

TRANSPORT FOR NSW

FEBRUARY 2018

SENSITIVE: NSW GOVERNMENT

DRAFT WESTERN SYDNEY FREIGHT LINE CORRIDOR

DRAFT STRATEGIC ENVIRONMENTAL ASSESSMENT

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Draft Western Sydney Freight Line Corridor Draft Strategic Environmental Assessment

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GLOSSARY, ABBREVIATIONS AND KEY TERMS

AHD	Australian Height Datum
ARTC	Australian Rail Track Corporation
AHIMS	Aboriginal Heritage Information Management System
BC Act	NSW Biodiversity Conservation Act 2016
Broad study area	Study area refers to the area defined in section 1.6 of the document
Bulk freight	<i>Commodity cargo that is transported unpackaged in large quantities</i>
Containerised freight	<i>Cargo that is transported via shipping containers</i>
Corridor	<i>A ‘corridor’ in this document refers to a proposed alignment of the infrastructure corridor (or any corridor alignment options) and any adjacent land which might be affected. Also see ‘recommended corridor’.</i>
EP&A Act	<i>Environment Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
IMT	<i>Intermodal Terminal – Facility used for the transfer of freight containers from one mode of transport to another (e.g. road to rail), together with ancillary support services and activities.</i>
km/h	Kilometres per hour
kV	Kilovolts
LGA	Local Government Area
M4	Western Motorway
M5	South Western Motorway
M7	Westlink
M12	Elizabeth Motorway
Nitrous Oxides	Associated with emissions – <i>referred to as NO_x</i>
OEH	Office of Environment and Heritage
Outer Sydney Orbital	Outer Sydney Orbital (including plans for a future M9 Motorway)
Particulate Matter	Associated with emissions – <i>includes very fine particles (PM_{2.5}) and fine particles (PM₁₀)</i>
Rail mode share	<i>Refers to the proportion of freight movements by rail compared to freight movements on road.</i>

Recommended Corridor	<i>Within the context of this Strategic Environmental Assessment, this refers to the corridor presented within section 1.7 of this document and is described as beginning west of the Westlink M7 and terminating west of Luddenham Road between Luddenham (south) and Orchard Hills (north).</i>
Refined study area	<i>Refers to the study area used to define options in both the western and eastern portions of the project as discussed in section 4 of this report. Note that the eastern refined study area is subject to further investigations.</i>
s.170 Register	Section 170 (of the NSW Heritage Act 1977) Heritage and Conservation Register
Sensitive Receivers	Defined by the NSW Environmental Protection Authority (EPA) as <i>a location where people are likely to work or reside and includes residential dwellings, schools, hospitals, schools, offices or public recreational areas.</i>
SEPP	State Environmental Planning Policy
TEUs	Twenty-foot equivalent units (standard shipping container)

EXECUTIVE SUMMARY

PROJECT JUSTIFICATION

The Western Sydney Freight Line Corridor is one of four critical long term infrastructure corridors in western Sydney currently under investigation and engagement with key stakeholders and the community. These corridors provide future north-south and east-west transport connections that will support the future growth of western Sydney, the Western Sydney Airport and the Western Parklands City. The integration of land use with future infrastructure corridors is critical to the success of NSW Government Policies including the *Draft Greater Regional Plan* (Greater Sydney Commission, 2017)¹ and supporting draft District Plans and *Draft Future Transport Strategy 2056* (NSW Government, 2017).

Protecting corridors is a first step toward meeting future growth in western Sydney. A summary overview of proposed corridor protection in western Sydney is separately available on the Transport for NSW website. That overview document explains how corridors underpin the future economic success of NSW, its regions, and Western Sydney with particular regard to job creation and the efficient movement of people and goods around Sydney and to NSW ports and airports as critical international gateways in trade and innovation.

The Western Sydney Freight Line Corridor will ultimately provide for a connection to the Southern Sydney Freight Line near Leightonfield and the proposed Outer Sydney Orbital corridor near Luddenham, which provides a freight rail line connection to the Main West Line near St Marys. The identification and protection of a Western Sydney Freight Line Corridor will occur in two sections - between west of the Westlink M7 and the proposed Outer Sydney Orbital Corridor at Luddenham where a recommended corridor has been identified, and between the Westlink M7 and the Southern Sydney Freight Line at Villawood, where further work is required to ensure the best land use outcomes are achieved. The rapid pace of development in the western section means that a recommended corridor needs more urgent protection.

East of the Westlink M7 the Western Sydney Freight Line Corridor will run through existing industrial areas in Wetherill Park, Smithfield, Yennora and Leightonfield. The eastern section of the Western Sydney Freight Line Corridor comprises established communities and employment areas, and further consultation with key stakeholders and the community is needed to develop feasible alignment options.

A limited window of opportunity exists to protect a future Western Sydney Freight Line Corridor between the Westlink M7 and the proposed Outer Sydney Orbital Corridor before it is entirely developed. The cost of protecting a corridor will increase over time, as will the disruption to communities and businesses affected by the construction of the future Western Sydney Freight Line. Identifying and protecting a Western Sydney Freight Line Corridor now provides increased certainty for the community, local councils and industry that future infrastructure provision can be provided when it is required.

Protecting a recommended corridor will also provide industry with confidence to identify opportunities for a Western Sydney Intermodal Terminal. It is intended that government will work with industry and other key stakeholders to investigate potential terminal locations to provide the needed capacity to meet long-term growth for international, interstate and regional freight. The total volumes of freight with an origin or destination in western Sydney are expected to more than double from 18.5 million tonnes in 2014 to 41 million tonnes in 2031.

In October 2017 Transport for NSW released *Future Transport 2056 – A Draft Strategy*, which includes an indicative alignment for the Western Sydney Freight Line Corridor. Future Transport explains that the Western Sydney Freight Line Corridor will connect to the proposed Outer Sydney Orbital Corridor near Luddenham and provide connections north to the Main West Line. A connection to the Main West Line is needed to separate regional freight services onto dedicated freight lines before St Marys, to free up the Main West Line for the increasing passenger volumes.

The Western Sydney Freight Line Corridor together with the proposed Outer Sydney Orbital Corridor is part of an expanding and dedicated freight rail network that will connect western Sydney with NSW Ports and regional areas.

Future rail infrastructure in these corridors will provide opportunities to move goods direct to Western Sydney and avoid more congested parts of the Sydney rail network.

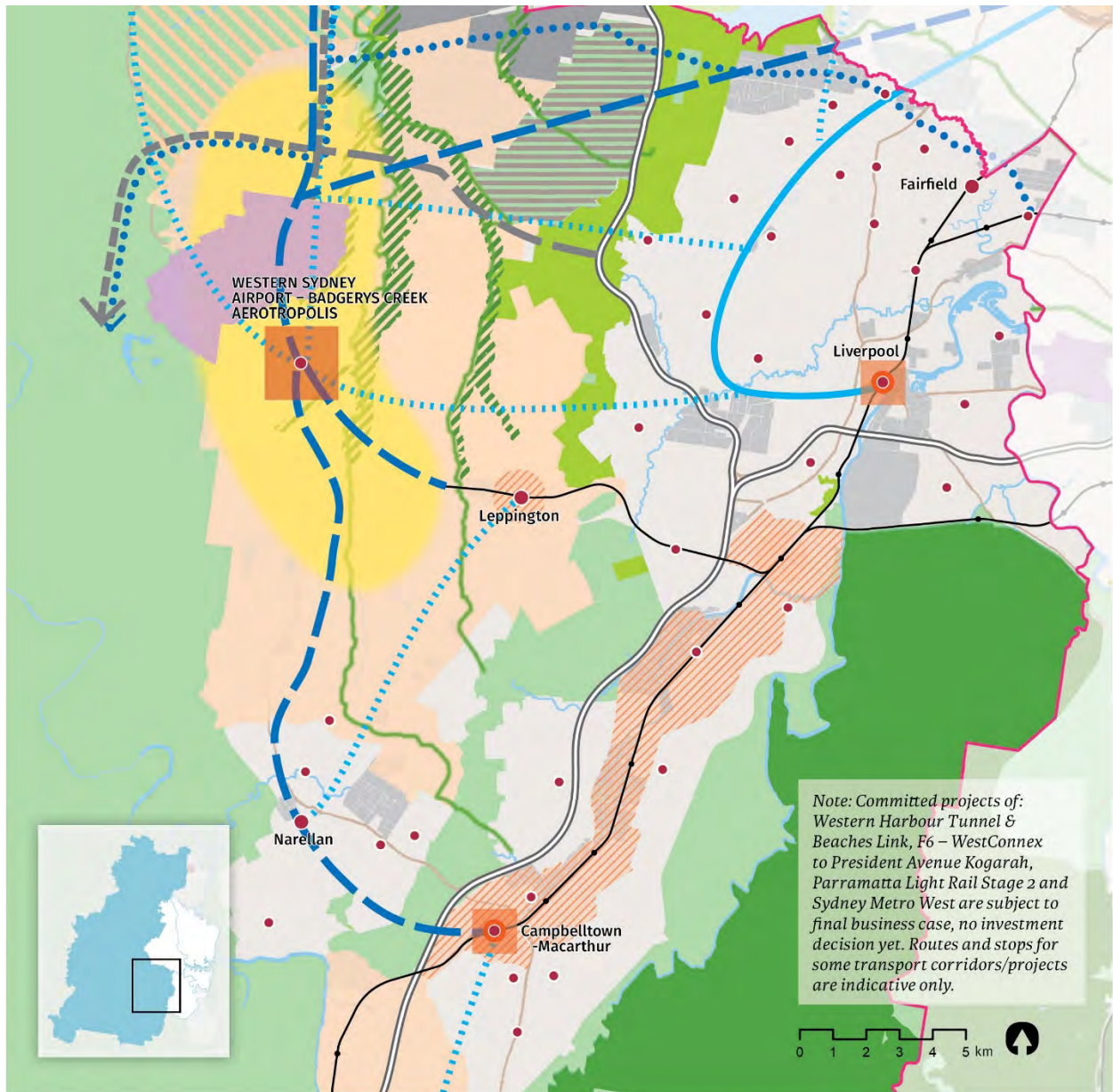
The Greater Sydney Commission has released a draft Regional Plan for Sydney and draft plans for five districts across Sydney. The Western Sydney Freight Line Corridor is shown indicatively in these draft plans (refer Figure ES.1). Both the draft District and Regional plans identify that the movement of freight in Sydney will double over the next 40 years. Future infrastructure such as the Western Sydney Freight Line will contribute to meeting this growth and reduce pressure on the Sydney road network, especially around Port Botany and the Western Sydney Airport area overtime.

The Western Sydney Growth Area extends west from the Westlink M7 and includes the planned Western Sydney Airport. The Western Sydney Freight Line Corridor is a key east west connection through the Growth Area. This area has the potential to become the single largest concentration of freight logistics industries in NSW. Since the development of the Westlink M7 the growth of logistics in western Sydney has exceeded forecast expectations. It is anticipated that approximately 80% of containerised freight imported through Port Botany will have a destination or origin within 40 kilometres of the Port with the majority of this originating in the increasingly populated western Sydney by 2045.

Accordingly, the demand for employment land has increased in the western Sydney region and is projected to continue to rise over the next 20 years (Urbis, 2013). Modelling projects that the demand for industrial land in western Sydney will more than double by 2046. Growth in this area is fuelled by the delivery infrastructure and ‘catalyst’ projects including the Moorebank Intermodal Terminal, the proposed Outer Sydney Orbital, and a dedicated freight line servicing western Sydney (Urbis, 2013).

The NSW government, together with Infrastructure Australia and the Australian Rail Track Corporation, have acknowledged the need to further separation of passenger and freight flows on the Sydney rail network to ensure both networks can grow to meet expected demands in to the future. The Main West Line is experiencing significant and ongoing growth in passenger demand. From the mid-2020s freight services sharing this part of the rail network will be increasingly constrained. It should be noted that passenger services have priority in weekday peak periods on the shared rail network.

Without the Western Sydney Freight Line, constraints on the Main Western Line for freight services will likely impact the movement of bulk commodities from regional NSW, such as coal and grains, which rely on the Main West to access markets. By connecting to the Southern Sydney Freight Line near Leightonfield a future Western Sydney Freight Line provides an opportunity for freight to connect to Port Botany and Port Kembla in the future. Increased separation of freight and passenger services would improve the efficiency of the rail network and could reduce freight transport costs.



	Metropolitan City Centre		Land Release Area		Waterways		Rapid Bus
	Metropolitan City Cluster		Urban Renewal Area		Train Station		Motorway
	Health and Education Precinct		Priority Growth Area Investigation		Committed Train Link		Committed Motorway
	Strategic Centre		Urban Investigation Area		Train Link / Mass Transit Investigation 0-10 years		Road Investigation 0-10 years
	Local Centre		Urban Area		Train Link / Mass Transit Investigation 10-20 years		Road Investigation 10-20 years
	Economic Corridor		Protected Natural Area		Freight Rail Investigation		Green Grid Priority Project
	Trade Gateway		Metropolitan Rural Area		Light Rail		
	Western Sydney Employment Area		Major Urban Parkland and Reserve		Light Rail Investigation		
	Industrial Land		Visionary Parkland and Reserve		On Street Rapid Transit		

(Source, GSC Draft Western City District Plan 2017)

Figure ES.1 Indicative alignment of Western Sydney Freight Corridor

There is widespread support across all levels of government, the community and industry for early identification and protection of long term infrastructure corridors. The key potential benefits of identifying and protecting a Western Sydney Freight Line Corridor include:

- **Reduced long term infrastructure costs** – estimates by Infrastructure Australia¹ (2017) indicate that early protection of the Western Sydney Freight Line Corridor and staged acquisition of land would potentially save approximately \$1.6 billion, even taking into account discounting (i.e. factoring in the opportunity cost of committing the funds early). Expensive retrofitting of surrounding infrastructure is also avoided with early identification and protection of the corridor.
- **Reduced land use impacts** by protecting the Western Sydney Freight Line Corridor from future urban development and later disruption when infrastructure is delivered in the corridor. The design and construction of adjoining uses can also benefit from early identification and protection of the recommended corridor, which ensures the potential impacts of future infrastructure is avoided upfront through design.
- **Certainty for long-term planning and network efficiency** to secure the broader freight network and support planned growth in western Sydney, particularly around the Western Sydney Airport. Protecting the Western Sydney Freight Line Corridor avoids the need for future adjustments to the corridor alignment – in terms of location and construction – to accommodate development, which can add significant cost and complexity (e.g. tunnelling) for the future delivery of infrastructure.
- **Guidance for private sector's delivery of intermodal freight terminals** in the Western Sydney Airport Growth Area building on a commitment by government to protect a Western Sydney Freight Line Corridor that directly connects Port Botany and western Sydney. This certainty encourages planning and investment in the design of adjoining employment areas to take best advantage of future provision of infrastructure in the corridor.

The Western Sydney Freight Line has the potential to generate \$800 million (present value) for the NSW economy and 10,000 new jobs in western Sydney over the next 40 years. The freight and logistics industry has strong potential for significant employment generation and economic growth associated with the secondary industries and businesses that rely on efficient freight movements.

Moving more freight on rail can deliver transport cost savings which include avoiding congestion on the Sydney road network. The provision of dedicated freight rail services in western Sydney has the potential to save 4.3 million truck kilometres each year on the Sydney road network by 2036. Reducing truck travel will also provide significant benefits to Sydney's air quality and lead to reduced greenhouse gases, as rail freight transport is less energy-intensive than road freight transport.

POLICY CONTEXT

The *Draft Future Transport Strategy 2056* (NSW Government, 2017) and the *Draft Greater Regional Plan* (Greater Sydney Commission, 2017)¹ build on earlier strategies including the *NSW Long Term Transport Master Plan* (TfNSW, 2012), the *NSW Freight and Port Strategy* (TfNSW, 2013) and *A Plan for Growing Sydney* (DPE, 2013). The proposed Western Sydney Freight Line is as a priority project in these documents as well as the *NSW State Infrastructure Strategy* (NSW Government, 2016) and the 2017 *National Infrastructure Priority List* (Infrastructure Australia, 2017).

The *Draft Future Transport Strategy 2056* (NSW Government, 2017) notes that the freight sector currently contributes \$13 billion to the NSW economy, and with the population of NSW projected to grow to more than 11 million by 2056, there is the potential for freight task in Greater Sydney to double. Key initiatives in the *Draft Future Transport Strategy 2056* (NSW Government, 2017) include the integration of transport and land use to separate freight and passenger traffic on major freight corridors; maximising the long-term capacity and performance of the state's three major ports; expansion

¹ Corridor Protection – Planning and Investing for the Long Term (Infrastructure Australia, July 2017)

of intermodal rail capacity in western Sydney; and improvement of east-west connections to support the regional export task.

The Greater Sydney Commission *Draft Greater Sydney Plan* (Greater Sydney Commission, 2017)¹ and *Draft Western City District Plan* (Greater Sydney Commission, 2017)² set the long term strategic planning framework for metropolitan and western Sydney respectively, and provide the bridge between state and local planning policy.

The *Draft Greater Sydney Plan* (Greater Sydney Commission, 2017)¹ sets the strategic planning framework to 2056 around a three cities concept that includes the development of the Eastern Harbour City, Central River City and Western Parkland City over the next 40 years. The Western Parkland City concept is centred on the development of the Western Sydney Airport as the economic catalyst for the growth of western Sydney; and the development of a new Western Economic Corridor. Key elements of the *Draft Greater Sydney Plan* (Greater Sydney Commission, 2017)¹ include improving the road connectivity from Villawood to Eastern Creek, to improve business-to-business and supply chain connectivity along this industrial corridor. The plan supports transport initiatives that will significantly improve the accessibility of the Western Parkland City with Greater Sydney and regional NSW. These initiatives include the Western Sydney Freight Line Corridor, the Outer Sydney Orbital Corridor – which is proposed to be a major orbital transit corridor for Greater Sydney – and a potential new western Sydney intermodal terminal.

The Western Sydney Freight Line Corridor is identified in the *Draft Western City District Plan*. (Greater Sydney Commission, 2017)². The *Draft Western City District Plan*. (Greater Sydney Commission, 2017)² provides a more detailed planning framework for the long-term planning and development of the ‘Western Parkland City’. The Plan notes that the development of Western Parkland City will be a significant economic catalyst to transform land uses in the area around the Western Sydney Freight Line Corridor and will attract major investment including a significant amount from the freight and logistics industry. The Plan includes a priority to ‘establish the land use and transport structure to deliver a liveable, productive and sustainable Western Parkland City’.

The Plan further notes that:

- the Western Sydney Employment Area is expected to provide more than 57,000 jobs over the next 30 years
- the Western Sydney Employment Area will be a key destination for cargo by 2036, with metropolitan intermodal terminals critical to managing the rapidly growing import container trade and enabling more freight to be moved by rail
- duplication of the Port Botany Rail Line and a dedicated freight line and intermodal terminal for western Sydney that connects to the Outer Sydney Orbital will support economic growth, driving employment and increasing the amount of freight carried on rail and reducing heavy vehicle trips on the Sydney Road Network.

The protection of future transport corridors in western Sydney is fundamental to support the Greater Sydney Commission’s three cities vision, including support for the Western Sydney Airport and the expected growth in population and employment as part of the North West and South West Growth Areas, the Western Sydney Airport Priority Growth Area and the Greater Macarthur Priority Growth Area.

The *NSW Draft Freight and Ports Plan* (TfNSW, 2017) was released for comment in December 2017. It will support Transport for NSW’s *Draft Future Transport Strategy 2056* (NSW Government, 2017) and will provide direction to business and industry for managing and investing in freight into the future. The draft plan identifies the Western Sydney Freight Line and Outer Sydney Orbital Corridors as future initiatives in the western region of Sydney. The draft plan notes that a Western Sydney Freight Line could support increased movement of construction goods such as quarry products by rail which is 35% cheaper than road transport. In developing this Plan, an integrated approach was adopted, with close alignment with the State Infrastructure Strategy, Draft Future Transport Strategy, Regional and Greater Sydney Services and Infrastructure Plans and the issue-specific and place-based plans.

PROJECT OBJECTIVES AND BUSINESS REQUIREMENTS

The key objectives of the Western Sydney Freight Line Corridor protection are to:

- allow for the development of infrastructure for the future Western Sydney Freight Line
- provide certainty over of the future Western Sydney Freight Line location to assist with the strategic and land use planning in the Western Sydney Airport Growth Area
- enable strategic acquisition of the corridor land to reduce long term infrastructure costs and community disturbance.

Protection of the corridor precedes any funding commitment necessary for project delivery. Corridor protection facilitates reservation of the land within the corridor for future infrastructure when required. A corridor has been identified for the western section (refer section 1.7) whilst an area within the eastern section has been identified subject to further study of integrated land use opportunities to determine a recommended corridor in 2018.

The key objectives of the future Western Sydney Freight Line are to:

- efficiently connect Western Sydney with the existing and future freight rail network including the Main Western Rail Line, the proposed Outer Sydney Orbital Corridor, the Southern Sydney Freight Line and Main South Rail Line
- reduce the cost of transporting goods across Sydney and throughout NSW through expanding the current dedicated freight rail network
- provide regional freight with increased access to Sydney's dedicated freight rail network connecting to Port Botany
- reduce future growth in truck kilometres in Sydney's roads by moving more freight on rail
- further separation of freight and passenger rail services in western Sydney to allow growth and improved reliability across both networks over time.

The key requirements for the Western Sydney Freight Line are:

- a minimum 60 metre width (increasing to 80 metres in places)
- operation to cater for diesel locomotives but not preclude later conversion to electrification
- capacity to cater for approximately 26 trains in each direction
- potential connection to Yennora Distribution Centres
- curves to permit 80 kilometres per hour operation
- double track structures
- Class 1 XC design standard.

CONSTRAINTS ANALYSIS

Identification of constraints was undertaken based on GIS mapping within the study area as well as desktop investigations into a range of potential constraints. A number of stakeholders were consulted regarding the study area and existing land use including local councils, utility providers, industry and other relevant government agencies. Transport for NSW has also worked closely with the Department of Planning and Environment, and Greater Sydney Commission in developing a recommended corridor.

The key constraints identified through the investigation include:

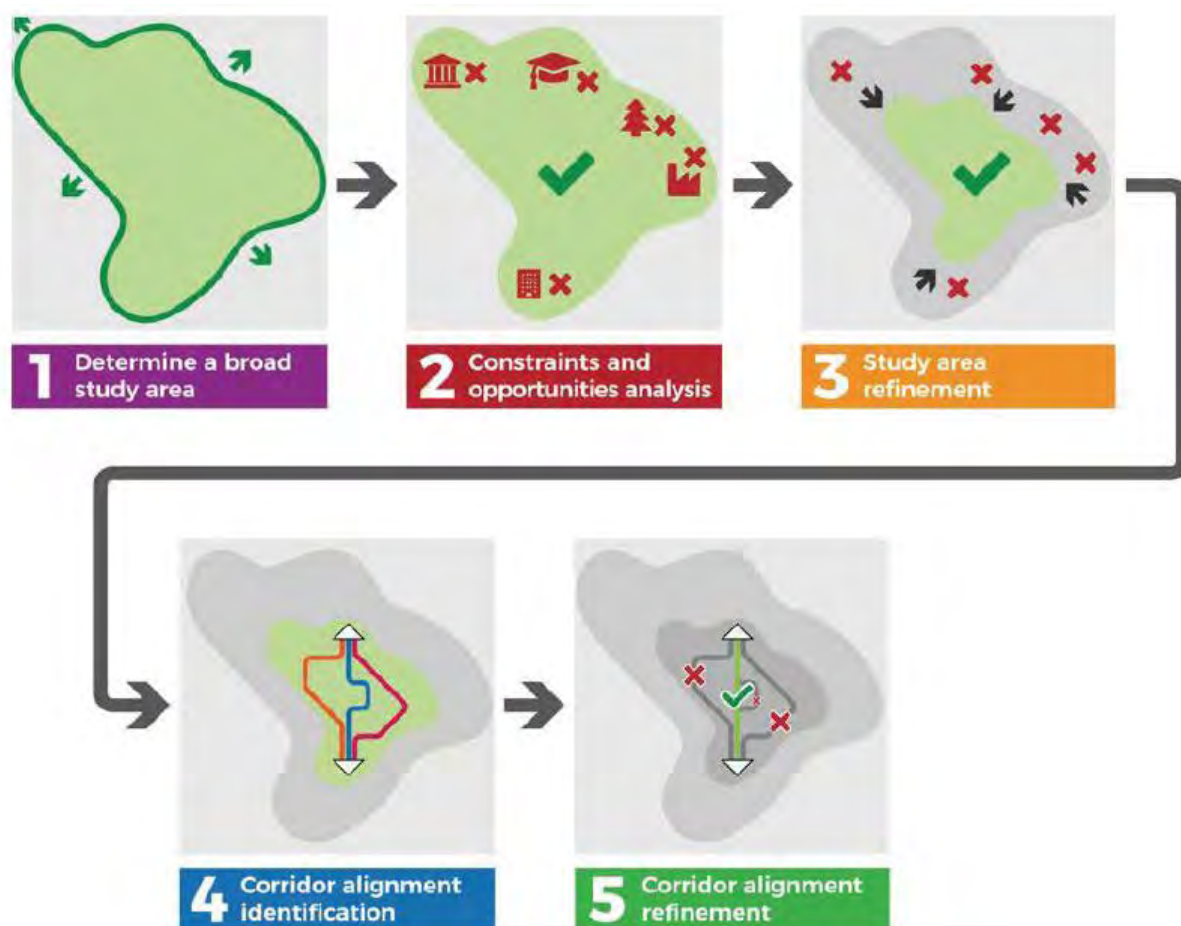
- **Land use and development** – The density and type of development present in the study area were carefully considered throughout the investigation process. Residential and community land uses were viewed as important constraints whilst employment land was considered to have more opportunity to integrate with a future freight line due to the potential future connections.

- **Infrastructure** – Major infrastructure in the study area was identified and wherever possible avoided due to the potential high cost and complexity in relocating this infrastructure. For example:
 - the corridor runs alongside the Warragamba pipeline in a manner that eliminates the need for the future infrastructure to cross the pipeline
 - the corridor crosses the Westlink M7 at a location that easily allows a grade-separated crossing
 - the corridor connects with the proposed Outer Sydney Orbital Corridor, allowing for a future connection to the Main West Line
 - the corridor connects with the Southern Sydney Freight Line to provide a dedicated freight link to Port Botany
 - the corridor traverses the Western Sydney Parklands where an effective design response can be adopted to mitigate the long-term impacts, but has avoided encroachment on the Prospect Reservoir and its surrounding protected area.
- **Biodiversity** – Areas of high ecological value are scattered throughout the western section, while biodiversity in the eastern section is limited due to the high level of urbanisation. In the western section the main areas of value are between Old Wallgrove Road and the M4 Motorway to the west of Ropes Creek. Wherever possible significant vegetation communities were avoided. The Office of Environment and Heritage was consulted regarding the recommended corridor.
- **Heritage** – The development of corridor options aimed to avoid or minimise the impacts to any listed heritage items or sites. Key heritage registers were reviewed including the State Heritage Register, local LEP heritage registers, government authority section 170 (s.170) registers and the Office of Environment and Heritage Aboriginal Heritage Information Management System. Items of Aboriginal or non-Aboriginal heritage significance listed on any federal, state or locally significant registers were avoided where possible. There are several heritage items within the refined study area, including both Aboriginal and non-Aboriginal items of significance as well as areas that may potentially contain heritage artefacts or sites if disturbed for development. These will require further consideration during design development.
- **Topography** – The topography within the study area comprises flat to undulating land. The business requirements for the future rail operations within the corridor specify a maximum grade of one per cent to ensure efficient operations and to avoid unnecessary emissions and increased noise. To meet this requirement steep topography was avoided where possible. Opportunities to make best use of prevailing topographical conditions were also considered. The proposed crossing point of the Westlink M7 for example was identified early in the investigation.
- **Flooding and hydrology** – Flooding presents a constraint to the corridor options as it presents increased engineering difficulties and construction costs. In the western section, there are three creeks that are prone to flood events including South Creek, Ropes Creek, and Reedy Creek. The eastern section contains three creeks prone to flood events including Eastern Creek, Prospect Creek and Orphan School Creek to the south-west of Yennora Station.

CORRIDOR PLANNING AND PROTECTION

CORRIDOR PLANNING PROCESS

The Western Sydney Freight Corridor has been identified in accordance with the process outlined in the Department of Planning and Environment's *Guidelines for Major Infrastructure Corridors*. A separate scope of requirements for the Draft Strategic Environmental Assessment was also provided by the Department of Planning and Environment. The process used to define the corridor in the western section is shown in Figure ES.2 below.



(Source: Mecone, 2017)

Figure ES.2 Corridor identification approach

CORRIDOR OPTIONS ANALYSIS

The identification of key land use and environmental constraints within the study area informed the development of a long and short list of corridor options. These options were assessed against the key project objectives and the criteria listed below as part of the assessment process:

- enables designated freight connection from the current freight network to the Western Sydney Employment Area
- accommodates a corridor that could potentially service the existing intermodal terminal sites (ideally including Yennora Distribution Centre) and support a potential future western Sydney intermodal terminal site
- as far as possible avoid residential areas and provides opportunities to service existing industrial areas
- facilitates a future Western Sydney Freight Line that reduces in the impact of regional and western Sydney rail freight from the town centres of Parramatta and Blacktown
- considers construction of a freight line which is sympathetic to the topography of the study area
- provides opportunities to renew existing industrial areas such as Wetherill Park and Yennora
- provides the shallowest grades possible and minimises geophysical constraints including flood risk
- provides the opportunity for freight tasks to transfer to rail, through the construction of new sidings in industrial areas.

RECOMMENDED CORRIDOR

The Western Sydney Freight Line Corridor is being planned to provide for an end-to-end future freight rail line connection between the Southern Sydney Freight Line near Leightonfield and the proposed Outer Sydney Orbital Corridor near Luddenham.

The corridor is being investigated and ultimately protected in sections:

- A western section, extending from the proposed Outer Sydney Orbital near Luddenham to the Westlink M7.
- An eastern section, extending from the Westlink M7 to the connection with the Southern Sydney freight Line near Leightonfield.

The corridor for the western section of the Western Sydney Freight Line Corridor was determined to best meet future project requirements while minimising impacts on the existing land use, biophysical and geophysical environments. It passes through established industrial areas west of the Westlink M7.

The corridor for the eastern section has several challenging land use and environmental issues that need to be addressed further before a corridor can be determined. It is therefore identified in this draft Strategic Environmental Assessment as an area that will be subject to further study of integrated land use opportunities by key Government Agencies including Transport for NSW, Greater Sydney Commission, Department of Planning and Environment and relevant local councils.

ALTERNATIVE SCENARIO

The ‘do minimum’ scenario for the purpose of this assessment assumes that protection of a long-term transport corridor for freight rail does not proceed.

Without certainty around future delivery of the Western Sydney Freight Line and connecting Outer Sydney Orbital, the existing road and rail networks would require further enhancement to meet future demand. However, given the expected future passenger growth on the shared railway network in Sydney, the opportunity for accommodating increasing freight rail services is limited.

The key risks associated with not progressing the protection of the Western Sydney Freight Line Corridor include:

- continuing urban growth and rapidly increasing land costs will diminish opportunities to identify and protect a corridor or will significantly increase the financial costs of corridor protection
- failure to protect the corridor will diminish opportunities to optimise the long term planning of employment lands in the vicinity of the project
- uncertainty over the corridor alignment will delay the planning and development of intermodal terminals – a critical part of the rail freight supply chain with large land requirements and long lead times
- future critical works to upgrade the Southern Sydney Freight Line by the ARTC may not include adequate provision for any services generated by the Western Sydney Freight Line or freight generated by growth within businesses located in the Western Sydney Employment Area and Western Sydney Airport Growth Area.

Under the ‘Do Nothing’ scenario with no delivery of the Western Sydney Freight Line, freight paths would be significantly reduced on the shared metropolitan rail network as demand for passenger services increases with population and job growth. The Western Sydney Employment Area would have no rail freight connection, and therefore the transport of freight within the Western Sydney region would remain on road. Regional and interstate freight using the Main West Rail Line would increasingly shift from rail to road from 2025 onwards without an increase of available rail capacity for freight movements, and as a result the quantity of freight transported by rail would diminish.

CORRIDOR PROTECTION PLANNING

This draft Strategic Environmental Assessment addresses the requirements for corridor protection provided by the Department of Planning and Environment in accordance with *Guideline for Major Infrastructure Corridors*. Based on the Guideline, the draft Strategic Environmental Assessment addresses key environmental, economic and land use requirements to justify the protection of a recommended corridor between the Westlink M7 and the proposed Outer Sydney Orbital Corridor in the relevant environmental planning instrument.

As part of the planned engagement for the Western Sydney Freight Line Corridor, a discussion paper will be exhibited by the Department of Planning and Environment for the recommended corridor west of the Westlink M7 explaining the proposed measures for protection of the corridor under the planning system.

