-west along the EPLR.

The resulting catchment – indicated in **Figure 17** – would result in the majority of the Ropes Creek Precinct being within 400m of a local bus route. Outside of the precinct, these local bus routes would connect to regional bus routes and rail lines (transit corridors) at major interchange points at key locations including:

- Development centres.
- Existing train stations at St Marys and Mt Druitt.
- Crossings with Liverpool-Parramatta T-way bus services.
- Future SWRL train stations.

It is recommended that detailed interchange locations, requirements, and layouts are developed and confirmed as the planning and design of **public transport network of the precinct – and the WSEA – progresses.**

**Figure 17 Proposed local bus route catchments**



Source: AECOM, 2016

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## 5.0 Walking and cycling network

### 5.1 Principles and guidelines

Generally, existing development and transport infrastructure can constrain the development of effective active (walking and cycling) transport networks. Given the lack of current development in the Ropes Creek Precinct, there is opportunity to develop a high quality active transport network which is integrated with the public transport network.

As the precinct is located around 4km from the nearest train station at Mt Druitt, the focus of the active transport network will be the provision of a quality active transport network which is integrated with the proposed bus network.

#### 5.1.1 NSW Bicycle Guidelines

The *NSW Bicycle Guidelines* (NSW Roads and Traffic Authority, 2003) assist in the design of bicycle facilities. The principles of network design are also relevant when designing pedestrian facilities. The document provides a step by step process that the design should move through and details factors that should be considered. It is a best practice guide and professional judgement should be used when applying the guidelines.

The *NSW Bicycle Guidelines* identifies key principles to adopt when developing a cycle network:

- Coherence:
  - The cycle network should link popular destinations in a continuous form, with consistent quality across the network.
  - The correct path, especially at intersections, should be clear.
  - There should be adequate density of routes to offer a choice to cyclists.
- Directness:
  - Long detours should be avoided, but minor detours to avoid the steepest section of a hill are advisable so that the cyclist can maintain a constant speed throughout the journey.
  - Barriers – such as a crossing at critical points – can disrupt the momentum of the ride.
- Safety:
  - Intersections should be designed with bicycles in mind and should include a path for cyclists.
  - Roadway crossings should be safe and easy to negotiate.
- Attractiveness:
  - Bicycle infrastructure should integrate with the surrounding environment.
  - Routes should be clearly signed, line marked, and well-lit to offer a sense of security.
- Comfort:
  - A smooth surface ensures a safe and comfortable ride.
  - Space should be allocated to cyclists within the road reserve (in either a cycle lane or separated path) on all roads unless speed and traffic volumes are very low.

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## 5.1.2 BWSEA active transport design principles

The *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report* details key considerations which are intended to guide the structure of the active transport network in the area. Guiding principles which are relevant for active transport planning in the Ropes Creek Precinct can be summarised as follows:

- Integration with current and future infrastructure:
  - It is envisaged that bicycle storage facilities | spaces will be provided near key transport interchanges for commuters.
- Integration with other transport modes and urban planning:
  - Pedestrian and bicycle plans cannot be considered in isolation from other forms of transport and urban planning.
  - Pedestrian and bicycle plans need to encourage access to bus stops and rail stations.
- Feed transit nodes:
  - Pedestrians must walk to access public transport services.
  - Provision of safe routes and bicycle parking will encourage more public transport use with less need for park and ride car parking.
- Designing an active transport network structure:
  - In order to promote cycling, it will be necessary to build the transportation and access network from the 'bottom-up' (i.e. pedestrian and cyclist) as well as the 'top-down' (railway and bus corridors).

These criteria have been considered during the development of the active transport network servicing the Ropes Creek Precinct. However, it should be noted however that these guiding principles may subject to changes as DPE is currently preparing a draft land use and Infrastructure Strategy for the Western Sydney Priority Growth Area.

## 5.2 Existing walking and cycling network

There are currently no existing infrastructure which provides dedicated active transport links through the Ropes Creek Precinct. The EPLR traverses the southern boundary of the precinct in an east-west alignment, providing a dedicated shared use path for pedestrians and cyclists between Lenore Drive and Old Wallgrove Road.

