Transport for NSW

Southern Link Road corridor – Options Report

September 2022

Southern Link Road

NSW GOVERNMENT

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Acknowledgement of Country

Transport for NSW acknowledges the traditional custodians of the land on which we work and live.

We pay our respects to Elders past and present and celebrate the diversity of Aboriginal people and their ongoing cultures and connections to the lands and waters of NSW.

Many of the transport routes we use today – from rail lines, to roads, to water crossings – follow the traditional Songlines, trade routes and ceremonial paths in Country that our nation's First Peoples followed for tens of thousands of years.

Transport for NSW is committed to honouring Aboriginal peoples' cultural and spiritual connections to the lands, waters and seas and their rich contribution to society.

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Versions

Version	Notes
1.0	August 2022
2.0	September 2022

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1. Executive Summary

1.1 Background

The Australian and NSW Government have identified the Western Sydney Employment Area (WSEA) as a critical development area to meet the increased demand for future employment. WSEA is located to optimise travel and freight movements between Sydney's principal centres, Port Botany and the Western Sydney Airport. The area is straddled by the M4 to the north, M7 to the east and borders the Western Sydney Growth Area to the south.

The Southern Link Road (SLR) is identified as a key east-west arterial link road for the WSEA. Stage 1 is the western section from Mamre Road to Old Wallgrove Road. Stage 2 is the eastern section and continues from Stage 1 through to Wallgrove Road.

It is anticipated that by 2031, Western Sydney will accommodate 50 per cent of Sydney's new jobs. The Southern Link Road is expected to improve the level of accessibility to the area by providing a shorter travel time for people working there. An additional 57,000 jobs are expected to be available within the WSEA over the next 30 years.

The SLR has been previously submitted for community consultation. Stage 1 is progressing unchanged from the alignment identified in the WSEA SLRN – Options Refinement Report, May 2014. Stage 2 is being reassessed to address additional constraints and opportunities that have been identified.

1.2 Purpose of this report

This report details the option development and evaluation process for Stage 2 of the SLR.

It aims to:

- Provide the strategic context and need for the project
- Detail the two options under investigation and their relevant issues and constraints
- Explain the evaluation process used to assess and compare the two options
- Present the preferred option for Stage 2
- Outline the next steps for project development1

1.3 Need for the proposed alignment

The SLR is a key east-west arterial link road for WSEA and is an important step in providing an efficient road network that supports both the supply chain and future employment growth by connecting to the M4 and M7 motorways. The proposed SLR would run parallel to the Erskine Park Road and Old Wallgrove Road, completing the road network for access to the WSEA.

Without the Southern Link Road, the following is expected to occur:

- NSW freight transport would be faced with a loss of efficiency due to reduced travel speeds and increase in travel time to the M4 and M7 Motorways
- Inefficient development of the WSEA land to the south of the Water NSW Pipeline
- Heavy congestion and increased delays at key intersections during peak travel periods over the next 5 to 10 years
- Less effective connections causing time delays between the M4 and the M7 motorways for industrial businesses, local workers and residents

- Public transport would be impacted by reduced travel speeds therefore an increase in travel time

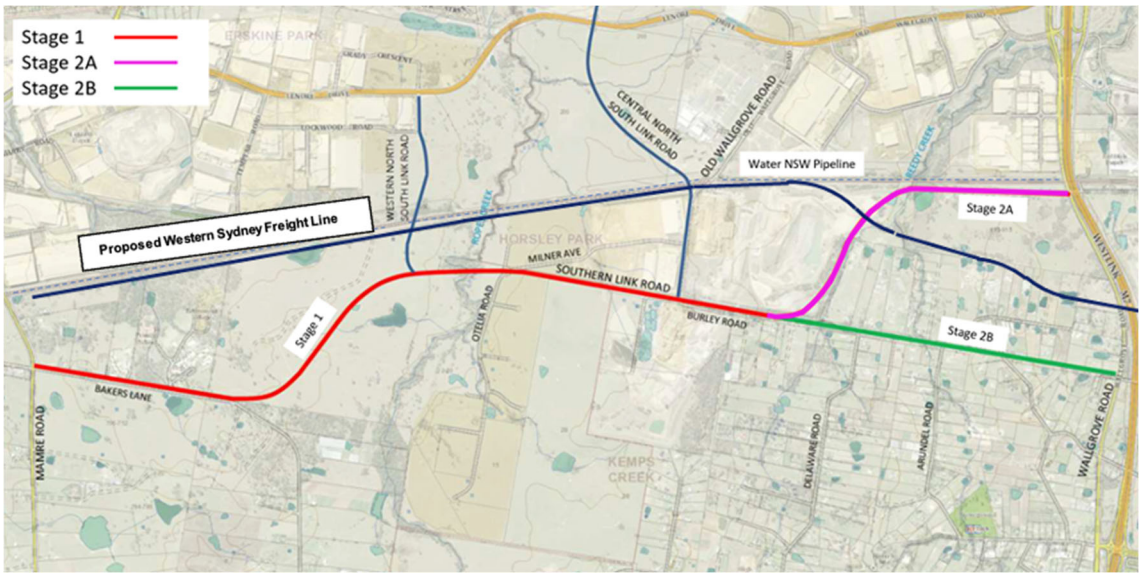
1.4 Proposal objectives

The objectives for the Southern Link Road are to:

- Provide a new road corridor within the Western Sydney Employment Area (WSEA) to facilitate economic growth by unlocking development and employment opportunities.
- Provide wider connectivity that could generate economic growth
- Enable safe, reliable and efficient access for employees and freight between the WSEA and the wider state road network.
- Achieve increased road capacity in the regional network to meet future traffic and transport demands.
- Cater for pedestrians, cyclists and public transport in terms of accessibility, connectivity, safety and amenity.
- Provide a value for money solution

1.5 Options identification and assessment

Two options for Stage 2 of the Southern Link Road were considered.



Stage 2A continues east along the route of Burley Road before curving to the north past the eastern extent of the Oakdale East development. It crosses Reedy Creek, the proposed Western Sydney Freight Line, the 330kv and 132kv Transmission lines and then continues through industrial property adjacent to the NSW Water pipeline until meeting Wallgrove Road.

Stage 2B continues east and generally follows the alignment of Burley Road within the existing road corridor. It crosses Reedy Creek and then intersects with Delaware Road, before passing beneath 132kV electricity transmission lines, crossing Reedy Creek again and departing from the Burley Road corridor to continue in an easterly direction through private property towards Chandos Road.

Each of the options have been investigated in order to reach an outcome that best meets the project's objectives. The report provides the evaluation criteria and methodology behind the outcome.

1.6 Options evaluation

The options evaluation process first involved information gathering. This was completed through undertaking preliminary environmental investigations, design development, traffic modelling analysis, constructability, risk and health and safety workshops as well as a value management process.

The findings from the information gathering process were then utilised to evaluate the two options by considering the project objectives along with the identified issues and constraints. The criteria for this included traffic efficiency, property impacts, safety, environment, utilities, future access, public transport, economic impact, design standards and urban design.

1.7 Preferred option

The outcome of the options evaluation resulted in Stage 2B being identified as the preferred option. The key differentiators between the two options were their attractiveness to future traffic, ability to unlock future developments, supply chain efficiency due to accessibility to the M7, utility impacts and economic viability.

1.8 Next steps

Transport for NSW (TfNSW) will now seek public feedback on the preferred option. This will provide an opportunity for the community and stakeholders to review the preferred option and provide feedback. Transport will use this feedback to refine the preferred option through the development of a concept design and environmental assessment for the proposal.

Transport will continue community and stakeholder consultation during the next stages of the proposal. The Transport website will be periodically updated with information about the progress of the proposal.

The community will also be provided with periodic project updates via community notifications and project webpage updates.

2. Introduction

2.1 Background

The Australian and NSW Government have identified the Western Sydney Employment Area (WSEA) as a critical development area to meet the increased demand for future employment and is located to facilitate improved travel and freight movements between Sydney's principal centres, Port Botany and the Western Sydney Airport. The area is straddled by the M4 to the north, M7 to the east and borders the Western Sydney Growth Area to the south.

The Southern Link Road (SLR) is identified as a key east-west arterial link road for the WSEA. Stage 1 is the western section from Mamre Road to the east of Old Wallgrove Road. Stage 2 is the eastern section and continues from Stage 1 through to Wallgrove Road.

The SLR would run parallel to the Erskine Park Link Road and Old Wallgrove Road upgrade, completing the road network for access to the WSEA, with access from west of the M7 Motorway and south of the M4 Motorway. SLR is located within the Penrith and Fairfield City Council areas.

It is anticipated that by 2031, Western Sydney will accommodate 50 per cent of Sydney's new jobs. The Southern Link Road is expected to improve the level of accessibility to the area by providing a shorter travel time for people working there. An additional 57,000 jobs are expected to be available within the WSEA over the next 30 years.

The SLR has been previously submitted for community consultation. Stage 1 is progressing unchanged from the alignment that was identified in the WSEA SLRN – Options Refinement Report, May 2014. Stage 2 is being reassessed to address additional constraints and opportunities that have been identified.

Figure 1 shows the location of WSEA in relation to the wider Western Sydney region and the SLR alignment (indicated as a solid red line).

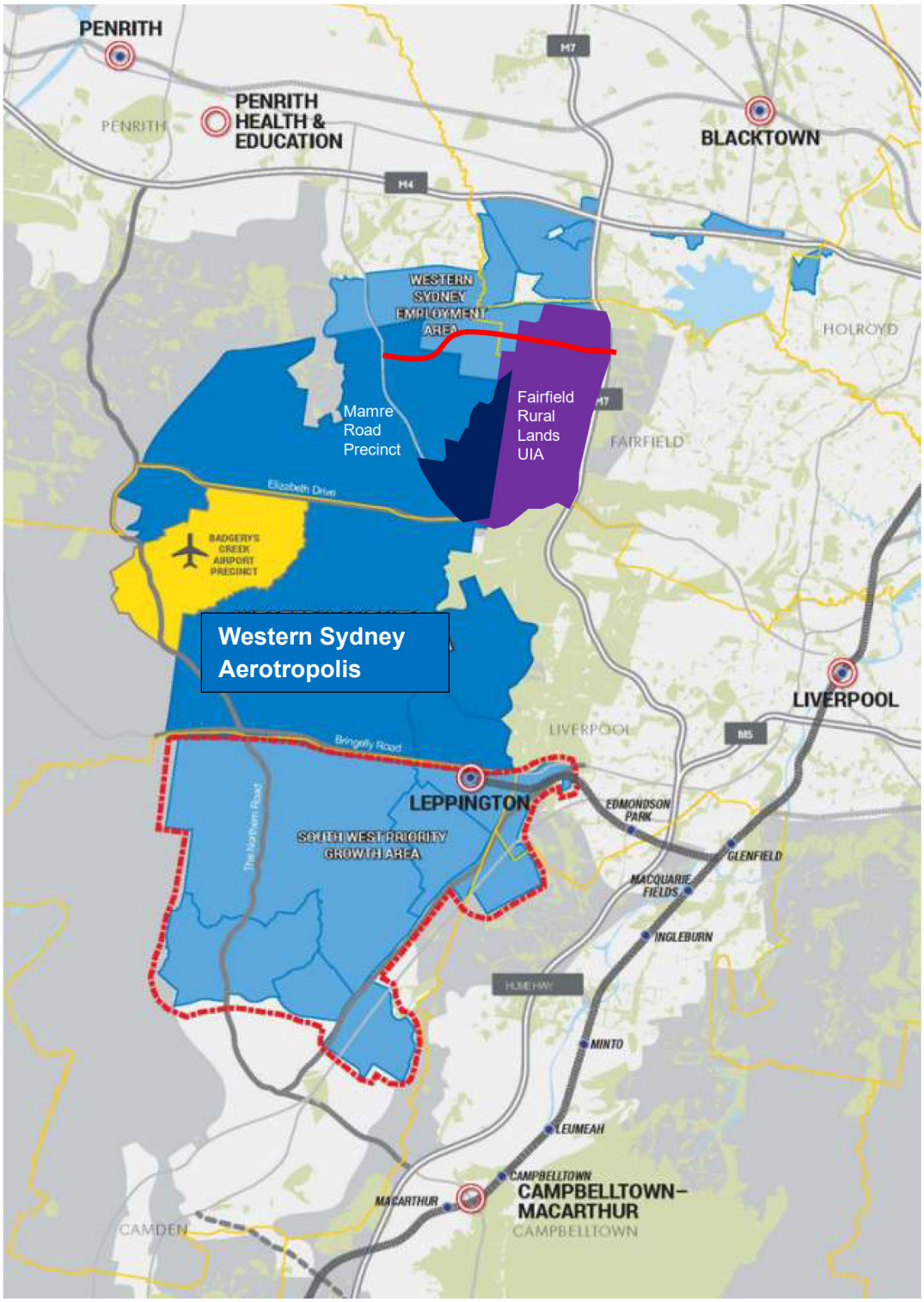


Figure 1. Western Sydney priority growth area

The project is being developed by Transport on behalf of the Department of Planning and Environment (DPE) and is being funded by states voluntary planning agreements.

A number of historical studies have been completed to date. Those key WSEA studies are specified below:

- The WSEA SLR Network Strategic Transport Assessment 2011
- The Draft Broader Western Sydney Employment Area – Structure Plan 2013
- Broader WSEA Southern Link Road Network – Options Refinement Report (AECOM,2014)
- The Broader Western Sydney Employment Area – Structure Plan – Transport Planning Analysis 2018

In addition to the broader WSEA studies, the following project specific studies have been undertaken to inform the preferred option selection process:

- Preliminary Environmental Investigation
- Strategic Design
- Flood Modelling
- Traffic Modelling
- Economic Analysis

Refer to Figure 2 below for an overview of the considered alignments informing the investigation areas with references to the approximate locations for each of the site photos included in this report.

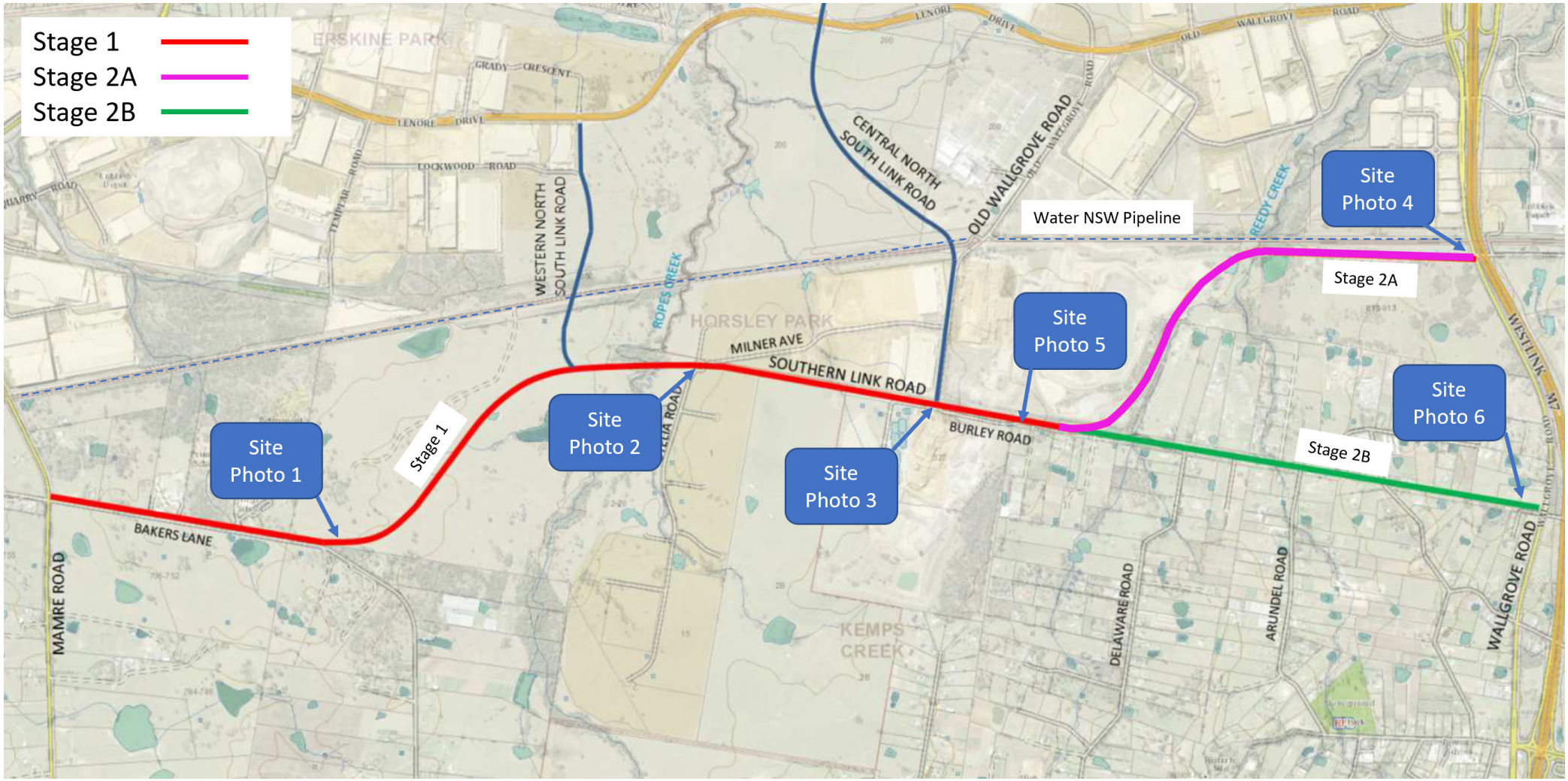


Figure 2. Stage 2 options

Figure 3
View west from the intersection of Alington Road and Southern Link Road.