An indicative study area has been identified east of the Westlink M7 for engagement with key stakeholders, industry and the broader community. A recommended corridor has not been identified in the eastern section, although a limited number of potential preliminary alignment options have been investigated based on the review of key constraints. These preliminary alignments are intended to stimulate a discussion with key stakeholder regarding the potential integration of a future freight line with existing land use and transport networks. The indicative study area includes existing industrial precincts in Wetherill Park, Smithfield, Yennora and Leightonfield. These precincts could benefit from the provision of a future freight rail connection. The existing Intermodal Terminal at Yennora, presently has access to the Old Main South Railway Line.

The eastern section study area will be further refined following the initial engagement with key stakeholders. An integrated planning process will be determined by the Department of Planning and Environment, together with the Greater Sydney Commission and Transport for NSW. This planning process will involve key stakeholders throughout 2018 and work towards establishing a land use framework and a recommended corridor for the Western Sydney Freight Line east of the Westlink M7 to join with the Southern Sydney Freight Line near Leightonfield.

RECOMMENDED CORRIDOR – WESTERN SECTION

A recommended corridor west of the Westlink M7 was identified from a short list of corridor alignments when assessed against the project objectives and performance criteria. The recommended corridor is shown in Figure ES.3. A summary of the key reasons in support of the recommended corridor is provided below:

- achieves the best balance between engineering and constructability while minimising impacts on the community and the environment
- has the least impact on existing dwellings by maximising the separation to residential communities, such as the Twin Creeks residential community
- avoids a direct impact on several sensitive receivers including the Emmaus Retirement Village, Trinity Primary School and recreational land uses
- has the least impact on critical infrastructure including the Warragamba pipeline, Outer Sydney Orbital Corridor and Westlink M7
- delivers the best operational freight outcomes which includes an alignment that avoids major undulations in landform (important as freight trains require very shallow or flat grades)
- avoids major impact to biodiversity, flooding or heritage
- facilitates the development of freight and logistics industries in western Sydney.

The recommended corridor's impact on property was less significant than other potential alignments given its co-location with the existing Warragamba Pipeline. The location of the recommended corridor immediately west of the Westlink M7 was also heavily influenced by the location of a potential crossing of the Westlink M7. The recommended corridor takes best advantage of the cutting of the Westlink M7, which facilitates a future grade-separated crossing with minimal disruption for the Westlink M7.

East of the Westlink M7, a future Western Sydney Freight Line Corridor would need to pass through the existing Western Sydney Parklands where opportunities for a freight rail corridor are limited. The area included in the indicative study area immediately east of the Westlink M7 has the most potential to accommodate a future Western Sydney Freight Line Corridor.

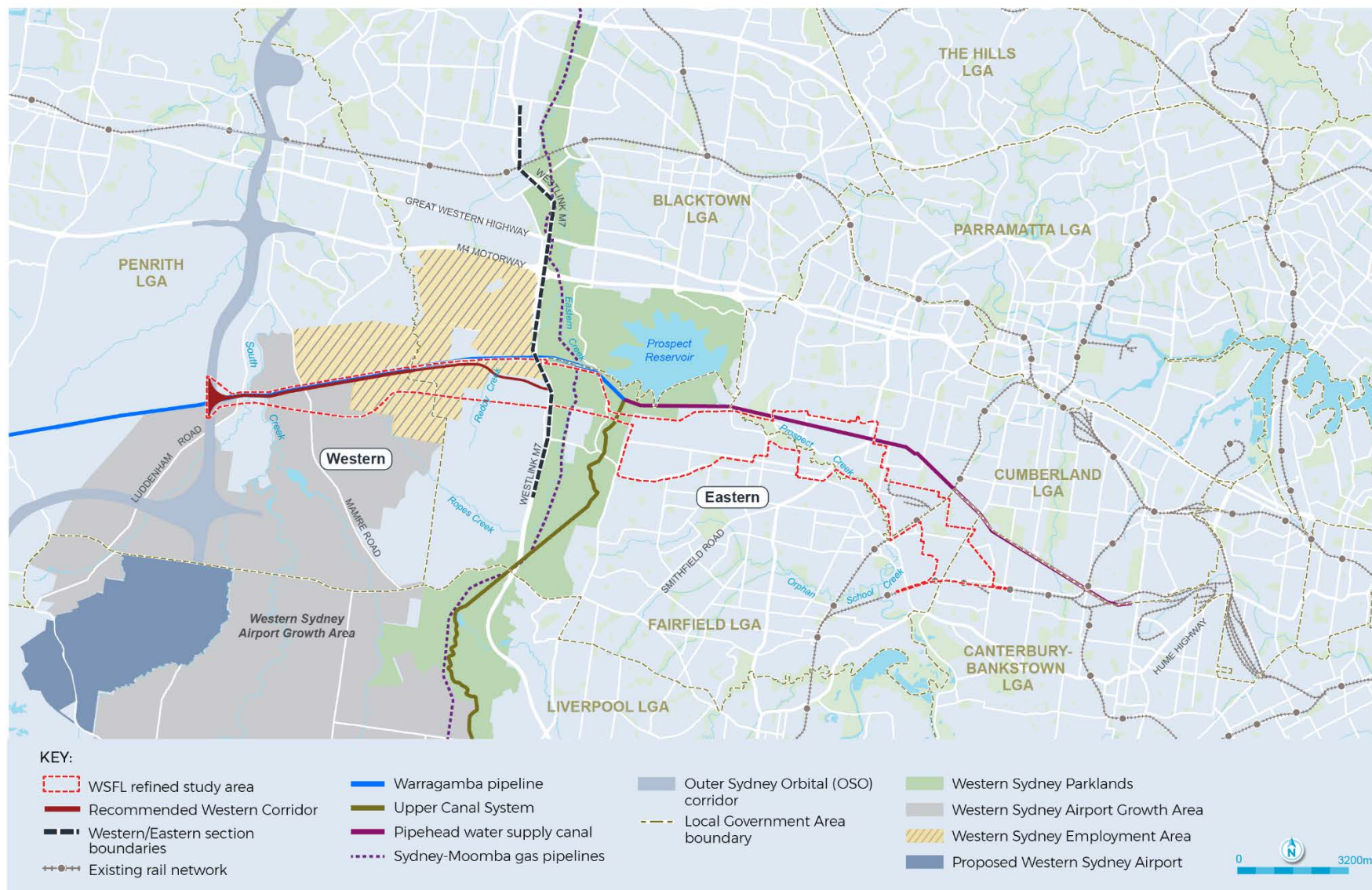


Figure ES.3 Recommended corridor (Western Section) and area subject to further study (eastern section)

1 INTRODUCTION

1.1 BACKGROUND

The need for movement of containerised freight to, from and within western Sydney is growing rapidly, particularly in relation to imported freight travelling via Port Botany. The total forecast freight volumes that have their origin or destination in western Sydney is expected to at least double from 18.5 million tonnes in 2014 to 41 million tonnes in 2041 (TfNSW, 2017). Containerised freight throughput at Port Botany is projected to grow significantly in future, from a current 2.3 million TEU to 8.4 TEU by 2045 (NSW Ports, October 2015). In recent years, Port Botany has also recorded a significant growth in rail mode share (percentage of containers transported by rail), primarily driven by operational performance initiatives within the Port Botany Landslide Improvement Strategy, which focus on continued improvements to supply chain efficiency.

Additional demand for container throughput associated with commodities has also increased rail mode share at the port, partially due to the shift of commodities from bulk freight to containerised freight. Shipments from rural areas (where most bulk exports originate) are more likely to be transported by rail than road, and more freight is moving to metropolitan intermodal terminals as additional freight imports and exports are transferred to rail.

To ease congestion on Sydney's roads, the NSW Government included a target within *NSW 2021 A Plan to Make NSW Number One* to double the proportion of container freight movements by rail through ports in NSW by 2020 (Goal 19) (NSW Government, 2011). *Navigating the Future: NSW Ports' 30 Year Master Plan* (NSW Ports, October 2015) sets a target to move three million TEU per year by rail by 2045.

The national land freight task is expected to grow significantly in the future. The *Australian Infrastructure Audit 2015* (Infrastructure Australia, 2015) found that freight rail will need to play a growing role in the movement of goods between ports and inland freight terminals. The role of freight rail will be particularly important for containerised freight, with demand for containerisation projected to grow faster than Gross Domestic Product (GDP). In order to facilitate a shift from road to rail for containerised freight movement in Sydney, additional capacity and higher levels of service are required on Sydney's rail freight network (Infrastructure Australia, 2017).

In response to this forecast growth, Transport for NSW is investigating a Western Sydney Freight Line Corridor – an east to west rail freight corridor in Sydney's west which would facilitate an extension of the dedicated freight rail network from Port Botany to the future Outer Sydney Orbital infrastructure corridor near Luddenham Road.

When delivered, the Western Sydney Freight Line would provide regional freight access to Sydney's dedicated freight rail network and enable the alternative existing passenger rail services through Blacktown and Parramatta to grow. It would also significantly contribute to shifting freight movements from road to rail transport; sustaining the *State Plan* target of doubling the percentage of containers on rail through ports in NSW by 2020 (NSW Government, 2011). The strategic need for a Western Sydney Freight Line has been discussed in several statutory planning documents detailed further in Chapter 3. The first step to a future Western Sydney Freight Line is to identify and protect a corridor for the future infrastructure. This draft Strategic Environmental Assessment aims to provide an assessment of the environmental, economic and social impacts of protecting the recommended Western Sydney Freight Corridor and provide justification for the protection of the corridor.

1.2 KEY TRANSPORT CORRIDORS OF WESTERN SYDNEY

The NSW Government is investigating and protecting land for a suite of other future transport corridors across Western Sydney. These corridors are shown in Figure 1.1 and include:

- Outer Sydney Orbital Corridor – planned to accommodate a motorway and freight line and extending over 80 kilometres from Windsor Road in the northwest and Hume Motorway in the southwest.
- North-South Rail Line Corridor – planned to service the Western Sydney Airport, new aerotropolis, and the surrounding industrial, commercial and residential lands between Bringelly and Schofields and south via Oran Park to Macarthur.
- Bells Line of Road – Castlereagh Connection Corridor – planned to accommodate a motorway which would extend from Bells Line of Road in Kurrajong Heights to the junction of Richmond Road and Westlink M7.
- South West Rail Link extension corridor – planned to extend from Leppington Station to Bringelly.

The Bells Line of Road – Castlereagh Connection, South West Rail Link Extension and the North-South Rail Line Corridor projects have no direct functional relationship to the Western Sydney Freight Line project. However, the proposed Outer Sydney Orbital Corridor would connect to and provide an extension to the Western Sydney Freight Line Corridor (as shown in Figure 1.1).

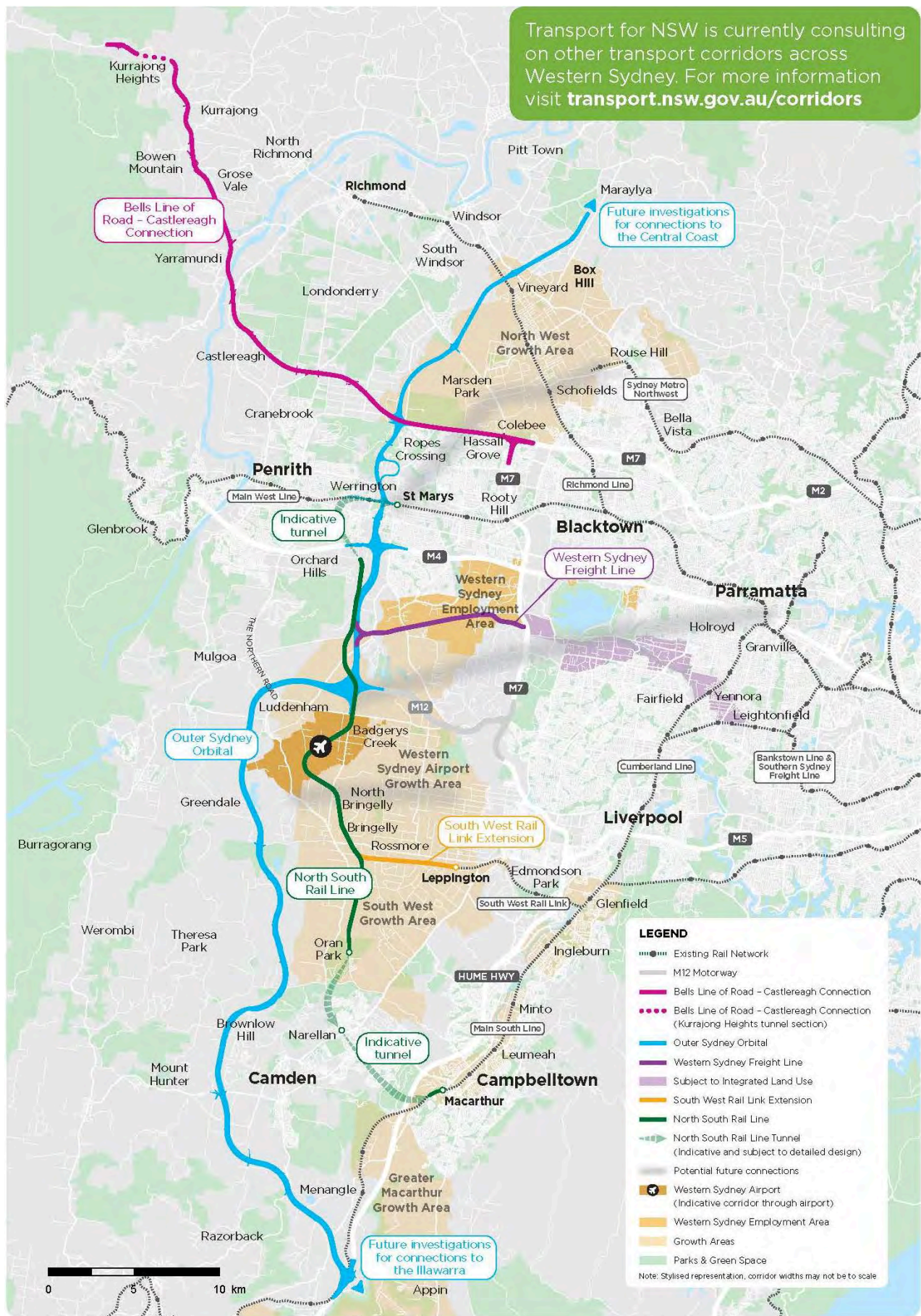


Figure 1.1 Corridors of Western Sydney

1.3 PURPOSE OF THIS DOCUMENT

The purpose of this draft Strategic Environmental Assessment is to introduce and describe the Western Sydney Freight Line Corridor, provide a strategic assessment of its environmental, social and economic constraints, and provide justification for the protection of the recommended corridor within its western section (the section of the project between the future Outer Sydney Orbital in Luddenham and the Westlink M7).

This document presents a corridor for the western section which best meets future project requirements while minimising impacts on existing land use, and the biophysical and geophysical environments. The eastern section of the Western Sydney Freight Line Corridor is identified in this Strategic Environmental Assessment as an area that will be subject to further study of integrated land use opportunities by key new Government agencies including Transport for NSW, Greater Sydney Commission, Department of Planning and Environment and relevant local Councils.

The document seeks to address the Department of Planning and Environment's Strategic Environmental Assessment Scope for the western section (Appendix A), provides an account of the existing environmental conditions of the recommended corridor, and describes potential land use and environmental opportunities, constraints and project impacts. Prior to approval of future infrastructure within the recommended corridor, as part of an Environmental Impact Statement, detailed environmental assessment of existing conditions and potential impacts would be undertaken.

This Strategic Environmental Assessment will form part of the statutory planning process leading to the protection of the recommended corridor (western section) and identification within an Environmental Planning Instrument.

Statutory planning for corridor protection within the eastern section would be undertaken in the future once further land use planning and constraints analysis has been completed and a corridor is identified.

1.4 OBJECTIVES

1.4.1 *OBJECTIVES OF WESTERN SYDNEY FREIGHT LINE CORRIDOR PROTECTION*

The key objectives of corridor protection for the Western Sydney Freight Line are to:

- allow for the future development of rail infrastructure within the Western Sydney Freight Line Corridor
- provide certainty over the future Western Sydney Freight Line Corridor location to assist with the strategic and land use planning of the surrounding area
- enable strategic acquisition of corridor land to reduce long term infrastructure cost and community disturbance.

The investigation of corridor alignments within a broad study area further considered the following key planning objectives:

- to enable a designated freight connection from the current freight network to the Western Sydney Employment Area (refer to Figure 1.2)
- to accommodate a corridor that could service a potential future western Sydney intermodal terminal site, and potentially connect to the existing Yennora intermodal terminal
- as far as possible to avoid residential areas and provide opportunities to service existing industrial areas
- to facilitate a future Western Sydney Freight Line that reduces regional and western Sydney intermodal rail freight from the town centres of Parramatta and Blacktown
- to consider construction of a freight line which is sympathetic to the topography of the study area
- to provide opportunities to renew existing industrial areas such as Wetherill Park and Yennora
- to provide the shallowest grades possible and minimises geophysical constraints including flood risk
- to provide the opportunity for other freight tasks to transfer to rail, through the construction of new sidings in industrial areas.

The study area used during the development of a recommended corridor for the Western Sydney Freight Line spans from Strathfield in the east to Luddenham (south) and Orchard Hills (north) in the west. The southern boundary extended from Yagoona in the east, to Mount Vernon in the west. The northern boundary extended from City of Auburn in the east, through Blacktown and concludes near North St. Marys in the west. The broad study area included areas within the following five local government areas: Penrith City Council, Blacktown City Council, Fairfield City Council, Cumberland Council and Canterbury-Bankstown Council and is primarily located within the Western City District of the Greater Sydney Region as defined by the Greater Sydney Commission District Plans.

Protection of the corridor precedes any funding commitment necessary for project delivery. It facilitates protection of the land within the corridor to allocate it for future freight rail use. A recommended corridor has been identified for the western section (refer section 1.7) whilst an area within the eastern section has been identified but will be subject to further study of integrated land use opportunities to determine a recommended corridor.

1.4.2 *OBJECTIVES OF THE FUTURE WESTERN SYDNEY FREIGHT LINE*

The key objectives of the future Western Sydney Freight Line are to:

- efficiently connect western Sydney with the existing and future freight rail network including the Main Western Rail Line, and the proposed Outer Sydney Orbital Corridor, the Southern Sydney Freight Line and Main South Rail Line
- reduce the cost of transporting goods across Sydney and throughout NSW by expanding the current dedicated freight rail network
- provide freight rail connections to serve the Western Sydney Airport Growth Area and help distribute the goods and services Sydney use everyday
- provide regional freight with future access to Sydney's dedicated freight network to facilitate exports via Port Botany and Port Kembla
- reduce future growth in truck kilometres in Sydney's roads by moving more freight by rail
- further separate freight and passenger rail services in western Sydney to allow growth and improve reliability across networks.

1.5 DESIGN AND OPERATIONAL REQUIREMENTS

A future Western Sydney Freight Line would be built in the short to medium term – around 10 to 20 years (subject to land reservation and project approvals) and would service existing industrial estates as well as the new Western Sydney Airport Growth Area. To meet the objectives for the corridor, the line would need to connect to the Southern Sydney Freight Line near Leightonfield and the Main West Rail Line via the proposed Outer Sydney Orbital Corridor, and would include the opportunity to provide a connection to a possible future intermodal facility.

The Western Sydney Freight Line Corridor would be between 60 and 80 metres wide and approximately 30 kilometres long, including both the western and eastern section.

This Strategic Environmental Assessment predominantly relates only to the western section (refer Figure 1.2). The recommended corridor within the western section would provide for the future infrastructure project footprint whilst considering constraints, environmental impacts and constructability challenges identified during the delivery phase of the project.

Trains operating on the future Western Sydney Freight Line are expected to be diesel locomotives, although the design would not preclude future electrification. The length of the future trains would vary with Port Botany shuttle services being approximately 640 metres long, and regional and interstate services up to 1800 metres long.

When operational, the future Western Sydney Freight Line would provide a dedicated freight link. Services on the line are expected to haul commodities including (but not limited to) manufactured goods, coal, grains, minerals, agricultural commodities, export and import consumer goods.

The design of the corridor provides for a double track railway compliant with ARTC standards, that can achieve a design speed of 80 kilometres per hour or greater, consistent with the operating specification of trains. It is envisaged that while the corridor is planned for double track, construction may be staged with some sections initially built as single line with passing loops. The line would generally provide 1:100 grades, consistent with the grades on the Metropolitan Freight Network for freight services accessing Port Botany. The recommended corridor provides for 800 m minimum curve radii to minimise wheel squeal and reduce track maintenance. All road crossings within the future project would be grade separated crossings.

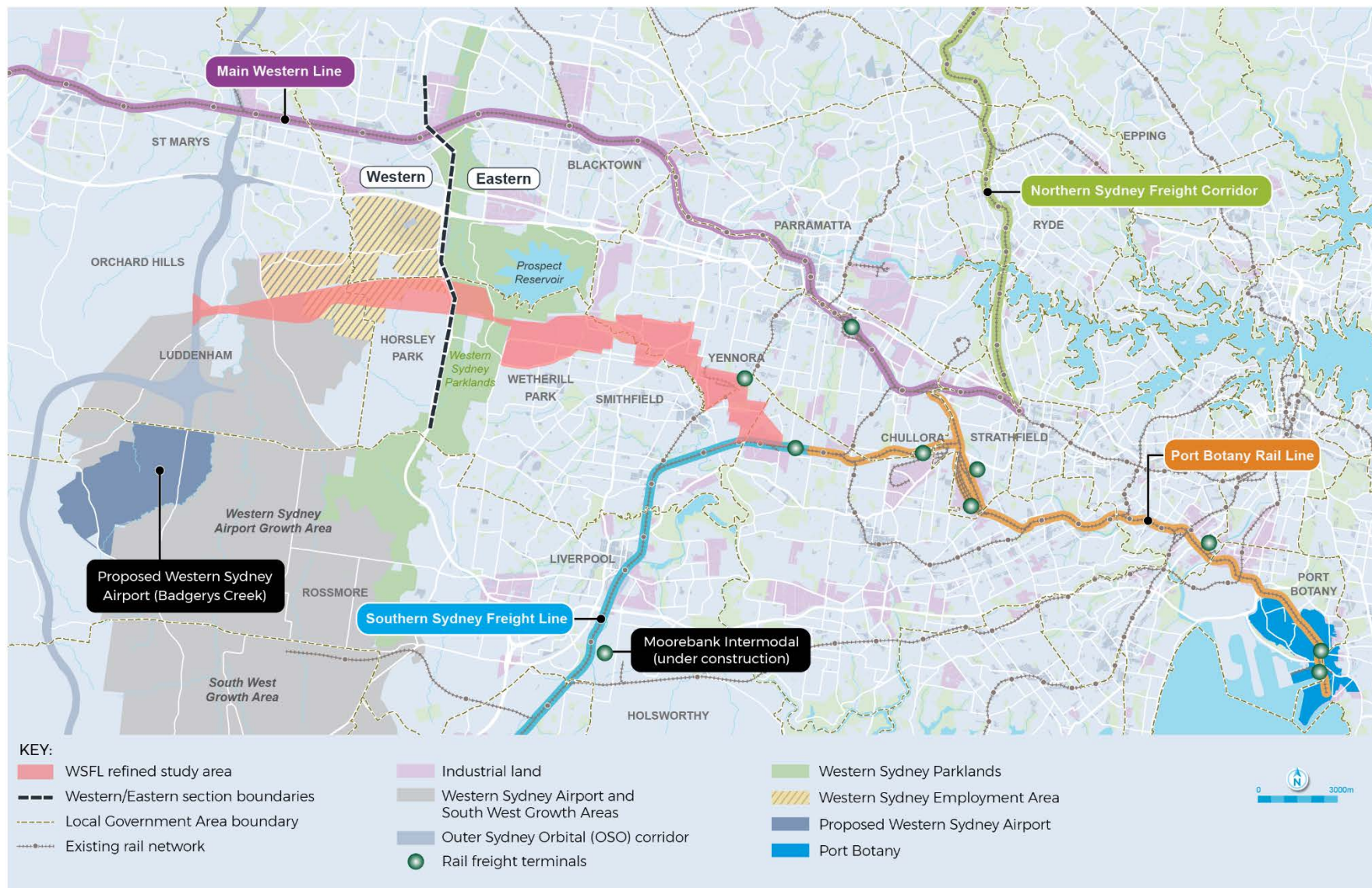


Figure 1.2 Regional context

1.6 CORRIDOR AREA FOR INVESTIGATION

The recommended Western Sydney Freight Line Corridor is located around 28 kilometres west of the Sydney CBD at its eastern end, and spans from the connection with the Southern Sydney Freight Line in the east to the connection with the proposed Outer Sydney Orbital Corridor in the west (Figure 5.1). The project would potentially interface with the Main South Rail Line and crosses the Westlink M7.

Overall the Western Sydney Freight Line Corridor is being planned as an end-to-end future freight rail line connecting the Southern Sydney Freight Line near Leightonfield and the proposed Outer Sydney Orbital Corridor near Luddenham. The corridor is being investigated and ultimately protected as sections with the Westlink M7 as a defining boundary:

- A western section, extending from the future Outer Sydney Orbital near Luddenham to the Westlink M7.
- An eastern section, extending from the Westlink M7 to the connection with the Southern Sydney freight Line near Leightonfield.

The corridor for the western section shown in Figure 1.3 was determined to best meet future project requirements while minimising impacts on the existing land use, as well as biophysical and geophysical environments. It starts west of Luddenham Road and ends at the Westlink M7 and passes through established industrial areas west of the Westlink M7. The investigation of alignment options in the refined study area are discussed further in Chapter 4.

The eastern section of the Western Sydney Freight Line project has several challenging land use and environmental issues that need to be addressed further before a corridor can be determined. It is therefore identified in this Strategic Environmental Assessment (Figure 1.3) as an area that will be subject to further study of integrated land use opportunities by key Government Agencies including Transport for NSW, Greater Sydney Commission, Department of Planning and Environment and relevant local councils. This area is presented in this Strategic Environmental Assessment to generally indicate the overall project alignment, for information only. Statutory planning for corridor reservation would be undertaken in the future once further land use planning and constraints analysis has been completed and a corridor is identified.

The recommended corridor is discussed further in section 5.1.

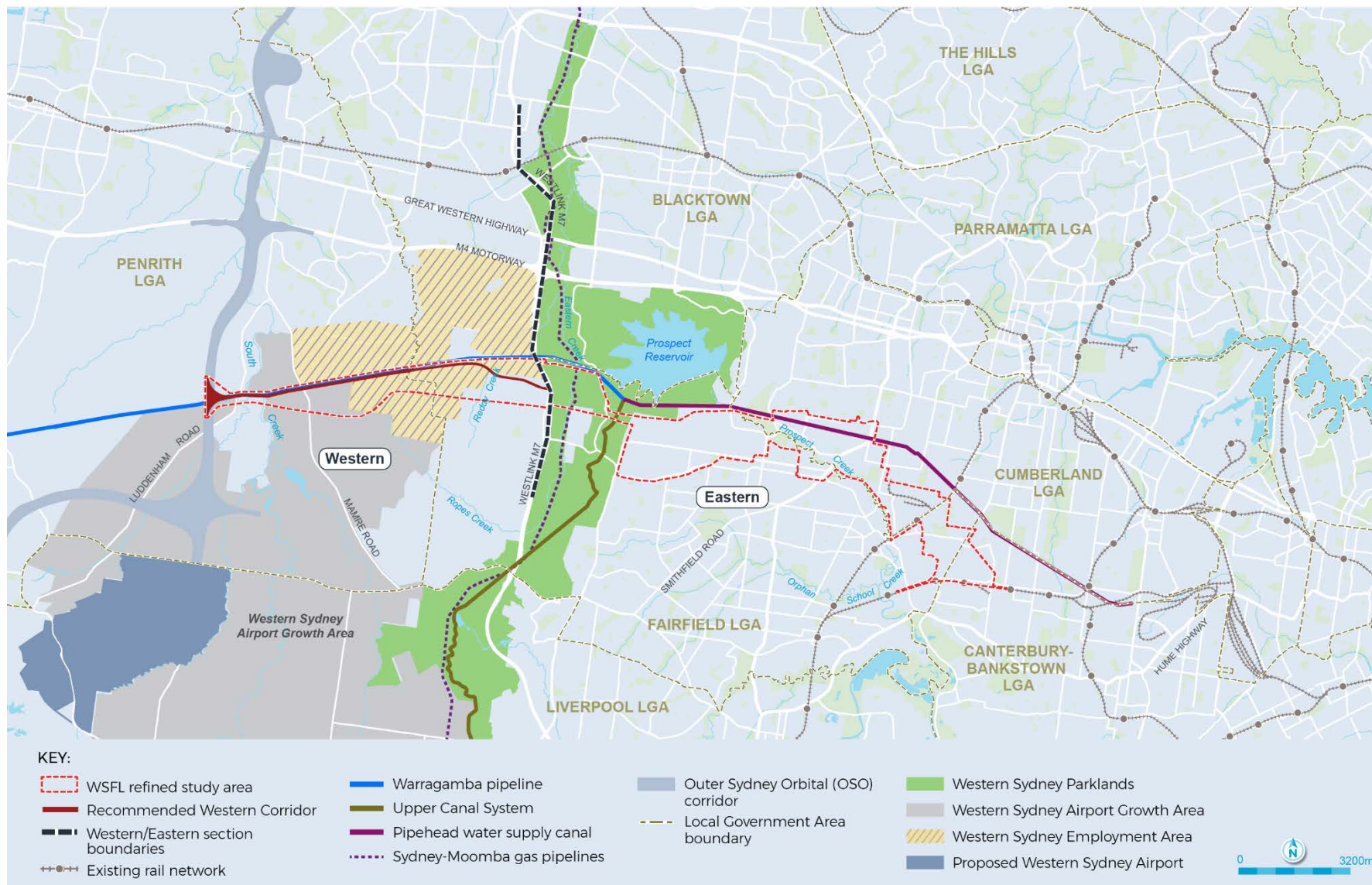


Figure 1.3 Study area

2 CORRIDOR PROTECTION PROCESS

The corridor protection process is outlined within the *Planning Guideline for Major Infrastructure Corridors* (the Guideline') produced by the NSW Department of Planning and Environment (DPE, 2015). The approach used to define a corridor is shown in Figure 2.1.

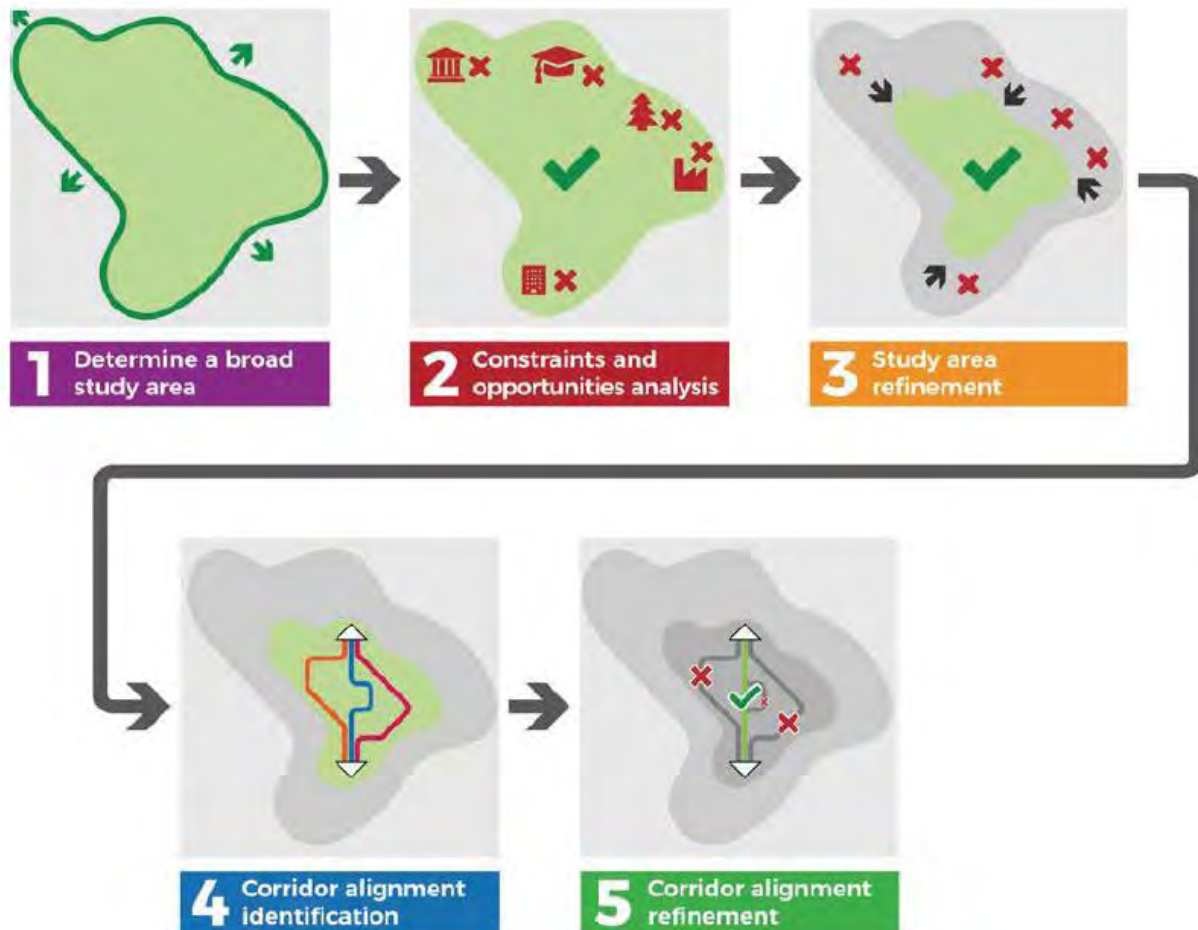


Figure 2.1 Corridor identification approach

The Guideline has also provided separate investigation requirements to ensure an appropriate recommended corridor is identified for planning protection that can adequately address any needs of consideration for social, environmental and economic matters. These investigation requirements are included in the template included as part of the guidelines.