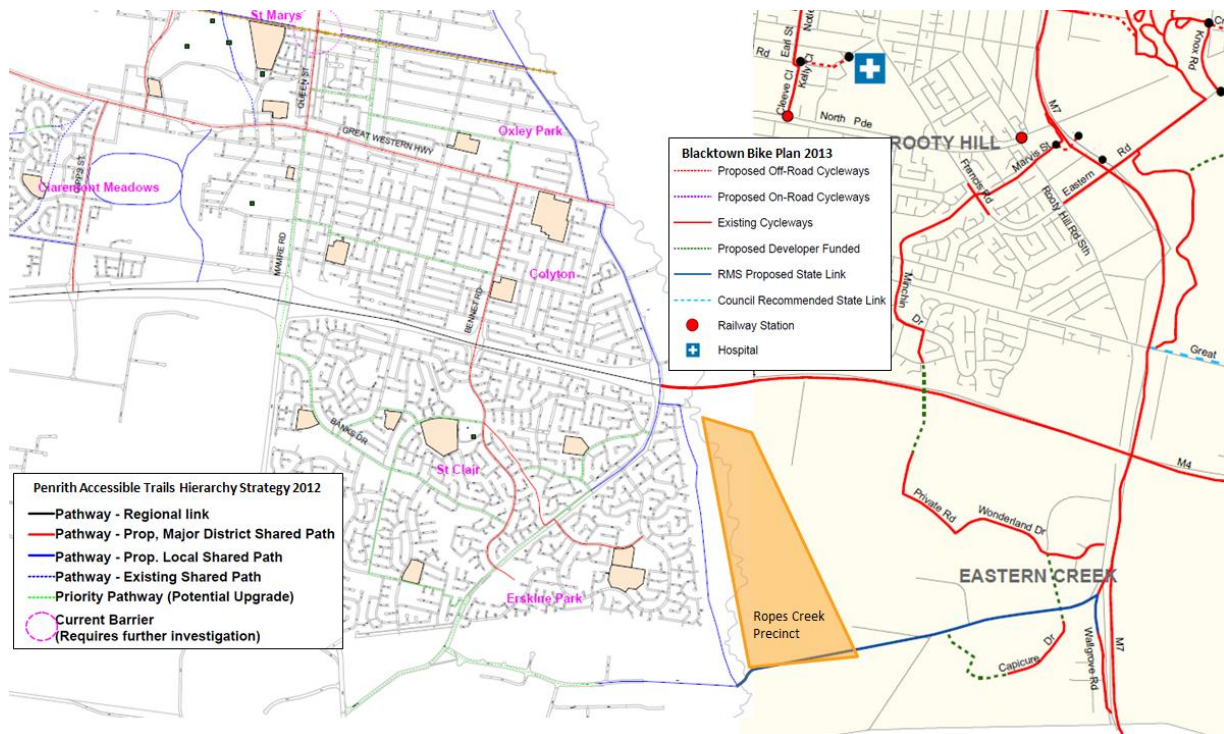
Existing cycle links in the vicinity of the Ropes Creek Precinct within the Penrith LGA to the west and Blacktown LGA to the east are shown in **Figure 18**. These links service the existing land uses surrounding the precinct. Major existing cycle routes include:

- M4 Regional Cycle Link: On-road, shoulder separated.
- M7 Cycleway: Off-road shared path.

The existing cycling network in the area surrounding the Ropes Creek Precinct provides connections to Mt Druitt and St Marys train stations.

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Figure 18 Existing and proposed cycle routes in Penrith LGA and Blacktown LGA



Source: Penrith Accessible Trails Hierarchy Strategy, PCC, 2012; Blacktown Bike Plan, BCC, 2013

## 5.3 Future walking and cycling network

### 5.3.1 BWSEA Draft Structure Plan

The *BWSEA Draft Structure Plan* indicates broad strategic cycling routes identified during the preliminary planning stage, as shown in **Figure 19**. It should be noted however that this network may be subject to changes as DPE is currently preparing a draft land use and Infrastructure Strategy for the Western Sydney Priority Growth Area. Proposed links which will directly assist in facilitating future cycle access to and from the Ropes Creek Precinct include:

- An on-road, shoulder separated north-south link along the future Archbold Road Extension, linking the existing routes along the M4 Motorway and EPLR.
- An off-road, east-west link east of the EPLR extending along Old Wallgrove Road. This would provide access between the precinct and the existing M7 Cycleway.
- An off-road, north-south link south of the EPLR | Lenore Drive extending along Aldington Road. This would provide access between the precinct and the south of the WSPGA.

A pedestrian transport concept is also presented in the *BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report*. It proposes that:

- Pedestrian facilities are also provided on all strategic cycle routes identified.
- Along these routes, pedestrian paths would be provided where active land uses directly abutting road space.
- Whilst the majority of off-road cycle routes are anticipated to be paths shared with pedestrians, paths may require separation where high levels of activity occur (e.g. near employment centres).