Figure 4
Artistic view of Southern Link Road bridge over Oakdale roundabout.

Figure 5
View south from the intersection of Old Wallgrove Road and Southern Link Road

Figure 6
View west from Wallgrove Road along Southern Link Road Stage 2A

Figure 7
View west along Southern Link Road Stage 2B (Burley Road)

Figure 8
View east along Southern Link Road towards Wallgrove Road Stage 2B

2.2 Project objectives

The objectives for the Southern Link Road are to:

- Provide a new road corridor within the Western Sydney Employment Area (WSEA) to facilitate economic growth by unlocking development and employment opportunities.
- Provide wider connectivity that could generate economic growth
- Enable safe, reliable and efficient access for employees and freight between the WSEA and the wider state road network.
- Achieve increased road capacity in the regional network to meet future traffic and transport demands.
- Cater for pedestrians, cyclists and public transport in terms of accessibility, connectivity, safety and amenity.
- Provide a value for money solution

2.3 Purpose of this report

The purpose of this report is to present the preferred option for stage 2 of the Southern Link Road project. It provides the material that was used to evaluate the options and support the conclusion.

- Explain the strategic context and need for the upgrade
- Present relevant issues and constraints
- Document community and stakeholder involvement
- Describe the options development and evaluation process, including the criteria used to select the preferred option
- Present the preferred option for stage 2
- Outline the next steps for project development

3. Need for proposal

The following major strategic planning and policy documents provide direction and inputs that are relevant to this project.

3.1 The Greater Sydney Region Plan

The Greater Sydney Region Plan, *A Metropolis of Three Cities* is based on the vision of three cities working together to create a cleverly integrated network that provides residents with access to their jobs, education, health facilities, services and great places within 30 minutes travel time. This is part of a broader framework set out over a 40-year period in the *Directions for a Greater Sydney*.

The plan includes a specific action to provide faster and more frequent transport services to meet the needs of a growing and changing population in Greater Sydney's three cities:

- The Western Parkland City
- The Central River City
- The Eastern Harbour City

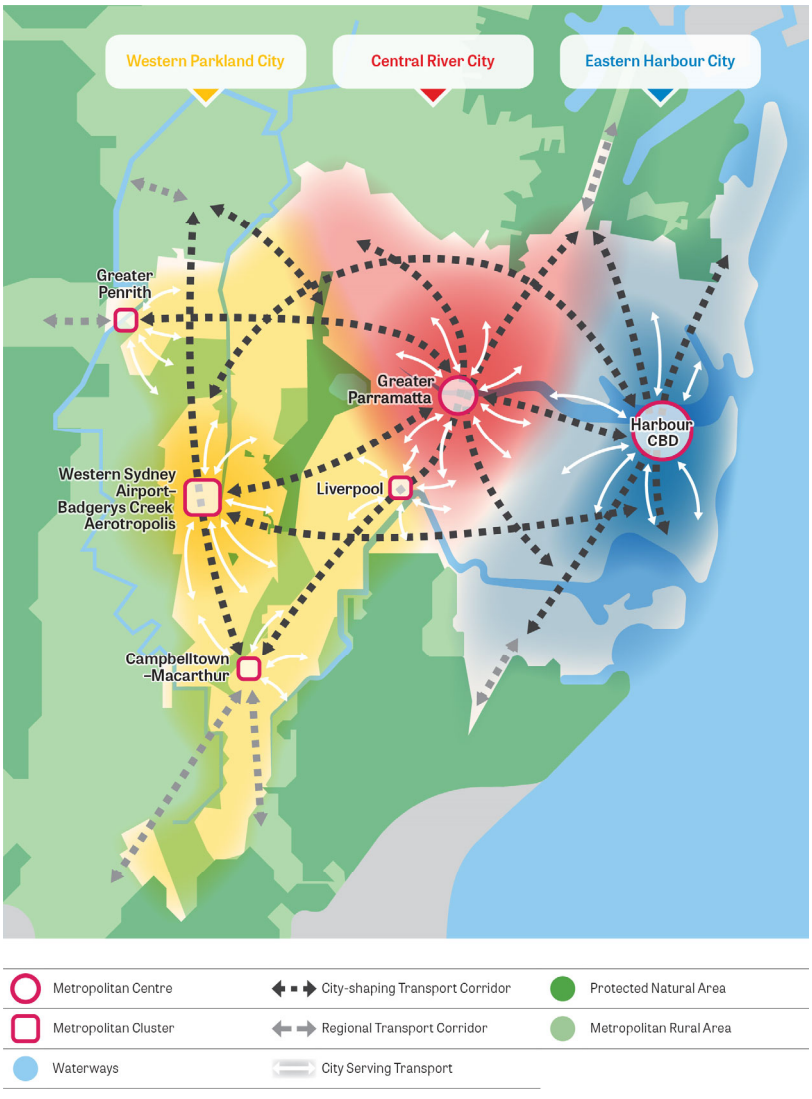


Figure 9 - A Metropolis of Three Cities

The SLR project is mostly within the Western Parkland City, however, also extends into the Central River City.

The Western City area covers the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly local government areas. The Central City area covers the Blacktown, Cumberland, Parramatta and The Hills local government areas.

The *Western City District Plan* (Greater Sydney Commission, 2018) and The *Central City District Plan* (Greater Sydney Commission, 2018) are 20-year plans to manage growth in the context of economic, social and environmental matters in order to achieve the 40-year vision of Greater Sydney. It is a guide for implementing the *Greater Sydney Region Plan – A Metropolis of Three Cities* at a district level and is a bridge between regional and local planning.

The SLR directly aligns with the planning priorities for both cities and their associated objectives outlined below:

Objective 1 – Infrastructure supports the three cities

Objective 2 – Infrastructure aligns with forecast growth – growth infrastructure compact

Objective 3 – Infrastructure adapts to meet future needs

The project also aligns with Planning Priority W7, which is establishing the land use and transport structure to deliver a liveable, productive and sustainable Western Parkland City, and Planning Priority W10, which is maximising freight and logistics opportunities and planning and managing industrial and urban services land. Both priorities have the objective to ensure that the freight and logistics network is competitive and efficient.

3.2 WSEA master planning

A number of previous studies have been undertaken to coordinate the development of WSEA with adjacent developments on a local and state level. The SLR will form a critical east-west link within WSEA, to the south of the Water NSW Pipeline corridor. Refer to Figure 10,11 and 12 for an overview of the SLR, WSEA road network strategy and proposed future developments in WSEA.

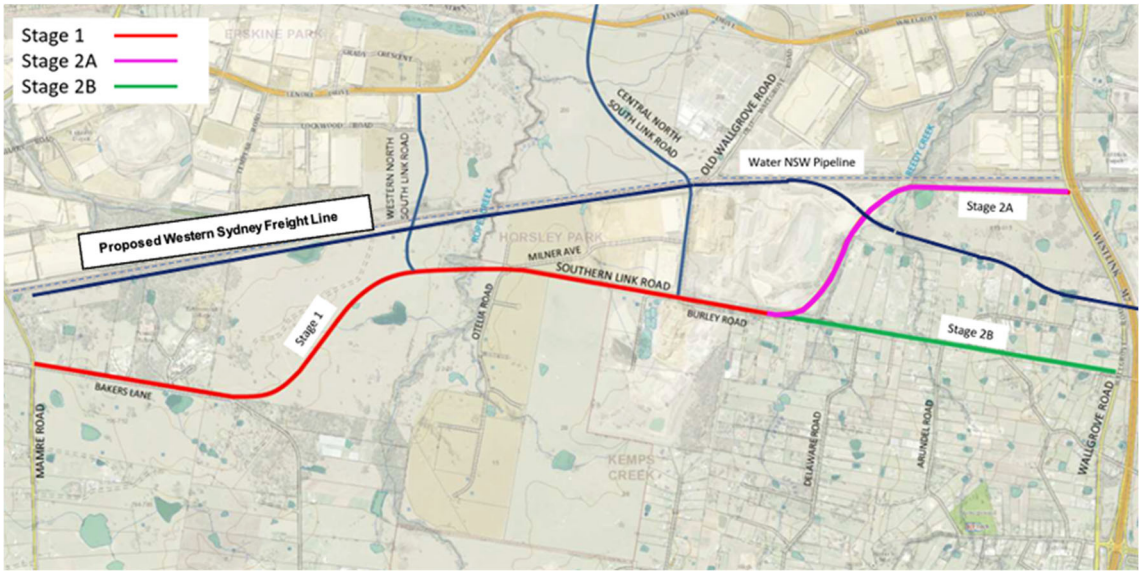
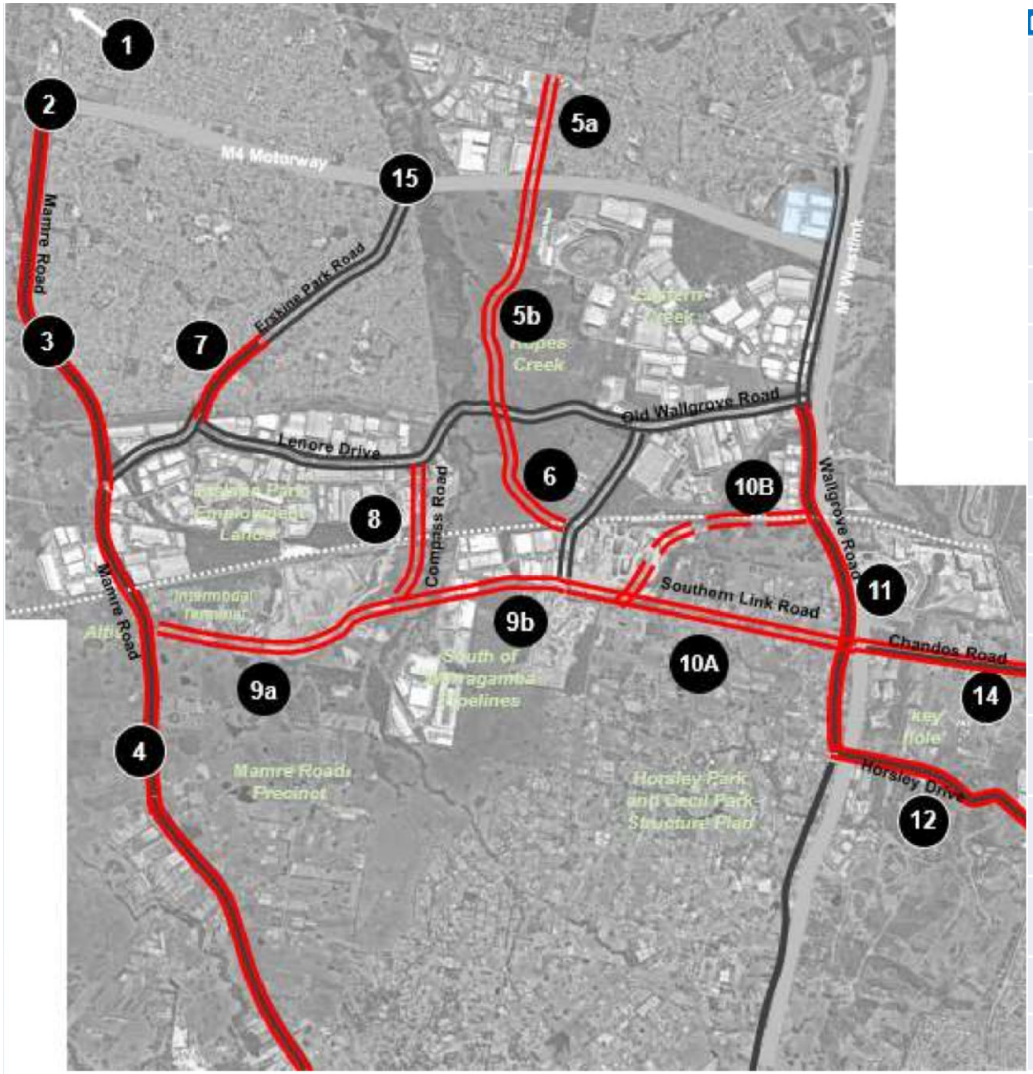


Figure 10. Project Overview

The WSEA road network strategy identifies the need for the SLR. Figure 11 summarises this strategy.



Map Ref.	Summary of WSEA Road Network Strategy (RNS)
1	**Upgrade at existing signalised intersection** Mamre Rd/Great Western Hwy
2	**Upgrade at existing signalised intersection** Mamre Rd/M4 Interchange
3	**Widening from 2 to 4 lanes** Mamre Rd between M4 and Lenore Drive
4	**Widening from 2 to 4 lanes** Mamre Rd between Lenore Drive and Kerrs Road
5a	**New 2 or 4 lane road** Archbold Rd between Great Western Hwy and M4
5b	**New 2 or 4 lane road** Archbold Rd between M4 and Lenore Drive
6	**New 2 or 4 lane road** Archbold Rd between Lenore Drive and Old Wallgrove Rd
7	**Widening to 4 lanes** Compass Rd
8	**New 4 lanes Road** Compass Rd
9a	**New 2 or 4 lane road** Southern Link Road between Mamre Rd and new Compass Road
9b	**New 2 or 4 lane road** Southern Link Road between new Compass Rd and Old Wallgrove Rd
10a	**New 2 or 4 lane road** Southern Link Road between Old Wallgrove Rd and Wallgrove Rd
10b	**New 2 or 4 lane road** Southern Link Road between Old Wallgrove Rd and Wallgrove Rd
11	**Widening to 4 lanes** Wallgrove Rd between south of Old Wallgrove Rd and Horsely Dr
12	**Widening from 2 to 4 lanes** Horsely Dr between M7 and Ferrers Road
14	**Widening from 2 to 4 lanes** Chandos Rd between Wallgrove Road and Victoria St

Figure 11 - WSEA road network strategy

The SLR strategic design alignment strategic design has been developed alongside the planned development of WSEA. Figure 12 identifies the proposed future developments.