The corridor protection and construction process provided in Figure 2.2 involves consideration of feedback based on consultation with agencies, landowners and other stakeholders during the planning and corridor protection phase.

Specific stages in the corridor protection process identified in the Guidelines are further described in the following sub sections.

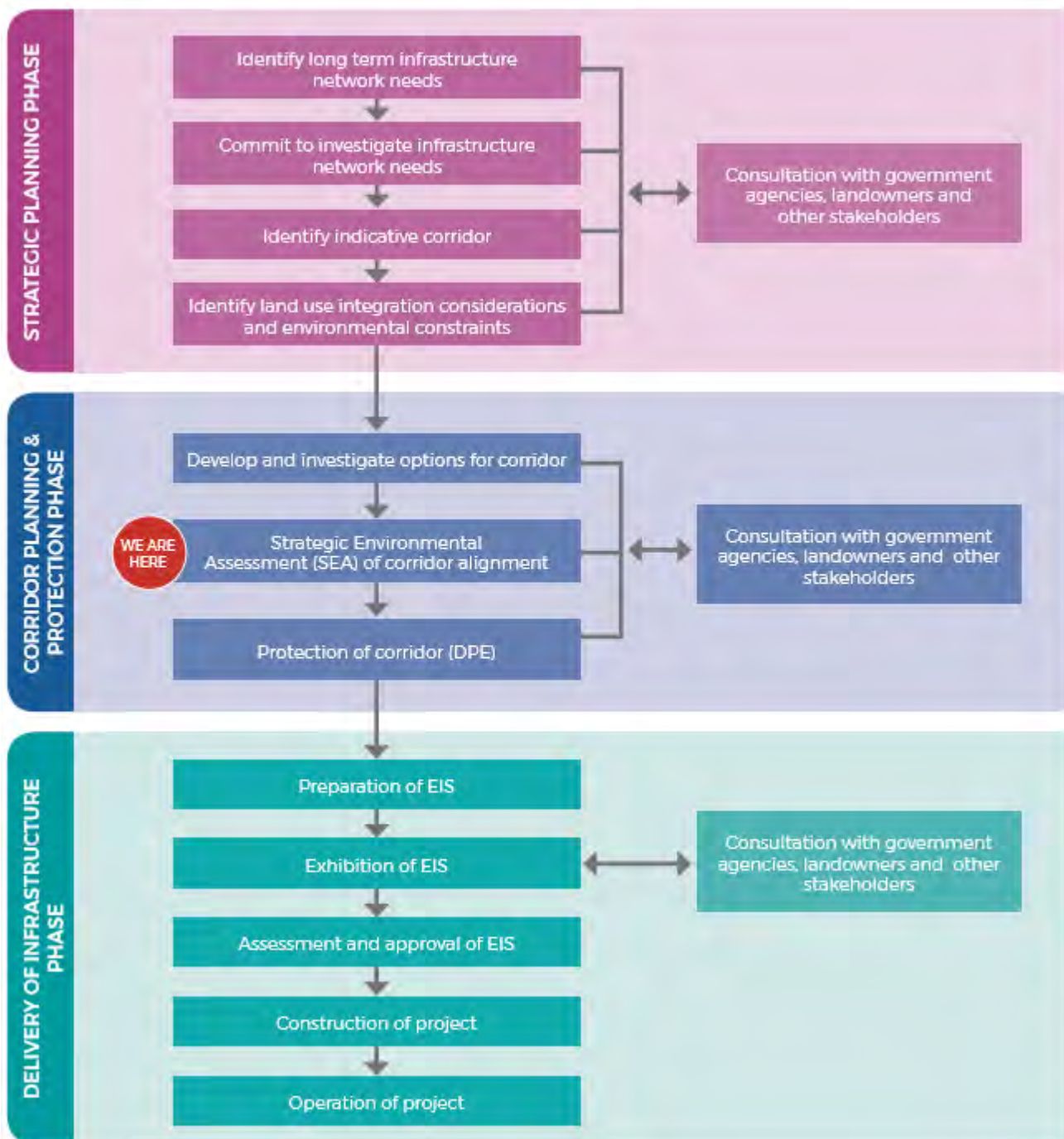


Figure 2.2 Corridor protection and consultation process

2.1 STRATEGIC PLANNING PHASE

The strategic planning phase is the first phase in the corridor protection and infrastructure delivery process providing early identification and discussion of a corridor in strategic plans such as draft *Future Transport Strategy 2056* (NSW Government, 2017) and the draft *Freight and Port Plan, Future Transport 2056* (NSW Government, 2017). The objective of this phase is for government and the community to have oversight of future major infrastructure corridors. The strategic planning phase also allows for strategic integration between potential infrastructure and future land uses. Early protection of a corridor for major infrastructure will inform and shape future land use and investment decisions.

Early corridor protection:

- provides greater certainty for land use planning
- minimises encroachment of incompatible urban development on the corridor
- encourages supportive land uses around proposed transport modes
- provides a ‘value for money’ approach through forward planning by reducing the costs of private property acquisition in future.

The strategic planning phase of the Western Sydney Freight Line Corridor identified:

- the need for the corridor as set out in strategic plans such as *Draft Future Transport Strategy 2056* (NSW Government, 2017) and the *Draft Freight and Ports Plan, Future Transport 2056* (NSW Government, 2017)
- key requirements for interfaces between the future Western Sydney Freight Line and other infrastructure corridors
- key economic benefits and risks associated with the Western Sydney Freight Line Corridor and future Western Sydney Freight Line
- high level constraints for consideration during corridor selection.

Through early evaluation of these constraints and requirements, the refined study area presented in this report was identified for further investigation to identify a recommended corridor.

2.2 CORRIDOR PLANNING AND PROTECTION

This draft Strategic Environmental Assessment forms part of the corridor planning and protection phase of the corridor process. The document is informed by technical and preliminary environmental assessment work undertaken to determine a recommended corridor (this process is described in detail in chapter 5). The document establishes the policy context, rationale and need for both the protection of the corridor, and the case for the future infrastructure.

Chapter 4 of this document also provides a desk-based assessment of the existing environment of the refined study area (including for the eastern section, where reservation of a corridor would be undertaken at a future stage). The evaluation of the existing environment included identification of constraints and opportunities, which have underpinned the selection of the recommended corridor for the western section, and would be considered in future for the identification of the eastern section.

Chapter 6 of this document provides a preliminary assessment of the environmental impacts of the recommended corridor. It also provides recommended mitigation management measures and future assessment requirements that would have to be undertaken through design development and the formal environmental assessment of the future infrastructure. A key feature of this preliminary assessment is to identify the key considerations in determining a final project footprint for the recommended corridor.

This draft Strategic Environmental Assessment will be placed on public exhibition by Transport for NSW, during which time the community, landowners, businesses and other stakeholders will have the opportunity to submit comments on the proposed recommended corridor. The document will be co-exhibited with a draft State Environmental Policy (SEPP), a statutory planning instrument prepared by the Department of Planning and Environment that, once gazetted, will give legal effect to the protection of the corridor and apply suitable development controls for land within and either side of the

recommended corridor. This draft Strategic Environmental Assessment effectively provides the evidence base to support corridor protection to allow for an informed decision to gazette the draft SEPP.

2.3 DELIVERY OF INFRASTRUCTURE

The delivery of infrastructure phase is focussed on the approval and delivery of the finalised project. This would likely include development of a detailed design, an environmental impact assessment under the *Environmental Planning and Assessment Act 1979* (EP&A Act), and construction of the approved project. Once construction is completed, the infrastructure would become operational.

Given the growth of the freight task for Greater Sydney and NSW, it is anticipated that the future Western Sydney Freight Line would need to be operational in the short-to-medium term, however at this point no funding has been allocated by Government for delivery of the infrastructure. Further consultation with the community and other stakeholders would be undertaken during the preparation of the environmental impact assessment for the construction of the future Western Sydney Freight Line.

3 STRATEGIC CORRIDOR JUSTIFICATION

3.1 FEDERAL AND STATE GOVERNMENT POLICY CONTEXT

3.1.1 BACKGROUND TO CURRENT POLICY FRAMEWORK

The Australian and NSW Governments seek to identify and protect major infrastructure corridors as part of an integrated land and transport planning approach.

At the federal level, corridor protection for the future Western Sydney Freight Line Corridor is listed as a high priority initiative within Infrastructure Australia's *Infrastructure Priority List* (Infrastructure Australia, 2017)¹. To support the Western Sydney Freight and other initiatives, Infrastructure Australia is proposing a corridor protection regime which is explored in *Corridor Protection – Planning and Investing for the Long Term* (Infrastructure Australia, 2017)³.

In October 2017, the Greater Sydney Commission released the Draft Greater Sydney Region Plan, *Our Greater Sydney 2056* (GSC, 2017)¹, to provide the metropolitan planning strategy to 2056 and to update *A Plan for Growing Sydney* (DPE, 2014). Objective 16 of the Plan is to ensure the freight and logistics network is competitive and efficient, and the plan states that:

A dedicated freight rail connection from Port Botany to the Western Parkland City will increase the proportion of freight moved by rail. This will boost the economic potential of surrounding industrial precincts in western Sydney such as Smithfield and Wetherill Park.

Objective 17 seeks to ensure that 'regional transport is integrated with land use', and it specifically identifies the Western Sydney Freight Line Corridor.

The protection of the Western Sydney Freight Line Corridor has also previously been identified in NSW Government strategies including the *NSW Long Term Transport Master Plan* (TfNSW, 2012), the *NSW Freight and Ports Strategy* (TfNSW, 2013), the *ARTC 2015-2024 Sydney Metropolitan Freight Strategy* (ARTC, 2015), and the *State Infrastructure Strategy Update 2014* (Infrastructure NSW, 2014). A coordinated program to protect major infrastructure corridors has not been enacted in NSW since the 1960s, leading to heightened costs of land acquisition and greater community impacts due to urban development.

The *NSW Long Term Transport Master Plan* (TfNSW, 2012) and the *NSW Freight and Ports Strategy* (TfNSW, 2013) identified the Western Sydney Freight Line Corridor as part of a comprehensive program to identify and protect major infrastructure corridors within a strengthened planning framework.

In 2014, the Productivity Commission's Inquiry into Public Infrastructure found the lack of protected land for future corridors was a considerable factor in the cost of delivering public infrastructure projects. Infrastructure NSW and the Department of Planning and Environment subsequently commenced investigations to identify impediments to the protection of major infrastructure corridors in NSW. The NSW Government announced \$100 million of Rebuild NSW's funding to be allocated to corridor identification and protection, as a part of Infrastructure NSW's *State Infrastructure Strategy Update 2014*. Additionally, the Department of Planning and Environment released the *Planning Guideline for Major Infrastructure Corridors* (DPE, 2015) which has informed this strategic environmental assessment and will help shape the process for the protection of infrastructure corridors.

3.1.2 AUSTRALIAN GOVERNMENT POLICY

3.1.2.1 INFRASTRUCTURE PRIORITY LIST 2017

The protection of a corridor for the future Western Sydney Freight Line is listed as a 'high priority' initiative in Infrastructure Australia's *Australian Infrastructure Priority List* (Infrastructure Australia, 2017). This list identifies that the core objective of the initiative is to address the growing freight task in Sydney through a reduction in the growth of truck movements on the Sydney road network. It also seeks to increase rail freight capacity and reduce delays to freight trains on the Main West Rail Line, where passenger trains have priority. Infrastructure Australia acknowledges that protection of the corridor is the first step to achieving this objective.

3.1.2.2 CORRIDOR PROTECTION PAPER

In 2017, Infrastructure Australia prepared the *Corridor Protection: Planning and investing for the long term in 2017*. (Infrastructure Australia 2017)³ to outline the case for effective corridor protection for future infrastructure projects. The paper demonstrated the economic benefits of early protection and included a summary of issues that would require addressing for effective corridor protection. The paper reviewed seven corridor areas including the Western Sydney Freight Line Corridor and the proposed Outer Sydney Orbital Corridor.

The paper identified that lessons could be gained from Australia's previous track record of effective early corridor protections, and that if undertaken immediately, would deliver substantial cost and risk reduction for governments. The findings were based on rising demand in growing cities that would drive acquisition costs in the future.

3.1.2.3 NATIONAL LAND FREIGHT STRATEGY

In 2012, the Australian Government Department of Infrastructure and Transport released the *National Land Freight Strategy – A place for freight* (Commonwealth of Australia, 2012). The objective of this strategy is to improve the efficiency of freight networks, minimise the negative impacts associated with freight movement and influence policy making relevant to the movement of freight. The strategy identifies challenges to ensure there are long-term, integrated plans in place for freight. It also recognises the importance of integrated planning, identifying current and future places for freight, and precinct and corridor protection. The protection of land for the future Western Sydney Freight Line is consistent with the objective of this strategy and its long-term directions. On 24 November, 2016 the Australian Government announced it will develop a national freight and supply chain strategy to increase the productivity and efficiency of Australia's freight supply chain (The National Freight and Supply Chain Strategy) which will supersede the 2012 National Land Freight Strategy. The Australian Government strategy will be informed by the findings of an independent inquiry that is currently under way.

3.1.2.4 NATIONAL PORTS STRATEGY

Infrastructure Australia and the National Transport Commission prepared a National Ports Strategy in 2011 (Infrastructure Australia & National Transport Commission, 2011) that was endorsed by the Council of Australian Governments in July 2012. The purpose of the National Ports Strategy is '*to drive the development of efficient, sustainable ports and related freight logistics that together support the needs of a growing Australian community and economy and the quality of life aspirations of the Australian people*'.

An objective for the National Ports Strategy is to improve the efficiency of port-related freight movement across infrastructure networks particularly through better planning. Improvements to land use planning and corridor protection were identified as a key issue to improve the performance of ports. Accordingly, a protected corridor to improve the efficiency of port related freight movement across infrastructure networks is consistent with the Strategy.

Actions that support a future Western Sydney Freight Line include:

- Action 1.2 – ‘Identify the landside access routes of strategic importance to the efficient function of the system of the relevant port and designate these as national port freight corridors’.
- Action 1.3 – ‘Identify for each metropolitan area the inland intermodal terminals, industrial/warehousing lands or other nodes that generate substantial amounts of port related freight traffic’.

Infrastructure Australia is considering mechanisms to achieve the reservation of corridors and relevant lands.

3.1.3 NSW STATUTORY LAND USE POLICIES

3.1.3.1 A PLAN FOR GROWING SYDNEY

A Plan for Growing Sydney (Department of Planning & Environment, 2014) describes a vision for Sydney as a strong global city with superior standards of liveability, which is achieved through a set of goals such as a competitive economy with world-class services and transport. The plan acknowledges that western Sydney is a key region for the overall success of Sydney and is a key hub for Sydney’s freight industry.

The Western Sydney Freight Line is relevant to this Plan under:

- Direction 1.4: Transform the productivity of western Sydney through growth and investment.
- Direction 1.4.1: Improve transport links and create a new services centre and industrial precinct to support the growth of Badgerys Creek Airport.
- Direction 1.5: Enhance capacity at Sydney’s gateways and freight networks.
- Direction 1.11: Deliver infrastructure.

The Plan outlines the need to “*preserve the land needed for a major intermodal terminal and for a related Western Sydney freight line between Port Botany and within the Western Sydney Employment Area*”.

Specifically, the following actions commit the Government to protecting the land needed for the Western Sydney Freight Line:

- Action 1.4.2: Develop new strategic employment corridors along transport infrastructure investments that will service Badgerys Creek Airport.
- Action 1.5.2: Support the productivity of the freight network by identifying buffers around key locations on the freight network.
- Action 1.11: Preserve future transport and road corridors to support future growth.

3.1.3.2 OUR GREATER SYDNEY 2056

In November 2016, the Greater Sydney Commission released *Towards our Greater Sydney 2056*, a draft amendment to *A Plan for Growing Sydney* released in conjunction with the then six draft district plans for Greater Sydney. The document introduced the ‘Three Cities’ concept that responded to the emergence of both the Greater Parramatta and Olympic Park area, and the Federal Government’s decision to build a Western Sydney Airport at Badgerys Creek. It additionally introduced the concept of the 30-minute city, whereby residents of Sydney should not need to travel more than 30 minutes to work. In this regard the plan was predicated on strong employment and population growth in western Sydney.

GREATER SYDNEY REGIONAL PLANS

Following public consultation in late 2016 and early 2017, the Greater Sydney Commission in October 2017 released the successor document – the *Draft Greater Sydney Regional Plan* (Greater Sydney Commission, 2017)¹. This plan once adopted will replace *A Plan for Growing Sydney* and will guide future land use planning in Sydney. The draft plan identifies several key metropolitan priorities for the growth of Sydney including the desire to increase Greater Sydney’s total economic activity by 75 per cent to approximately \$655 billion by 2036. The *Draft Greater Sydney Regional Plan* also outlines commitments to establish growth within the newly designated ‘Western Parkland City’ which aims to

deliver additional housing, jobs and infrastructure to western Sydney. A key objective of the plan is to deliver a competitive freight and logistics network. A future Western Sydney Freight Line is discussed in Objective 20 of the plan associated with the creation of economic catalysts for the Western Parkland City and is shown in the Western City Structure Maps (refer to Figure 3.2). Protection of a corridor for a potential future Western Sydney Freight Line would assist in fulfilling this objective. The *Draft Greater Sydney Regional Plan* is supported by the Draft District plans including the *Draft Western City District Plan* (Greater Sydney Commission, 2017)².

3.1.3.3 WESTERN SYDNEY EMPLOYMENT AREA

The Western Sydney Employment Area was established by the NSW Government to provide businesses in the region with land for industry and employment, including transport and logistics, warehousing and office space. The *State Environmental Planning Policy (Western Sydney Employment Area) 2009* established objectives for the area that include:

- promotion of economic development
- provision of coordinated planning and development of land
- rezoning of land for employment or environmental conservation purposes
- improvement of certainty and regulatory efficiency by providing a consistent planning regime for future development and infrastructure
- assurance that development occurs in a logical, environmentally sensitive, and cost-effective manner
- commitment to conserve and rehabilitate areas which have a high biodiversity, heritage or cultural value.

The Western Sydney Freight Line would bring opportunities for industrial expansion in the area. Additionally, the identification and protection of a recommended corridor west of the Westlink M7 for the Western Sydney Freight Line would improve the certainty regarding the expansion of industry in the area as it will provide a ready link into the existing freight network. The Western Sydney Employment Area is shown in Figure 3.1.

3.1.3.4 WESTERN SYDNEY AIRPORT GROWTH AREA

Following the announcement of the Western Sydney Airport, the Western Sydney Airport Growth Area was created (as shown on Figure 3.1). A land use and infrastructure implementation plan is being prepared by the Department of Planning and Environment for the area and is anticipated to be publicly exhibited in 2018.

The Western Sydney Airport Growth Area intends to provide for new jobs, homes and services around the planned Western Sydney Airport at Badgerys Creek. One of the main objectives of the Western Sydney Airport Growth Area is to investigate opportunities to integrate planning, including access and infrastructure with the planned Western Sydney Airport and regional cities such as Liverpool and Penrith by the Department of Planning and Environment. The future Western Sydney Freight Line would connect the region to the wider Sydney freight network as well as opportunities for economic development in the area.

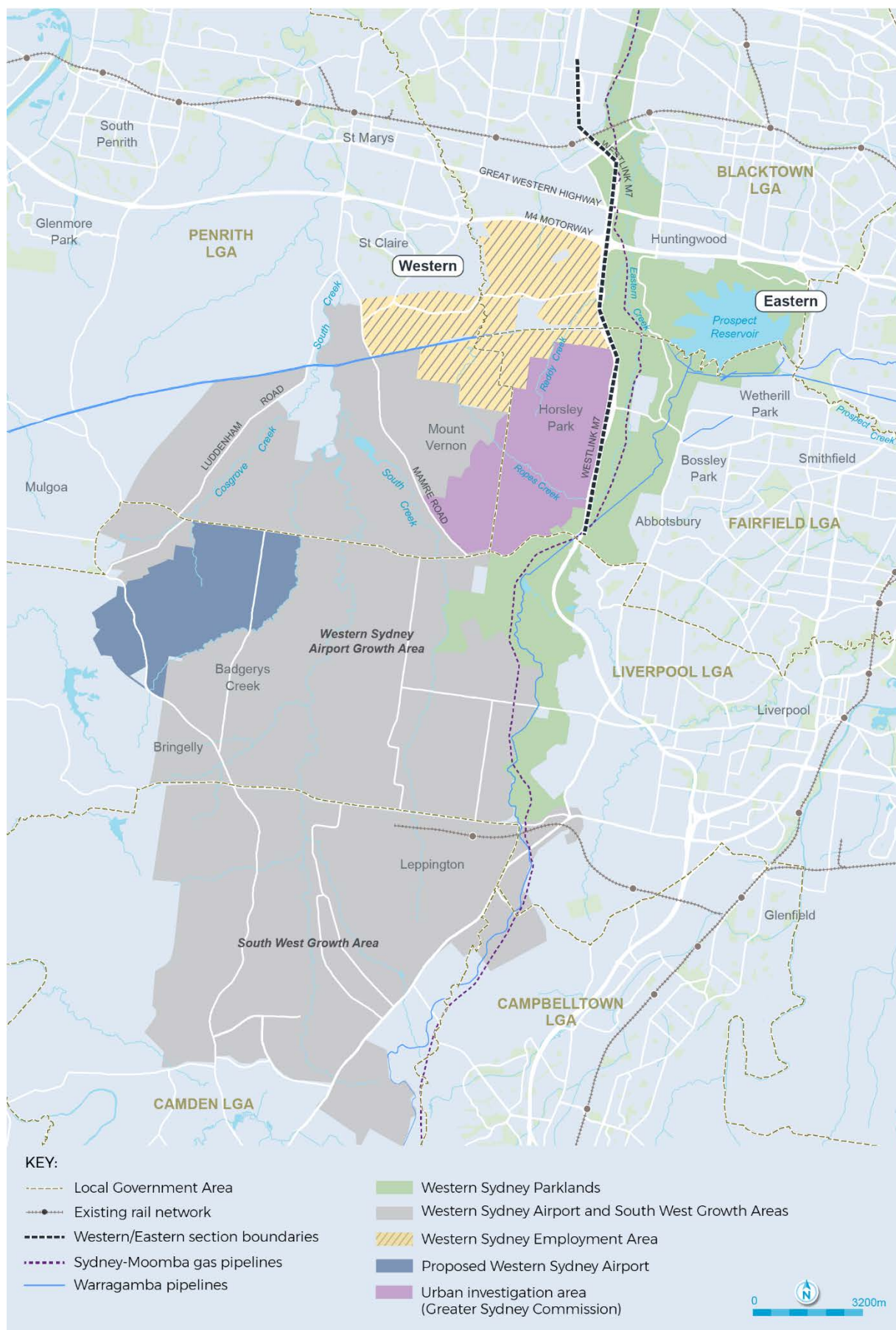
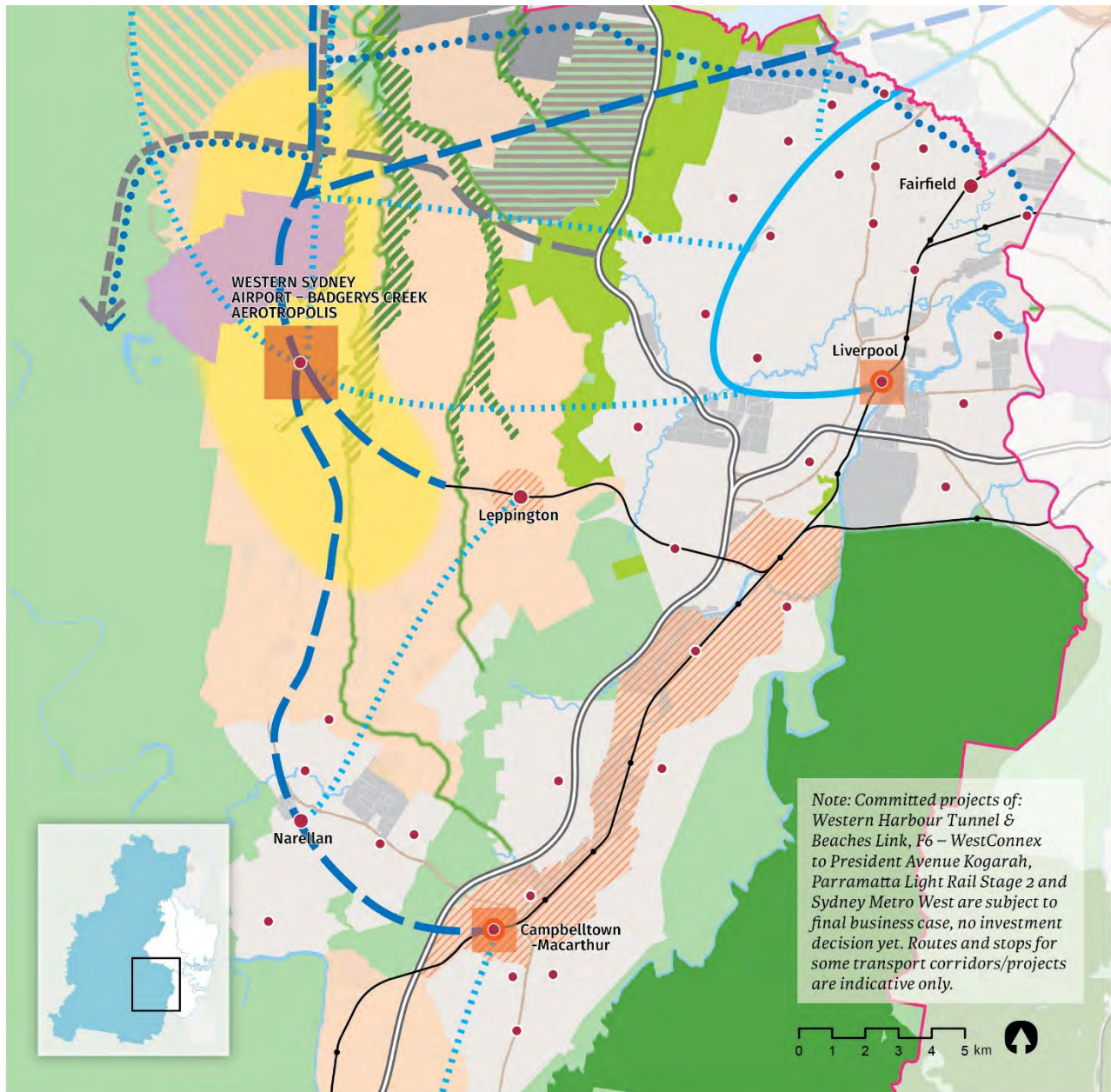


Figure 3.1 Western Sydney Employment Area and Western Sydney Airport Growth Area (DPE, 2017)



	Metropolitan City Centre		Land Release Area		Waterways		Rapid Bus
	Metropolitan City Cluster		Urban Renewal Area		Train Station		Motorway
	Health and Education Precinct		Priority Growth Area Investigation		Committed Train Link		Committed Motorway
	Strategic Centre		Urban Investigation Area		Train Link / Mass Transit Investigation 0-10 years		Road Investigation 0-10 years
	Local Centre		Urban Area		Train Link / Mass Transit Investigation 10-20 years		Road Investigation 10-20 years
	Economic Corridor		Protected Natural Area		Freight Rail Investigation		Green Grid Priority Project
	Trade Gateway		Metropolitan Rural Area		Light Rail		
	Western Sydney Employment Area		Major Urban Parkland and Reserve		Light Rail Investigation		
	Industrial Land		Visionary Parkland and Reserve		On Street Rapid Transit		

Figure 3.2 Western City structure map – south (GSC, 2017)²

3.1.4 NSW GOVERNMENT INFRASTRUCTURE POLICIES

3.1.4.1 NSW 2021

In 2011, the NSW Government released *NSW 2021: A plan to make NSW number one* (NSW Government, 2011). This document provides a 10-year plan to guide strategic policy making and infrastructure delivery in NSW.

The plan includes a target of enhancing rail freight movement in NSW by doubling ‘the proportion of container freight movement by rail through ports in NSW by 2020’. The plan states that shifting freight movements to rail is a priority action to maximise capacity at Port Botany and reduce truck movements on the NSW road network. Another priority action was to develop and deliver the *NSW Freight Strategy* (delivered in November 2013), which would be integrated with strategic land use and transport planning, consistent with the objectives of the Western Sydney Freight Line Corridor (discussed in section 1.4).

3.1.4.2 NSW PREMIER PRIORITIES

In September 2015, the NSW Premier released 30 ‘state priorities’, including 12 ‘premier priorities’ to grow the economy, deliver infrastructure, and improve health, education and other services across NSW (NSW Government, 2017). Key priorities relevant to a future Western Sydney Freight Line include building infrastructure and creating jobs.

The protection of the Western Sydney Freight Corridor is a first step to building freight rail infrastructure. The Western Sydney Freight Line Corridor will enable future infrastructure to deliver increased rail mode share for freight in western Sydney and reduce the current congestion costs of transporting freight via road, especially around Port Botany. The Western Sydney Freight Line will create employment by encouraging development of intermodal and other employment lands.

3.1.4.3 NSW LONG TERM TRANSPORT MASTER PLAN

In 2012 the *NSW Long Term Transport Master Plan* (The Plan) (TfNSW, 2012) was released. The Plan is an overarching framework that identifies the current challenges in the NSW transport system. It aims to guide long-term and detailed transport plans, policy decisions, reforms and funding decisions, and enable an integrated transport system capable of supporting the state’s economic and social performance over the next 20 years. The Plan provides a direct link to national strategies and integrates with state and metropolitan infrastructure and land use plans. The Plan also aims to support other plans such as the *NSW Freight and Ports Strategy* (TfNSW, 2013).

The Plan focuses on five key transport challenges:

- 1 Integrating modes to meet customer needs
- 2 Getting Sydney moving again
- 3 Sustaining growth in Greater Sydney
- 4 Providing essential access for regional NSW
- 5 Supporting efficient and productive freight.

The challenges of ‘sustaining growth in Greater Sydney’ and ‘supporting efficient and productive freight’ have direct relevance to future need and strategic justification for a Western Sydney Freight Line Corridor. The challenge of ‘providing essential access to regional NSW’ is also addressed by protecting land for a freight corridor, which aims to improve freight connections between Port Botany, western Sydney and ultimately regional NSW. The other two challenges of ‘integrating modes to meet customer needs’ and ‘getting Sydney moving again’ are largely related to passenger transport, not freight. However, a future Western Sydney Freight Line Corridor would enable increased separation of freight and passenger services on the Main West Rail Line, which would increase the efficiency and capacity of public transport in western Sydney.

The Plan specifically recognises the ‘benefit in improving freight efficiency and productivity through major investments and efficiencies in the road and rail freight networks and at ports, airports and intermodal terminals’. It therefore supports the future Western Sydney Freight Line Corridor and has the following benefits for western and greater Sydney by:

- reducing road congestion particularly around Port Botany, M4 Western Motorway, M5 South Western Motorway and Westlink M7. However, the growth in freight may make the road congestion reduction temporary
- alleviating the constraints on freight handling at Port Botany by removing current conflicts of passenger and port freight tasks and increasing the capacity of freight movements
- supporting Sydney’s (and more broadly NSW and Australia’s) growing population and increasing demand for containerised freight
- supporting a future increase of rail freight mode share and thereby reducing the growth of heavy vehicles on Sydney’s congested motorway network
- improving overall environmental and social outcomes by reducing truck kilometres, particularly the impacts from air pollution and greenhouse gas emissions from heavy vehicles, fuel consumption, waste generation, noise, vibration, congestion costs and road trauma.

3.1.4.4 FUTURE TRANSPORT 2056

The *Draft Future Transport Strategy 2056* (NSW Government, 2017) is the 2017 update of the NSW Long Term Transport Master Plan. It is a 40-year vision for mobility in NSW being developed with the Greater Sydney Commission, the Department of Planning and Environment, and Infrastructure NSW.