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Figure 19 BWSEA proposed regional bike network



Source: BWSEA Draft Structure Plan Transport Planning Preliminary Analysis Report, GHD, 2013. Note that the Department of Planning and Environment is currently preparing a Land Use and Infrastructure Strategy which may update the walking and cycling network for the area.

### 5.3.2 Other walking and cycling plans

As shown in **Figure 18**, a variety of links are proposed by both PCC and BCC which would improve existing cycling connections to and from the Ropes Creek Precinct. In combination with the proposed walking and cycling facilities along the Archbold Road Extension proposed by the *BWSEA Draft Structure Plan*, walking and cycling facilities in the surrounding area would promote cycling movements between the precinct and existing development and centres to the north, including Mt Druitt and St Marys train stations.

The 'RMS Proposed State Link' on the EPLR has now been partially constructed, providing a dedicated shared use path for pedestrians and cyclists along the southern boundary of the precinct, as noted in **Section 5.2**. When complete this dedicated facility will extend east along Old Wallgrove Road to the M7 Motorway, providing an active transport link between the Ropes Creek Precinct and the M7 Cycleway and Eastern Creek. The provision of this facility is consistent with the indicative regional cycling network presented in the *BWSEA Draft Structure Plan*.

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## 5.3.3 Proposed walking and cycling network

The proposed walking and cycling network for the Ropes Creek Precinct includes:

- Regional network (Arterial roads):
  - 3m wide dedicated shared use path for pedestrians and cyclists along the Archbold Road Extension between the M4 Motorway and EPLR, as shown in **Figure 8 (Section 3.3.4)**.
  - This facility would provide a strategic north-south connection to, from, and through the precinct.
- Local network (Industrial roads):
  - 4.5 metre wide dedicated shared use path for pedestrians and cyclists, illustrated in **Figure 9 (Section 3.3.4)**.
  - These facilities would provide local connections between areas within the precinct, and to and from the Archbold Road Extension regional connection.

In addition to pedestrian and cycling facilities along proposed road corridors, detailed planning and design would also investigate the potential for additional active transport corridors within the precinct. These corridors could enhance the integration of the proposed active and transport networks – for example providing direct corridors to and from bus stops – and consequently increase active transport and public transport demand within the precinct.

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## 6.0 Summary

The purpose of this study was to undertake a traffic and transport assessment, in support of a Development Control Plan (DCP) for the Ropes Creek Precinct. The key findings of the assessment are summarised below:

### - Road network

- Traffic modelling was undertaken by Jacobs as part of the *Archbold Road Upgrade and Widening Review of Environmental Factors – Traffic and Transport Impact Assessment*, February 2016.
- The Aimsun and SIDRA intersection modelling results indicate that in 2031, all nearby intersections (including accesses) operate at a LoS C or better with the exception of the Great Western Highway | Archbold Road intersection which operates at an acceptable LoS D.
- Accordingly, the proposed road network within the Precinct including Archbold Road extension would be able to support development at Ropes Creek.

### - Public transport network

- The proposed bus network within the broader area consists of regional bus routes supplemented by connecting local bus routes.
- Public transport provision to and from the Ropes Creek Precinct would be directly facilitated by the following local bus services through the precinct travelling north-south along the Archbold Road Extension and along the southern boundary of the precinct travelling east-west along the EPLR. The resulting catchment would result in the majority of the Ropes Creek Precinct being within 400m of a local bus route.
- Outside of the precinct, these local bus routes would connect to regional bus routes and rail lines (transit corridors) at major interchange points at key locations including development centres and existing train stations at St Marys and Mt Druitt.
- It is recommended that detailed interchange locations, requirements, and layouts are developed and confirmed as the planning and design of public transport network of the precinct – and the WSPGA – progresses.

### - Walking and cycling network

- The proposed walking and cycling network for the Ropes Creek Precinct includes dedicated shared use path for pedestrians and cyclists along the Archbold Road Extension between the M4 Motorway and EPLR to provide a strategic north-south connection to, from, and through the precinct.
- The access roads are proposed to provide a dedicated shared use path for pedestrians and cyclists, which would provide local connections between areas within the precinct, and to and from the Archbold Road Extension regional connection.
- In addition to pedestrian and cycling facilities along proposed road corridors, detailed planning and design would also investigate the potential for additional active transport corridors within the precinct.
- These corridors could enhance the integration of the proposed active and transport networks – for example providing direct corridors to and from bus stops – and consequently increase active transport and public transport demand within the precinct.