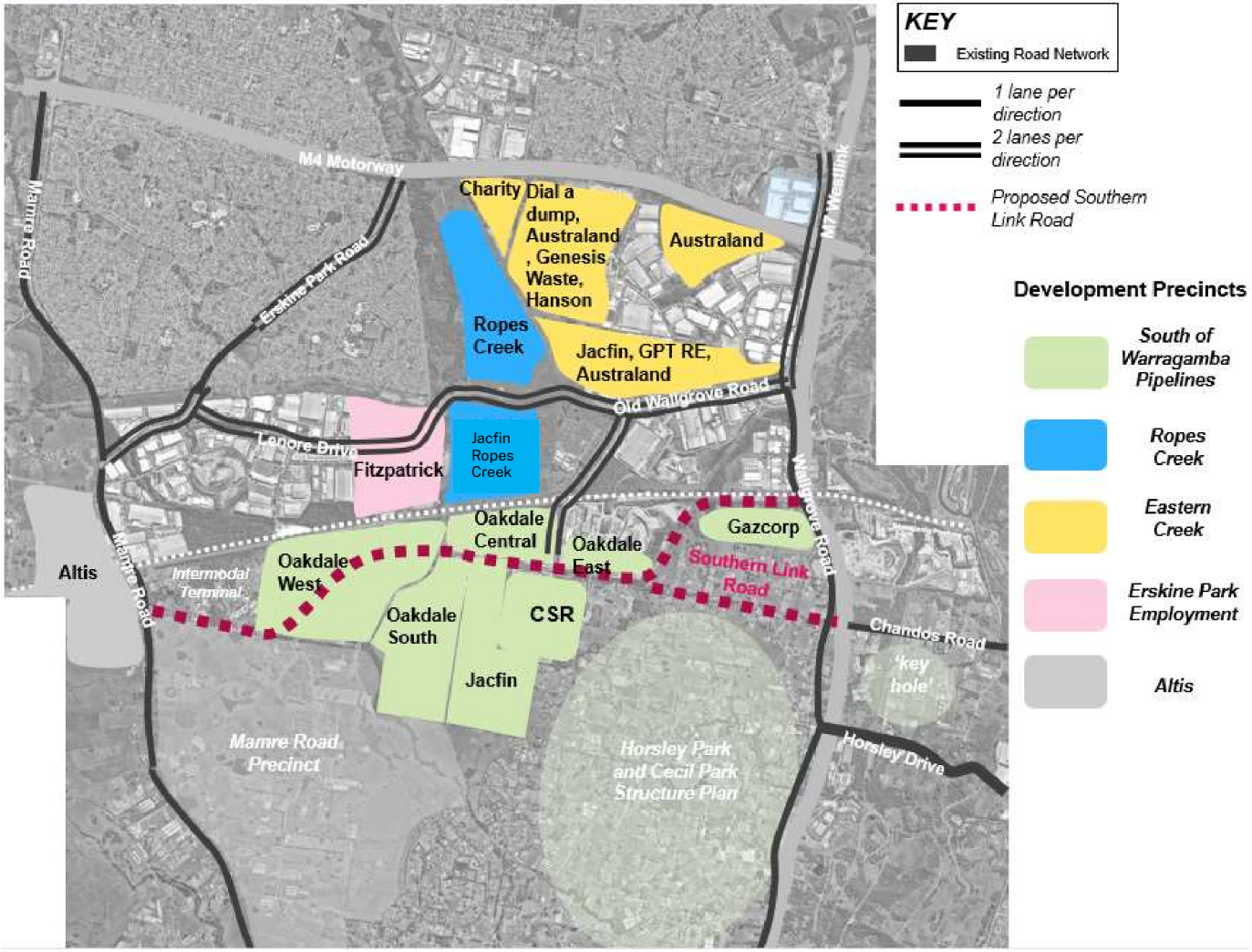


Figure 12 - Proposed future developments in WSEA

3.3 Current planning proposals

In addition to the developments and plans identified above, the following planning proposed are identified within the SLR project extents:

- Fairfield City Council's draft structure plan
- Western Sydney Aerotropolis Plan (WSAP):
    - LUIIP stage 2 available
    - Mamre Road Precinct
        - Additional industrial land and incorporation into WSEA

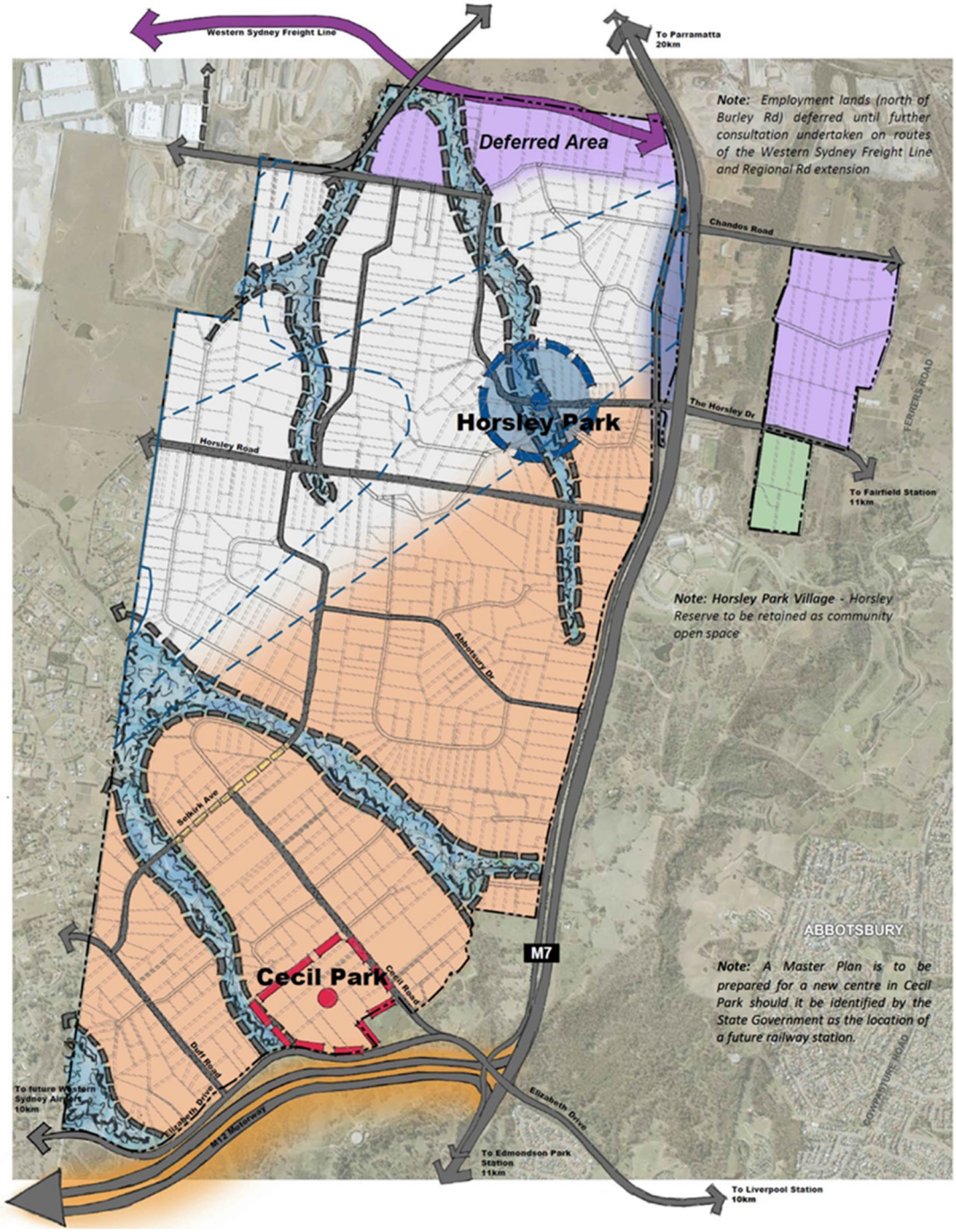


Figure 13 - Fairfield City Council's draft structure plan

3.4 WSEA freight network

There is a key focus on driving growth and development in the WSEA. The following initiatives are supporting the region and its freight capabilities:

- Delivery of new infrastructure - WSEA Road Network Strategy
- Additional major projects - Outer Sydney Orbital, Western Sydney Freight Line and Western Sydney Intermodal Terminal
- The establishment of a metropolitan 'hub'
- Increasing building capacity by identifying 'supply chain accelerators'
- Economic incentives, such as, it being an urban enterprise zone

The SLR forms part of the WSEA road network and facilitates movement of freight by road, forming a vital part of the freight network, as summarised in Figure 14.

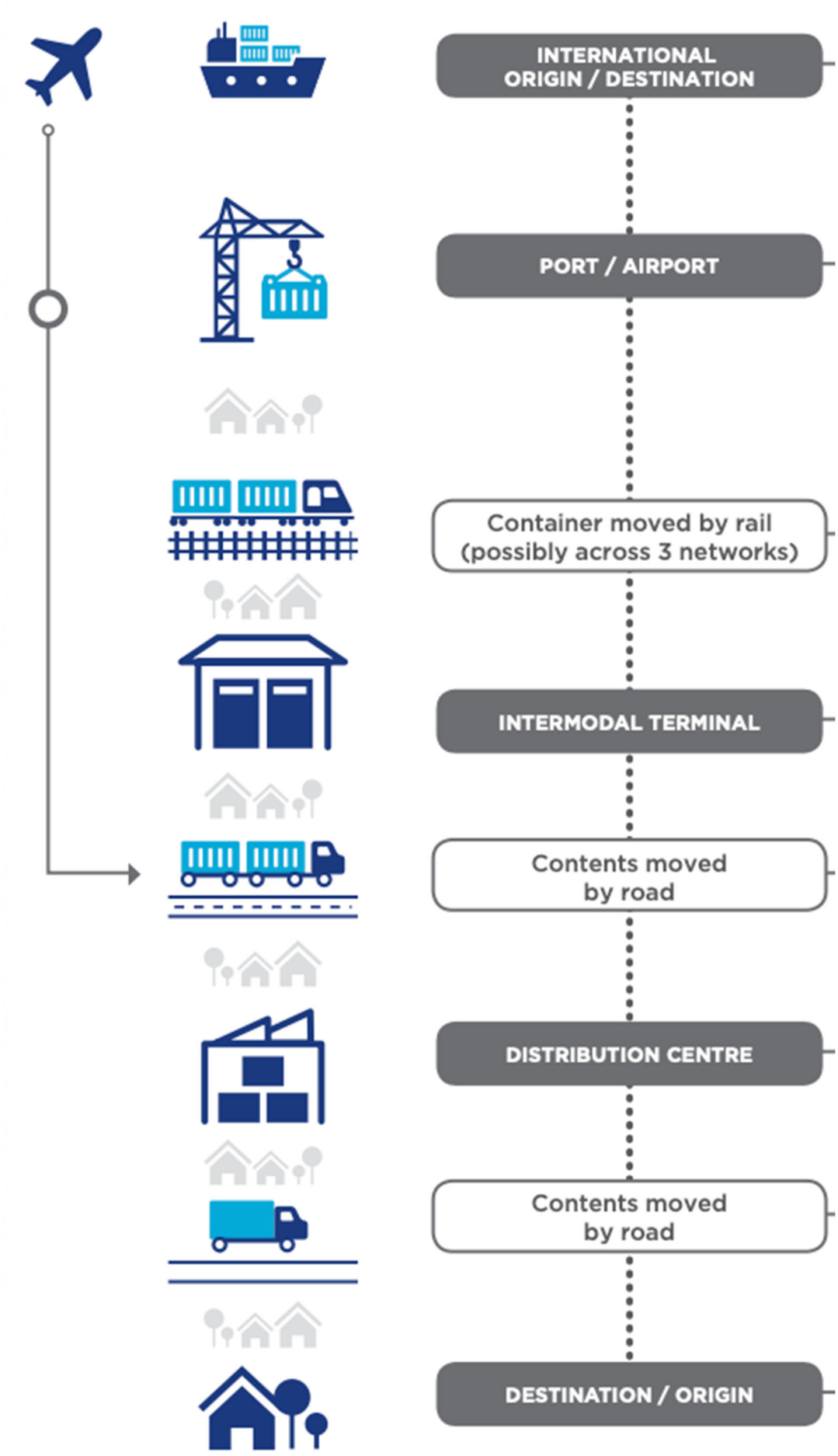


Figure 14 - Freight efficiency process

3.5 NSW ports and freight strategy

The *NSW Freight and Ports Plan 2018-2023* presents more than 70 different initiatives to address potential opportunities for growth, such as, infrastructure investments and trial technologies.

Southern Link Road is to be classified as an arterial road and provides important connections to the Westlink M7, Western Sydney Intermodal and Old Wallgrove Road.

Objectives of the *NSW Freight and Ports Plan* that are relevant to the project include:

- Provide confidence and certainty that encourages continued investment in the freight industry to support economic growth.
- Improve the efficiency of existing infrastructure and ensure greater connectivity and access along key freight routes.
- Create a safe freight supply chain, involving safe networks, safe transport, safe speeds and safe people.

3.6 Australian Government – Corporate Plan 2020-21

The Department of Infrastructure, Transport, Regional Development and Communications Corporate Plan 2020-2021 outlines a clear focus on recovery post-COVID-19. The relevant objectives related to the project are:

- Transport connectivity – supporting an efficient, sustainable, safe and accessible transport system.
- Regional development – improving living standards and facilitating economic growth in cities and regions across Australia.

3.7 Road network conditions

Traffic modelling and an assessment report was undertaken by GHD to inform the strategic design. This report uses the proposed development of WSEA and adjacent areas to model the future expected traffic volumes and is summarised below and is included in **Appendix A**.

3.7.1 Existing traffic volumes and congestion

The existing traffic conditions and traffic data was collected for WSEA and was then further characterised by the road type and primary usage. The results are summarised below in Table 1.

For further details regarding the road network conditions refer to Appendix A.

Table 1 - WSEA Characterised Daily Traffic Volumes

Road link	2019 AVT (Veh/day)	Road Type	No. Traffic Lanes	Proximity to existing development	Proximity to Motorway Access
Wallgrove Rd (Great Western Highway to Roussell Road	37,220	Major Arterial	4	Residential	M4
Mamre Rd (M4 to Erskine Park Road	35,680	Major Arterial	4	Industrial	M4
Erskine Park Road	34,050	Sub Arterial	4	Residential	M4
Wallgrove Rd (Roussell Road to Elizabeth Drive	27,240	Major Arterial	2	No	M7
Mamre Rd (Erskine Park Road to Kerrs Road)	22,150	Major Arterial	2	Industrial	No
Lenore Drive	14,370	Sub Arterial	4	No	No
Templar Road	9,400	Industrial Road	2	Industrial	No
Milner Avenue	7,130	Industrial Road	2	Industrial	No

3.7.2 Traffic growth

The expected traffic volumes were modelled up to 2036, based on the WSEA RNS strategic model. The inclusion of Mamre Road Precinct and Horsley Park predicted traffic has a large impact to the performance of the SLR.

The expected traffic volumes and impacts to the surrounding key roads interfacing with SLR are provided summarised below in Table 2. Further details are provided in Appendix A.

Table 2 - Expected traffic growth

Link	Direction	2026 - 2019	2026 - 2019	2036 – 2019	2036 - 2019
		AM	PM	AM	PM
Mamre Road (south of M4)	Northbound	7%	32%	14%	43%
	Southbound	45%	5%	55%	5%
Erskine Park Road (south of M4)	Northbound	0%	6%	6%	11%
	Southbound	12%	-2%	17%	4%
Lenore Drive (west of Old Wallgrove Road)	Northbound	-45%	-34%	-40%	9%
	Southbound	-66%	-36%	-31%	-32%
Mamre Road (at pipeline)	Northbound	-11%	22%	15%	51%
	Southbound	3%	-10%	24%	8%
Wallgrove Road (at pipeline)	Northbound	-19%	-27%	-27%	-32%
	Southbound	-25%	-40%	-25%	-41%

3.7.3 Road safety

The *Road Safety Plan 2021* (Transport for NSW, 2018) outlines how the NSW Government will work towards the State Priority Target of reducing fatalities by 30 per cent by 2021 (compared to average annual fatalities over 2008–2010). It also aligns the Towards Zero vision with Future Transport 2056, which aims to have a NSW transport network with zero trauma by 2056.