The *Draft Future Transport Strategy 2056* sets out a vision, strategic directions and customer outcomes, with infrastructure and services plans for Greater Sydney and Regional NSW delivering these directions across the state. Future directions for the development of freight include the creation of ‘smart’ freight with a focus on ‘freight as a service’, and integration of transport and land use planning to separate freight and passenger traffic on major freight corridors. The Western Sydney Freight Line would maximise the long-term capacity of the state’s three existing ports, expand intermodal capacity in Western Sydney and improve east-west connections to support the regional freight task.

3.1.4.5 NSW FREIGHT AND PORTS STRATEGY

In November 2013, the *NSW Freight and Ports Strategy* (TfNSW, 2013) was released. This strategy seeks to establish a roadmap for addressing NSW’s freight needs, and identifies a series of actions to achieve network efficiency, capacity and sustainability through government mechanisms (policy reform, program delivery and infrastructure investment by both the private and public sector). The strategy notes that planning for a future Western Sydney Freight Line Corridor to connect to Port Botany would deliver future dedicated rail capacity and help reduce the pressure on Sydney’s motorway network.

The strategy includes several actions that helped develop objectives for the future Western Sydney Freight Line Corridor, including:

- **Action 1E** – Improve productivity of the rail freight network. The document notes that ‘the movement of freight on the rail network in NSW is essential to the success of the NSW economy’ (p 77) and the development of projects such as the Western Sydney Freight Line will create a positive impact on the efficient operation of the rail freight.
- **Action 2A** – Identify and protect strategic freight corridors. Task 2A-1 is to ‘establish corridors to meet long term freight needs of NSW’ and the strategy specifically mentions achieving greater separation of freight and passenger movements from locations that conflict with passenger and port freight tasks to western Sydney. The Western Sydney Freight Line is identified as the first of several priority corridor investigation projects that respond to this Action.
- **Action 2C** – Develop and maintain capacity for freight on the rail network. Tasks 2C-1 is to ‘separate passenger and freight movements with network enhancements and rail alignments’ with a commitment from Transport for NSW to investigate rail freight alignments including the Western Sydney Freight Line.

- **Action 2G** – Develop and maintain projects to support network capacity. This action identifies the increasing pressure to identify and protect important dedicated freight corridors such as a corridor for the Western Sydney Freight Line. Transport for NSW has committed to provide funding to accelerate critical projects like the Western Sydney Freight Line Corridor that is facing increasing pressure from urban growth.

The Strategy notes that the NSW Government “*in consultation with local government, will deliver a program to secure an integrated network of corridor alignments and strategic freight sites*”. These actions and supporting statements are generally consistent with the objectives for the Western Sydney Freight Line Corridor (discussed in section 1.4).

The draft *Freight and Ports Plan (2017)* which is to be guided by the *NSW Freight and Ports Strategy* and supports the draft *Future Transport Strategy 2056*, also identified the Western Sydney Freight Line.

2015–2024 SYDNEY METROPOLITAN FREIGHT STRATEGY

In October 2015 ARTC released the *2015-2024 Sydney Metropolitan Freight Strategy* which aimed to provide a long-term view on existing freight capacities and anticipated projects. The strategy highlights the challenges and opportunities associated with potential projects, considers growth implied by both aspirational volumes of known projects and background train numbers in Sydney, and uses growth forecasts to assess what the capacity constraints may be on the rail network as a result.

The strategy discusses the need for a Western Sydney Freight Line Corridor. Challenges highlighted in the strategy include the lack of a defined corridor given the increased rate of growth in the region, and the increasing difficulties of accommodating growth on the Southern Sydney Freight Line. The first challenge is addressed by the protection of a corridor, while the latter is addressed in the strategy through the paired reservation of the Outer Sydney Orbital Corridor. The pairing of the Western Sydney Freight Line with the proposed Outer Sydney Orbital is noted as ‘a desirable solution for Sydney’s rail freight needs’ (ARTC, 2015).

3.1.4.6 STATE INFRASTRUCTURE STRATEGY UPDATE (2014)

The *State Infrastructure Strategy Update* (Infrastructure NSW, November 2014) provides independent advice to the government on critical infrastructure priorities for NSW. The \$20 billion program of infrastructure investment announced through the *Rebuilding NSW* initiative is funded from the long-term lease of 49 per cent of the State’s electricity network assets.

In this update, there is a strategic objective to ‘connect Sydney and NSW regional to national and global markets and suppliers’. The protection of a corridor for the Western Sydney Freight Line is a key infrastructure recommendation to support the modal shift from road to rail. It is noted that an additional challenge in the modal shift from road to rail is the regular disruption to freight trains running to and from Port Botany, as they currently operate on the shared metropolitan passenger rail network. Passenger train services on the metropolitan rail networks have increasingly been given priority over freight trains, reducing the reliability of rail freight. The report recommends to ‘reserve the corridor and site for the planned Western Sydney Freight Line and commence assessment of these proposals’. It is anticipated that the State Infrastructure Strategy will be updated in early 2018.

3.1.4.7 WESTERN SYDNEY INFRASTRUCTURE PLAN

The Australian and NSW Governments are investing \$3.6 billion over 10 years in the Western Sydney Infrastructure Plan, with the Australian Government providing \$2.9 billion.

The plan will provide better road links in the western Sydney region and benefit the region’s growing population. This investment will unlock the economic capacity of the region by easing congestion and reducing travel times. The plan will deliver a quality surface transport network, ensuring the efficient movement of passengers, employees and freight, when Western Sydney Airport opens in 2026.

3.2 LOCAL POLICY CONTEXT

Several policy documents have been prepared by local councils within the study area that make relevant provisions for a future Western Sydney Freight Line Corridor. These documents comprise:

- *Economic Development Strategy* (Penrith City Council, 2017) – strategic directions detailed under the *Economic Development Strategy* include advanced manufacturing and logistics with a focus on the Western Sydney Airport Growth Area and existing manufacturing clusters. These strategic directions give weight to the development of the Western Sydney Freight Line Corridor to service the Western Sydney Employment Area and Western Sydney Airport Growth Area.
- *Integrated Transport Management Plan* (Blacktown City Council, 2013) – The *Integrated Transport Management Plan* identifies the provision of safe and efficient delivery of freight as a key objective. A Western Sydney Freight Line Corridor would assist in shifting future growth in road freight movements to a dedicated rail line, increasing the efficiency of freight movements and safety on local roads. Blacktown City Council also identified the Western Sydney Freight Line in its submission to the National Freight and Supply Chain inquiry.
- *2017/18 – 2020/21 Delivery Program* (Fairfield City Council, 2016) – The Fairfield City Council document highlights the Smithfield – Wetherill Park industrial area as a key employer and generator of traffic in the council area.
- *Employment Land Strategy* (Fairfield City Council, 2008) – Fairfield City Council document highlights freight and logistics along with distribution and warehouse spaces as integral areas of opportunity for council into the future. A Western Sydney Freight Line Corridor would provide additional support to expand these industries through a dedicated freight link for the region.
- *Economic Development Strategy 2014-17* (Bankstown City Council, 2013) – The former Bankstown Council document acknowledges the area's prime position within the freight network.
- *Toward 2032 – City of Canterbury Economic Development and Employment Strategy* (City of Canterbury Council, 2009) – The former Canterbury council document identifies freight and logistics as a significant generator of employment in the region.
- *Cumberland Council Draft Employment and Innovation Lands Strategy & Land Use Planning Framework* (Cumberland Council, 2017) – The Cumberland council document highlights the identification of a potential Western Sydney Freight Line Corridor by state government and proposes a medium-term action to leverage the investment through intervention in the planning controls.

In addition to the policy documents, Local Environmental Plans and Development Control Plans establish the land use controls at the local level and are discussed in section 8.3 and 8.4.

3.3 DEMAND FOR A WESTERN SYDNEY FREIGHT LINE

3.3.1 THE NEED FOR FREIGHT RAIL INFRASTRUCTURE IN GREATER SYDNEY

3.3.1.1 INCREASING DEMAND FOR MOVEMENT OF CONTAINERISED FREIGHT FROM PORT BOTANY TO WESTERN SYDNEY

The demand for freight rail infrastructure in western Sydney is driven by both the movement of freight to and from Port Botany, and the movement of regional freight including some interstate movements.

Containerisation of freight itself has seen strong growth, with the benefits of containerisation summarised as:

- the flexibility to cater for a range of goods – commodities, manufactured goods, liquids and refrigerated goods with the same container handling equipment
- low transport costs, and economies of scale at ports and intermodal terminals
- fast turnaround and transit times compared to bulk-freight
- simpler storage and warehousing requirements
- greater safety and security.

The NSW Ports Masterplan (NSW Ports, 2015) predicts that Port Botany is expected to become Australia's largest container port by volume in the next 30 years, with containers forecast to grow from 2.3 million TEU (as of 2015) to 7.5-8.4 million TEU per year by 2045. The key drivers of this container growth are domestic demand, population growth, the strength of the NSW economy, the value of the Australian dollar, domestic manufacturing, government trade policies and the location of key distribution centres.

The Ports Masterplan notes that more than 80 per cent of containers imported through Port Botany are delivered within a 40 kilometre radius of the port. It specifically notes an upward shift in the proportion of containers destined for Sydney's western and south-western suburbs, especially areas of Blacktown, Fairfield, Holroyd and Liverpool, due to the availability of large parcels of land and the lower cost of land for the development and operation of distribution centres. Demand for industrial land in western Sydney is increasing and has been further accelerated with the Australian Government's announcement to construct the Western Sydney Airport at Badgerys Creek.

Regional and interstate freight movements (i.e. to and from western NSW and interstate) are dependent on the Main West Rail Line to access Sydney and international markets, and these movements are forecast to double by 2031 to meet the growing needs of these markets (NSW Ports, 2015).

3.3.1.2 LIMITATIONS OF THE EXISTING FREIGHT NETWORK

Many of the freight services operating in Greater Sydney consist of shared passenger and freight lines, such as the Main West Rail Line. Freight services are constrained to off-peak and overnight periods as legislative requirements² provide priority for passenger services on the shared network. By the mid to late 2020s, it is anticipated that the increasing passenger demands on the Main West Rail Line will constrain freight services further. The Western Sydney Freight Line would address this issue by providing a future dedicated freight rail access from the Main West Rail Line via the proposed Outer Sydney Orbital Corridor to the existing South Sydney Freight Line and Port Botany. The Western Sydney Freight Line would also lead to improved access to the road network through reduced truck movements in the Greater Sydney.

² Set forth within section 99a of the *Transport Administration Act 1988*

Without a dedicated freight rail line and investment in new and existing intermodal facilities, western Sydney will continue to rely on road transport for most freight movement. This means higher transport costs, lost employment opportunities and further congestion impacts on Sydney's road network.

Freight infrastructure is integral to achieving western Sydney's potential. The economic benefits to NSW from more efficient transport, via rail freight, is significant, with around half of all Sydney jobs forecast to be located in western Sydney by 2031.

3.3.1.3 ROLE OF INTERMODAL TERMINALS IN THE FREIGHT NETWORK

Intermodal terminals (IMT) are freight interchanges that facilitate the transfer of freight between rail and road. Capacity within the existing IMT network is constrained due to factors such as limited access to rail paths which are shared with passenger rail. As a result, the existing intermodal terminals in Sydney will be unable to meet forecast demand.

The location of existing intermodal terminals is shown in Figure 1.2. The figure shows that no road/rail intermodal terminal exists west of Paramatta and Liverpool/Campbelltown. An intermodal terminal at Eastern Creek was proposed, however this sites has subsequently been developed for other purposes. A proposed intermodal terminal at St Marys, accessing the Main West Rail Line has not progressed. The existing Yennora terminal has constraints associated with using the shared rail network.

Without a dedicated freight line corridor and certainty over the delivery of the eventual infrastructure, industry is unlikely to commit to the development of a future intermodal terminal in western Sydney due to the financial and investment risks. A committed freight corridor would generate potential interest from the market to deliver essential terminal capacity in western Sydney. The early planning for intermodal terminals is critical due to their requirement for large areas of flat land with immediate access to the freight line with good road access, and as the western becomes developed, the ability to identify suitable intermodal sites will become more challenging.

The expansion of the IMT network is highlighted in the *NSW Long Term Transport Master Plan* (TfNSW 2012) and is listed as an action in the *NSW Freight and Ports Strategy* (Action 2E) (TfNSW, 2013). Protection of a corridor for the future Western Sydney Freight Line would assist in providing a clear pathway for additional IMT in the western Sydney and would help meet the action set forth in the *NSW Freight and Ports Strategy* (TfNSW, 2013).

Planned growth and delivery of new road and rail infrastructure in western Sydney will provide the necessary conditions for the market for the needed intermodal terminal capacity. It also offers opportunities for other rail freight terminals to be developed in industrial areas services by the Western Sydney Freight Line.

3.3.2 EASING THE PORT BOTANY BOTTLENECK

Port Botany is Australia's second largest container freight port, and the major port in NSW. It serves as a vital gateway for the movement of freight, and is critical to the Australian economy: it handles more than \$60 billion in trade each year, contributes \$2.5 billion to the NSW economy and generates 17,000 jobs (Deloitte 2014). Throughput at Port Botany is continuing to grow, with long term growth forecast to be around 4.2 per cent annually. However, this increase in throughput in combination with the increased rail-mode share of containers entering Port Botany means that the capacity of existing and planned intermodals and associated existing freight lines in Sydney will not able to meet the long-term demands of western Sydney.

The NSW Government currently has a target to double the percentage of containerised freight on rail through ports in NSW by 2020. The Western Sydney Freight Line, with an IMT, would significantly contribute to providing the capacity to sustain the growth in rail mode share.

The constraints from land use and congestion on the surrounding road and rail network around the port is increasing the need for increased rail capacity. To allow Port Botany to realise its throughput potential, and given that there are limited opportunities to increase the capacity of the road network around the port specifically for freight, enhancement of the freight rail network from the port is essential. Specifically, duplication of the Port Botany Rail Line and enhancement of the SSFL is necessary to realise the benefit of connecting Port Botany to western Sydney via the Western Sydney Freight

Line Corridor. Avoiding similar constraints in western Sydney as experienced in Port Botany and the adjoining Kingsford Smith Airport requires a long-term vision for transport network and the protection of essential corridors.

3.3.3 ROAD CONGESTION

Most of the containerised freight transported between Port Botany and other parts of Sydney is moved by road. In 2014/15 it is estimated that only 14 per cent of container freight through Port Botany was transported by rail. However, Sydney's freight handling capacity is increasingly constrained by a heavily congested road network. To cope with future growth, more freight needs to be moved to and from Port Botany by rail. If the current rail mode share does not improve, heavy vehicle traffic at Port Botany may have to increase by as much as 400 per cent by 2029/30 to cope with demand (NSW Government 2011, Port Botany and Sydney Airport Transport Improvement Program, Submission to Infrastructure Australia).

Specifically, without a dedicated freight line serving destinations in western Sydney, Government's objectives of doubling rail mode share will not be realised. While rail-based freight will generally still require the increased future use of road-haulage to allow containerised freight to reach its final destinations (via road-rail intermodal terminals), the use of freight rail will ensure that these road-based trips are significantly shortened. Continued growth in demand for on road freight will result in higher transport costs, lost economic and employment opportunities, and further congestion impacts for Sydney's road network.

The Western Sydney Freight Line Corridor would facilitate improved access to the road network through reduced truck movements in the Greater Sydney Area. It is estimated that by 2036, 4.3 million truck kilometres per year could be saved by Western Sydney Freight Line (Bureau of Freight Statistics), which will contribute to reducing overall growth in truck movements on Sydney's motorways.

3.4 STRATEGIC BENEFITS OF CORRIDOR PROTECTION

3.4.1 FUTURE LAND USE OPPORTUNITIES

The Western Sydney Freight Line Corridor (western section) in conjunction with the investigation area (eastern section) includes industrial, open space and recreational, residential and infrastructure land uses. The construction and ultimate operation of the Western Sydney Freight Line would present numerous land use opportunities which would have benefits for the local and regional communities. Around 57 per cent of the recommended corridor (west) and around 68 per cent of the investigation area (east) occurs within government designated employment land.

The protection of the Western Sydney Freight Line Corridor would provide a catalyst for further opportunities for industry in the area to connect with the wider NSW freight network and opportunities to revitalise surrounding employment areas such as Wetherill Park and Yennora. The corridor protection process enables collaboration with local stakeholders and industry groups to optimise the recommended corridor for the Western Sydney Freight Line Corridor. The protection and delivery of the Western Sydney Freight Line Corridor also presents an opportunity to develop an intermodal terminal and associated precinct in the Western Sydney Airport Growth Area to facilitate the transit of freight to and from western Sydney businesses as well as from other potential private rail sidings within industrial lands.

The protection of a corridor also creates opportunities to coordinate design with other infrastructure nearby including a future Outer Sydney Orbital, the Westlink M7 and other infrastructure such as power.

Planning in this eastern section of the Western Sydney Freight Line Corridor would provide opportunities to integrate a future corridor within existing employment precincts and nearby communities. The future planning of these precincts will require a collaborative approach between the NSW Government, local council and stakeholders. The Western Sydney Freight Line Corridor is likely to support other transport modes within or directly adjoining the corridor. The potential for other cycle or road connections can be considered as part of future detailed planning in the eastern section of the corridor and as part of the detailed design and approval of future infrastructure along the entire corridor once protected.

3.4.2 ECONOMIC BENEFITS

Given the rapid rate of development in the Western Sydney region, early protection of a corridor would result in less costs for the delivery of the future infrastructure project. Identification of the corridor in planning documents would also provide planning entities, developers, businesses and the community with a clear view on infrastructure plans and would inform future development, and reducing potential conflicts. Protection of a corridor would allow for businesses and industrial estates to consider the placement of infrastructure when forward planning for their businesses. The early protection of a corridor would also facilitate adequate opportunities to consult with relevant stakeholders to ensure the infrastructure proposals best meet the logistic needs of target areas, including existing industrial areas and the Western Sydney Employment Area. This would allow time to negotiate interfaces such as sidings that would allow businesses to access the dedicated freight line into the future. Corridor protection would also allow NSW Ports and ARTC to align Port Botany and freight movement strategies based on a dedicated freight connection to Western Sydney.

A recommended dedicated corridor would help improve the performance of Port Botany and the existing metropolitan passenger rail network (particularly the Main West Rail Line). It would integrate western Sydney into the existing metropolitan freight network by connecting the Main West Rail Line to the Southern Sydney Freight Line.

The Western Sydney Freight Line would support growth of Port Botany through improved network capacity for both road and rail. The infrastructure would provide better access for regional bulk commodities by avoiding one of the most congested sections of the Sydney Metropolitan Railway Network, result in improved travel times for freight and result in less freight volumes on Sydney roads lowering road maintenance costs. The Western Sydney Freight Line Corridor would also provide regional freight with access to Sydney's dedicated freight network, enabling capacity for growth in passenger services and greater passenger rail reliability through key strategic centres in the Central City, Blacktown and Parramatta. The delivery and operation of the Western Sydney Freight Line would also create jobs throughout the delivery and operation of the project.

3.4.3 ENVIRONMENTAL AND SOCIAL BENEFITS OF THE PROJECT

Western Sydney Freight Line would increase rail volumes with greater service efficiency, which would reduce air pollutants and greenhouse gas emissions, as rail freight uses less energy than road freight. The Western Sydney Freight Line Corridor intends to introduce future freight rail to areas that are primarily used for industrial purposes.

The introduction of the Western Sydney Freight Line would also help achieve the goals set forth in the NSW Governments *Action for Air* (Department of Environment, Climate Change and Water NSW, 2009). The *Action for Air* is a 25-year air quality management plan that identifies the progressive transition of freight movements from road to rail as an integral action to improving and maintaining air quality in NSW.

The Western Sydney Freight Line would improve outcomes for rail passengers with better reliability and capacity, and reduced interaction with freight services, in particular on the heavily congested Main West Rail Line. The introduction of the Western Sydney Freight Line would improve outcomes for road users by reducing congestion as freight volumes switch from road to rail. This switch has the potential to reduce the number and severity of crashes per net tonne of freight carried, therefore increasing safety on Sydney's road network.

The placement of the Western Sydney Freight Line through areas predominantly used for industrial activities would remove rail freight from more densely populated areas around the Main West Rail Line, including both Blacktown and Parramatta CBDs. The early identification of the Western Sydney Freight Line Corridor will allow for appropriate land use planning to mitigate impacts on surrounding land uses. The recommended study area has additionally sought to avoid impacts on biodiversity and has been co-located for much of its length, with the Warragamba Pipeline (the pipeline corridor forms part of the northern boundary of the recommended corridor) thereby reducing severance and visual impacts.

3.5 DO MINIMUM SCENARIO

For the purposes of this assessment the 'Do Minimum' scenario refers to:

- 1 No protection of the corridor for the Western Sydney Freight Line prior to its delivery
- 2 Continued reliance on the existing Main West Line infrastructure for regional freight with limited freight rail capacity enhancement initiatives.

The 'do minimum' scenario for the purpose of this assessment assumes that protection of a long-term transport corridor for freight rail does not proceed, that is the Outer Sydney Orbital and Western Sydney Freight Line Corridors are not protected. Unlike passenger rail, diesel freight locomotives are unsuitable for travelling in tunnels for long distances and therefore leaving construction of the Western Sydney Freight Line and Outer Sydney Orbital Corridors to a 'just in time' scenario industry would require significant property impacts. The cost of this infrastructure may also prove unsustainable for future governments given these property impacts and associated acquisition costs.

Without certainty around future delivery of the Western Sydney Freight Line and connecting with the Outer Sydney Orbital Corridor, the existing road and rail networks would require further enhancement to meet future demand. However, given the expected future passenger growth on the shared railway network in Sydney, the opportunity for accommodating increasing freight rail services is limited. The expansion of existing rail lines like the Main West Line is extremely difficult, costly and can have significant property impacts.

It is likely that without a Western Sydney Freight Line Corridor or intermodal terminal, all western Sydney freight would be road hauled between Port Botany and the Western Sydney Airport Growth Area. The potential for regional bulk commodities to shift from rail to road would be very limited and may require reliance on any remaining capacity on the passenger rail network connections or reductions in production.

The key risks associated with failing to protect the Western Sydney Freight Line Corridor are:

- Continuing urban growth and rapidly increasing land costs will diminish opportunities to identify and protect a corridor and will significantly increase the financial costs of corridor protection if not done early.
- Diminishing opportunities to optimise the long-term planning of employment lands in the vicinity of the corridor.
- Uncertainty over the corridor alignment will delay the planning and development of an intermodal terminal – a critical part of the rail freight supply chain with large land requirements and long lead times. As noted in Section 3.3.1.3, existing intermodal capacity is insufficient to meet projected demand and would result in greater road freight movements.
- Without the long-term certainty provided by the protection of the Western Sydney Freight Line, future critical works to upgrade the Southern Sydney Freight Line by the ARTC may not include adequate provision for any services generated by the Western Sydney Freight Line or freight generated by growth within businesses located in the Western Sydney Employment Area and Western Sydney Airport Growth Area.

Specific key project risks due to not proceeding with or significantly delaying delivery of the Western Sydney Freight Line are summarised below:

- By the mid to late 2020s rail freight on the Main West Rail Line will be constrained as passenger needs continue to take priority. Without new rail freight capacity, more goods will be transported by road to and from Regional NSW.
- Increased road congestion due to freight movements between western Sydney and Port Botany, will constrain economic growth in Sydney.
- Without a confirmed corridor, the opportunity for a future Western Sydney Freight Line and an IMT site will be lost.
- Additional freight movements on the road network from Port Botany to western Sydney will place excessive demand on the roads around Port Botany and the M5 South Western Motorway, the M4 Motorway and WestConnex.

- Increasing reliance on road transport risks increasing transport costs due to road congestion and environmental externalities such as air pollution, fuel consumption, noise and vibration from road freight and fatalities and injuries from road accidents.

In this scenario, expenditure on the Main West Rail Line would be carried out to ensure continued operation as a passenger rail corridor. Under the 'do minimum' scenario with no delivery of the Western Sydney Freight Line, freight paths would be significantly reduced on the shared metropolitan rail network as demand for passenger services increases with population and job growth. This scenario recognises that the Western Sydney Employment Area has no rail freight connection, and therefore the transport of freight within the western Sydney region remains on road. Regional and interstate freight using the Main West Rail Line would shift from rail to road from 2025 onwards without an increase of available rail capacity for freight movements, and the quantity of freight transported by rail would diminish.

3.5.1 THE EXISTING METROPOLITAN FREIGHT NETWORK

Within Sydney, there is an existing dedicated freight-only network that provides strategic links to Port Botany and selected freight locations, and by-passes the central hub of passenger operations. In recent years, this Metropolitan Freight Network has been enhanced through construction of the Southern Sydney Freight Line and upgrades to the Port Botany Rail Line by the ARTC. The Southern Sydney Freight Line provides a freight rail link between Macarthur (south of Sydney) and the Metropolitan Freight Network, enabling freight services to/from southern NSW to access the Metropolitan Freight Network without using the shared passenger network. Without a dedicated freight connection, western Sydney would continue to rely on roads for the movement of freight, missing a potential savings of 4.3 million truck kilometres per year.

3.5.2 SOCIAL AND ENVIRONMENTAL IMPACTS OF ROAD CONGESTION

Road freight produces higher costs per tonne (in terms of social and environmental costs) relative to rail and sea shipping. The Western Sydney Freight Line would alleviate some of the existing negative environmental and social impacts associated with road freight container transport between Port Botany, western Sydney and interstate. These impacts include air pollution and greenhouse gas emissions, fuel consumption and waste generation, noise and vibration, time delays and other congestion costs, and fatalities and injuries from road accidents.

4 EXISTING ENVIRONMENT AND CONSTRAINTS

4.1 APPROACH TO EVALUATION OF EXISTING ENVIRONMENT AND CONSTRAINTS

The following section provides an assessment of the characteristics of the existing environment of the refined study area of the Western Sydney Freight Line. In addition, for certain key issues (particularly land use), an evaluation of the future environment is provided to reflect the extensive land use change that is occurring in western Sydney which has significant influence on the urgency for corridor protection, particularly for the western section of the project.

This evaluation addresses the western section and eastern sections separately where practicable (with the notable exception of the economic section, noting that economic conditions cannot be isolated to a particular portion of the project, and certain aspects of the biodiversity assessment). Splitting the project into a western and eastern section is in recognition that at this point, protection of the western section only is proposed.

The following evaluation has been solely based on desk studies, involving review of public information and previous plans and reports.

This chapter presents two areas of evaluation:

- an overview of the existing environmental conditions
- a brief overview of the constraints associated with these environmental conditions, with a focus on constraints that have either been avoided or minimised in determining the recommended corridor (in the case of the western section), or should be avoided during development (in the case of the eastern section).

In general, the description of existing environment is undertaken for the refined study area, as shown on Figure 1.3.

4.1.1 REFINED STUDY AREA

The development of the Western Sydney Freight Line Corridor was the outcome of an options development and assessment process (refer to Chapter 5). The initial constraints analysis was undertaken on a broad study area which met the key objectives of the project, including the need to efficiently connect western Sydney with the existing and future freight network between the Main West Line, the proposed Outer Sydney Orbital Corridor and the Southern Sydney Freight Line. A long list of options was considered and assessed within the broad study area. A high-level options elimination and multi-criteria assessments (MCA) was used to develop a short list of end-to-end options. This short list of end-to-end options avoided key constraints within the board study area including large areas of residential and community land, areas of high ecological value, listed heritage items, flood prone land and undulating topography which would meet the 1:100 grade requirement to ensure efficient operations of a potential future freight operation. The short-listed options also capitalised on opportunities such as utilising a corridor alongside the Warragamba pipeline and crossing the Westlink M7 at a location that facilitated an effect grade-separated crossing.

These short-listed options were considered further within a refined study area which has formed the basis of this chapter to evaluate the existing environment and constraints further to attempt to identify a recommended corridor. A 200 metre buffer was applied to the shortlisted options within the western section to determine the refined study area boundary to be used for the detailed MCA. The refined study area boundary in the eastern section was selected based on existing land used, primarily trying to avoid residential areas.

Chapter 5 provides a more detailed description of development of the refined study area and recommended corridor.

4.2 LAND USE

Existing land uses zones within the refined study area include rural, residential, industrial, commercial, commercial facilities, open space and environmental conservation areas

4.2.1 WESTERN SECTION OF REFINED STUDY AREA

At its western extent and through to lands located east of Mamre Road, the refined study area comprises land zoned RU2 Rural Landscape. The remainder of the western section of the refined study area comprises land zoned as IN1 General Industrial which is also captured by the Western Sydney Employment Area. An Urban Investigation Area has also been identified by the Greater Sydney Commission for land which is currently has rural residential land zoning.

At its western extent near Luddenham Road, the refined study area comprises rural residential (including several large properties), a poultry farm, and a small private airstrip. The land use zone in this area is RU4 Primary Production (small lots). The refined study area (as shown in Figure 1.3) contains the Warragamba pipeline close to its northern boundary for most of the western section and adjacent vacant lots that are designated for water supply infrastructure. The Warragamba pipeline is situated at grade for most of the refined study area's western section and acts as a physical constraint. The Warragamba Pipeline provides an opportunity for co-locating the potential future Western Sydney Freight Line.

Between Luddenham Road and South Creek, the refined study area traverses open space at the northern end of the Twin Creeks Estate – a low-density residential estate and golf club, and South Creek. Between South Creek and Mamre Road the refined study area incorporates land that is used for rural residential purposes, with scattered residential dwellings on large lots. The land use zone in this area is E4 Environmental Living. Between Mamre Road and Ropes Creek, the refined study area contains further rural residential land, community facilities and developing and completed industrial uses (including food distribution and general freight and logistics). The community facilities comprise Emmaus retirement village, Emmaus Catholic College, Trinity Primary School and Mamre Anglican School (as indicated in Figure 4.1). The land in this area, excluding Twin Creeks Estate, is contained within the Western Sydney Airport Growth Area which support the development of employment areas, infrastructure and services. Land uses zoned for rural residential living will continue to develop to support the Western Sydney Airport and surrounding commercial and industrial areas. Community facilities, such as the Emmaus retirement village and Twin Creeks Estate are anticipated to experience a change to their adjacent and surrounding land uses. This will occur as surrounding land uses develop to support industries such as manufacturing, warehousing and logistics, consistent with the Western Sydney Airport Growth Area.

The refined study area between Ropes Creek and Old Wallgrove Road (north/south connection), includes the Oakdale South and Oakdale Central industrial estates, which have been completed in recent years and primarily comprise large-scale modern warehousing and distribution facilities including facilities operated by DHL and Woolworths. Further developments of this nature are planned for this area as discussed further in section 4.3.

Between Old Wallgrove Road (north/south connection) and Westlink M7, the refined study area contains the Austral Bricks and CSR Brickworks sites – both operational quarries and brickmaking facilities. In addition, the area contains Reedy Creek and associated environmental conservations/riparian areas, rural residential properties, industrial land uses and agricultural land uses. The *Draft Western City District Plan* has identified an urban investigation area which captures rural residential and agricultural properties in this area which may lead to further land use changes.

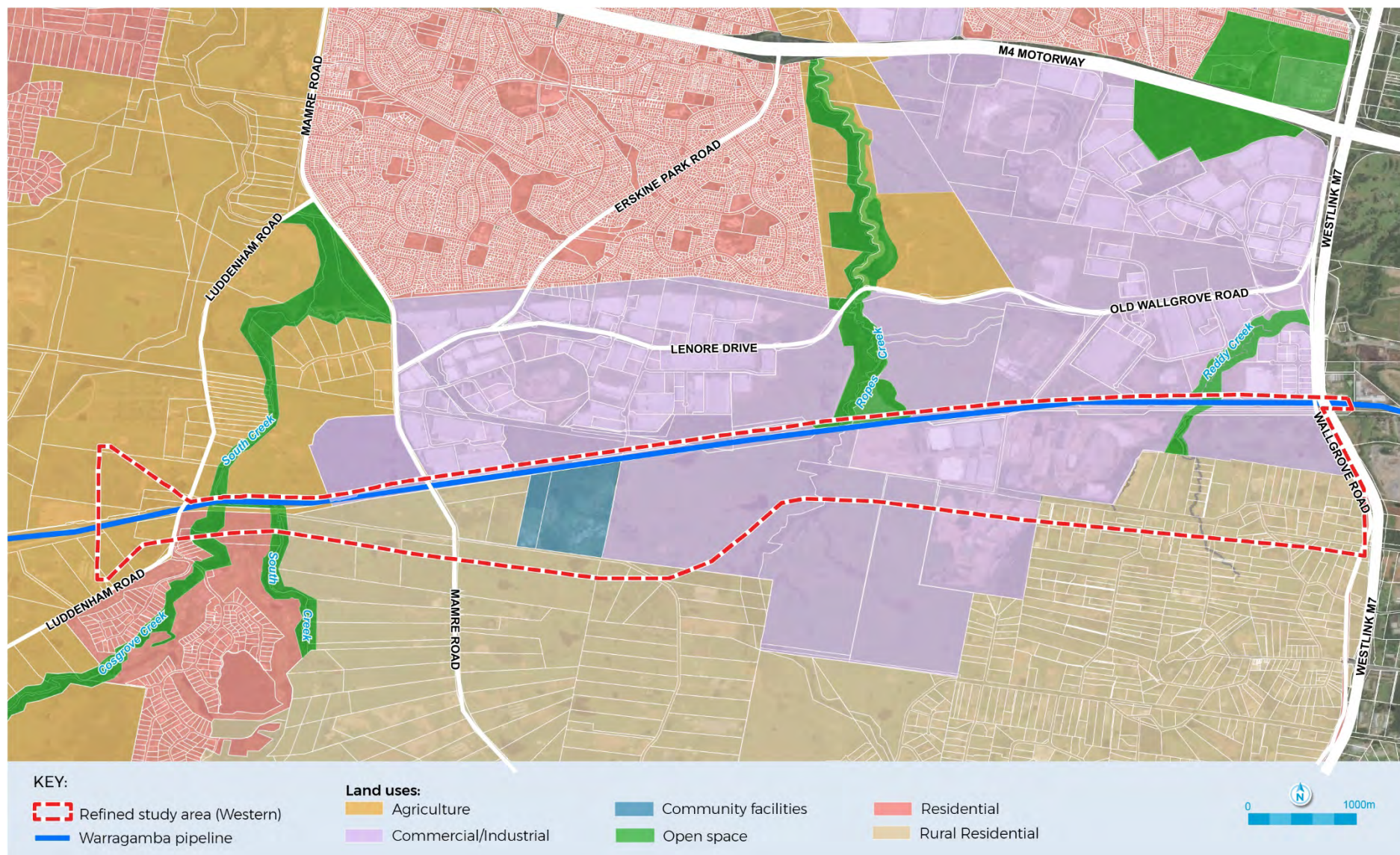


Figure 4.1 Overview of land uses in western refined study area

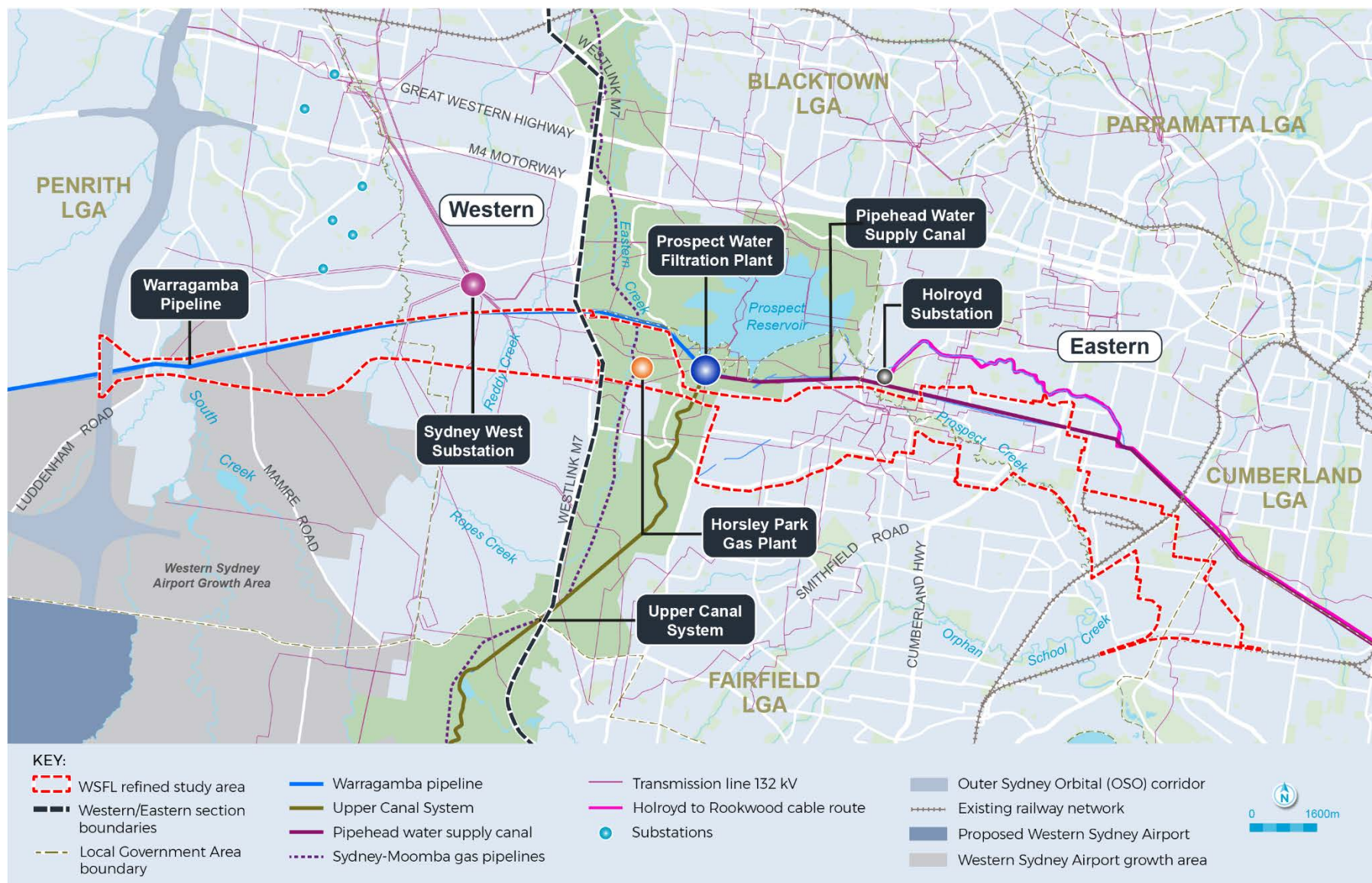


Figure 4.2 Existing utilities infrastructure in the refined study area

4.2.2 EASTERN SECTION OF REFINED STUDY AREA

Between Westlink M7 and Ferrers Road, the refined study area encompasses two Austral Brick facilities (extractive industry and brickmaking). The area also contains Eastern Creek and its riparian areas, infrastructure supporting the Jemena Eastern Gas Pipeline, areas of undisturbed vegetation and rural residential properties. Part of the refined study area is located within the Western Sydney Parkland, a park system and nature reserve. Western Sydney Parkland comprises 5,280 hectares that stretches 27 kilometres from Blacktown in the north to Leppington in the south. The State Environmental Planning Policy (Western Sydney Parklands) 2009 allows for industrial uses that are consistent with the Metropolitan Strategy (currently, *Our Greater Sydney, 2017*) where there will be beneficial social and economic outcomes for western Sydney.

Between Ferrers Road and Cowpasture Road, the refined study area primarily contains undeveloped rural residential and agricultural land.

Between Cowpasture Road and Railway Street (adjacent to Yennora railway station), the refined study area comprises an almost continuous 10 km industrial corridor incorporating Wetherill Park, Smithfield and Yennora (refer to Figure 4.3). These older industrial areas represent a regionally significant employment area represented by a range of industries including manufacturing. The corridor also presents an opportunity to connect the existing Yennora distribution centre to the proposed freight only line. Notable open spaces and sporting fields within this portion of the refined study area include Gipps Road Sporting Complex, Rosford Street Reserve, Guildford West Sportsground, Crosby Reserve and Fairfield Road Park. Figure 4.3 shows areas of open space.

Between Widemere Road and Warren Road, Prospect Creek and its riparian areas traverse the refined study area. Furthermore, between Warren Road and Railway Street, Prospect Creek meanders over the southern boundary of the refined study area

Between Railway Street and Woodville Road, the refined study area is dominated by industrial land uses with small pockets of residential land uses. These residential land uses are in the suburb of Yennora. Yennora Public School is partially overlapped by the refined study area. Woodville Road, also accommodates commercial land uses.

Between Woodville Road and Miller Road, the dominant land use within the refined study area is industrial. However, there are also residential land uses near Woodville Road and Millowera Road in the suburbs of Villawood and Chester Hill. The refined study area also overlaps a large portion of the Villawood Immigration Detention Centre.

Existing utilities in the eastern refined study area include several 132 kV transmission lines that connect to the Sydney West substation (refer to Figure 4.2), the Horsley gas plant and the Sydney-Moomba gas pipeline.

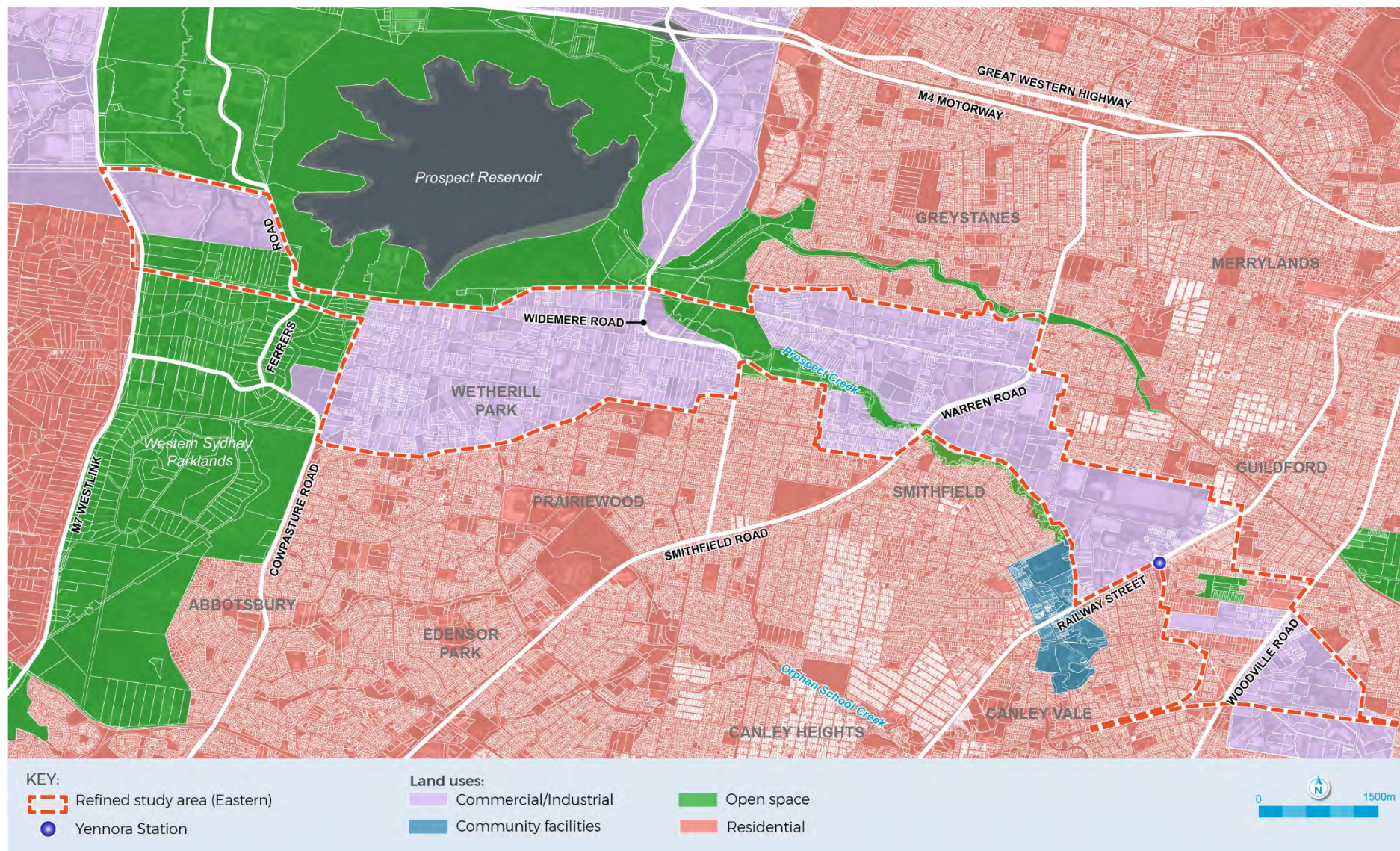


Figure 4.3 Overview of land uses in eastern refined study area

4.2.3 SUMMARY OF KEY LAND USE CONSTRAINTS

The following constraints were considered in the identification of the refined study area (western and eastern section) and the development of the recommended corridor (eastern section):

Western Section:

- Avoidance of residential land was a key consideration in terms of minimising the need for property acquisition and maximising separation distances between the project and sensitive receivers.
- The recommended corridor has maximised separation distances to other sensitive receivers including the Emmaus retirement village, Emmaus Catholic College, Trinity Primary School and Mamre Anglican School.
- The recommended corridor avoids directly impacting recently completed industrial developments.
- The recommended corridor minimises impact on infrastructure.

Eastern Section:

- Avoidance of residential land was a key consideration in developing a refined study area both in terms of minimising the need for property acquisition and maximising separation distances between the project and sensitive receivers. The project largely traverses older industrial land and has a minor impact on the Villawood and Yennora residential areas at the eastern end of the refined study area, however investigations are ongoing to mitigate this impact.
- Avoidance of impact on Gipps Road Sporting Complex, Rosford Street Reserve, Guilford West Sportsground, Crosby Reserve, Knights Park and Fairfield Road Park will be a key consideration in determining a recommended corridor.

4.3 FUTURE LAND USE OPPORTUNITIES

This section has been prepared in recognition that the Western Sydney Freight Line project traverses an area that is undergoing major change (particularly in the western section). This change is driven by the broader growth of western Sydney, and the demand for industrial lands near the western section recommended of the corridor, as reflected in strategic planning policy and discussed in Chapter 3. While this change is happening irrespective of the Western Sydney Freight Line Corridor, there are major opportunities for integrated planning between the project and the future land uses.

This assessment of future land use considers likely land use change as a result of strategic plans and policies, and the influence of zoning. This section also provides a high-level overview of large-scale development proposals currently being assessed or under construction within the refined study area. It is assumed that development proposals in the refined study area will continue at a rapid pace and currently vacant or rural land will continue to be developed.

4.3.1 WESTERN REFINED STUDY AREA

State and local government policies (discussed further in Chapter 3) including the Draft Western City District Plan (GSC, 2017) identify the Western Sydney Employment Area, Western Sydney Airport Growth Area and Urban Investigation Area as either part of the study area or being in close proximity, as shown in Figure 3.1. The Western Sydney Employment Area was established to act as a long-term metropolitan land supply for industrial and employment activities. The Western Sydney Growth Areas identify new communities and residential land uses that will be developed in conjunction with the Western Sydney Employment Area. Urban Investigation Areas have been identified due to their proximity to existing urban areas and the emerging Westland Parkland City.

The refined study area currently contains land zoned as IN1 General Industrial which is progressively being developed from agricultural rural residential land use and extractive industry into employment land with a focus on freight and logistics/warehousing and distribution industrial development. Major industrial estate development will occur between Mamre Road and Wallgrove Road. By way of illustration, at the time of publication of this Strategic Environmental Assessment the following development proposals were in the planning system (including development of masterplans and approvals) and are shown on Figure 4.4:

- 1 Gazcorp Industrial Estate – A proposal for an industrial estate containing warehousing and distribution related facilities. There is currently no approval or development activity on this site.
- 2 Oakdale Central Estate – State Significant Development (SSD) Approval has been granted. Construction of six warehouses is complete at the east of the site, two at the west of the site, and another currently under construction.
- 3 Oakdale South – A proposal for nine warehouse buildings across several precincts. There is approved SSD masterplan and approved stages.
- 4 Oakdale West – The masterplan includes 23 warehouses across four precincts. An SSD application is currently in progress.
- 5 Jacfin Horsely Park Project – A Stage 1 SSD approval that would support an industrial estate and associated warehousing has been approved. There has been no construction started on the site.
- 6 CSR Brickworks – A development application has been lodged for the site for a 14-lot industrial subdivision.
- 7 Jacfin Ropes Creek Employment precinct – A concept plan has been approved for an industrial estate and distribution park comprising warehouses, distribution centres and light industry. No development applications have been lodged.

A key consideration will be avoiding or minimising impact on existing and emerging industrial development sites. In addition, developing the corridor in a manner that will facilitate the delivery of a suitably located intermodal terminal with immediate access to the Western Sydney Freight Line, will be of critical importance. The protection of a corridor does not in itself secure land for a future intermodal development, however it provides the certainty to potential developers and intermodal operators that the rail infrastructure will be delivered. This encourages the long-term planning for future intermodal sites by the private sector.

More generally, land use zones within the refined study area are reflected on Local Environment Plans, and provide an indication at a local level of potential for land use change. The Local Environmental Plans of relevance for the refined study area are the Penrith Local Environmental Plan 2014 and Fairfield Local Environmental Plan 2013. Zoning within the refined study area is presented in Figure 4.5.

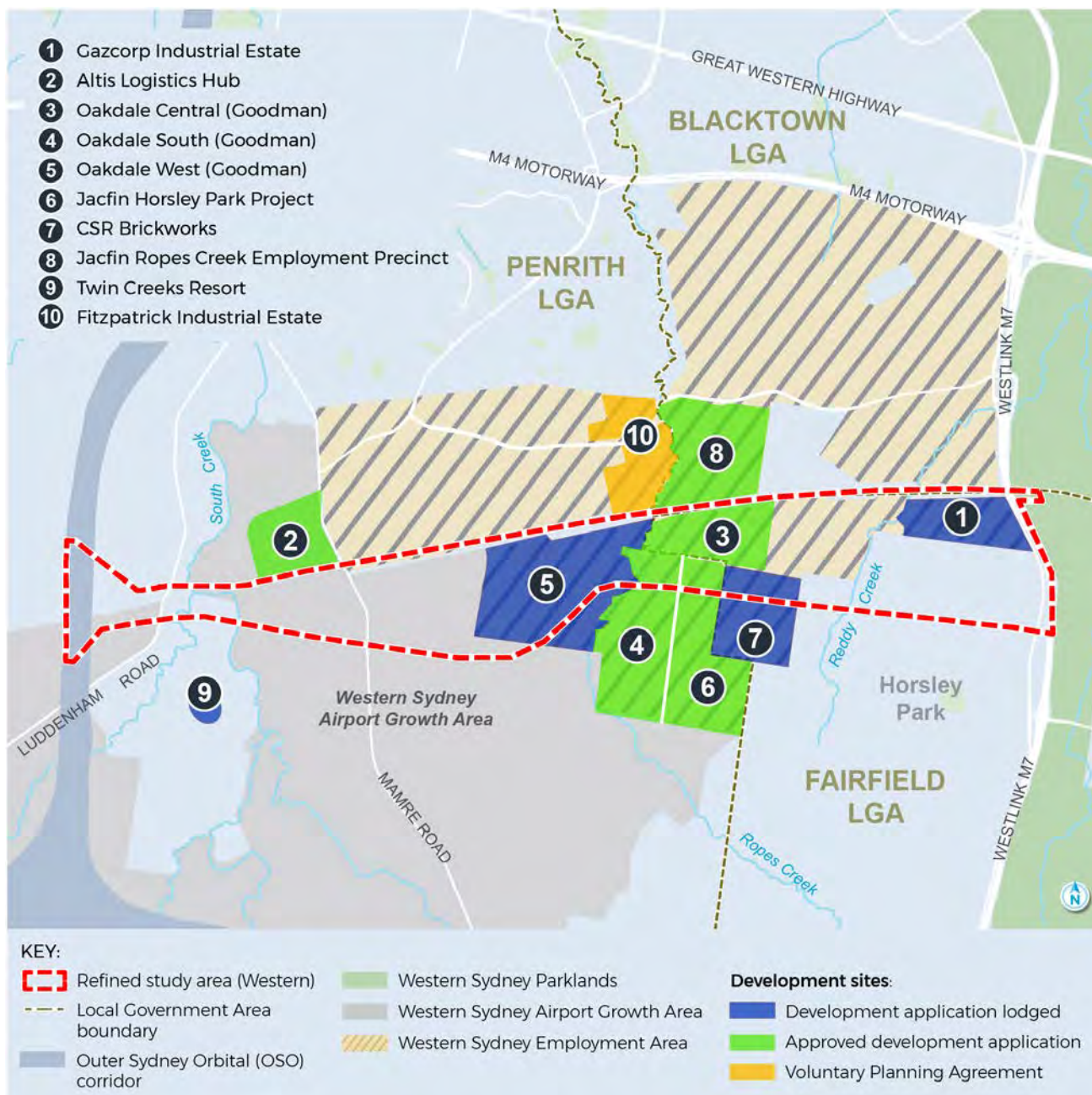


Figure 4.4 Major future developments within the western refined study area

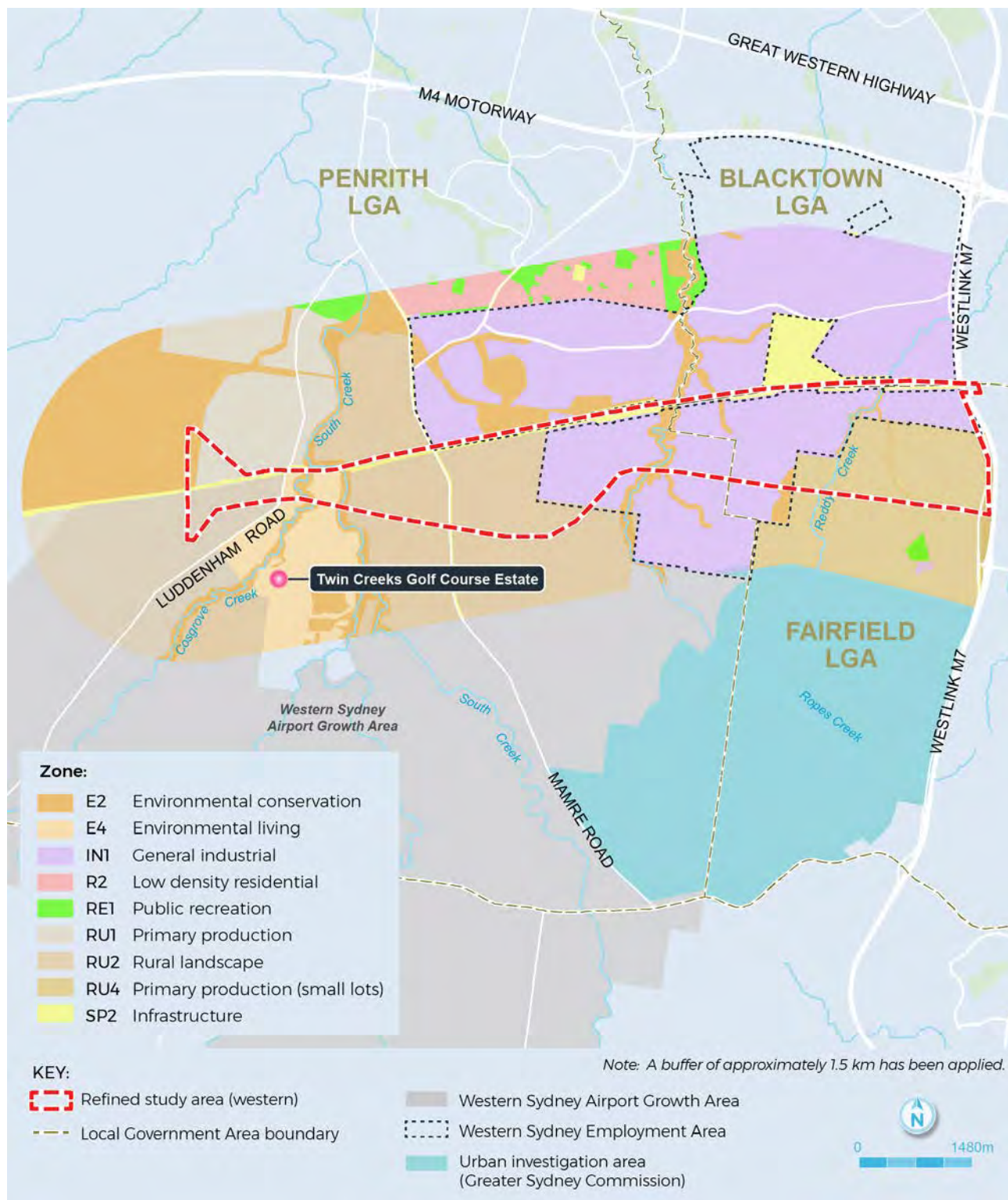


Figure 4.5 Zoning in the western refined study area

4.3.2 EASTERN REFINED STUDY AREA

The eastern section of the refined study area provides opportunities to integrate a future Western Sydney Freight Line Corridor with existing industrial precincts including the industrial areas of Wetherill Park, Smithfield, Villawood and Yennora whilst protecting options for future employment growth. The Draft Western Sydney District Plan (GSC, 2017) promotes the importance of retaining these lands as a strategic employment corridor, noting that there is development pressure for residential and other mixed land use within the refined study area.

The Western Sydney Regional Parklands, immediately east of the Westlink M7, are under the control of the Western Sydney Parklands Trust and currently contain a mix of extractive industry, agriculture and recreation. Statutory planning for the future of the parklands is undertaken under the State Environmental Planning Policy (Western Sydney Parklands) 2009. The Parklands Plan of Management 2020 (adopted on 25 January 2011) and the Parklands Plan of Management 2020 Supplement (adopted by the Minister for Environment, Minister for Heritage on 2 March 2014) establish the detailed objectives and plans for the park. They provide a strong strategic management framework for the Parklands and assists the Western Sydney Parklands Trust in determining actions and priorities over the coming years. Minimising adverse impacts on the future recreation and conservation uses of the park will be a key issue which will require ongoing consultation.

There is a strong focus in the Parkland's Plan of Management on enhancing accessibility, active and passive recreation, conservation and compatible uses such as urban farming. Near the eastern end of the refined study area. Fairfield Council is currently undertaking master planning for the redevelopment of the Villawood Town Centre to provide for an increase in apartments to grow the local economy.

The Local Environmental Plans of relevance for the refined study area are the Fairfield Local Environmental Plan 2013, Holroyd Local Environmental Plan 2013 (currently the Cumberland Council), and Bankstown Local Environment Plan 2015 (currently the Canterbury-Bankstown City Council). Zoning within the refined study area is presented in Figure 4.6. The land use zoning within the eastern refined study area is predominantly IN1 General Industrial. Minimising impact on existing employment uses will be a key issue during the identification of a future corridor. Zoning within the refined study area is presented in Figure 4.6.

The Western Sydney Parklands Plan of Management 2020 Supplement identifies bushland corridors within the refined study area. Furthermore, it identifies potential land uses as being industrial, storage and distribution premises and transport related services. The management plan acknowledges this area as a business hub that supports industrial uses with limited conservation value.

More investigation is needed before we can identify a recommended corridor of land between the existing Southern Sydney Freight Line at Leightonfield near Villawood, and the M7 Motorway. This area will be subject to integrated land use and transport planning to understand how the future freight rail line can serve employment lands and stimulate more employment opportunities in the future. We will continue to collaborate with the Greater Sydney Commission, Department of Planning and Environment and Councils. A separate consultation process with landowners, community and stakeholders will be undertaken for the remaining section of the Western Sydney Freight Line Corridor.

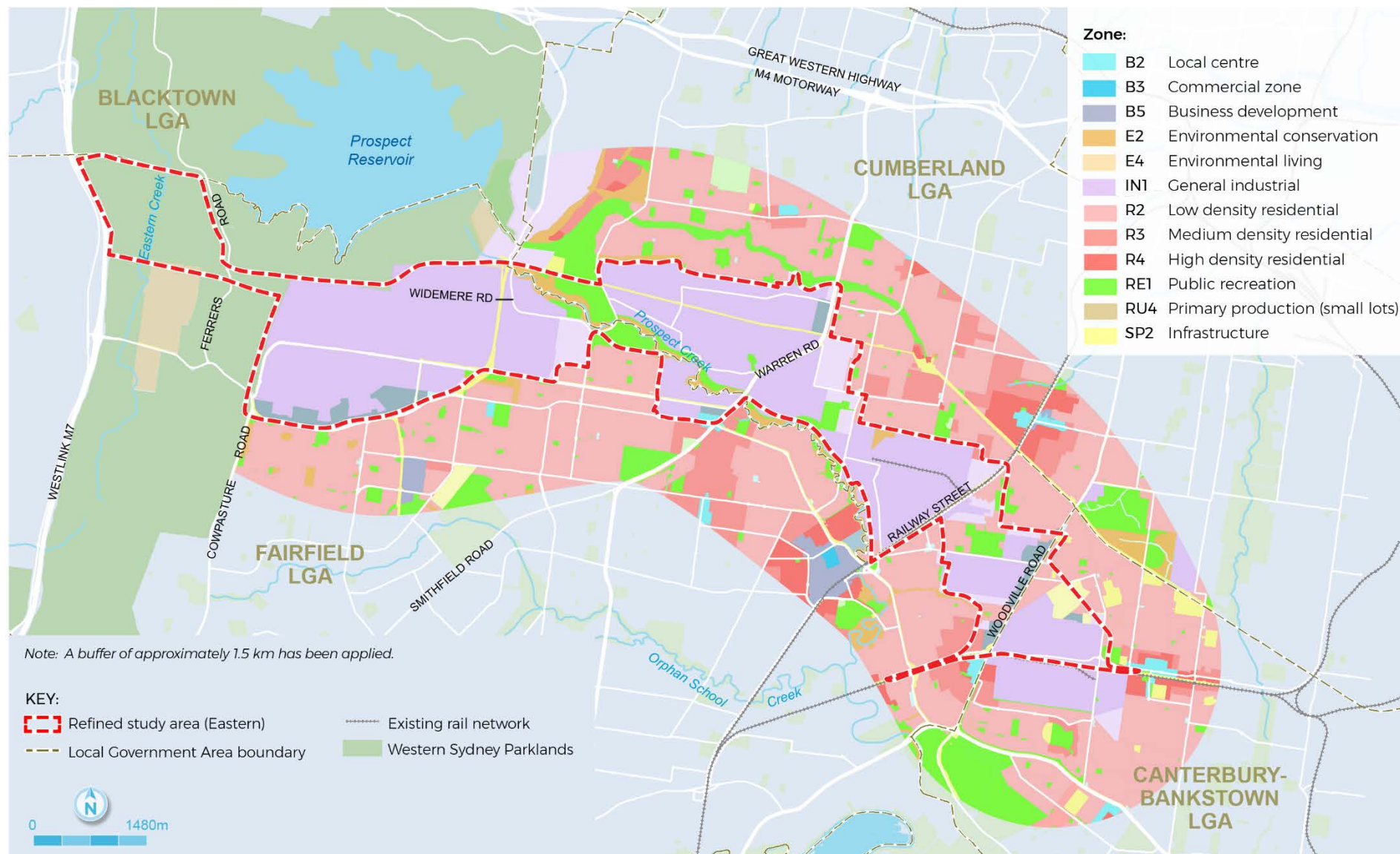


Figure 4.6 Zoning in the eastern refined study area

4.3.3 *SUMMARY OF KEY FUTURE LAND USE CONSTRAINTS AND OPPORTUNITIES*

For the western section the key future land use constraints and opportunities are:

- Optimisation of future Western Sydney Freight Line to serve current and planned employment lands
- To identify opportunities to facilitate the development of an intermodal terminal
- Avoiding recent large industrial development shown Figure 4.4.

For the eastern section:

- The renewal of older industrial land between Wetherill Park and Villawood
- Minimising impact on existing employment uses
- Crossing of the Western Sydney Regional Parklands in a way which minimises adverse impact on the future recreational and conservation uses of the park, requiring ongoing consultation with the Western Sydney Parklands Trust.

4.4 ECONOMY

4.4.1 WESTERN SYDNEY POPULATION GROWTH

The Western Sydney Region is Australia's third largest economy (Parliament NSW, 2015), is home to 46% of Sydney's total population (2.23 million) and produces 16% of NSW's Gross Regional Product (\$83 billion). The total size of the labour force in the Western Sydney Region is just over 1 million, of which 92.9% were employed (with an unemployment rate of 7.1%).

Freight and supply chains are worth nearly \$66 billion a year to the NSW economy (or 13.8% of gross state product) and employ around 500,000 people within the state (TfNSW, 2017). Establishing freight services in the region has been identified as a key planning priority within the Draft Western City District Plan.

Intermodal terminals, which are a key part of the supply chain, are themselves a significant employment generator. By way of example the Moorebank Intermodal Terminal precinct in south western Sydney, when fully developed, is expected to generate approximately 6,800 full-time equivalent employment opportunities within the areas of warehousing, transport, terminal operations, site management and ancillary services (Moorebank Intermodal Company, 2016).

The population of the Western Sydney Region will grow by around 464,000 between 2016 and 2036 (Greater Sydney Commission, 2017²). In line with this growing population there will be a proportionate increase in consumer demand for manufactured goods such as white goods and clothing (generally imported via Port Botany as containerised freight), perishable produce and other foods (arriving in western Sydney either as imports or via the regional rail network), and bulk materials for construction and development. This increased local demand (as well as growth in demand west of Greater Sydney) will lead to increased warehousing and logistics development in western Sydney, and increased demand for freight movement. In turn, such development will generate additional employment in western Sydney, and support the development of local employment opportunities for western Sydney residents.