The SLR is consistent with the directions set out in *Road Safety Plan 2021* as it adopts a safe systems approach to road user safety. Opposing traffic flows are separated by a median and conflicting traffic movements at intersections are generally controlled by traffic signals.

A hierarchy of control is applied to known hazards, where the first response is the removal of the hazard from the road corridor and if possible followed by substituting with a safer product along with the adoption of an engineering solution such as safety barriers.

4. Issues and constraints

To inform the selection of a preferred alignment option, several assessments were undertaken, including a preliminary environmental investigation, Aboriginal Cultural heritage, Hydraulic modelling, traffic modelling analysis, a strategic urban design analysis ground survey and utilities investigation. In addition to these investigations, various workshops including Health & Safety in Design, Risk Management, Constructability and Value Engineering were completed to engage with relevant stakeholders on all aspects of the project.

The key issues and constraints considered during the option evaluation stage of this project are:

- Landscape character and visual amenity
- Biodiversity
- Hydrology and flooding
- Noise and vibration
- Air quality
- Socio-economic and land use
- Aboriginal heritage
- Historic heritage
- Western Sydney Freight Line
- Utilities
- Local access
- Bridges
- Property constraints
- Intersection performance
- Traffic demand
- Economic analysis

4.1 Landscape character and visual amenity

The area is currently undergoing significant landscape and visual amenity changes in light of the area being rezoned to facilitate the WSEA.

The major topographic elements of the area are:

- Undulating plain and rolling low hills
- Landforms are varied, comprising narrow spur and ridge crests with adjacent steep to moderate gradient slopes, above gentler lower slopes and flats associated with drainage lines
- A more defined floodplain is present around Ropes Creek within Stage 1. The proposed road corridor intersects two main watercourses and several lower order tributaries

- Reedy Creek is located to the east, with the main channel located near the divergence of the two eastern options.
- A tributary forming the eastern arm of Reedy Creek is present just to the east and both options cross this creek line near Flavex Lane.
- Reedy Creek has its confluence with Eastern Creek approximately 2.9 kilometres to the north east of the site area near the M4 Western Motorway.
- The site intersects with permanent tributaries to the Cumberland Plain's two chief watercourses as well as numerous lower-order drainage lines which drain the slopes and crests of the higher ridgelines.

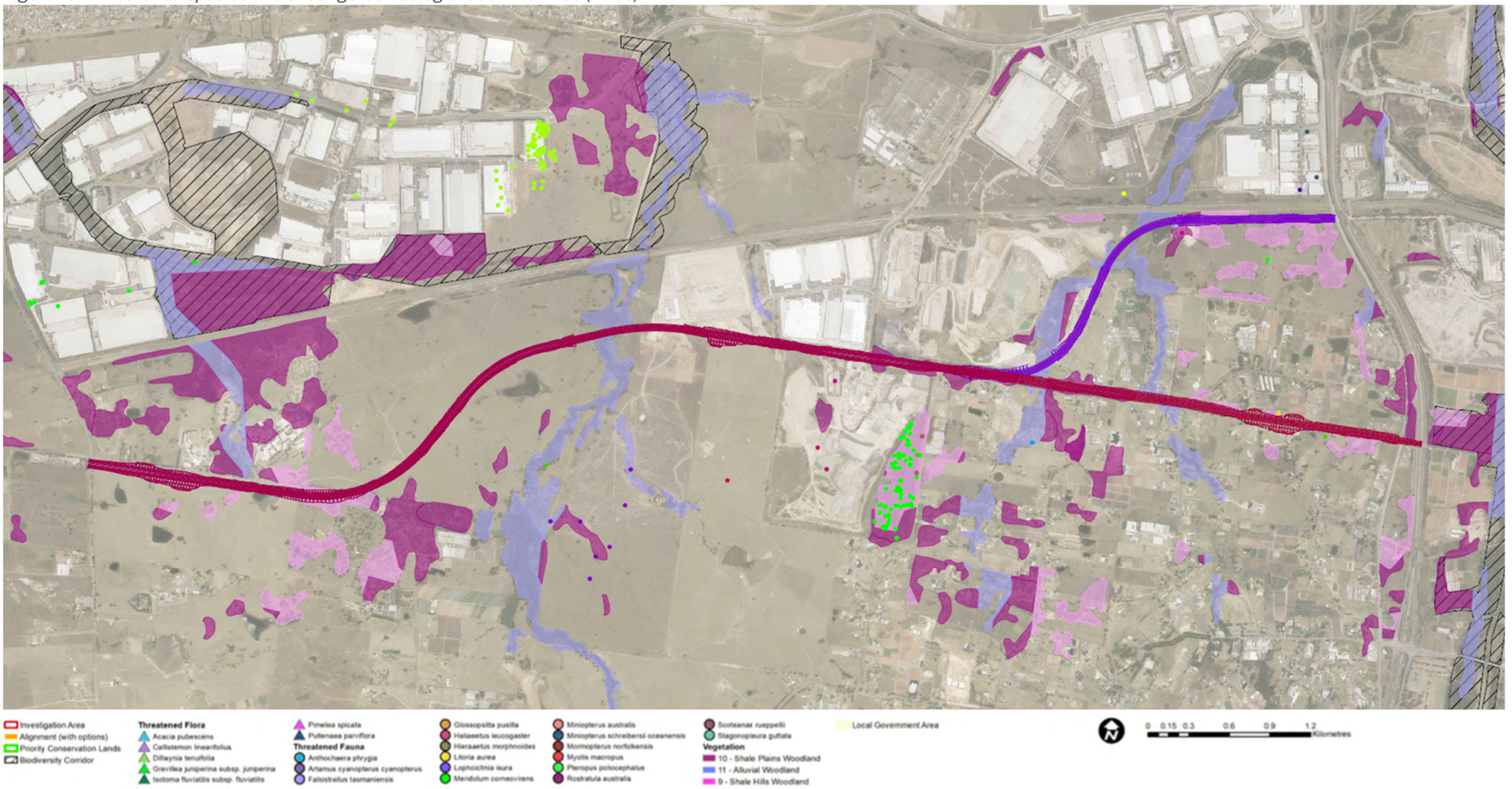
Provision of the SLR will modify the existing character of the landscape and impact the visual amenity of the area. Works will include tree clearing and the introduction of new structures and embankments. Stage 2A will contain longer and larger bridges, while Stage 2B will contain shorter bridges and a section of benched cutting up to 13m deep.

4.2 Biodiversity

The preliminary environmental investigation identified that the main biodiversity issues for the proposed corridor are:

- Potential impacts on threatened ecological communities (primarily on biocertified land) listed under the Biodiversity Conservation Act 2016 (BC Act) and the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The affected threatened ecological communities are:
    - River-flat Eucalypt Forest (BC Act)
    - Cumberland Plain Woodland (EPBC Act and BC Act)
- Potential impacts on habitat for threatened flora and fauna, including impacts on fauna connectivity along South Creek, which is a regionally significant biodiversity corridor
- Potential for direct impacts on key fish habitat (South Creek)
- Potential impacts on existing surface flow patterns and potential changes to the flooding regime

Figure 15 - Threatened species and endangered ecological communities (EECs)



4.3 Hydrology and flooding

Hydrological and flooding studies were undertaken by Lyall and Associates to assess the impact of SLR through a comprehensive range of rainfall events for the catchment. In addition to this, they have modelled flood behaviour in the South Creek catchment to determine the influence of tailwater flooding in Ropes Creek and Reedy Creek. The preconstruction and post-construction flood behaviours have been modelled to determine if the project will cause a significant difference in flood level.

The flooding and drainage investigation report includes modelling the water depths across the catchment for various rainfall events, the Probable Maximum Flood (PMF) for the catchment area and 5 per cent and 1 per cent AEP rainfall events and PMF for the South Creek catchment. All cross drainage structures have been designed to cater for a 1 per cent AEP rainfall event.

Stage 2A and 2B alignments both meet the project required flood immunity of 1 in 100 year flood. Further assessment and impacts to the neighbouring local roads is to be undertaken during the Concept Design. Included within these assessments will be the impact to flood excavation route, it is anticipated that the flood evacuation routes will be more efficient with the inclusion of the Southern Link Road.

4.4 Geology and soils

The underlying geology of the study area consists mainly of:

- Bringelly Shale (Rwb), which is common to the Cumberland Plain and is composed of shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff (Clark and Jones 1991).
- Small volcanic diatremes that intrude the shale landscape around the site. These diatremes typically consist of volcanic breccia, varying amounts of sedimentary breccia, silcrete and basalt.
- Deposits of more recent Quaternary Alluvium (Qal) that occur along the creek corridors and on associated floodplains, comprising of fine-grained sands, silts and clays.
- Raw materials that are suitable for artefact manufacture feature widely across the Cumberland Plain in the form of rock outcrops, large cobbles and various river gravels, with cobbles, pebbles and clasts deposited across the landscape by the complex network of stream channels.

The following types of soil were found to be consistent across the proposed site:

- Blacktown soil is located on gently undulating rises with broad rounded ridges and crests with gently inclined concave slopes between drainage lines. Erosional susceptibility of this soil landscape is relatively low but that increases where surface vegetation is not maintained (Bannerman, Hazleton, and Tille 1990).
- Erosional Luddenham soils are present on the steeper and more elevated ridgelines and slopes which extend north into the study area from Cecil Hills. The erosional susceptibility of this soil landscape is moderate to very high depending on disturbance and vegetation, with sheet erosion particularly prevalent where pasture has been overgrazed. Aboriginal sites within the Luddenham soils are likely to be disturbed low-density scatters exposed by the eroding landscape.

There are known contamination sites that are within or adjacent to the project area that will require further investigation.

4.5 Noise and vibration

The SLR alignment has both residential and commercial dwellings located along the proposed corridor. The main noise sensitive receivers are the residential dwellings, mainly located in the eastern section of Stage 2B.

Operational noise and vibration impacts are a key consideration for the environmental assessment phase and will be further reviewed within the Concept Design. The project area is effected by the expected operational noise from the Western Sydney Airport, which will have an impact on both the Stage 2A and 2B alignments.

Construction noise would be primarily a construction management issue for the project.

The Stage 2A alignment is located in close proximity to the Water NSW Pipeline and potential vibration mitigations and protections may be required.

4.6 Air quality

The provision of a large road corridor could result in air quality impacts throughout the construction and operation of the SLR. This change in land use and increase in road traffic will need to be considered with the industrialisation of the WSEA lands. This will be further considered in the environmental assessment phase and concept design.

4.7 Socio-economic and land use

The following socio-economic benefits are anticipated as a result of the preferred alignment for Southern Link Road Stage 2:

- Travel time improvements due to higher travel speeds and less congestion
- Improvements to the safety of the road environment
- Economic benefits over the construction period

The following potential socio-economic impacts could occur as a result of the project:

- Disruption associated with property acquisition
- Congestion and delays during construction associated with lane occupancy and road work speed limits. This would potentially affect both buses and general traffic
- Residential amenity impacts such as noise and visual amenity
- Changes in access for residents and users
- The impact of the project on the availability of residential, commercial, industrial and community land

4.8 Aboriginal heritage

An Aboriginal archaeological survey report was undertaken by Kelleher Nightingale Consultants. This report archaeological survey identified:

- Four archaeological sites comprising of Aboriginal objects and
- Six areas of Potential Archaeological Deposit (PAD) within the study area.

Based on a corridor wide impact assessment, the identified sites and PADs will be at least partially impacted by the proposed works. Both Stage 2A and 2B alignment options would impact on sites/PADs in the study area.

At the time of the assessment, no access was available for two portions of the study area that fall within private property. These areas will require field survey when access is available as part of further investigations for the project to identify any unknown Aboriginal archaeological sites and inform the future detailed design.

Future detailed design for the project should take the location of the identified sites and PADs into consideration and avoid impact where possible.

Mitigation requirements will be determined during the detailed design stage and should be based on the extent of impact caused by the planned road works and significance of the impacted archaeology.

4.9 Historic heritage

Non-Aboriginal heritage was considered by reference to statutory and non-statutory heritage lists/registers as well as previous studies, where available. All searches were updated on 28 November 2018. The following sources were considered:

- NSW State Heritage Inventory
- NSW State Heritage Register
- Roads and Maritime Heritage and Conservation Register
- Australian Heritage Database
- Australian Heritage Places Inventory
- Blacktown, Penrith and Hawkesbury LEPs
- 813-913 Wallgrove, Horsley Park - Heritage Impact Assessment (AMBS, 2013)
- Oakdale West Estate Non-Aboriginal (Historical) Heritage Assessment and Historical Archaeological Research Design (Artefact, 2017).

The following listed heritage items were found within the SLR investigation area

- Luddenham Road alignment, Penrith LEP

The *813-913 Wallgrove, Horsley Park - Heritage Impact Assessment* (AMBS, 2013) found no non-Aboriginal heritage at the Gazcorp site (813-913 Wallgrove Road, Horsley Park – Lot 5, DP 24090) at the eastern extent of the investigation area. The *Oakdale West Estate Non-Aboriginal (Historical) Heritage Assessment and Historical Archaeological Research Design* (Artefact, 2017) found a collapsed cottage site with moderate potential to contain locally significant archaeological relics, however, this site falls just outside of the investigation area.

During stakeholder engagement with Water NSW, it was identified that the Water NSW pipeline is an item of state heritage.

A historic heritage and archaeological assessment including detailed research, a comprehensive field survey, a significance assessment and an impact assessment should be completed as part of the concept design.

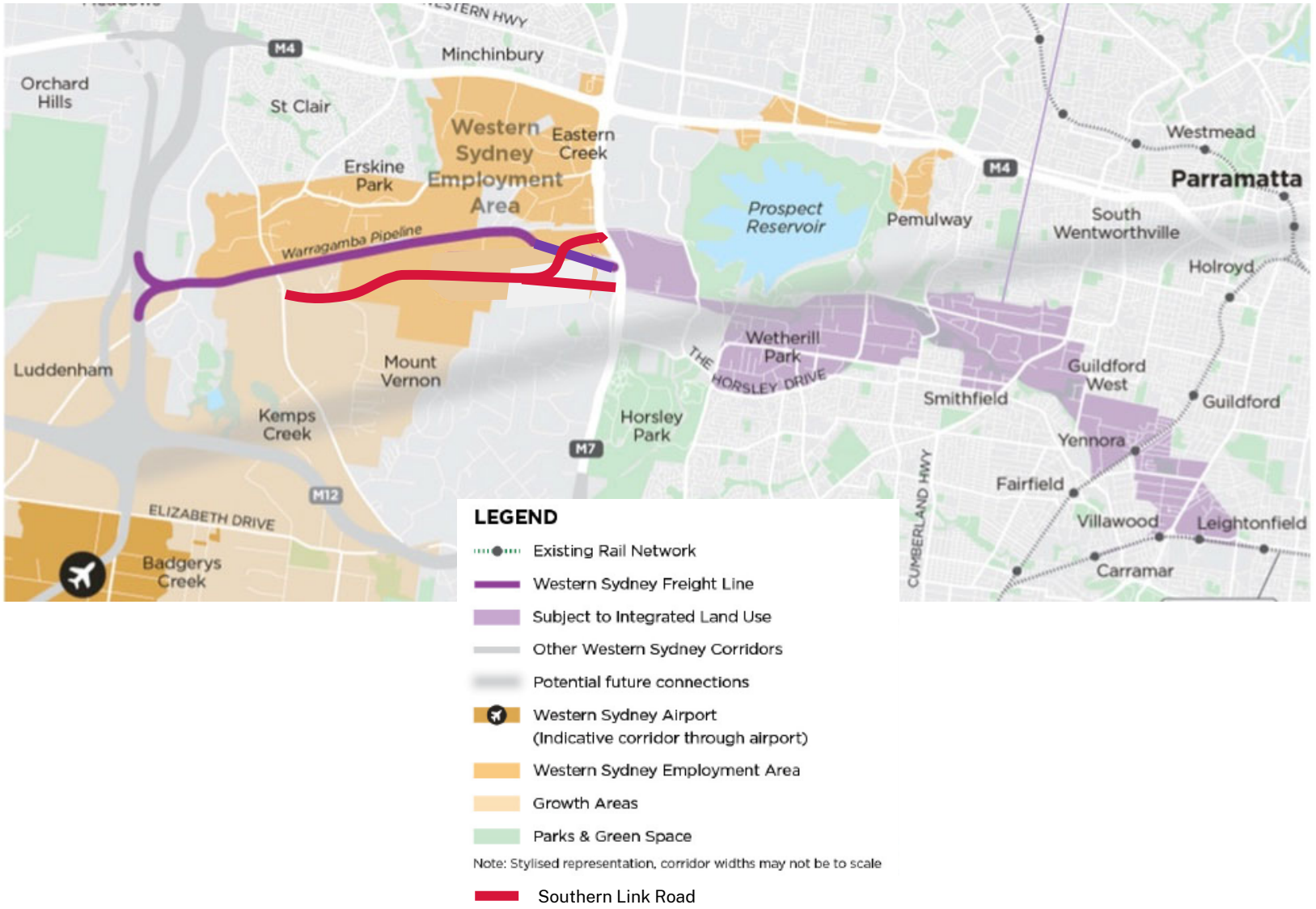
4.10 Western Sydney Freight Line

The Western Sydney Freight Line (WSFL) is proposed to be a dedicated freight rail line connection between the Western Parkland City and Port Botany. With the aim of reducing congestion on local roads, this new freight line will allow the transport of goods by rail across Greater Sydney, linking growing industrial areas and distribution centres, including the location of announced Western Sydney Intermodal terminal. The new freight rail line will also free up the Main West Rail Line to allow more passenger services over time.