There is significant industrial activity surrounding the refined study area. Section 4.2 describes in detail the extent of employment lands across both the western and eastern sections of the refined study area, and these substantially underpin the economic conditions within the vicinity of the study area, and for western Sydney more broadly. The western section of the refined study area is currently freight and logistics businesses with further similar developments planned (e.g. Goodman Oakdale industrial estates). In comparison, the eastern section of the refined study area currently accommodates smaller scale manufacturing industries.

Employment numbers in Erskine Park, Horsley Park, Wetherill Park, Smithfield, Yennora and Villawood totalled approximately 9,000 full time positions and 4,000 part-time positions. Approximately 2.7% of employees are employed in road freight transport (transport, transportation and driving, as defined by the Australian Bureau of Statistics). This is significantly higher than the NSW average of 1.1% (Australian Bureau of Statistics 2016).

Based upon observed and anticipated trends and known planned and committed infrastructure, economic growth within the Western Sydney Employment Area (refer to Figure 3.1) is likely to remain driven by freight and logistics and general industry in the short to medium term (Urbis, 2013). The planned future development discussed in section 4.3 identifies key infrastructure projects will support the growth of the Broader Western Sydney Employment Area. The establishment of the Western Sydney Airport and associated 'Western Parkland City' defined by the Greater Sydney Commission and detailed in the Draft Greater Sydney Region Plan.

4.4.2 STRATEGIC PLANNING FOR ECONOMIC DEVELOPMENT

As discussed in Chapter 3 there are several current Government policies aimed at increasing employment growth in western Sydney, with more than half of all new jobs in Sydney to be located there by 2031. Government policies aim to address a current jobs imbalance in western Sydney that results in unsustainable commuting patterns to employment opportunities in the Eastern City (Greater Sydney Commission, 2017²).

The Western Sydney Employment Area includes approximately 10,700 ha of land generally bounded by the M4 Motorway to the north, the Westlink M7 to the east, the Northern Road to the west and the South West Growth Area. The area incorporates land within Penrith, Liverpool, Blacktown and Fairfield local government areas. The area also encompasses part of the existing Western Sydney Employment Area identified and zoned under State Environmental Planning Policy (Western Sydney Employment Area) 2009.

The western section of the refined study area traverses the Western Sydney Employment Area, which is earmarked for significant industrial growth. The Western Sydney Employment Area was established by the NSW Government to promote economic growth in the Western Sydney region by providing land for industry such as transport, logistics, warehousing and office space. The Western Sydney Employment Area is expected to provide about 57,000 jobs by 2046 (NSW Department of Planning & Environment, 2014). A proposal was announced in 2014 to extend the Western Sydney Employment Area to include a further 4,573 hectares of employment land to link to the future Badgerys Creek Airport. The creation of this Western Sydney Employment Area means there will be over 212,000 jobs expected to be created in the long term in the area.

The overall strategic plan for Sydney, the *Plan for Growing Sydney* (Department of Planning & Environment, 2014), and the *Draft Greater Sydney Regional Plan* (Greater Sydney Commission, 2017)¹ acknowledge Western Sydney as a key hub for Sydney's freight industry and a key region in the overall economic growth of Sydney. The *Plan for Growing Sydney*, makes specific reference to identifying and protecting strategic transport corridors to support the productivity of the freight network to contribute to the success of the Western Sydney.

4.4.3 FREIGHT AND LOGISTICS

Container volumes to western Sydney will continue to grow as trade volumes increase over the next 30 years. It is predicted that container volumes could more than triple from 2.3 million twenty foot equivalent units (TEU) to 8.4 TEU by 2045. Port Botany contributes \$3.2 billion to gross state product and will become Australia's largest container port in the next 30 years. This growth will be linked to the increases in employment and industrial activity in western Sydney as well as population growth and associated consumer demand. The future Western Sydney Freight Line will assist in increasing the movement of containers by rail and will enable Port Botany to increase its container throughput capacity. The Western Sydney Freight Line will allow forecast container growth to be accommodated in a cost effective and efficient manner.

A large proportion of the existing businesses within and adjacent to the refined study area are in manufacturing, transport and warehousing. As industry continues to grow in the area, the freight task will continue to increase. Currently industries in the area rely on the roads and distant connections to the freight rail line network for connection to Port Botany. Where freight is moved by rail to the western Sydney region, it utilises a shared network which also services passenger rail needs of the area.

Furthermore, the Western Sydney Airport will also contribute to the delivery of consumer goods to western Sydney as employment activity and population increases. Urban and industrial development in western Sydney will also require transportation of construction and quarry materials which could utilise the Western Sydney Freight Line.

4.5 TRAFFIC AND TRANSPORT NETWORK

4.5.1 RAIL FREIGHT TRANSPORT NETWORK

The key components of the rail freight network are shown on Figure 4.7. Key routes for freight movements across Sydney currently comprise:

- The Port Botany Rail Line, the Metropolitan Freight Network and Southern Sydney Freight Line, which together provide a dedicated freight network from Port Botany to Macarthur in Sydney's south west via intermodal terminals at Chullora, Enfield and Moorebank (currently under development).
- The Main North Line between Strathfield and the Hunter Valley (and beyond) with connections to the North Coast rail line. The line includes the Northern suburban and Central Coast and Newcastle intercity passenger lines.
- The Main South Line between Sydney and the Southern Highlands (and beyond) via Granville, Liverpool and Campbelltown. The line includes parts of the Inner West and Leppington, Cumberland and Airport and South suburban and Southern Highlands intercity lines. The section of the line between Granville and Cabramatta is sometimes known as the Old South Line.
- The Main West Line between Sydney and Lithgow (and beyond) via Parramatta – a shared freight and passenger line providing freight access between Sydney and western NSW. The line includes the Western Suburban and Blue Mountains Intercity lines. The current capacity constraints on freight movements on this line are a key reason for the development of the Western Sydney Freight Line (refer Chapter 3).

4.5.2 ROAD TRANSPORT NETWORK

4.5.2.1 TRAFFIC ROUTES BETWEEN PORT BOTANY AND WESTERN SYDNEY

Most road freight from Port Botany to western Sydney currently travels via Botany Road/Foreshore Road before joining the M5 South Western Motorway, Hume Highway, Westlink M7 and M4 Western Motorway and supporting arterial road network. Major roads are referenced in Figure 4.7.

Botany Road and Foreshore Drive experience traffic congestion associated with truck movements into and out of the Port, background peak hour traffic congestion and the impact of traffic generated by Sydney Airport.

In addition, the M5 currently experiences significant traffic congestion especially during morning and afternoon peaks, and traffic on the M5 is forecast to increase due to increased urban development, and growth in truck traffic from Port Botany even with a doubling of rail mode share.

WestConnex and the M5 Motorway expansion works will cater for growth and alleviate some of this congestion, but long term strategies to remove heavy vehicles provides a longer-term solution to meeting the needs of Sydney.

4.5.3 LOCAL ROAD NETWORK EXTERNAL TO THE REFINED STUDY AREA

The local road network identified in Table 4.1 will facilitate the onward movement of freight from the Western Sydney Freight Line via a future intermodal facility which is expected to be located towards the western extent of the western refined study area.

Table 4.1 Surrounding roads external to the refined study area

WESTERN SECTION			
Luddenham Road	Elizabeth Drive	Erskine Park Road	The Northern Road
Mamre Road	Lenore Drive	The Northern Road	
EASTERN SECTION			
Ferrers Road	Mimosa Road	Jersey Road	Warren Road
The Horsley Drive	Elizabeth Drive	Woodville Road	Victoria Street
Cowpasture Road	Cabramatta Road West	Henry Lawson Drive	

4.5.4 LOCAL ROAD NETWORK WITHIN THE REFINED STUDY AREA

The refined study area overlaps with several existing key roads listed in Table 4.2. Further investigation will be required into crossing options and road severance for these road crossings.

Table 4.2 Road network within the refined study area

WESTERN SECTION			
Luddenham Road	Oakdale Close	Barwar Close	Wallgrove Road
Mamre Road	Milner Avenue	Arundel Road	
Bakers Lane	Burley Road	Walworth Road	
Old Wallgrove Road	Delaware Road	Chandos Road	
EASTERN SECTION			
Chandos Road	Liverpool Parramatta Transit Way	Loftus Road	Gipps Road
Ferrers Road	Long Street	Railway Street	Widemere Road
Trivet Street	Woodpark Road	Orchardleigh Street.	
Victoria Street	Fairfield Road	Cumberland Highway	

4.5.5 PLANNED UPGRADES TO THE ROAD NETWORK AROUND THE WESTERN SYDNEY FREIGHT LINE

The Western Sydney Infrastructure Plan has identified a number of road upgrades that will support economic and population growth in areas surrounding the future Western Sydney Freight Line. These include but are not limited to the proposed M12 Motorway, The Northern Road upgrade and The Horsley Drive upgrade.

The proposed Southern Link Road is designed to further support development of employment lands in the Western Sydney Employment Area. It would parallel the Erskine Park Link Road and provide a connection between Mamre Road and Wallgrove Road for development of lots south of the Warragamba pipeline.

The proposed M12 Motorway would provide direct access to the Western Sydney Airport and provide a connection to Sydney's motorway network. It would increase road capacity for future growth and development in Sydney and improves access to the Western Sydney Airport Growth Area and Western Sydney Employment Area.

The proposed The Northern Road upgrade involves 35 kilometres of road upgrade and will deliver an upgraded road to support integrated transport in the region and capitalise on the economic benefits from developing the Western Sydney Airport. The upgrade will also provide one of the main arterial transport corridors for the South West Growth Area and the Western Sydney Airport Growth Area.

The Horsley Drive upgrade between the Westlink M7 and Cowpasture Road is an arterial road connection into the Smithfield/Wetherill Park industrial area that provides a strategic road freight link to and from the Westlink M7. The upgraded road would provide important east-west connections between the Western Sydney Employment Area, Westlink M7 and Wetherill Park/Smithfield industrial area.

4.5.6 ACTIVE TRANSPORT WITHIN THE REFINED STUDY AREA

4.5.6.1 WESTERN SECTION OF REFINED STUDY AREA

There are no dedicated off-road cycle paths located within the refined study area. Opportunities to utilise the existing road network as a shared cycle path exist in the refined study area.

4.5.6.2 EASTERN SECTION OF REFINED STUDY AREA

Prospect Reservoir and Orphan School Creek cycle circuit traverses the refined study area in two places, Horsley Park and Yennora. It is a 29 km bike path circuit that occurs entirely on off-road paths. A separated bike path also runs the full length of the Westlink M7. A bike path also traverses Prospect Creek and forms part of a wider on-road and off-road cycle network.

4.5.7 KEY PUBLIC TRANSPORT ROUTES WITHIN THE REFINED STUDY AREA

The Liverpool – Parramatta Transitway traverses the study area along Fairfield Road, Guildford West in its own corridor through Wetherill Park.

4.5.8 SUMMARY OF KEY TRAFFIC AND TRANSPORT CONSTRAINTS

The following key issues have been identified:

- The crossing of the Westlink M7 and other major arterial, including grade separation options
- Minimising potential severance to the local road network and impacts to road network performance during construction and operation phases.

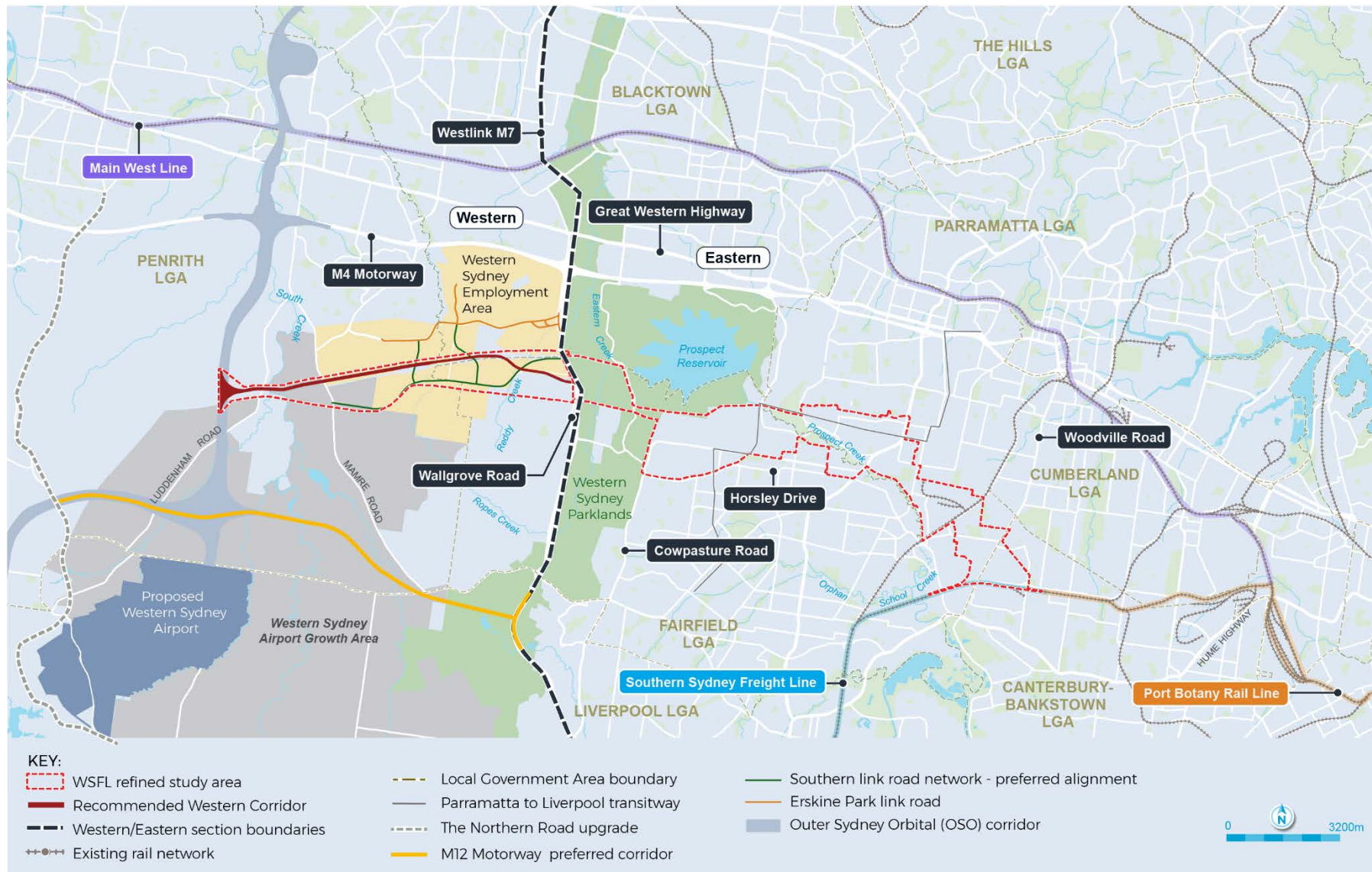


Figure 4.7 Transportation infrastructure within the refined study area

4.6 NOISE AND VIBRATION

The refined study area contains a mix of land uses including industrial, residential, recreational and commercial. Sensitive receivers were identified as residential and public open space land uses and community facilities such as schools or retirement villages. While residential receivers are located along the length of the refined study area in the form of scattered rural residential properties, there are areas of denser residential development in the eastern section of the refined study area including medium density suburban areas in Yennora, Villawood and Chester Hill. Details of existing land uses that are analogous to sensitive receivers in the refined study area are identified in Figure 4.8 and Figure 4.9.

4.6.1 WESTERN SECTION

Sensitive receivers include rural residential properties that are located between the western extent of the refined study area through to the western side of Mamre Road. Within this section, the refined study area also captures Twin Creeks Golf and Country Club. On Bakers Lane, community facilities have been identified as sensitive receivers. These include Emmaus Retirement Village, Emmaus Catholic College, Trinity Primary School and Mamre Anglican School. Throughout the western section, rural residential properties have been identified as sensitive receivers.

4.6.2 EASTERN SECTION OF REFINED STUDY AREA

Rural residential properties and the Western Sydney Parklands occur immediately east of the Westlink M7 and have been identified as sensitive receivers within the refined study area. Open space areas that have been identified as sensitive receivers at Gipps Road Sporting Complex, Rosford Street Reserve, Guildford West Sportsground, Crosby Reserve and Fairfield Road Park (refer Figure 4.9). East of Railway Street, Yennora Public School and significant tracts of suburban residential land uses occur in Yennora, Villawood and Chester Hill within the refined study area. However, it should be noted that Yennora Public School and residential areas in the vicinity of Railway Street are already impacted by being adjacent to the existing Main South Line which supports the Inner West and Leppington Line and Cumberland Line freight operations.

4.6.3 SUMMARY OF KEY NOISE AND VIBRATION ISSUES

The following key issues have been identified:

- Within the western section, sensitive receivers were identified as rural residential properties, Twin Creeks Golf and Country Club and four community facilities located on Bakers Lane.
- Within the eastern section, sensitive receivers were identified as rural residential properties east of the Westlink M7, public open space and sports grounds in the vicinity of Gipps Road Sporting Complex, Yennora Public School and suburban residential land in Yennora, Villawood and Chester Hill.
- Noise impact minimisation and mitigation will be required during the construction and operation phases of the future infrastructure.

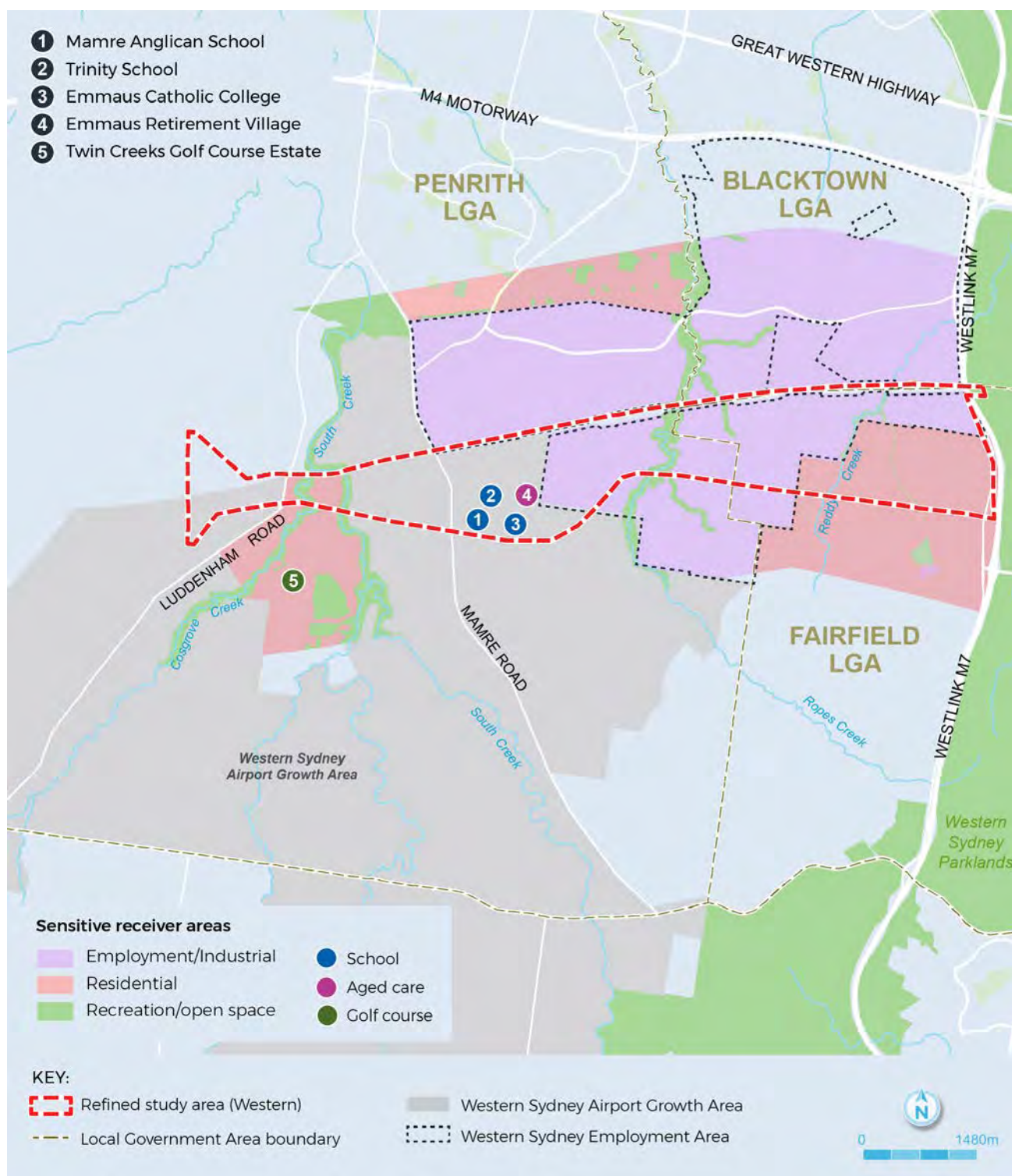


Figure 4.8 Sensitive receivers in the western refined study area

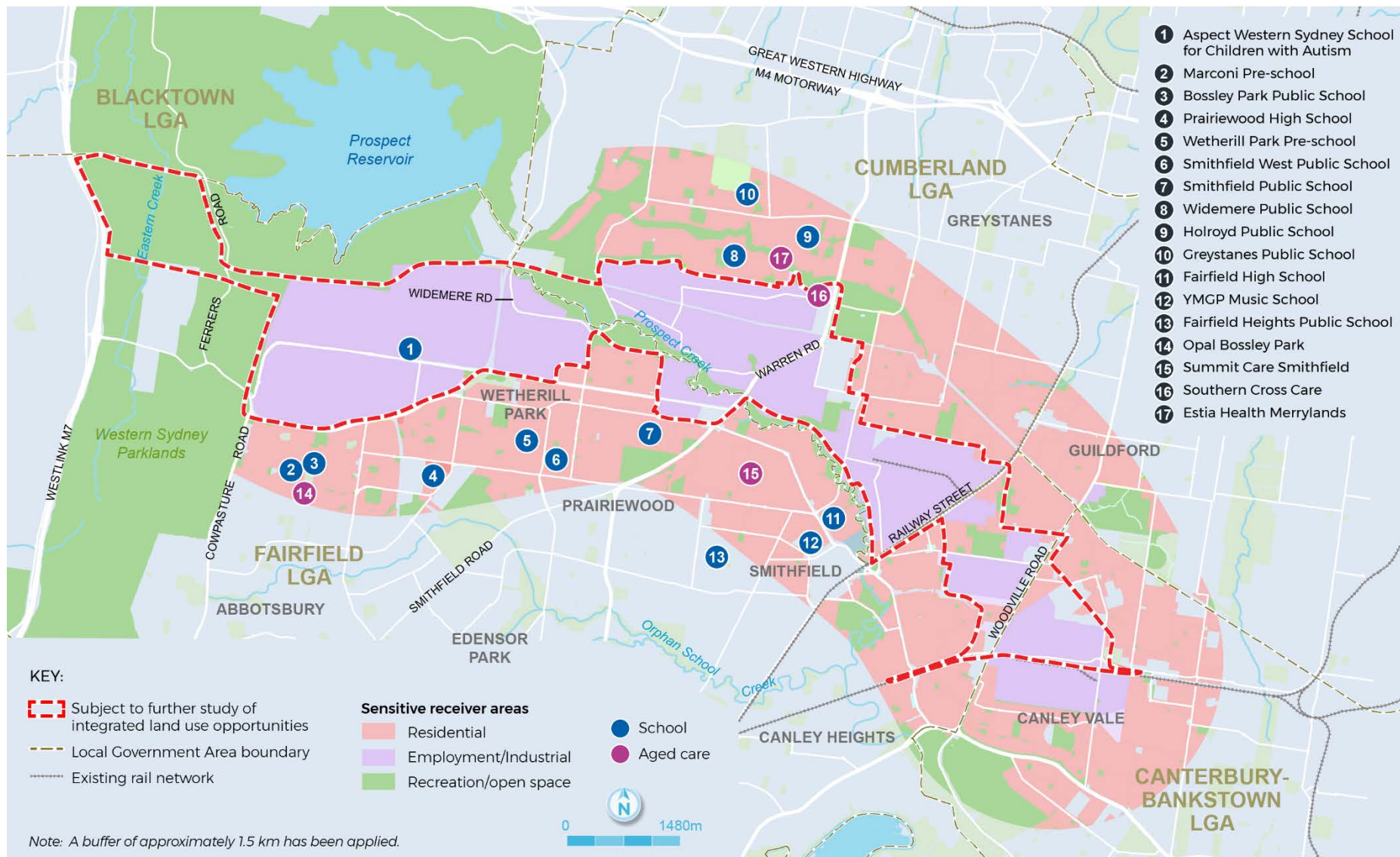


Figure 4.9 Sensitive receivers in the eastern refined study area

4.7 VISUAL AMENITY

This section provides an evaluation of the landscape characteristics of the area, and the potential visual constraints that have been taken into account in determining the refined study area and that will need to be considered further in the identification and assessment of potential future Western Sydney Freight Line.

4.7.1 APPROACH TO EVALUATION OF VISUAL ENVIRONMENT

The evaluation has been based on the categorisation of landscape character as outlined in the Roads and Maritime 2013 *Environmental Impact Assessment Guidance Note EIA – N04 Guidelines for Landscape Character and Visual Impact Assessment*.

The evaluation of the existing visual environment considered:

- The sensitivity of the landscape – the degree to which a landscape type could accommodate change without detrimental effects to its character.
- The magnitude of change – the size and scale the development of a freight rail line within the landscape.

The existing visual environment was classified as a series of landscape character zones (Figure 4.10 and 4.11). These zones define areas that have distinct, recognisable and consistent natural and/or built elements. The landscape character zones are:

- Environmental – characterised by vegetation surrounding freshwater bodies and woodlands. Riparian/woodland landscapes generally contribute positively to the visual amenity of an area and are rated highly sensitive to change.
- Recreational – characterised by man-made green space used for recreational purposes. This would include parks and sporting fields. Recreational green spaces contribute positively to the visual amenity of an area and are rated highly sensitive to change.
- Residential – characterised by low to medium density residential buildings and residential streets. This landscape zone would be rated medium to high sensitivity to change.
- Industrial/employment – characterised by warehouses, offices, facilities and equipment required for industry. This landscape character zone would be rated low to medium sensitivity to change.
- Infrastructure – areas or corridors used by major pieces of infrastructure including roads, rail and waste, water and electricity services. This landscape character zone would be rated as of low sensitivity to change.
- Agricultural – generally characterised by land cleared but not developed and used primarily for stock or crop production. This landscape character zone would be rated as medium sensitivity to change.

4.7.2 LANDSCAPE CHARACTERISTICS

4.7.2.1 WESTERN REFINED STUDY AREA

The western section of the refined study area (refer to Figure 4.10) is predominantly located in agricultural landscapes identified for employment as part of the Western Sydney Airport Growth Area and Western Sydney Employment Area. Corridors of infrastructure cross the refined study area including Luddenham Road, Mamre Road, Old Wallgrove Road and the Westlink M7 at its eastern extent in addition to the Warragamba pipeline in the northern section. The presence of large transmission lines and an increasing number of facilities such as warehouses and logistics centres represent the changing landscape character. The refined study area also includes environmental areas in riparian corridors including South Creek, Ropes Creek and Reedy Creek.

4.7.2.2 EASTERN REFINED STUDY AREA

The eastern section of the refined study area (refer to Figure 4.11) includes the industrial landscape of Austral Brickworks, the environmental landscapes of the Prospect Reservoir and the Western Sydney Parklands, as well as agricultural landscapes to the south of Prospect Reservoir. The industrial landscapes of Wetherill Park, Smithfield and

Yennora lie to the east, along with environmental and recreational landscapes along Prospect Creek. Beyond these areas, the refined study area includes small pockets of residential areas in the suburbs of Smithfield, Yennora, Villawood, and Chester Hill, as well as the Villawood Immigration Detention Centre.

Linear corridors of infrastructure in the form of rail lines and existing roads crossing the eastern investigation area include The Horsley Drive, Smithfield Road, Woodville Road and the Bankstown Line to Liverpool, the Southern Sydney Freight Line and the Main South Line which includes the Leppington and Cumberland lines.

4.7.3 SUMMARY OF KEY VISUAL AMENITY CONSTRAINTS

The following key issues have been identified:

Western section of the refined study area:

- The western section of the refined study area is predominantly industrial and agricultural landscape identified for employment as part of the Western Sydney Airport Growth Area and Western Sydney Employment Area.

Eastern section of the refined study area:

- The eastern section of the refined study area includes the industrial landscape of Austral Brickworks, the environmental landscape of the Prospect Reservoir and Western Sydney Parklands as well as the agricultural areas to the south of the Prospect Reservoir.
- Industrial landscapes of Wetherill Park, Smithfield and Yennora lie to the east.
- Small pockets of residential areas lie further to the east in the suburbs of Smithfield, Yennora, Villawood and Chester Hill.

As the refined study area largely passes between private industrial properties, public viewpoints of a future potential freight line would be limited to these road corridors and through existing riparian corridors where elevated structures are required.

Opportunities exist to co-locate with existing infrastructure and industrial areas such as the Warragamba pipeline, and to avoid areas of residential and environmental landscapes such as the Western Sydney Parklands, and Prospect Reservoir in order to reduce visual impacts.