The WSFL as shown in Figure 16, runs parallel with and to the north of the SLR, before diverting in a south easterly direction where it would cross the Stage 2A SLR alignment. Stage 2A would be required to pass under the WSFL, with a minimum clearance of 5.3m to the rail bridge.

Stage 2B has no impact to the proposed WSFL.

Figure 16 -Western Sydney Freight Line



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4.11 Utilities

Dial Before You Dig utilities have been obtained for the purpose of design investigations. There are likely to be many new utilities placed in or close to the proposed road corridor as development of the WSEA takes place. In addition to future utilities, there are many existing key utilities that need to be considered.

The following utilities were identified within the SLR investigation area:

- Ausgrid overhead power traversing the investigation area at various locations
- Water NSW pipelines within the northeast and western extent of the investigation area
- Endeavour Energy assets within most road reserves
- Jemena gas pipelines along Burley Road
- Underground power and communications assets within the Westlink M7 corridor
- NBN assets in Wallgrove Road, Burley Road, Delaware Road, Arundel Road, Redmayne Road, Walworth Road and Old Wallgrove Road
- Sydney Water pipes within most road reserves and immediately west of South Creek

A full 3-D utility investigation should be carried out concurrently with the concept design.

Sections 4.11.1 - 4.11.3 detail the impact to the identified existing key utilities.

4.11.1 Water NSW pipeline

The existing Water NSW pipeline runs east to west, to the north of the SLR, as shown in figures 20 and 21. Given the close proximity of the stage 2A alignment with the pipeline, it is expected that either protection or relocation of the pipeline would be required.

Stage 2B has no impacts to the Water NSW pipeline.

4.11.2 330kV transmission lines

The 330kV transmission line crosses the Stage 2A alignment. The proposed Stage 2A alignment provides in excess of the minimum 10.5m vertical clearance.

Stage 2B has no impact to the 330kV transmission lines.

Constructing in close proximity to the 330kV transmission lines requires additional safety and constructability considerations.

4.11.3 132kV Endeavour Energy transmission lines

The 132kV Endeavour Energy transmission lines cross both Stage 2A and 2B of the SLR.

Constructing in close proximity to the 132kV transmission lines requires additional safety and constructability considerations.

4.12 Local access

Stage 2A of the SLR impacts existing access to properties on the southern side of Burley Road, east of the CSR industrial site. It is proposed to reconstruct Burley Road as a two-lane local access road along the existing southern corridor boundary to allow access to the affected properties.

The remainder of Stage 2A is wholly within the planned corridor through the WSEA, with one traffic signal-controlled access point to the Gazcorp development.

Stage 2B of Southern Link Road departs from the previously defined corridor, generally following the existing Burley Road/Chandos Road corridor east to Wallgrove Road. This route passes through rural residential land which is not part of the WSEA. Direct access to the Southern Link Road will not be permitted from the adjoining properties. Multiple properties will no longer have direct access to Burley Road/Chandos Road.

A strategy to reinstate access to the properties has been developed as part of the Stage 2B design. The creation of separate local link roads is required to provide access to all the affected properties.

These potentially include:

- A two-lane access road that runs parallel to the Southern Link Road, with a connection that runs between Burley Road and Delaware Road.
- Three new local roads to connect Delaware Road to Burley Road via the addition of an extension of Delaware Road to the north, an east-west road and a north-south road running down the boundary of Burley Road.
- An access driveway running in the Burley Road corridor, connects Barwar Close with Delaware Road. No property acquisition required.
- A right of way down the eastern boundary of Burley Road, then runs east through Wallgrove Road to connect to Chandos Road.
- A right of way along the eastern boundary of Redmayne Road provides access to Chandos Road.

The implementation of the SLR project will also require coordination and changes to the existing local bus routes.

4.13 Bridges

The Southern Link Road may have either four or five bridges along the length of the corridor, depending on whether Stage 2A or Stage 2B becomes the preferred option.

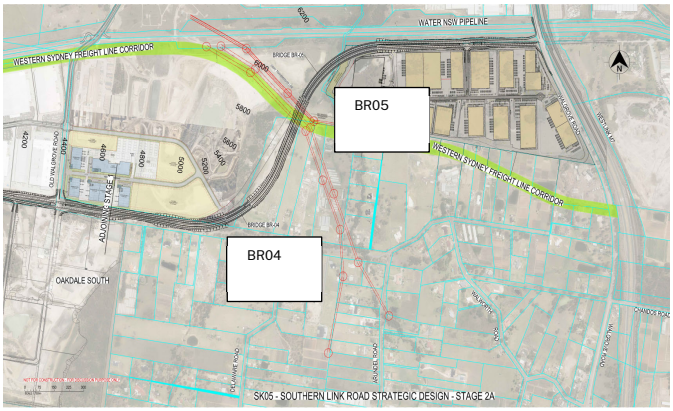
The length of the bridges over Ropes Creek and Reedy Creek may be subject to change when more detailed flood modelling is carried out in future stages of the design. All bridges are designed to be clear of the 1% AEP flood level.

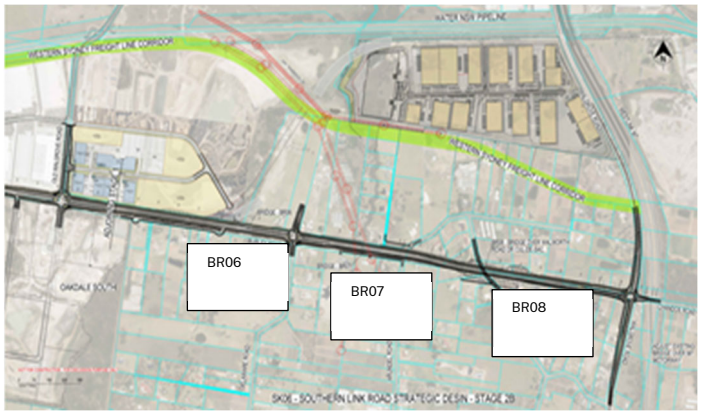
Transport Bridge Section has been involved in developing the concept designs for all of the bridges.

A summary of the bridges for both Stage 2A and Stage 2B is provided in Table 3.

Table 3 - Summary of Stage 2 bridges

Bridge	Alignment	Length	Width	Type	Location
BR04	450m Horizontal Curve	150m 5x30m spans	19.7	Twin bridges Super-T Structure	Stage 2A Reedy Creek
BR05	465.2m Horizontal Curve	447m 15x30m spans	19.7	Twin bridges Super-T Structure	Stage 2A Reedy Creek
BR06	Straight Alignment	60m 2x30m spans	17.7	Twin bridges Super-T Structure	Stage 2B Reedy Creek
BR07	Straight Alignment	81m 3x27m spans	17.7	Twin bridges Super-T Structure	Stage 2B Reedy Creek
BR08	280m radius	54.0m 2x27m spans	13.2	Single bridge Super-T Structure	Stage 2B Walworth Rd





The Stage 2A strategic design alignment requires approximately 600m of bridges on curved alignment, while the Stage 2B alignment requires approximately 200m with the majority of bridges on a straight alignment. The Stage 2B bridges will be easier to construct and provide a more cost-efficient solution given the alignment and required length

4.14 Property constraints

Stage 2A and 2B of the SLR will result in property acquisitions of both residential and industrial land. The amount of land that needs to be acquired will be further refined in the concept design.

The strategic design has identified Stage 2A as requiring more land acquisition with a large amount of industrial land to be acquired. Stage 2B has less land acquisition as the majority of the alignment is within the existing Burley Road corridor, however, requires more residential land acquisition. Refer to Table 4 for the approximate land acquisition of the strategic design.

Existing warehouse buildings which are part of the Gazcorp development have constrained the horizontal alignment of Stage 2A, between Reedy Creek and the Water NSW supply pipeline corridor. These property constraints have tightened the horizontal alignment, resulting in large bridges being constructed on sharp curves.

Table 4 -Approximate property acquisition

Option	Private	Other (m2)
Stage 2A	218,000 m^2 1 Full Acquisition 5 Partial Acquisitions	2,147,000 m^2 Industrial, Vacant and NSW Pipeline Land
Stage 2B	298,000 m^2 12 Full Acquisition 16 Partial Acquisitions	

4.15 Traffic and transport

4.15.1 Transport impacts

The SLR forms part of the larger strategic planning context, as identified in Section 2 of this report. The SLR forms a vital east west link for the WSEA development and connections for adjacent development areas. In particular, the SLR will provide a key link in the freight supply chain providing access from the proposed Mamre Rd Intermodal to WSEA and the M4 and M7 Motorways. Option 2B provides more efficient access to the M7 and Chandos Rd from the proposed Mamre Road Intermodal.

Expected traffic volumes were modelled up to 2036, based on the WSEA RNS strategic model. This modelling identified Option 2B as attracting more traffic.

4.15.2 Intersection performance

The inclusion of Mamre Road Precinct and Horsley Park predicted traffic into the assessment has a large impact to the performance of the SLR, with both Stage 2A and 2B producing unsatisfactory intersection performances.

It is expected that these intersection performances will be improved with further design and more detailed traffic modelling, to be undertaken in the concept design phase. A strategic design level assessment has identified locally expanding to 6 lanes between Old Wallgrove Rd and Chandos Road and modifying the individual intersection layouts as an option to improve the intersection performances of the eastern end of the SLR.

4.16 Project Cost

A project cost estimate has been completed to estimate the project costs for both Stage 2A and Stage 2B options. The Stage 2A option is estimated as having a higher cost estimate than Stage 2B by approximately 12%.

4.17 Value for Money

An economic analysis of the Stage 2A and 2B preferred option was conducted by GHD. This assessment was undertaken to compare the Benefit Cost Ratio (BCR) of the two options. This report is in accordance with the *Principles and Guidelines for Economic Appraisal of Transport Investment and Initiatives* (Transport for NSW, 2013).

The economic analysis found that the benefit of both Stage 2A and 2B would exceed the capital cost of the upgrade and is therefore economically viable.

The Stage 1 and Stage 2B option is estimated as having a higher BCR than Stage 1 and Stage 2A.

5. Community and stakeholder engagement

5.1 Consultation approach

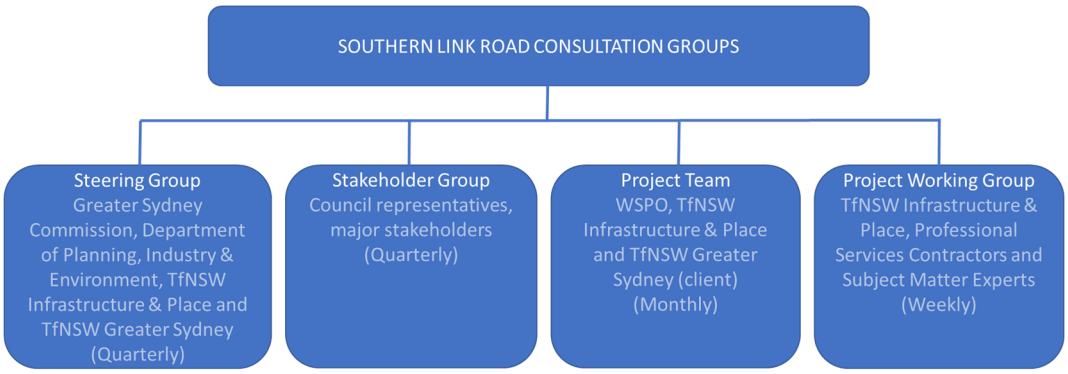
A Communication and Engagement Plan was prepared to support the development and delivery of the Southern Link Road project. The plan outlines the communication and engagement objectives for the project and presents the communications approach, tools, key messages, protocols and the evaluation process to support project communications. The plan also provides an agreed approach to community and stakeholder engagement, providing open communication channels and clear protocols. Transport is committed to meeting the reasonable needs and desires of the community for information and welcomes the community's views on the project.

The Communication and Engagement Plan requires the development of detailed implementation plans ahead of each project milestone. In response to emerging interests and issues, a flexible approach will be necessary and the plan will be updated as required.

5.2 Community and stakeholder involvement

Stakeholder groups have been consulted as outlined in the Southern Link Road – Community and Stakeholder Engagement Plan prepared by Transport (September 2018). This included involvement at several workshops, the consultation groups are summarised in Figure 17.

Figure 17 -Southern Link Road consultation groups



The following stakeholders have been identified as having potential interest in the project. This list is not exhaustive and will continue to be refined throughout the course of the design:

- Penrith City Council
- Fairfield City Council
- Property Owners within Western Sydney Employment Area
- Property owners group of Mamre Road Precinct
- Property Owners
    - Schools
    - Rural and rural residential
- Utility Authorities
- Proposed Western Sydney Freight Line
- Transport project team from Mamre Road upgrade

5.3 Future community and stakeholder involvement

Transport proposes to seek comment on the preferred road corridor and will publicly release this Preferred Option Report. Comments received from the public display of the report will be considered as part of the project development process. After analysing the submitted community issues, a submissions report will be published with the recommended Preferred Option along with the responses to all community submissions.

There will be ongoing discussions with key stakeholders through the development of consultation groups. Public consultation will occur at the following stages:

- Display of Concept Design and REF

6. Options development

6.1 Typical cross section considerations

The original corridor width in the precinct planning has been increased to allow for a possible additional lane in each direction in the future. The SLR corridor is now capable of facilitating a 6 lane arterial road, with a narrow median separating the carriageways and active transport corridors either side. Refer to Figure 18 and 19 for the typical 4 and 6 lane cross sections.

The corridor widens at intersections to provide sufficient width for turning lanes and bus stops where required. Traffic modelling has been carried out to determine the number of turning lanes required at each intersection and their length. The corridor has a separated path on one side of the Southern Link Road and a shared path on the other side. The footways have been widened to accommodate this.

The median on the 4 lane interim design is wide enough to accommodate landscaping and future incident management movements.

Figure 18 -Typical 4 lane cross section

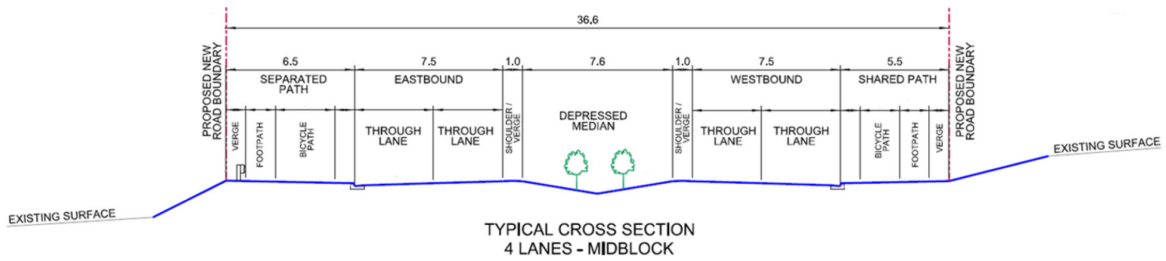
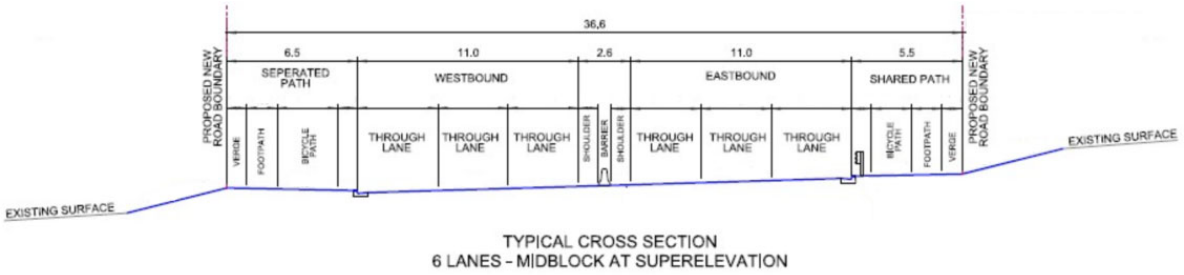


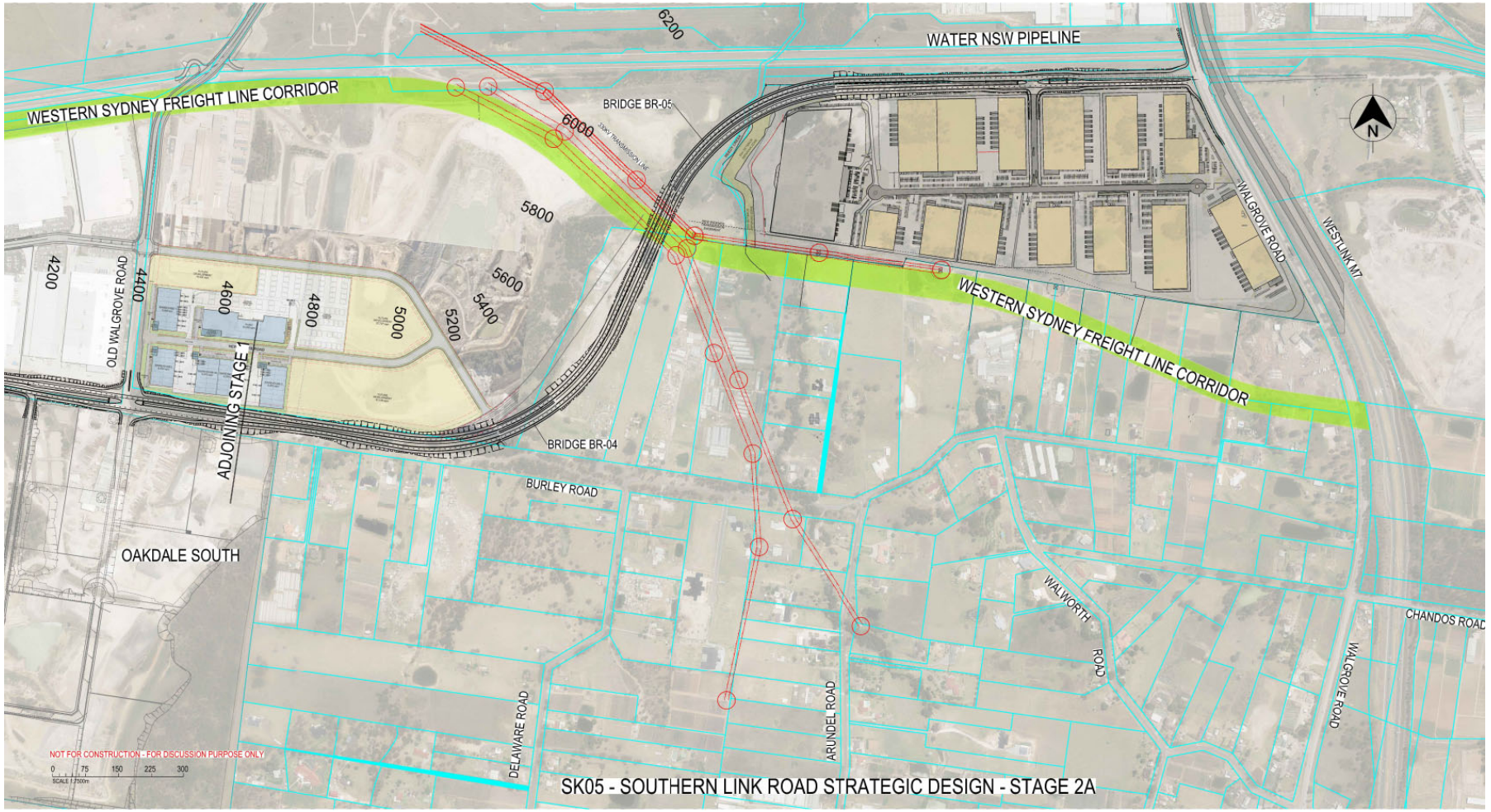
Figure 19 -Typical 6 lane cross section



6.2 Strategic options considered

6.2.1 Stage 2A

Figure 20 -Stage 2A strategic design



Stage 2A continues east along the route of Burley Road before curving to the north past the eastern extent of the Oakdale East development. It makes its first crossing of Reedy Creek on a curved bridge approximately 150m long and then continues through a disused industrial site crossing under the route of the proposed Western Sydney Freight Line and 330kV electricity transmission lines.

The vertical alignment has been designed to provide a minimum of 5.3m clearance beneath the proposed rail overbridge and in doing so it also achieves in excess of the 10.5m minimum clearance required between the road pavement and the conductors for the 330kV transmission lines.

The Stage 2A alignment then crosses Reedy Creek again on a 490m long curved bridge before following a route between the southern boundary of the Water NSW pipeline corridor and the northern boundary of the Gazcorp development site, before intersecting with Wallgrove Road opposite the access point to Austral Bricks.

The route is quite constrained with two curves featuring radii around 450m which although satisfy the design criteria for 90 km/h, they are close to the minimum radius of 400m (assuming 3% superelevation). The adoption of this alignment has been necessary to avoid existing development and to minimise impact on proposed development sites.

There is some risk associated with adopting this route as plans for the Western Sydney Freight Line have not been finalised and the structure depth of the overbridge has been assumed, therefore target clearance beneath the bridge may not be achieved if different design parameters are used. In addition to this, there is some risk of damage to the water supply pipelines which could be created due to vibration from road construction activities carried out nearby. This alignment would also require acquisition of Water NSW land, potentially impacting the future operation of both the pipeline and the SLR corridor.

The second bridge over Reedy Creek traverses the flood plain of creek resulting in a much longer structure than the bridge in Stage 2B (490m in Stage 2A vs 80m + a 9 cell 3.6m x 1.5m box culvert in Stage 2B).

There are two intersections included in Stage 2A, a signalised T-intersection which will provide access to the Gazcorp development and a four-way traffic signal-controlled intersection at Wallgrove Road, Southern Link Road and Austral Bricks access.

Stage 2A provides a more efficient access to the southern portion of WSEA from the north, than Stage 2B given the location of the intersection with Wallgrove Road

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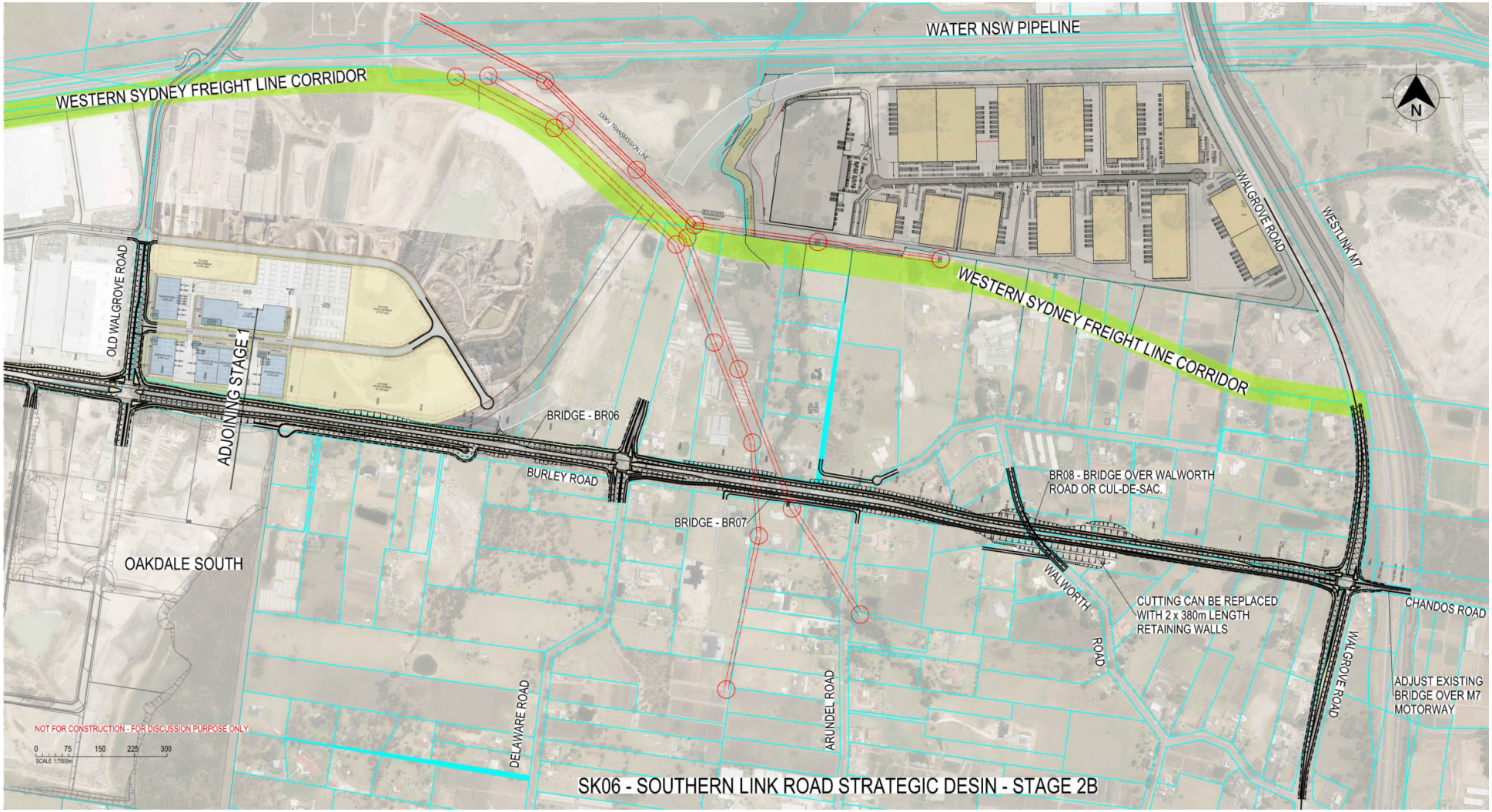
6.2.2 Stage 2B

Figure 21 -Stage 2B strategic design



Stage 2B continues east from stage 1, generally following the alignment of Burley Road within the existing road corridor. It crosses Reedy Creek and then intersects with Delaware Road, before passing beneath 132kV electricity transmission lines, crossing Reedy Creek again and departing from the Burley Road corridor to continue in an easterly direction through private property towards the end of Chandos Road. Burley Road and Arundel Road would become cul-de-sacs under this option.

Stage 2B will pass through a cutting which will be approximately 13m deep at its deepest point. Benched cut batters have been utilised to leave a conservative project footprint, this should be reviewed during the concept design. Geotechnical investigation carried out in the concept design will enable batter slopes and the extent of property impact to be more accurately determined.

It is proposed to provide a bridge to carry Walworth Road over the top of the Southern Link Road at this location and take advantage of the depth of cut.

Stage 2B continues east intersecting with Wallgrove Road opposite the intersection of Chandos Road. Chandos Road continues east passing over the top of the M7 Motorway and continuing east to Ferrers Road. Utilising this location for the eastern end of the Southern Link Road creates opportunities for expanded access to the east via an upgraded Chandos Road/Ferrers Road and potential ramps to the M7 Motorway.

The Stage 2B alignment is much straighter than the Stage 2A alignment, with the minimum curve radius being 1500m as opposed to 450m on Stage 2A.

There are two bridges crossing Reedy Creek on the Stage 2B alignment. The first is a 60m long Super-T structure on a straight alignment and the second is an 80m long Super-T structure also on a straight alignment. There is a 9 cell 3.6m x 1.5m box culvert to carry channel overflows from the second creek crossing during large storm events.

There are two intersections included in Stage 2B. The first is a four-way traffic signal-controlled intersection at Delaware Road which will be extended approximately 370m to the north to facilitate local access. The second intersection will be at Wallgrove Road, opposite Chandos Road. This is an existing four-way stop sign controlled intersection which would be upgraded to a four-way traffic signal-controlled intersection under this option.

Future stages of the design will need to consider intersection options at Arundel Road in consideration with local bus routes.

Stage 2B would require the construction of a number of link roads and service roads to provide local access because entry to the Southern Link Road will be limited in order to keep local traffic and WSEA traffic separated. These potential link roads are further detailed in Section 3.12.