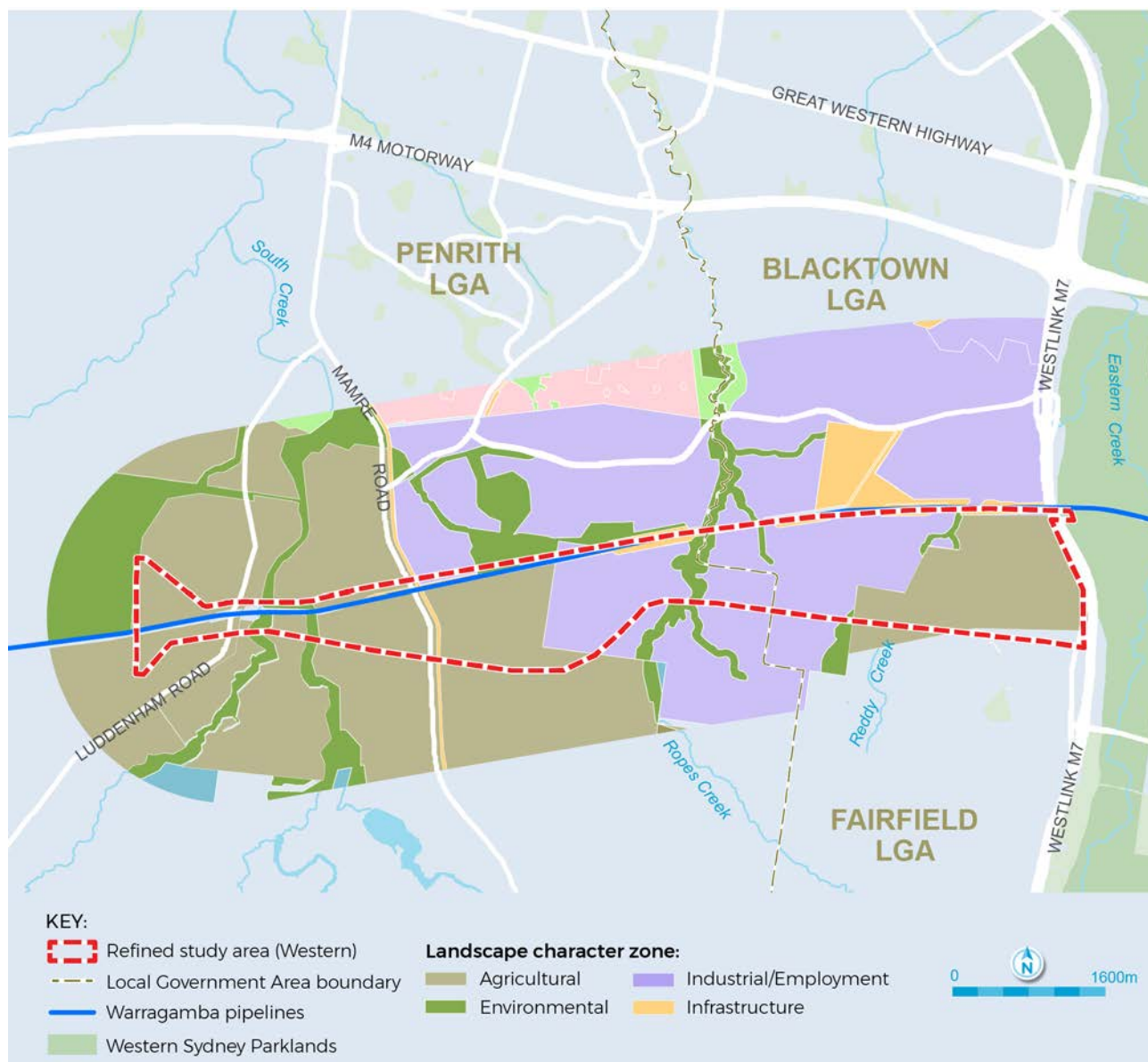


Figure 4.10 Landscape character areas western refined study area

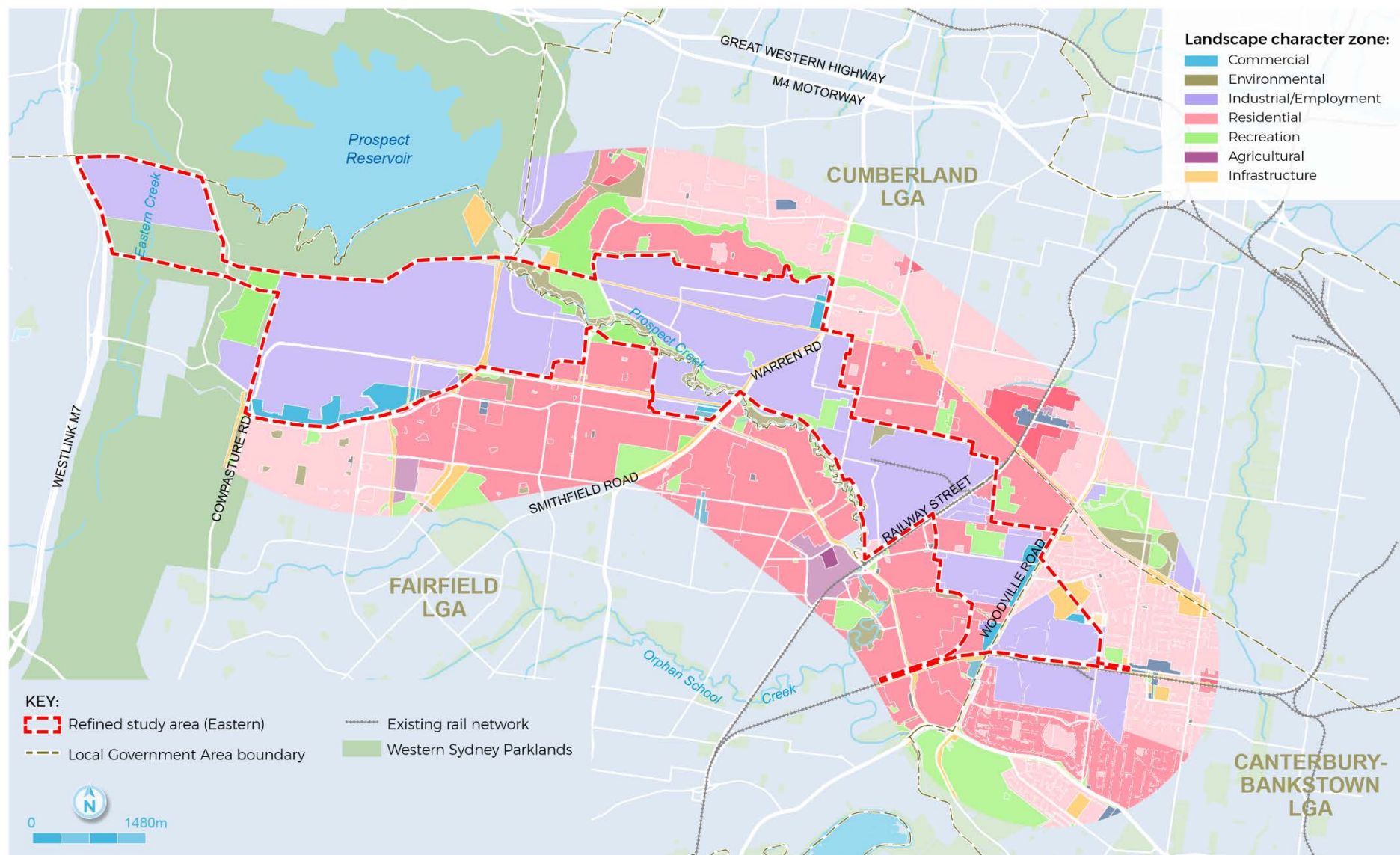


Figure 4.11 Landscape character areas eastern refined study area

4.8 SOILS AND GEOLOGY

A high-level desktop review was conducted to characterise the soil and water landscape of the future investigation area.

4.8.1 SOILS

The soils landscape of the refined study area is shown on the Soil Landscapes of the Penrith 1:100,000 Sheet map (Soil Conservation Service of NSW, 1990).

Soil landscapes found in the investigation area include:

- South Creek landscape – characterised by floodplains, valley flats, and drainage depressions in the Cumberland Plain channels. Usually flat with incised channels, mainly cleared. South Creek soils feature red and yellow podzolic and soil landscapes are prone to erosion hazard and frequent flooding.
- Blacktown landscape – found around the Prospect Reservoir and characterised by gently undulating rises on Wianamatta Group shales, cleared eucalypt woodland and tall open-forest. The soils are shallow to moderately deep and the soil landscape are limited by highly plastic subsoils, low soil fertility and poor soil drainage.
- Luddenham soil landscape – characterised by undulating to rolling rises on low hills on Wianamatta shale and narrow ridges, hillcrests and valleys. Soil landscapes are prone to high soil erosion potential and localised impermeable highly plastic subsoil.

4.8.2 GEOLOGY

The geological landscape of the refined study area is dominated by Wianamatta Group shales overlaid by areas of sand and silt.

4.8.2.1 WESTERN SECTION OF REFINED STUDY AREA

The soils of the western section of the refined study area are largely Blacktown soils with South Creek soils found along the watercourses and Luddenham soils found atop higher elevations.

The geology within the western section is largely Bringelly shales with pockets of volcanics and basalt located to the west of Old Wallgrove Road. The shale is more difficult to sustain tunnelling than sandstone which occurs in the eastern part of the Cumberland Plain.

4.8.2.2 EASTERN SECTION OF REFINED STUDY AREA

The refined study area crosses Blacktown and South Creek soils as well as Berkshire Park and Richmond soils. The South Creek and Berkshire Park soils are concentrated around Prospect Creek, while the Richmond Soils are found towards the connection with the existing Southern Sydney Freight Line.

The geology in the eastern sections is Bringelly Shale with quaternary sand and silt deposits. The underlying geology around watercourses is quaternary silt, sand and clay deposits.

4.8.3 CONTAMINATED LAND

4.8.3.1 WESTERN SECTION OF REFINED STUDY AREA

The area has a long history of use by agriculture and industry and as such there is potential for contamination throughout the recommended corridor. However, there are no sites recorded on the Contaminated Land Record kept by the NSW Environment Protection Authority.

4.8.3.2 EASTERN SECTION OF REFINED STUDY AREA

Due to the current and historical land use activities in the refined study area there is potential for contamination throughout the recommended corridor. However, there are no sites recorded on the Contaminated Land Record kept by the NSW Environment Protection Authority.

4.8.4 ACID SULFATE SOILS

The Australia Soil Resource Information System indicates that there would be low to very low probability for the presence of acid sulfate soils in both the western and eastern refined study area, but that this is stated with low confidence. While the presence of acid sulfate soils does not present a risk to the protection process of the refined study area, further investigation would be required during the detailed design and delivery phases.

4.8.5 HYDROLOGY

The identification of corridor options and selection of a recommended corridor considered existing flooding constraints based on existing available flood studies in the catchment. Whilst further detailed flood modelling is required in the future stages of infrastructure design, the recommended corridor can address potential flooding impacts.

4.8.5.1 WESTERN SECTION OF REFINED STUDY AREA

The western section contains South Creek, Ropes Creek, Cosgrove Creek and Reedy Creek as well as a number of unnamed tributaries that are prone to flood events. Potential flood risk is shown in Figure 4.12.

No sources of potable water have been identified in the western section of the refined study area.

Groundwater is expected at a depth of greater than 20 m, however shallow, perched and possibly seasonal groundwater may occur at the soil bedrock interface in alluvial soils in proximity to local creeks, and along drainage lines.

4.8.5.2 EASTERN SECTION OF REFINED STUDY AREA

The eastern section contains three creeks prone to flood events including Eastern Creek, Prospect Creek and Orphan School Creek to the south-west of Yennora Station. A number of tributaries are also located in the vicinity that feed into the junction of Prospect and Orphan School Creeks including the re-aligned Burns Creek in Leightonfield. Many of the tributaries in the eastern section have been modified with channels constructed to drain the surrounding development. Potential flood liable land associated with these creeks is shown in Figure 4.13.

Prospect Reservoir forms part of Sydney's drinking water supply and is still used regularly in times of high demand for drinking water or when other parts of the water supply system are taken offline for maintenance.

No sources of potable water have been identified in the eastern section of the refined study area.

4.8.6 SUMMARY OF KEY SOILS AND HYDROLOGY ISSUES AND CONSTRAINTS

- No recorded contaminated sites are present, however due to a long history of agricultural and industrial land use the potential exists for contamination throughout the refined study areas.
- There is a low probability of the presence of acid sulfate soils within both the western and eastern refined study areas.
- Several notable watercourses including Ropes Creek, South Creek and Reedy Creek, and a number of unnamed tributaries are present in the western refined study area. Water courses including Eastern Creek, Prospect Creek and Orphan School Creek are located in the eastern refined study area. Water courses including potential flooding constraints exist at these locations and potential flooding presents engineering and cost challenges.
- Prospect Reservoir, which forms part of the Sydney drinking water supply is located immediately to the north of the investigation area.

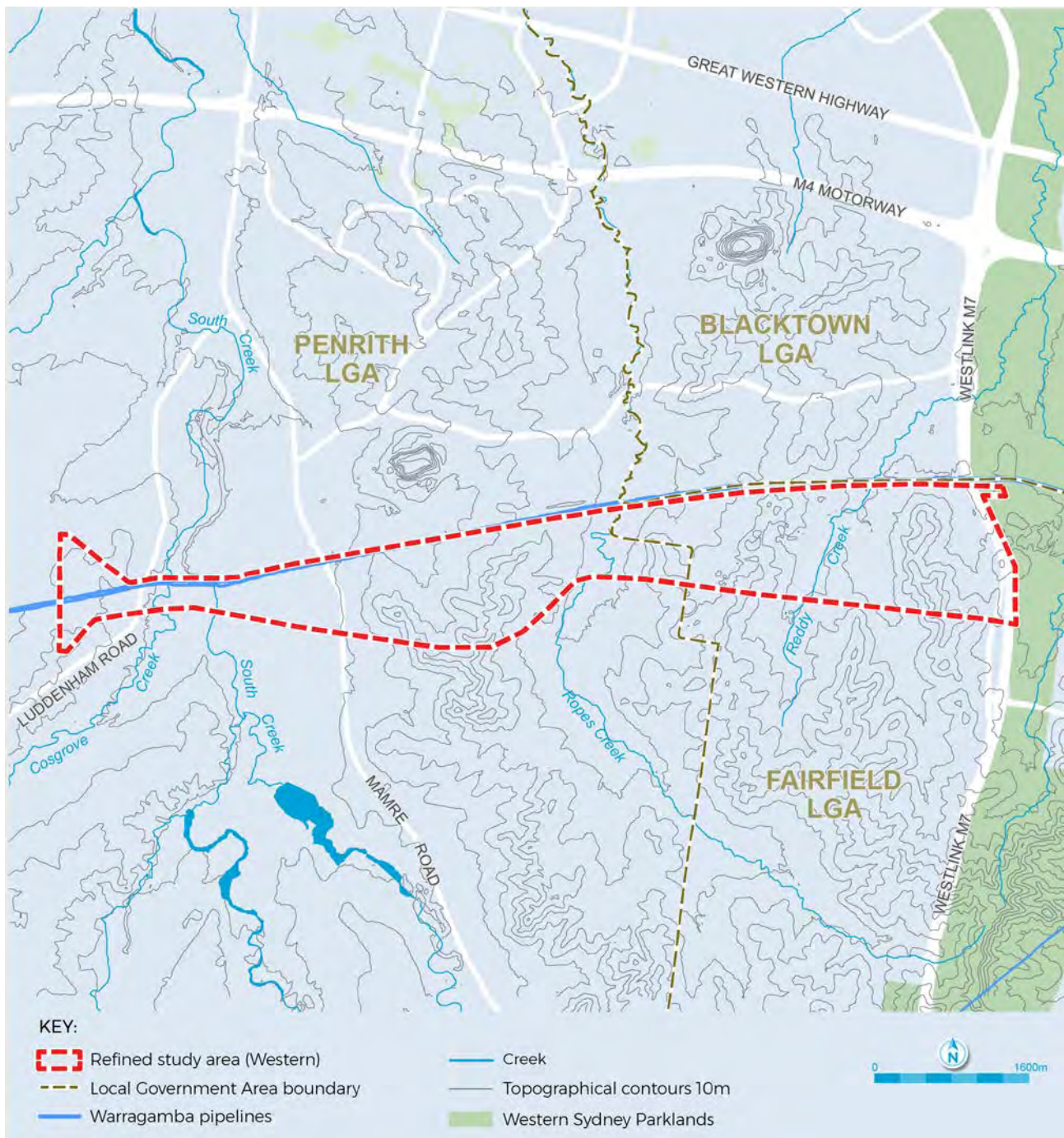


Figure 4.12 Creeks in the western refined study area

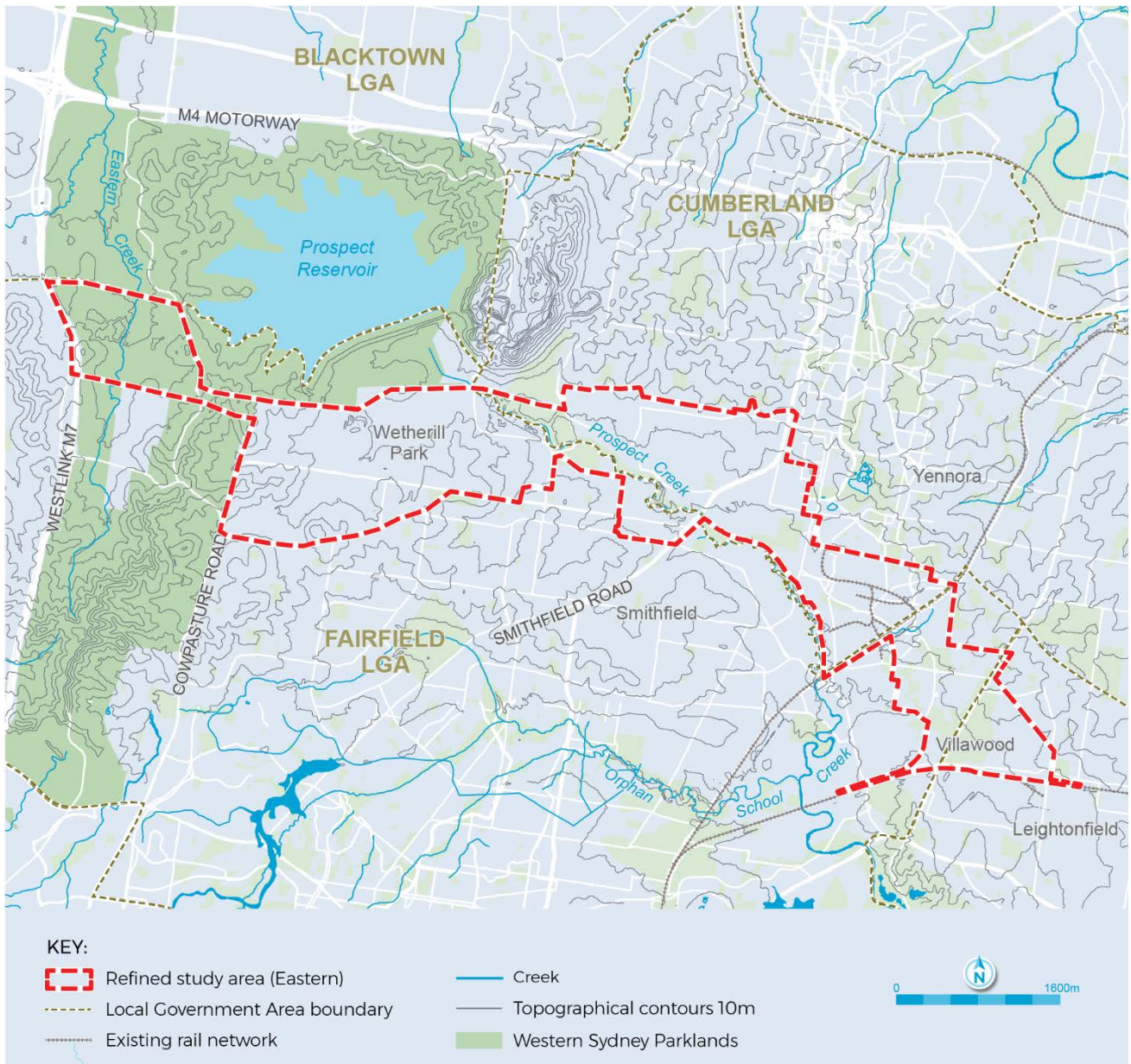


Figure 4.13 Creeks in the eastern refined study area

4.9 BIODIVERSITY

The western Sydney region encompasses a range of topography, from floodplains to sandstone ridgetops and wetlands that influence the biodiversity of the area. The geography supports diverse vegetation communities that provide habitats for flora and fauna.

A high level ecological review was undertaken for this report to identify areas of critical and highly constrained ecology within the refined study area. This included some on-site verification of vegetation and potential flora and fauna habitat in publicly accessible lands. The review was undertaken following consultation with the Office of Environment and Heritage (OEH) on the key ecological features and requirements within the refined study area. The investigations included the presence of threatened ecological communities, habitat connectivity and biodiversity offsets requirements if needed.

The assessment of ecological constraints indicated that while most of the land within the refined study area consists of residential and rural/rural residential properties, areas of native vegetation remain, particularly throughout the western section refined study area, and the areas around Western Sydney Parklands and Prospect Reservoir.

The assessment identified several locally present threatened ecological communities, endangered flora and fauna populations and threatened species that are listed in the schedules of the NSW *Biodiversity Conservation Act 2016* (BC Act), the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Fisheries Management Act 1994* (FM Act).

4.9.1 THREATENED ECOLOGICAL COMMUNITIES

Three threatened ecological communities listed under the BC Act, and one threatened ecological community listed under the EPBC Act are known to occur in the refined study area. These communities and their listings are shown in Table 4.3.

Table 4.3 Threatened ecological communities within and immediately adjacent to the refined study area

THREATENED ECOLOGICAL COMMUNITY	EPBC ACT	BC ACT
Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Critically Endangered
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	Not listed	Endangered
Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered	Endangered

The biodiversity review identified the ecological values and constraints within and adjacent to the refined study area including areas of critical and high ecological value. Ecological constraints and values were categorised as follows:

- Critical – Larger occurrences of *Environment Protection and Biodiversity Conservation Act 1999* listed critically endangered vegetation communities (greater than 5.0 hectares); known or potential habitat for substantial populations of EPBC Act listed threatened plants; regional scale wildlife corridors.
- High – EPBC Act listed critically endangered vegetation communities (0.5–5.0 hectares); *NSW Biodiversity Conservation Act 2016* endangered ecological communities in moderate to good condition; known or potential substantial populations of BC Act listed threatened plants and sedentary animals; small populations of EPBC Act listed threatened plants; local scale wildlife corridors.
- Moderate – BC Act listed endangered ecological communities in poor condition.
- Low – Cleared lands with little or no native vegetation.

These designations are illustrated in Figure 4.14 and Figure 4.17.

4.9.1.1 WESTERN SECTION OF FUTURE INVESTIGATION AREA

Areas of high ecological value are scattered throughout the western section of the refined study area, with the main areas of value between Old Wallgrove Road and the M4 Motorway to the west of Ropes Creek. Vegetation communities at these locations mainly comprise Shale Plains Woodland, Alluvial Woodland and Shale Hills Woodland, that correspond to Threatened Ecological Communities listed under the BC Act and/or EPBC Act.

The largest patch of threatened vegetation (Cumberland Plain Shale Woodland) is present in the western section of the refined study area near the Emmaus Catholic College Trinity Primary School. This patch has the potential to be the most viable area of the vegetation community due to its large size (approximately 20 hectares) and overall moderate condition.

A summary of ecological value and constraints in the western section of the refined study area is included in Figure 4.14.

A summary of vegetation communities in the western refined study area is included in Figure 4.15.

4.9.1.2 EASTERN SECTION OF FUTURE INVESTIGATION AREA

In the eastern section of the refined study area the main ecological constraints are the Prospect Nature Reserve, with areas of high and critical value present to the north, west and south-west of the Prospect Reservoir. In addition, small areas of critical ecological values exist along Prospect Creek and south of the refined study area in Lansdowne. The Western Sydney Parklands contain areas of high ecological value near the Prospect Reservoir and some smaller areas of ecological value throughout the remainder of the parklands. The parkland also act as a regional corridor for wildlife movement.

A summary of ecological value and constraints within the eastern section of the refined study area is in Figure 4.16.

A summary of vegetation communities is included in Figure 4.17.

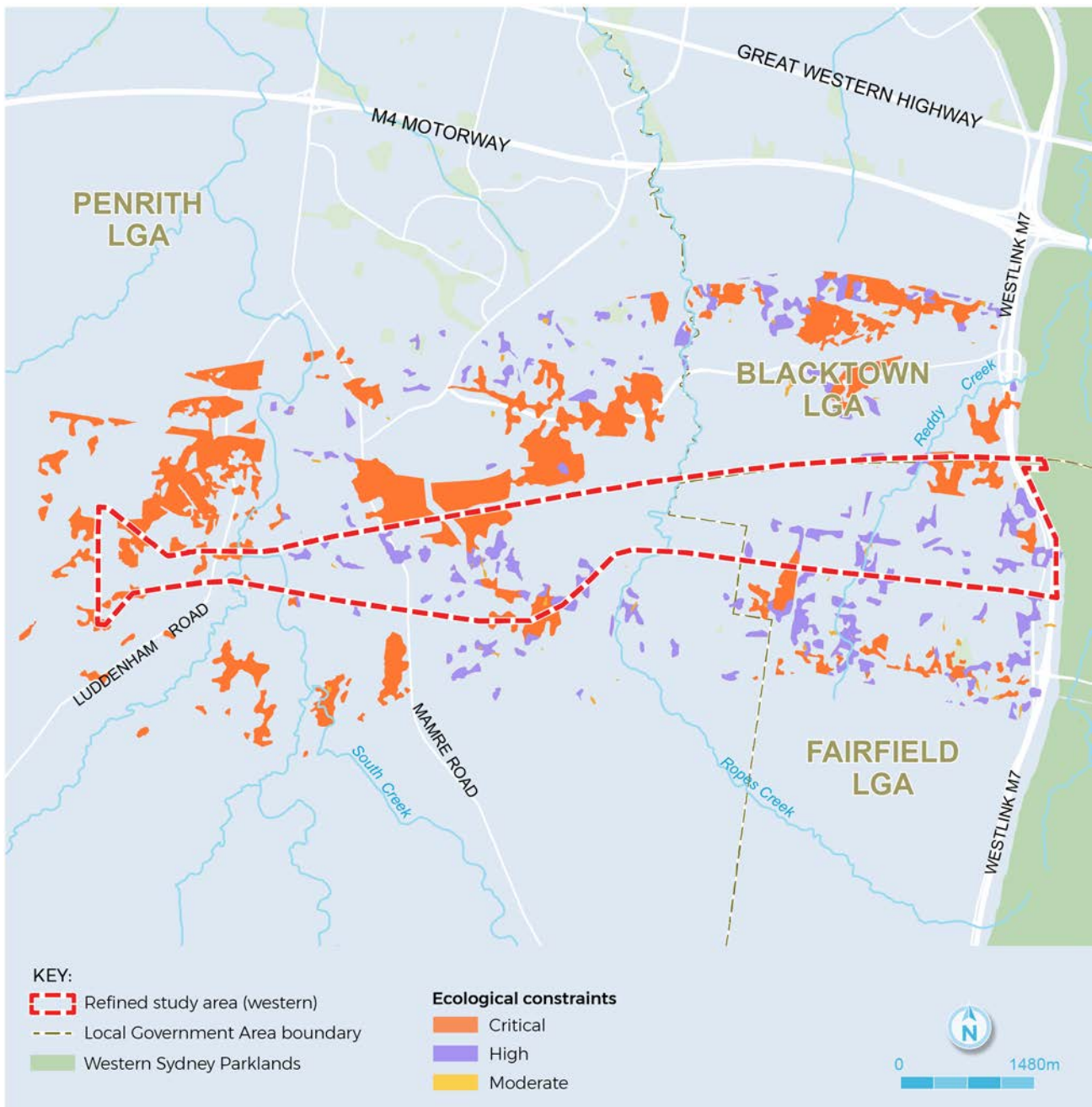


Figure 4.14 Ecological constraints within the western section of the refined study area

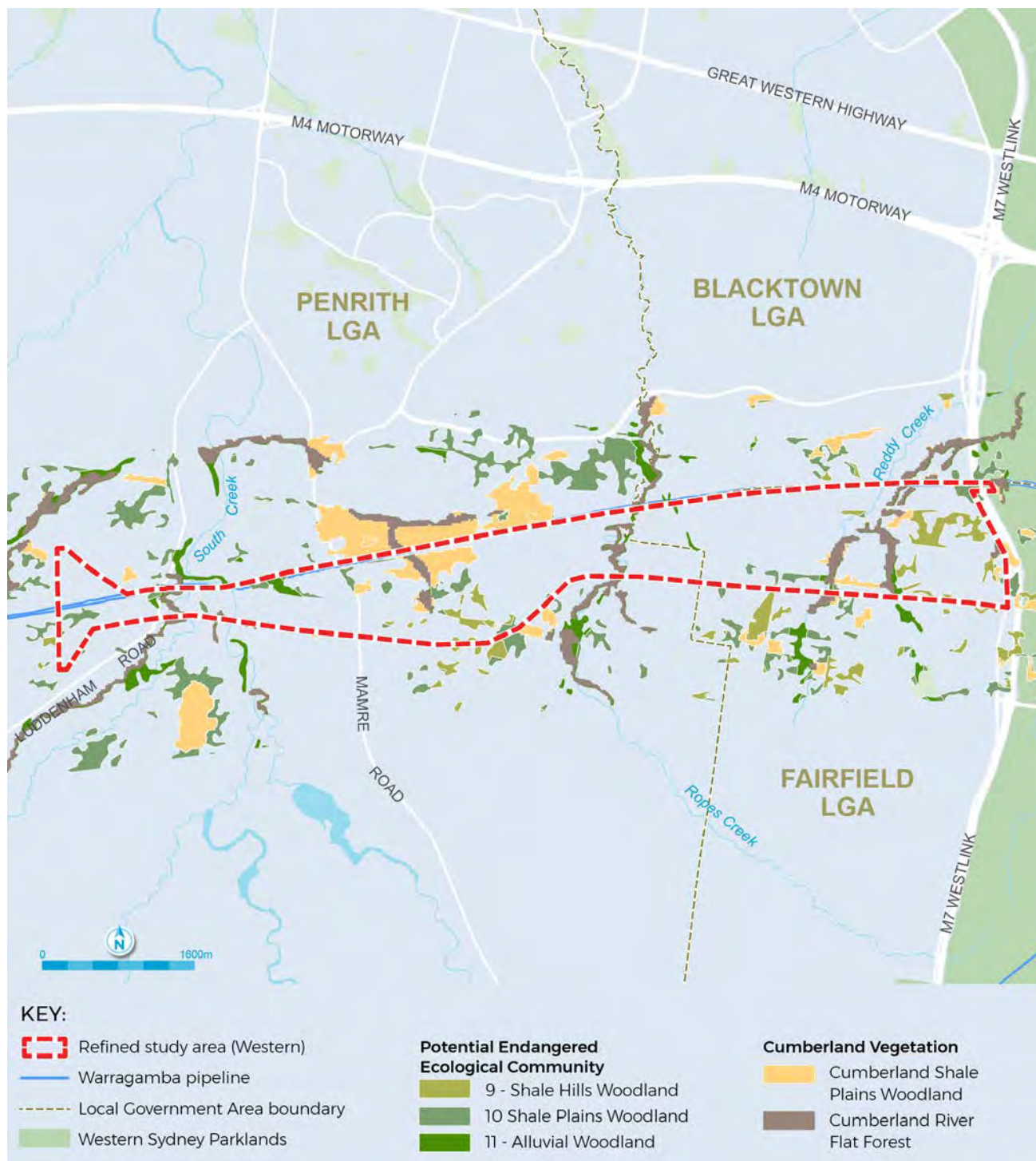


Figure 4.15 Vegetation communities within the western refined study area

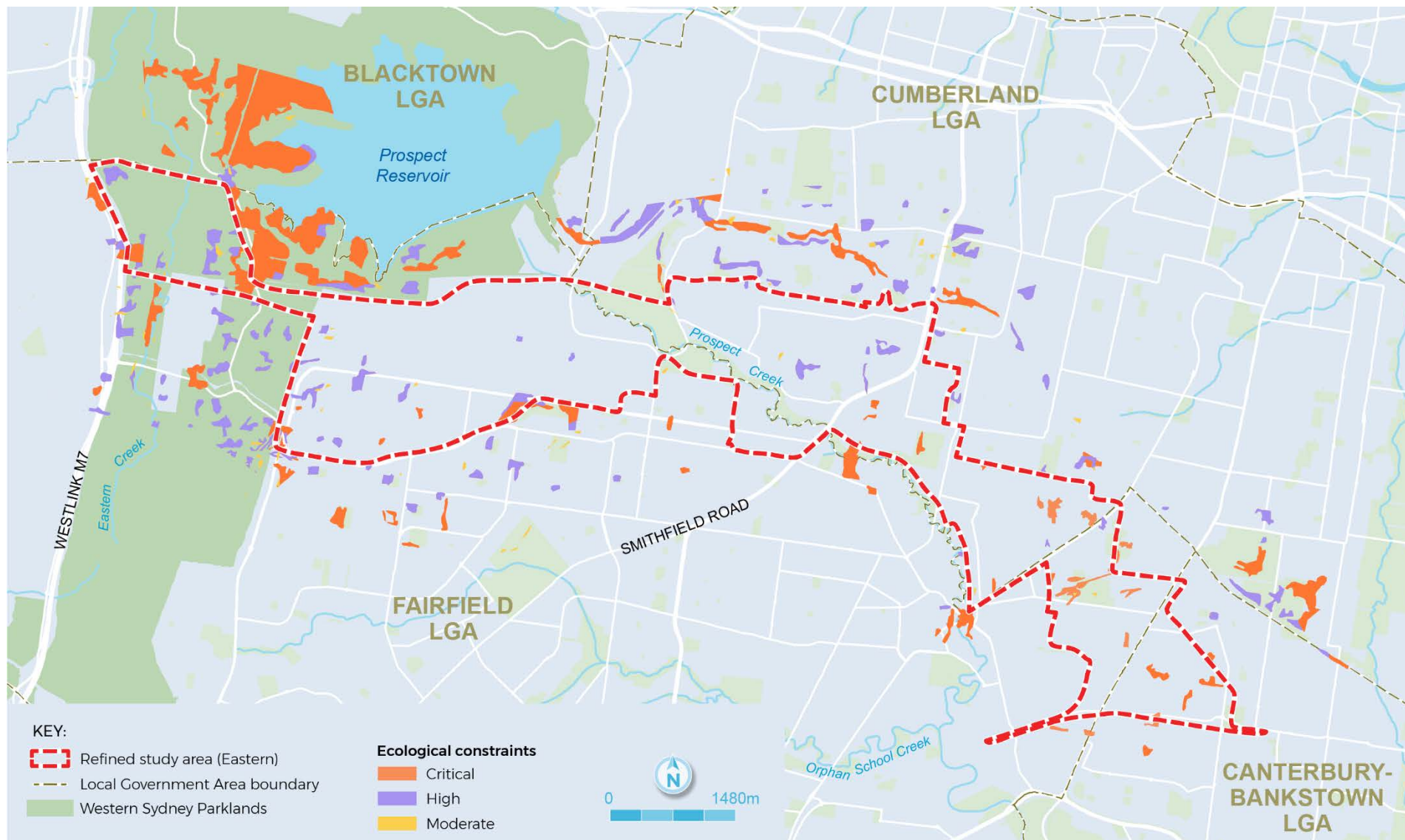


Figure 4.16 Ecological constraints within the eastern section of the refined study area

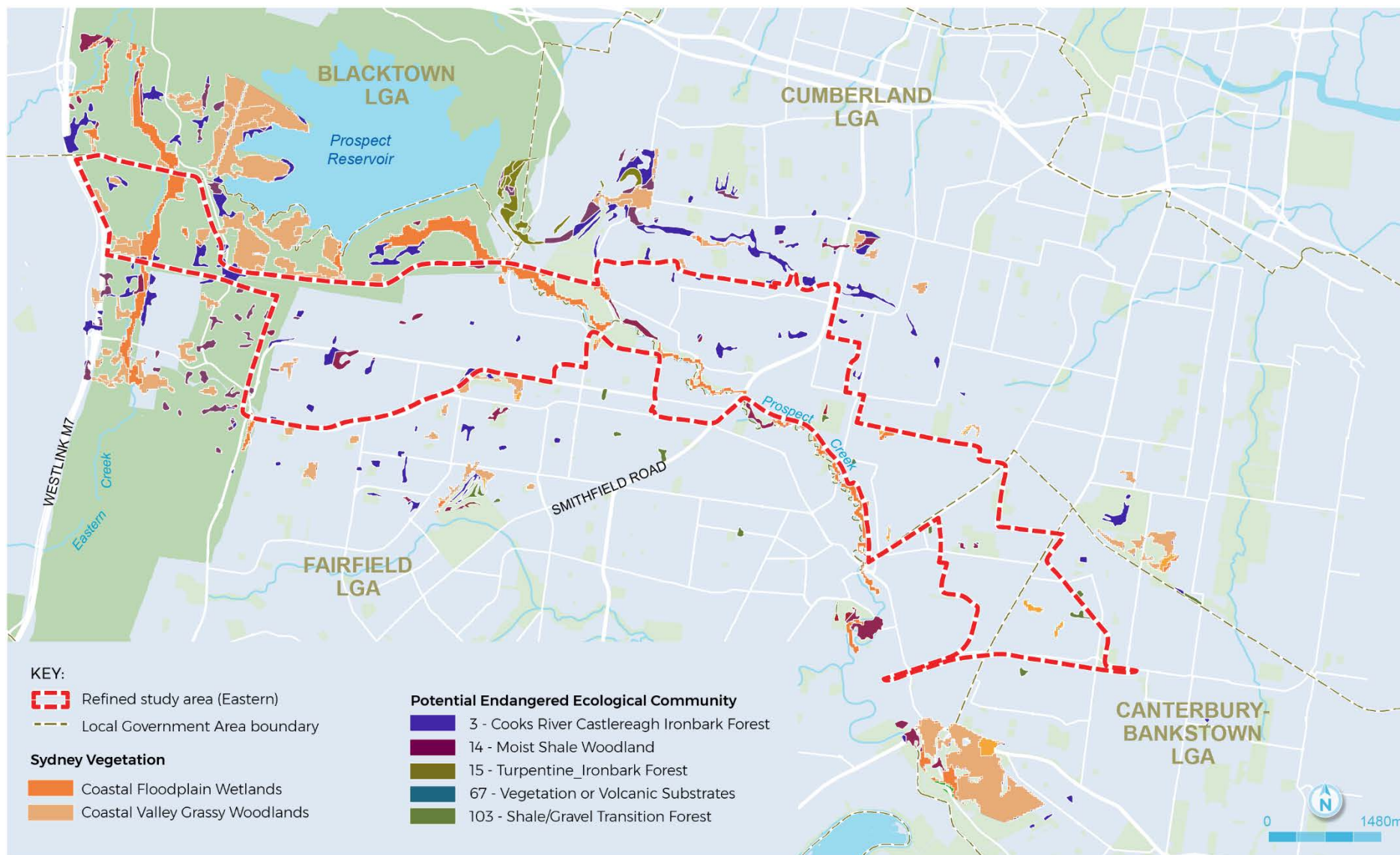


Figure 4.17 Vegetation communities within the eastern refined study area

4.9.2 ENDANGERED FLORA AND FAUNA POPULATIONS

Three endangered flora and fauna populations listed under the BC Act have been identified in the Hawkesbury/Nepean and Sydney Metropolitan catchment management areas. These include:

- *Marsdenia viridiflora* R. Br. Subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs.
- White-fronted Chat population in the Sydney Metropolitan catchment management area.
- Long-nosed Bandicoot population in Inner Western Sydney.