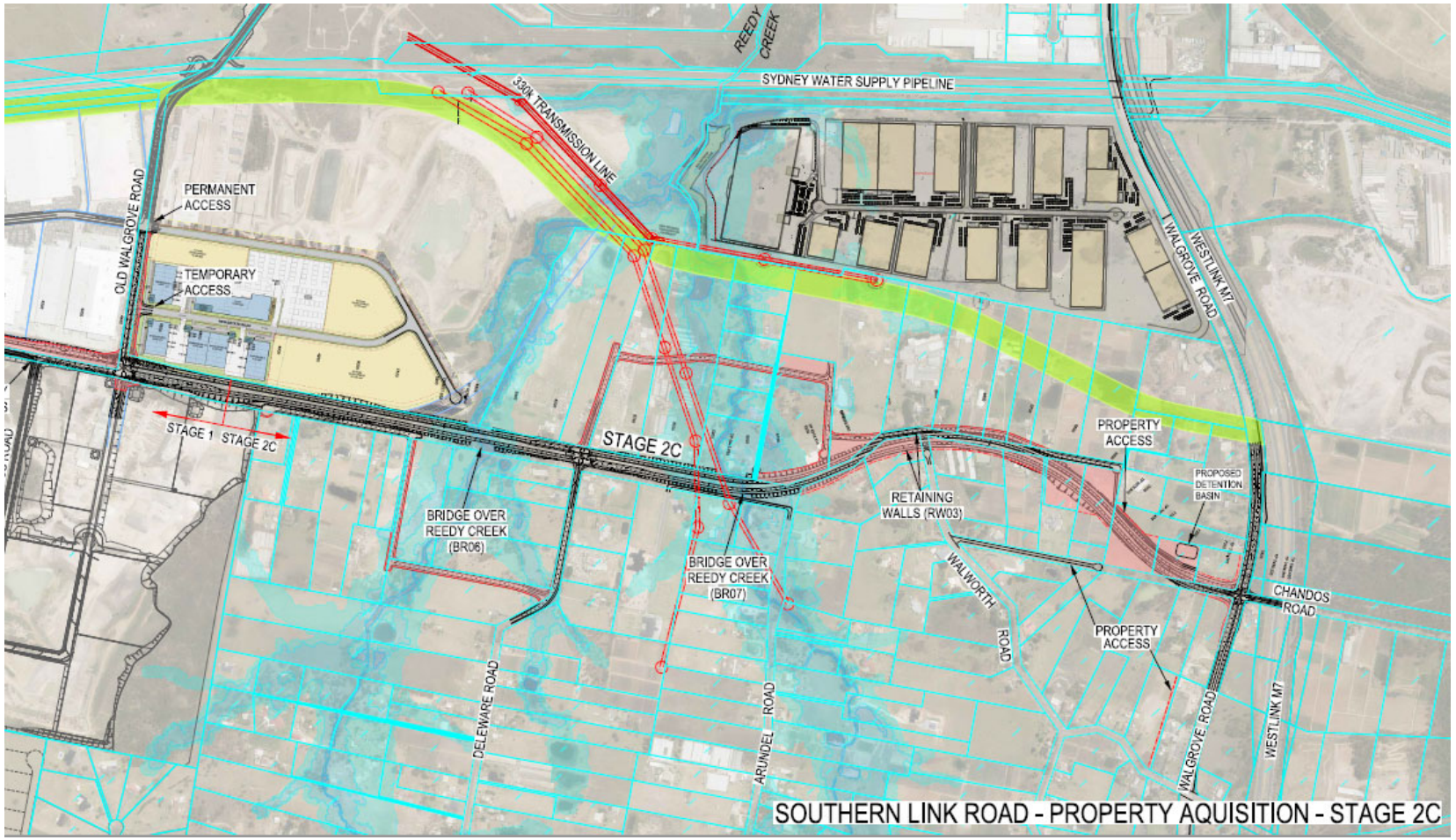
The location of the intersection of the SLR and Wallgrove Road suits future expansion to the east and could include future connection to the M7.

6.3 Approach to option development

The SLR alignment options were produced utilising an iterative approach that involved a number of inputs. These were identified through completing preliminary environmental investigations, property impact assessments, utility impacts, road design requirements, key stakeholder inputs and technical workshops including Safety in Design, Constructability, Risk and Value Management workshops.

6.4 Sub-options which were rejected

6.4.1 Stage 2C



This sub option investigated the use of the existing Burley Road corridor for the Southern Link Road east of Arundel Road as a means of potentially reducing the property impact of Stage 2B.

Alignments for various design speeds were investigated for this sub-option but it still required a deep cutting in the vicinity of Walworth Road, even with the lower design speed options.

It would have been necessary to lower the level of Walworth Road to meet the level of the Southern Link Road/Burley Road at a T-intersection, which would have had an increased property impacts and increase property acquisition. Another option was to cul-de-sac Walworth Road at Burley Road, which would have caused greater disruption to local access and require property acquisition.

Properties with direct access to Burley Road would have either required extensive level adjustments to driveways to meet the provision of new road levels for access roads, which would have impacted more dwellings.

Stage 2C had a greater impact on property access and acquisition than Stage 2B because of the need to address existing property access to Burley Road and the location of the residential dwellings being close to the Burley Road corridor, causing them to be impacted by cut batters.

This sub-option was therefore rejected.

6.5 Intersections

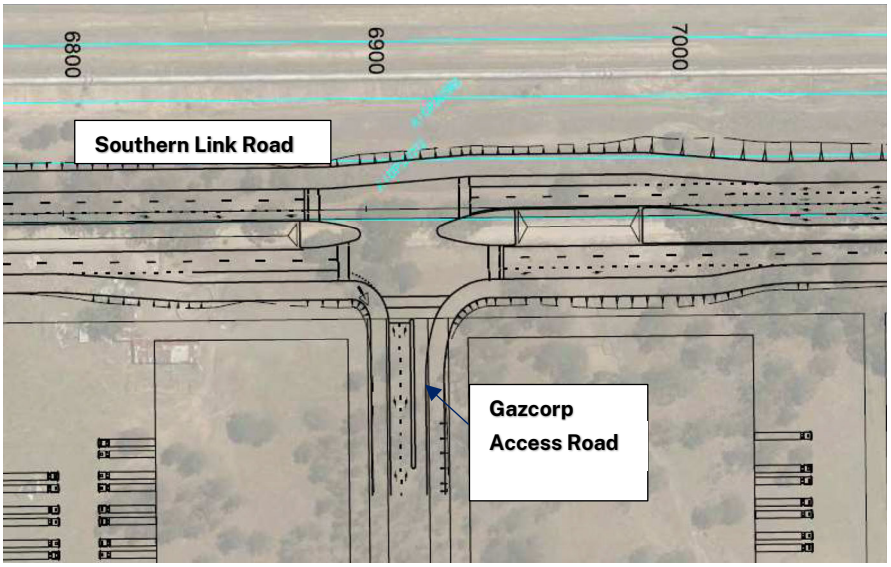
Traffic modelling has been carried out to determine the configuration of each intersection. Intersection layouts and configurations are to be further assessed in future design stages.

6.5.1 Intersection of SLR and Gazcorp Access Road (Stage 2A)

The intersection of the SLR and Gazcorp access road is approximately 300m west of Wallgrove Road and is a traffic signal-controlled T-intersection. It has two through lanes on each of the Southern Link Road approaches, with a westbound left turn slip lane and an eastbound single lane right turn lane.

The Gazcorp access road will have a left turn lane and a right turn lane on approach to the intersection, with a single lane on the departure side.

Figure 22 -Intersection of Southern Link Road and Gazcorp Access Road

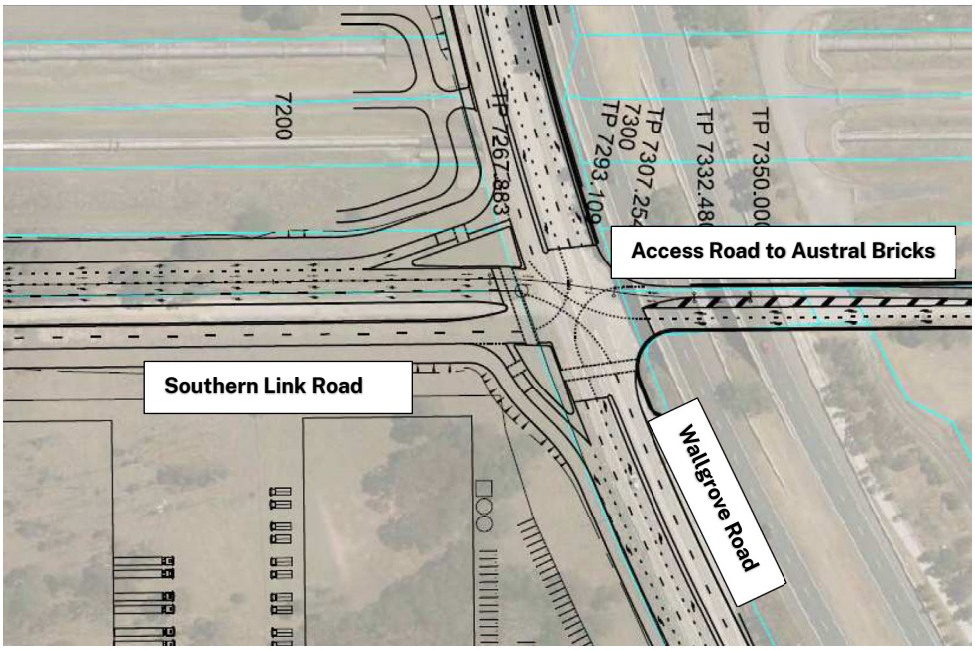


6.5.2 Intersection of SLR and Wallgrove Road at Austral Bricks (Stage 2A)

The intersection of the Southern Link Road and Wallgrove Road will be a traffic signal controlled four-way intersection which will include the access road to Austral Bricks on the eastern side of Wallgrove Road. It has one through lane, one left turn lane with a high entry angle left turn treatment and two right turn lanes, with two lanes on the departure side of the Southern Link Road. . Wallgrove Road has two through lanes, a single right turn lane and a left turn slip lane in each direction. The northbound left turn slip lane has a high entry angle left turn treatment. The access road has a shared though and left turn lane and a right turn lane on approach to the intersection and a single lane on the departure side.

The through lane between the Southern Link Road and the access road has a kink across the intersection. This was unavoidable because neither side of the intersection could be realigned. The Southern Link Road leg of the intersection is tightly constrained by the Water NSW corridor to the north, the Gazcorp site to the south and the access road passes under the M7 Motorway close to the intersection making it unfeasible to move it further to the north to align with the Southern Link Road.

Figure 23 -Intersection of Southern Link Road and Wallgrove Road and Access Road to Austral Bricks



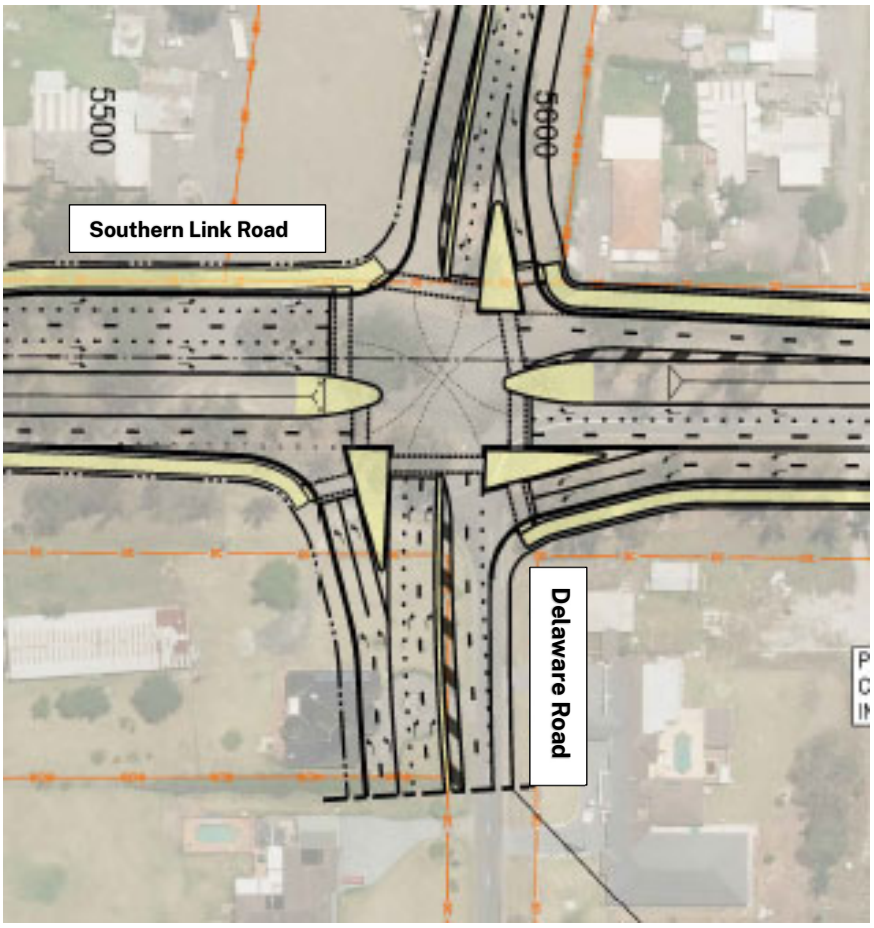
6.5.3 Intersection of SLR and Delaware Road (Stage 2B)

The intersection of the Southern Link Road and Delaware Road will be a four-way traffic signal-controlled intersection with two through lanes, a dedicated left turn lane and dual right turn lanes on the Southern Link Road eastbound approach. Two through lanes, dual left turn lanes and a right turn lane are proposed on the Southern Link Road westbound approach The Delaware Road legs of the intersection will have a through, dual left turn lane/s and right turn lane on northbound approach and a through, a left turn slip lane and a right turn lane on the southbound approach.

The southern leg of the intersection ties into the existing Delaware Road alignment. The northern leg of the intersection is a new road, which is an extension of Delaware Road to provide access to existing properties to the north of the Southern Link Road between Delaware Road and Burley Road.

The intersection will be used by local bus routes that runs along Delaware Road, Burley Road and Arundel Road.

Figure 24 - Intersection of Southern Link Road and Delaware Road

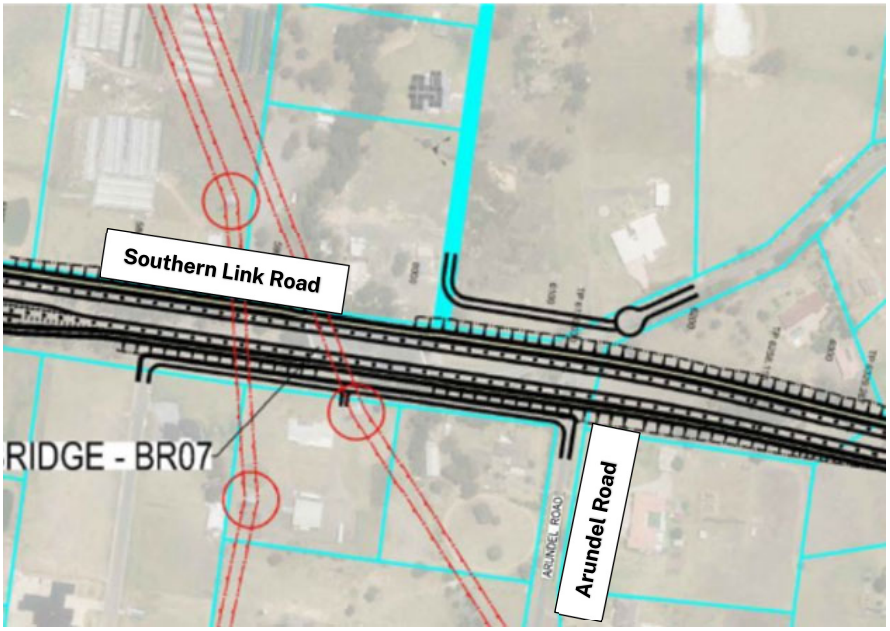


6.5.4 Intersection of SLR and Arundel Road (Stage 2B)

The intersection of the Southern Link Road and Arundel Road has been shown closed in the strategic drawings for Stage 2B with the implementation of a cul-de-sac.

Future design stages will need to consider the impact to local bus routes and if an additional intersection is required at Arundel Road.

Figure 25 - Intersection of Southern Link Road and Arundel Road



6.5.5 Intersection of SLR, Wallgrove Road and Chandos Road (Stage 2B)

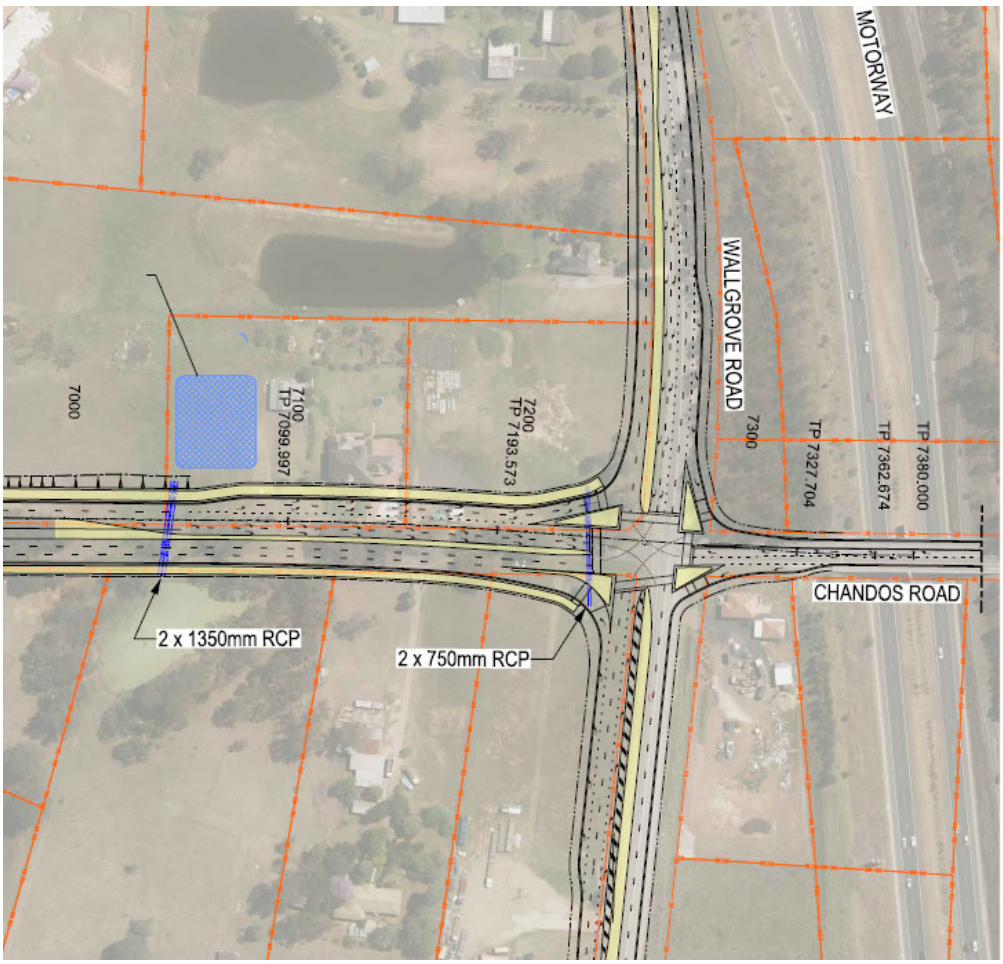
The intersection of the Southern Link Road, Wallgrove Road and Chandos Road proposed in the Stage 2B option is a four-way traffic signal-controlled intersection.

The Southern Link Road leg of the intersection has signalised dual left turn lanes, a single through lane and dual right turn lanes on approach to the intersection and two lanes on departure, with the merge lane from the northbound left turn lane from Wallgrove Road.

Wallgrove Road has two through lanes in each direction on approach and departure to the intersection. The northern leg of Wallgrove Road has dual right turn lanes turning west into the Southern Link Road with a free-flowing left turn slip lane into Chandos Road. The southern leg has a left turn slip lane with a free-flowing left turn treatment and a single right turn lane into Chandos Road.

The Chandos Road leg of the intersection is constrained by the two-lane bridge over the M7 Motorway. The proposed layout has a single right turn lane, a through lane and a short left turn slip lane on approach to the intersection, with a single lane on the departure side.

Figure 26 -Intersection of Southern Link Road, Wallgrove Road and Chandos Road



7. Options evaluation

7.1 Options evaluation process

7.1.1 Overview of the process

The options evaluation process involves several stages. Figure 27 summarises the various steps that were taken to arrive at a preferred option.

Figure 27 -Options evaluation process

The initial stages of the process are used to gather information and inform the strategic design. The key inputs to the evaluation process are detailed further in Section 7.1.2 through Section 7.1.9.

7.1.2 Traffic modelling

Transport engaged GHD to carry out traffic modelling based on predicted traffic volumes in the WSEA. GHD produced a report titled “Traffic Modelling and Road Network Strategy of Southern Link Road, including Western Sydney Employment Area – Southern Link Road Traffic Modelling and Assessment Report” in August 2019.

The report includes SIDRA modelling for key intersections along the route of the Southern Link Road, based on predicted traffic volumes for the year 2036. This traffic modelling has been used to determine the configuration of each intersection, with respect to the number of turn lanes required and the length of the lanes.

The report is included in Appendix A.

7.1.3 Preliminary environmental investigation

The Preliminary Environmental Investigation Report (PEI) prepared by Transport in June 2018 was reviewed and the outcomes were considered throughout the strategic design development as well as the options assessment. The key items from the PEI have been specified in Section 3 of this report.

A number of recommendations are made that have identified some of the steps to be undertaken during the detailed environmental assessment and concept design phases.

For further details refer to Appendix B.

7.1.4 Urban design

Urban designers have provided high level input into the development of the strategic design. Key areas considered include provision for active transport and the possibility of planting the corridor with canopy trees.

A comprehensive urban design strategy will be developed during the concept and detail design phases of the project.

7.1.5 Value management workshop

Two value management workshops were completed. The first on the 28 October 2019 was for both Stage 1 and Stage 2 of the Southern Link Road project. While a second workshop was held virtually on 21 July 2020 and assessed Stage 2 only. The workshop outcomes were recorded in Value Management reports and outcomes were considered within the strategic design.

The workshops used a structured process to ensure key issues were identified and that the option endorsed by the group meets essential requirements and objectives. Participants represented a great cross section of the area, including Transport, Fairfield Council, Penrith City Council and the Department of Planning and Environment.

The value management process included the following four phases:

Information phase:

- Pre-workshop video briefing and design documentation
- Review project background, objectives, scope and overview

Analysis phase:

- Assess stakeholder needs and requirements
- Identify option benefits and constraints
- Understand concerns held by participants

Option assessment phase:

- Assess the proposed options

Creative & judgement phase:

- Identify potential project improvements
- Evaluate practicality, viability and cost effectiveness of ideas

The provided contributions were utilised further in the preferred alignment option selection process and subsequent development of the Southern Link Road project.

7.1.6 Risk management workshop

The risk management workshop took place on 11 November 2019 and included a site visit. The workshop focussed on risk identification and assessment before drawing conclusions that were documented in the project risk register.

7.1.7 Constructability workshop

A Constructability and HSiD workshop facilitated by BG&E Engineering was held on 19 December 2019.

The key construction risks identified to date for Stage 2 are:

- Stage 2A – the intersecting alignments of the high voltage electricity transmission lines, the proposed Western Sydney Freight Line, the Southern Link Road and the proximity of the Water NSW pipelines.
- The construction footprint, including provision for site compounds, laydown and stockpile areas.
- Staging of the works to maintain traffic flow and access to industrial areas, businesses, schools and residences during construction.

The key opportunities identified to date are:

- The possibility of constructing a single carriageway first, which would reduce initial cost and speed delivery of the project.
- The possibility of raising the grade line to reduce the amount of excavation in hard rock.

The outcome of the workshop was recorded in a register of constructability issues. These issues were then considered by the project team in finalising the strategic design.

7.1.8 Health and Safety in Design workshop

The Health and Safety in Design workshop was held on 19 December 2019, in combination with the Constructability Workshop. The purpose of conducting this HSiD workshop was to:

Identify (at the design stage) any health and safety hazards for workers and those near the asset

Eliminate identified hazards, so far as is reasonably practicable, and

Where not reasonable or practicable to eliminate, then the risk to health and safety is to be minimised by applying the hierarchy of controls

The outcome of the workshop was recorded in a register of HSiD issues and potential mitigation measures. These outcomes were then considered by the project team in finalising the strategic design.

7.1.9 Option assessment process

The option assessment process was completed using a method consistent with the Appraisal Summary Table (AST) detailed on the *Australian Government, Australian Transport, Assessment and Planning framework* and included an economic assessment (outcomes detailed further in Section 3.16) undertaken by GHD.

This process involves narrowing down the list of options through an assessment of merit for each option. Stage 2A and Stage 2B were assessed against meeting the proposed project objectives and the constraints documented as inherent in both options evaluated. Refer to tables 5 and 6.

Table 5 - Identifies the project objectives and the criteria

Project Objective	Measurable Criteria
Provide a new road corridor within the Western Sydney Employment Area (WSEA) to facilitate economic growth by unlocking development and employment opportunities	Increase access availability to sites along the alignment within WSEA and Mamre Road Precinct based on current situation vs project case.
Provide wider connectivity that could generate economic growth	Number of opportunities to connect to wider road network.
Provide safe, reliable and efficient access for employees and freight between the Western Sydney Employment Area (WSEA) and the wider state road network	Provide 25% to 50% crash reduction rate. Provide 20% reduction in travel time along the corridor in weekday and AM peak periods.
Achieve increased road capacity in the network to meet future traffic and transport demand	Provide Level of Service at all intersections of E or better in 2036 in the AM Peak. Volume Capacity less than 0.9 in 2036 in AM peak. Able to attract additional users.
Cater for pedestrians, cyclists, and public transport in terms of accessibility, connectivity, safety and amenity	Public transport accessible within 1km radius of all businesses. Additional pedestrian and cycle paths.
Provide a value for money solution	Maximise the Benefit Cost Ratio.

Table 6 -Identifies the constraints that were evaluated within the assessment.

Constraint	Description
Utility Impacts	The impact of the option on utilities and the extent of required relocation and / or protection
Biodiversity	The impact of the option on the natural environment
Contamination	The impact of the option on contaminated lands
Flood Immunity	The projects level of flood immunity and the impact of the option on adjacent land
Noise	The impact of the options on local sound receivers
Intersection Performance	The level of service the option can provide
Property Impacts	The extent of property acquisition required for the option
Heritage Impacts	The impact of an option on heritage elements
Urban Design	The projects ability to improve amenity in town centres, fit within the built fabric and natural patterns
Constructability	The safety and ease of the option to be constructed
Project Funding	The cost and value for money of an option

To complete the technical evaluation, a ranking matrix was used. Refer to Table 7.

Table 7 -Evaluation ranking

Score	Description
	Feasible
	Less Feasible
	Unfeasible

7.2 Option assessment outcome

The outcomes from the option selection process informed the technical assessment. The two options were compared to evaluate their ability to meet the project objectives and the impact of each option assessed. Table 8 and 9 detail the key assessment criteria and the relevant outcomes for both Stage 2A and Stage 2B.

Table 8 -Project objectives assessment

Project Objective	Comment	Option 2A	Option 2B
Provide a new road corridor within the Western Sydney Employment Area (WSEA) to facilitate economic growth by unlocking development and employment opportunities	Both options provide access and growth opportunities within WSEA. Option 2A allows potential unlocking of industrial land on the eastern side of Wallgrove road in the Austral site. Option 2B allows potential unlocking of industrial lands along the Burley Rd corridor.		
Provide wider connectivity that could generate economic growth	Stage 2B provides improved connectivity to the M7 and Chandos Road. This connectivity will improve freight and passenger movement efficiency providing higher economic growth opportunities.		
Provide safe, reliable and efficient access for employees and freight between the Western Sydney Employment Area (WSEA) and the wider state road network	Both options expected to meet the crash reduction rates requirements. Option 2B provides shorter travel to the M7.		
Achieve increased road capacity in the network to meet future traffic and transport demand	Both options are expected to provide similar intersection performance. Option 2B has been identified as attracting more users.		
Cater for pedestrians, cyclists, and public transport in terms of accessibility, connectivity, safety and amenity	Both options provide additional cyclist and pedestrian movements. Both options corridor width allows for provision of required Bus Stops.		
Provide a value for money solution	Option 2B has a higher Benefit Cost Ratio.		

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Table 9 -Technical assessment outcomes

Element	Comment	Option 2A	Option 2B
Utilities	• 2A has significant impacts to Water NSW Pipeline and 330kV Transmission Lines.		
Biodiversity	• 2A has more riparian area impacted. • 2B has threatened species adjacent to the corridor.		
Contamination	• Both options expected to encounter similar contamination.		
Flood Immunity	• Both options meet required flooding immunity.		
Noise and Vibration	• 2B has more residential sensitive receivers.		
Intersection Capacity	• 2A and 2B both produce unsatisfactory level of service.		
Property Acquisition - Private	• 2B required more private property acquisition.		
Property Acquisition - Other	• 2A requires significant other property acquisition.		
Aboriginal Heritage	• Both options encounter AHIMS/PAD Sites.		
Urban Design	• 2A has longer larger bridges. • 2B has a large cutting.		
Constructability	• 2A is considered harder to construct with long curved bridges, Western Sydney Freight Line and key utility impacts.		
Project Cost[1]	• 2B has a lower cost than 2A.		

The assessment was undertaken in two parts, firstly assessing the two options against the project objectives - without considering the project cost. This resulted in Option 2B being assessed as the preferred option. The second part of the assessment included the project cost and also identified Option 2B as the preferred option.

8. Conclusion and next steps

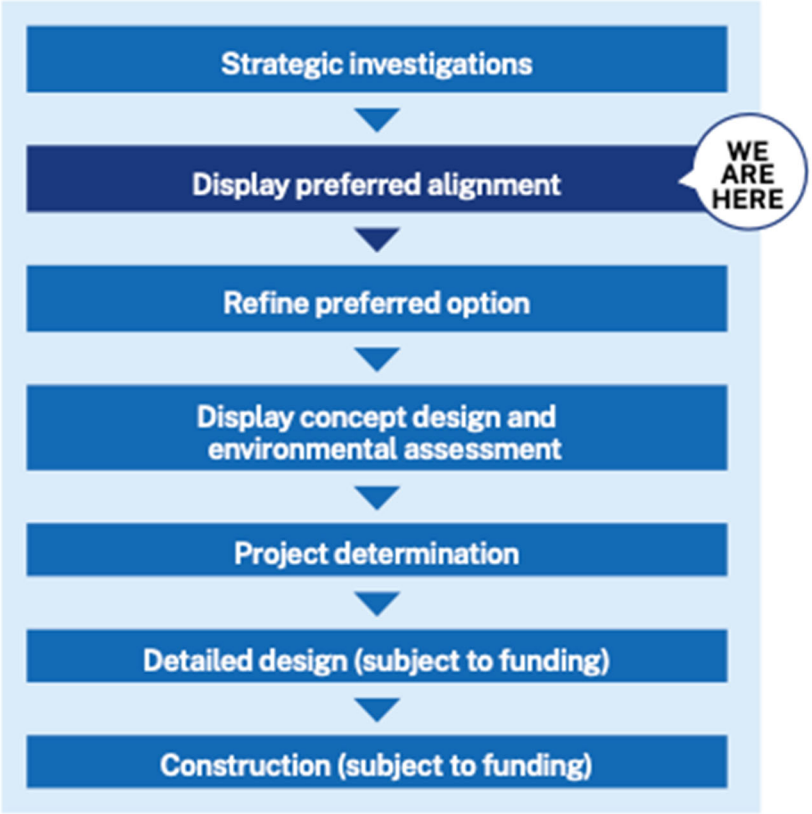
The options evaluation process for the upgrade of Southern Link Road has considered a range of environmental, social, economic and engineering constraints/issues and has involved preliminary consultation with key stakeholders.

The preferred option is:

Stage 2B

The next steps for the project are outlined in Figure 28. Following public exhibition of the preferred option, Transport will consider community submissions, make changes where necessary and then confirm the preferred option.

Figure 28 -SLR next steps



Transport will continue stakeholder and community consultation during the next stages of the project. The Transport website will be periodically updated with information about the progress of the project.

9. References

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Appendix A: Traffic Modelling and Assessment Study

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Appendix B: Preliminary Environmental Investigation

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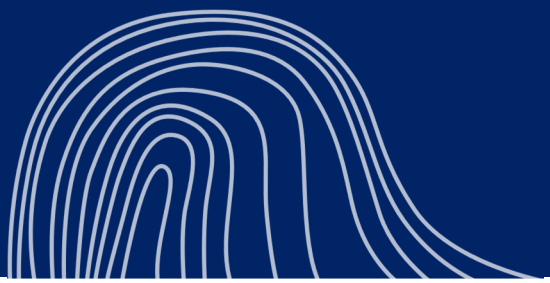

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