Marsdenia viridiflora subsp. *viridiflora* is known from the area around Prospect Reservoir and in several other localities in and adjacent to the refined study area. Where areas of native vegetation are present, such as in the refined study area, a suitable habitat for *Marsdenia viridiflora* subsp. *viridiflora* may exist. The White-fronted Chat and Long-nosed Bandicoot are unlikely to occur in the refined study area.

4.9.3 THREATENED SPECIES

A review of relevant databases identified 12 threatened plant species that may be present in the refined study area based on the suitability of habitats. The assessment identified that most of these threatened plant species may occur in specific areas of the refined study area. The species *Marsdenia viridiflora* subsp. *viridiflora*, *Acacia pubescens* and *Grevillea juniperina* subsp. *juniperina* are the species most at risk from potential clearing associated with the refined study area. The refined study area is also within the key management site for *Acacia pubescens*, a site managed under the Saving our Species Program.

Twenty threatened animal species are likely to inhabit the refined study area and surrounds. Of these, the following species are most likely to be at risk due to their low mobility:

- Cumberland Land Snail
- Green and Golden Bell Frog.

The following species are likely to be at risk of impact due from potential impacts to vegetation used for breeding:

- Little Lorikeet
- Eastern False Pipistrelle
- Eastern Free-tail Bat
- Southern Myotis
- Greater Broad-nosed Bat.

Further survey will be necessary to confirm the presence of suitable habitat and any species in the final corridor, and may require significance assessments under the BC Act and/or the EPBC Act.

4.9.4 MIGRATORY SPECIES

Migratory species are protected under the international agreements to which Australia are a signatory, including bilateral migratory bird agreements with Japan (JAMBA), China (CAMBA), the Republic of Korea (RoKAMBA) and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered matters of national environmental significance and are protected under the EPBC Act. Eight migratory species may occur in the areas surrounding the refined study area. Habitat for migratory species in the refined study area is considered marginal for many species considering the abundance of similar or greater quality habitat nearby and the degraded nature of the habitats in the corridor. Migratory species are not considered a major constraint for the project.

4.9.5 WETLANDS

There are no wetlands present in the investigation area.

4.9.6 RIPARIAN/AQUATIC HABITAT AND MARINE HABITATS

Major creeks in the refined study area include Prospect Creek, Eastern Creek, Ropes Creek and South Creek. These are all freshwater creeks and do not support marine vegetation. The vegetation of these areas is characterised by alluvial woodlands.

South and Ropes Creek have been the subject to planning, management and restoration works in order to improve river banks and open spaces surrounding the creeks. Investigation works have been completed under the Ropes and South Creek Regional Open Space Strategic Management Plan. The Ropes and South Creeks area has been extensively modified due to vegetation clearing, urban development, agriculture and associated impacts such as weed invasion, reduced water quality, bank erosion and altered fire regimes. However endangered populations, threatened species, and endangered ecological communities were identified within these habitats.

4.9.7 SUMMARY OF KEY BIODIVERSITY CONSTRAINTS

- The investigation area consists largely of urban development and cleared land. Remnant vegetation in the refined study area is likely to be considered high ecological value vegetation due to the scarcity of remaining habitats in the region.
- Endangered ecological communities in the investigation area include:
 - *Marsdenia viridiflora* R.Br subspecies *viridiflora*
 - Cumberland Plain Woodland in the Sydney Basin Bioregion
 - River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions
 - Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.
- Areas of high ecological value are scattered throughout the western section of the refined study area, with the main areas of value between Old Wallgrove Road and the M4 Motorway to the west of Ropes Creek. Vegetation communities mainly comprise Shale Plains Woodland, Alluvial Woodland and Shale Hills Woodland, that correspond to Threatened Ecological Communities listed under the BC Act and/or EPBC Act.
- In the eastern section the main ecological constraints are the Prospect Nature Reserve, vegetation to the north, west and south-west of Prospect Reservoir and some small areas of critical ecological values along Prospect Creek and at the south of the refined study area in Lansdowne. The Western Sydney Parklands contain areas of high ecological value near the Prospect Reservoir and some smaller areas of ecological value throughout the remainder of the parklands. The parklands also act as a regional corridor for wildlife movement.

4.10 ABORIGINAL HERITAGE

4.10.1 REGISTERED ABORIGINAL HERITAGE SITES

A total of 29 Aboriginal heritage sites are listed on the Office of Environment and Heritage (OEH) Aboriginal heritage Information Management System (AHIMS) site register in the refined study area. The sites are predominantly artefact sites.

4.10.1.1 WESTERN SECTION OF REFINED STUDY AREA

There is a high density of recorded Aboriginal items (19) in the western section of the refined study area due to relatively large extent of greenfield land. The sites within the western refined study are predominantly artefacts. Site locations are shown in Figure 4.18.

4.10.1.2 EASTERN SECTION OF REFINED STUDY AREA

The density of reordered Aboriginal heritage sites decreases towards the east where 10 recorded sites are present. This corresponds with an increase in urban density, and land use within Fairfield, Cumberland and Canterbury Bankstown. The sites are predominantly artefacts located along Prospect Creek to the east of Wetherill Park. Site locations are shown in Figure 4.19.

4.10.2 POTENTIALLY SENSITIVE LANDFORMS

Aboriginal sites are common in the Cumberland Plain as the area contains accessible water sources and diverse flora and fauna used by Aboriginal groups who moved through the area. As such, there is potential for artefacts, sites and potential archaeological deposits (PADs) to be present in the refined corridor that have not been recorded in the AHIMS. The refined study area is identified to have high potential for undiscovered Aboriginal artefacts and sites due to the presence of several creeks and associated tributaries and ridgelines throughout the area. Further assessment would be undertaken during the environmental assessment and design of the potential future Western Sydney Freight Line.

‘Potentially sensitive landforms’ are described as landforms and landscapes in which Aboriginal artefacts are typically found in NSW. The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (Office of Environment and Heritage, 2010) lists five sensitive landforms. These are landforms are:

- within 200 metres of waters
- within a sand dune system
- on a ridge top, ridge line or headland
- within 200 metres below or above a cliff face
- within 20 metres of or in a cave, rock shelter, or a cave mouth.

A summary of areas of potentially sensitive landforms is shown in Figures 4.18 and 4.19.

4.10.2.1 WESTERN SECTION OF REFINED STUDY AREA

Based on local models undertaken for the Cumberland Plain, the refined study area intersects seven sensitive landforms with some disturbance and four with heavy disturbance. Figure 4.18 identifies the sensitive landforms near the refined study area and their level of disturbance.

4.10.2.2 EASTERN SECTION REFINED STUDY AREA

The eastern section contains two sensitive landforms with some disturbance and six with heavy disturbance. These include respectively, the area in the Western Sydney Parklands and the area around Prospect Creek which has the greatest level of disturbance. Figure 4.19 identifies the sensitive landforms near the refined study area and their level of disturbance.

Given the presence of recorded Aboriginal sites, potentially sensitive landforms and the Aboriginal history of the refined study area, further research on Aboriginal heritage in the area must be considered before the construction of infrastructure. This research may take the form of:

- Examination into the nature and distribution of Aboriginal artefacts near the corridor in order to apply predictive models of the developed, semi-developed and relatively undeveloped areas of the Cumberland Plain
- Study of the effect of development and survey on the record of Aboriginal material in the Cumberland Plain
- Identification of additional areas of sensitivity and archaeological potential near the corridor
- Engagement and consultation with Aboriginal groups.

4.10.3 SUMMARY OF KEY ABORIGINAL HERITAGE CONSTRAINTS

- High density of recorded Aboriginal heritage items located in the western section of the refined study area due to limited development history.
- High potential for undiscovered Aboriginal artefacts and sites due to the presence of several creeks, associated tributaries and ridgelines throughout the area in the western section of the refined study area.
- The density of reordered Aboriginal heritage items decreases in the refined study area further east.

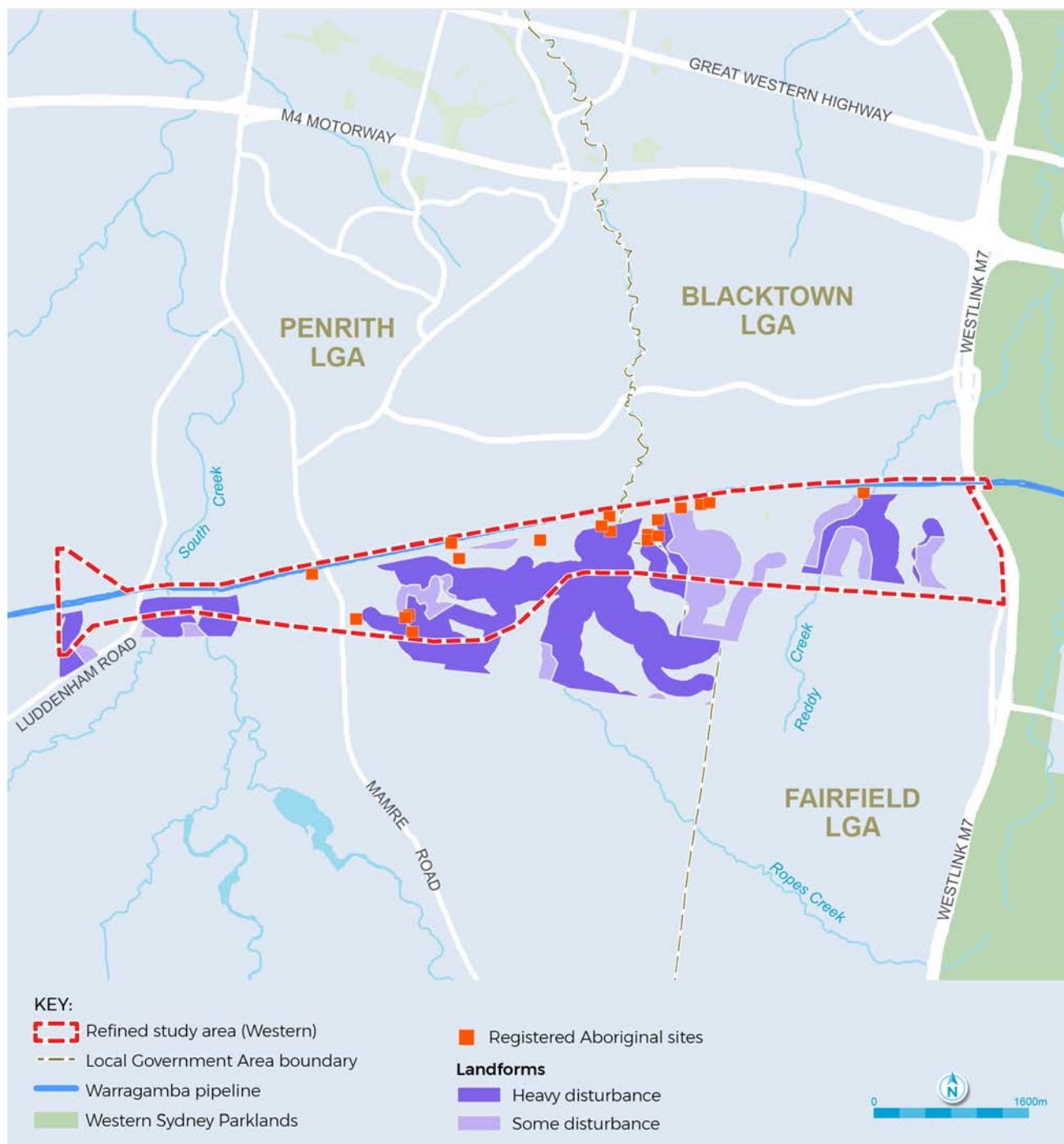


Figure 4.18 Potentially archaeologically sensitive landforms within the western refined study area



Figure 4.19 Potentially archaeologically sensitive landforms within the eastern refined study area

4.11 NON-ABORIGINAL HERITAGE

A strategic review was conducted to ensure that heritage matters were considered as part of the corridor protection process. Searches to identify heritage items and potential sensitive areas were performed in the broad area encompassing the refined study area.

4.11.1 EXISTING ENVIRONMENT

4.11.1.1 WESTERN SECTION OF REFINED STUDY AREA

There is one item listed on a local heritage register in the refined study area. No other state listed or Section 170 register listed heritage items are present. The heritage item is the Luddenham Road alignment located to the far west of the refined study area. The location of listed heritage items near the western refined study area are listed in Table 4.4 and shown on Figure 4.20.

Table 4.4 Heritage items within the western section of the future Investigation area

HERITAGE ITEM	REGISTER	LOCATION	DESCRIPTION
Luddenham Road alignment	Penrith City Council Local Environmental Plan	Far west of the western section	Luddenham Road Alignment is listed as a locally significant heritage item. The State Heritage Inventory database does not contain an entry for this item

Areas of archaeological potential are areas that may contain intact archaeological remains from which meaningful information of past activities and communities can be derived. This level of significance is associated with historical, associative and research potential criteria. A potential area for undiscovered archaeology in the western refined study includes land around the former alignment of Luddenham Road, Lochwood Estate and Horsley Park. Nineteenth century archaeological remains on the Lochwood Estate would potentially be of state significance, however heritage investigations in this area have not identified any such remains. In addition, Oakdale West in Lockwood and Jacfin Horsley Park Project in Horsley Park are currently under development. Therefore, the potential for undiscovered archaeological items is low.

4.11.1.2 EASTERN SECTION OF REFINED STUDY AREA

There are three heritage items listed on the State Heritage Register, four items listed local heritage registers and seven items listed on Section 170 registers in the eastern section of the refined study area. The location of listed heritage items near the eastern refined study area are listed in Table 4.5 and shown on Figure 4.21.

Table 4.5 Heritage items within the eastern section of the future investigation area

HERITAGE ITEM	REGISTER	LOCATION	DESCRIPTION
Prospect Reservoir and surrounding area	State Heritage Register 01370 S170	Northern half of the Eastern Section	Prospect Reservoir is Sydney's largest reservoir and comprises a large component of its water distribution system. It is fed from the Warragamba Dam, Upper Nepean Dams and Shoalhaven Scheme if required. The curtilage of this item includes the boundary of the grounds and all associated pumping and pipe infrastructure.

HERITAGE ITEM	REGISTER	LOCATION	DESCRIPTION
Prospect Reservoir Valve House	State Heritage Register 01371 S170	Northern edge of the Eastern Section	Built during the 1880s, the Valve House is a sandstone octagonal shaped building constructed in a Victorian Frere Classical style.
Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	State Heritage Register 01373 S170	Runs north-south through the eastern section	Built in the 1880s, the Upper Canal System forms a major component of the Upper Nepean Water Supply Scheme. It supplies water from the Cataract River to the Crown Street reservoir.
Pipehead, Water Supply Canal and Associated Works	Local Environmental Plan I01629	North-west of the central section	Three pipelines built between 1888 and 1925 acted as the first major link between Pipehead (at Guildford) and the Potts Hill No.1 Reservoir. The curtilage includes the pipelines and associated infrastructure such as valve houses, flow metres, cross connections and pumping stations.
Villawood Railway Station Group	Local Environmental Plan 101629 S170	South-east of the eastern section	A 1920s railway station that represents standard rail construction and decoration techniques during the 1920s and 1930s. The 1920s platform building and footbridge are characteristic of this period.
Leightonfield Railway Station Group	S170	South-east of the eastern section	A station constructed in 1942 that represents the expansion of railway services during World War II. It displays the simple, utilitarian style of the period that was a shift away from the ornate structures of the 1920s stations.

Additional items not listed above but which are identified on the Section 170 registers:

- Prospect Hill Reservoir (Elevated) (WS 0095) (Sydney Water)
- Water supply pipelines, part of the Upper Nepean Scheme (Sydney Water).

The potential for undiscovered archaeological remains across the eastern refined study area. Areas of specific potential relate to the Widemere Quarry Line and the existing rail corridors and station complexes close to or in the refined study area, including Villawood, Leightonfield, Yennora Railway Station Groups, and the former alignment of Woodville Road.

4.11.2 SUMMARY OF KEY NON-ABORIGINAL HERITAGE CONSTRAINTS

- Low potential for European heritage items in the western section of the future investigation area.
- Three heritage item listed on the State Heritage Register, four items listed local heritage registers and seven items listed on Section 170 registers in the eastern section of the future Investigation area.
- Potential areas of undiscovered non-European heritage in the eastern section of the refined study area include the Widemere Quarry Line and the existing rail corridors and station complexes, including Villawood, Leightonfield, and Yennora Railway Station Groups, and the former alignment of Woodville Road.

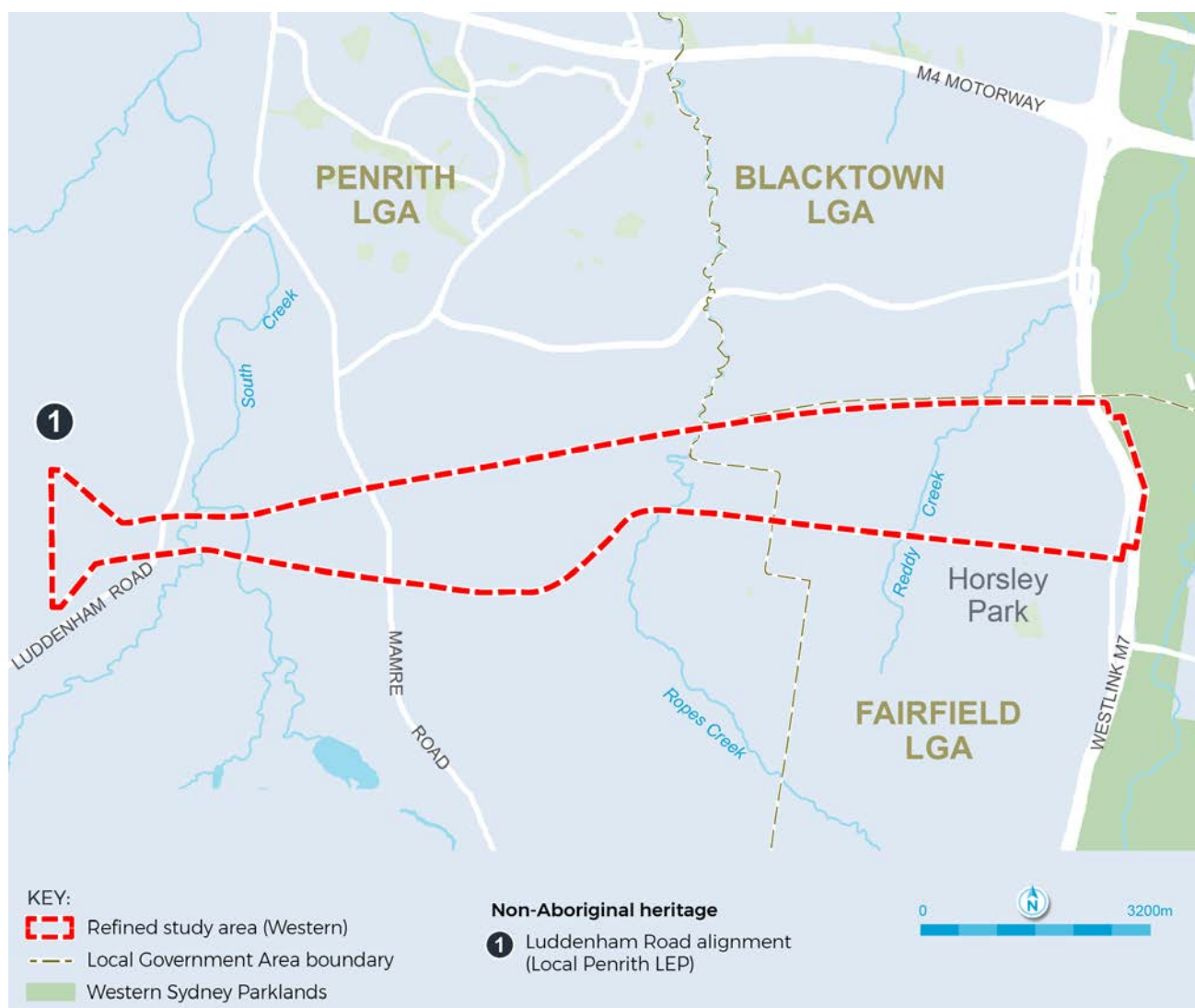


Figure 4.20 Overview of non-Aboriginal heritage items in the western refined study area

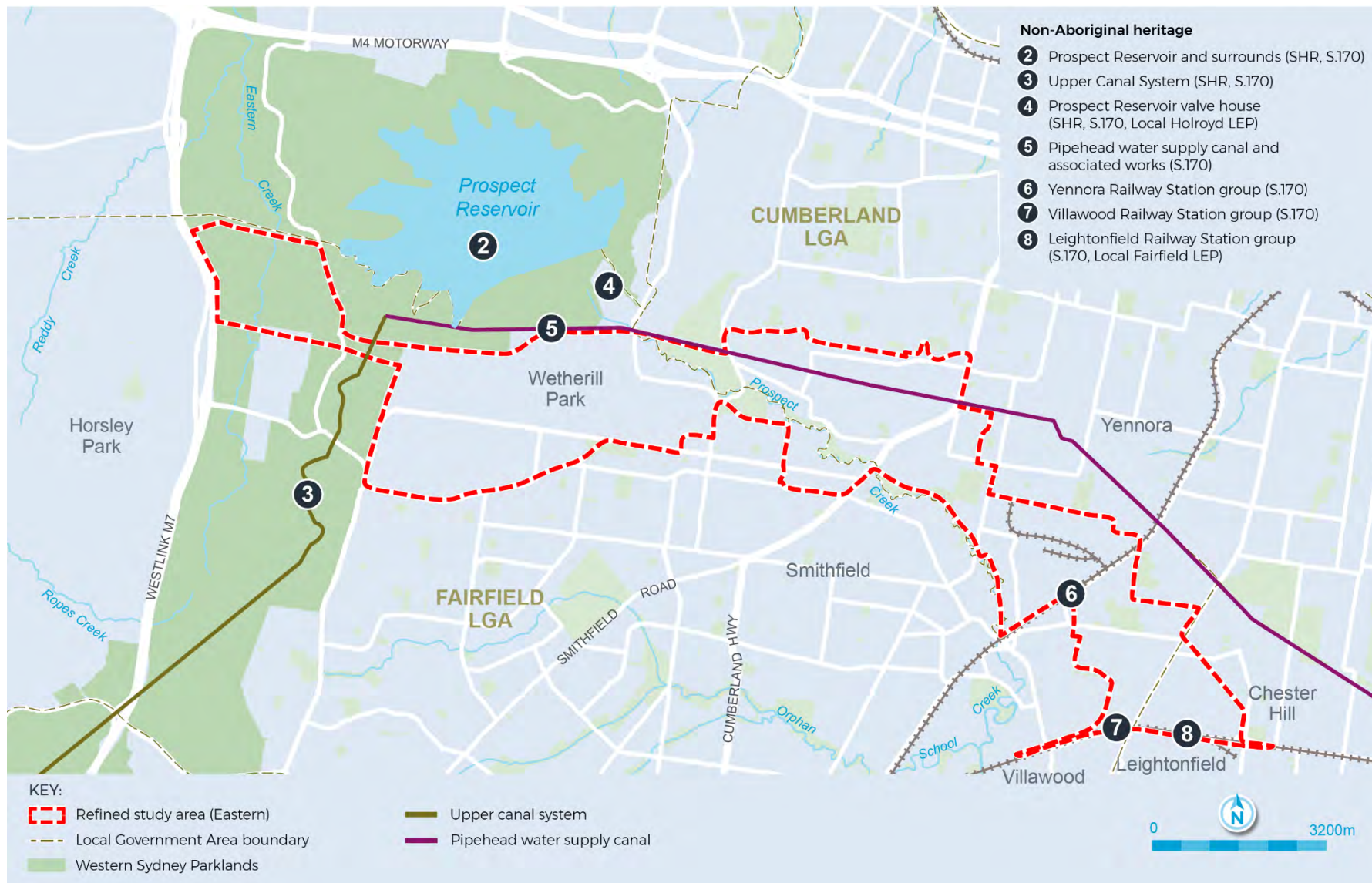


Figure 4.21 Overview of heritage items in the eastern refined study area

4.12 AIR QUALITY

The influence of sea and land breeze circulation on the regional air quality in Sydney is complex. Due to mountain boundaries to the north, west and south, the Sydney metropolitan area is in what is known as a ‘closed’ basin. A closed basin in air quality terms means that the air pollution generated in the basin cannot escape the area due to topographical features and can recirculate over the area throughout the day.

As such, meteorology plays a vital role in the transport and dispersion of pollution from all emitters of air pollution whether they are anthropogenic or natural sources of pollution. In general calm conditions result in slower atmospheric dispersion of pollutants and typically result in higher ground level pollution concentrations closer to the source than under stronger wind conditions. Differences in air quality are expected to occur along the length of the refined study area but the highest pollutant levels are expected near major roadways, industrial areas and in valleys.

4.12.1 EXISTING AIR POLLUTION SOURCES

Several industrial and non-industrial sources near the refined study area have the potential to influence the local air environment. These include, but are not limited to:

- several existing industrial facilities across both western and eastern sections of the investigation area, including manufacturing, warehousing and service industries
- vehicle emissions from the existing road network, including the Westlink M7 that traverses the boundary of the western and eastern sections.

The most significant contributors to poor air quality are nitrogen oxides (NO_x), carbon monoxide (CO), particulates 10 micrometres or less in diameter (PM₁₀) and 2.5 micrometres or less in diameter (PM_{2.5}), sulphur (SO₂), ozone and volatile organic compounds (VOCs) generated through fossil fuel combustion in motorised vehicles. The primary air pollutants of concern associated with construction and transportation are PM₁₀ and PM_{2.5} and NO₂.

4.12.2 LOCAL AIR QUALITY CONDITIONS

The bureau of meteorology operates three monitoring sites in proximity of the refined study area (Prospect, St Mary’s and Chullora). Monitoring from these stations shows ambient concentrations of NO₂, SO₂ and CO consistently below the national air quality standards, and levels of PM₁₀, PM_{2.5} and ground level ozone are of marginal to poor performance.

Monitoring over a 12-month period has shown that 79 per cent of recorded daily Air Quality Index values for the region were between “very good to good”, with 15 per cent recorded as “fair” (OEH, 2017). Up to four annual exceedances of PM₁₀, and up to 5 annual exceedances of PM_{2.5} were recorded. St Marys’ and Prospect stations each recorded one annual exceedance of ozone. No exceedances of CO, NO₂ or SO₂ were noted.

Overall, Prospect air quality monitoring station recorded the highest air pollution concentrations in comparisons to Chullora and St Marys (excluding the annual average NO₂ concentration at Chullora air quality monitoring station). This is likely due to the station’s position at a higher altitude than stations at Chullora and St Marys. It is likely that there are lower winds, which would result in low dispersion of air pollutants. Furthermore, Prospect air quality monitoring station is located near the M4 and Westlink M7, and is exposed to a higher amount of air pollution.

4.12.3 REFINED STUDY AREA SENSITIVE RECEIVERS

Sensitive receivers are defined as a location where people are likely to work or reside. Sensitive receivers include residential properties and recreational land uses zones along the investigation area in both the western and eastern sections.

4.12.4 SUMMARY OF KEY AIR QUALITY CONSTRAINTS

- Sydney is considered to have good air quality in relation to international standards.
- Local monitoring stations indicate predominantly 'very good to good' results.
- The most significant contributors to poor air quality include local industry and warehousing activities, and vehicle emissions on the local road network, such as the Westlink M7.
- The primary air pollutants of concern associated with construction and transportation are PM₁₀ and PM_{2.5} and NO₂.

4.13 SOCIAL CONTEXT

This review provides a preliminary summary of key community and population characteristics in the refined study area.

4.13.1 *DEMOGRAPHICS*

This section provides a demographic profile of the residential population of the communities in the refined study areas. This profile draws on publicly available data from the 2016 Census.

Census data is available for residential populations only, therefore any industrial and commercial precincts within the refined study area have been excluded from this profile. However, it is noted that the distribution of these activities and land uses, as well as the major and arterial road networks, may influence the connectivity and relationship between surrounding residential communities. Economic conditions are summarised in Section 4.3.

4.13.2 *POPULATION DENSITY*

4.13.2.1 WESTERN SECTION OF REFINED STUDY AREA

The western section of the refined study area includes land within Penrith, Blacktown and Fairfield LGAs. Figure 4.22 shows the population density in 2016 across the communities within the refined study area.

As the refined study area passes through agricultural and industrial areas, residential density throughout the area is low. The population density in the suburbs of Luddenham-Wallacia, Mt Vernon, Kemps Creek, Badgerys Creek, and Orchard Hills in the refined study area, are among the lowest in the Penrith LGA. Density in the Blacktown LGA suburb of Eastern Creek is low as the area is generally industrial land use. The suburb of Horsley Park consists mainly of low density rural living areas and therefore contains some of the lowest density within the Fairfield LGA.

4.13.2.2 EASTERN SECTION OF REFINED STUDY AREA

The eastern section of the refined study area includes land within Fairfield, Cumberland, and Canterbury Bankstown LGAs. Figure 4.23 shows the population density in 2016 across the communities within the refined study area.

The refined study area passes predominantly through commercial and industrial land use in the suburbs of Horsley Park, Wetherill Park, Smithfield, Yennora and Villawood, corresponding with low population densities. Small pockets of residential areas have resulted in higher densities in areas of Smithfield, Guildford West, Fairfield East, and Villawood. The highest population density exists in a small pocket of Chester Hill along Woodville Road and in Fairfield East. No major population centres are located in the refined study area. The Fairfield, Cumberland and Canterbury-Bankstown LGAs generally have a higher population density towards the south, north east and east of the refined study area.



Figure 4.22 Overview of population density western refined study area

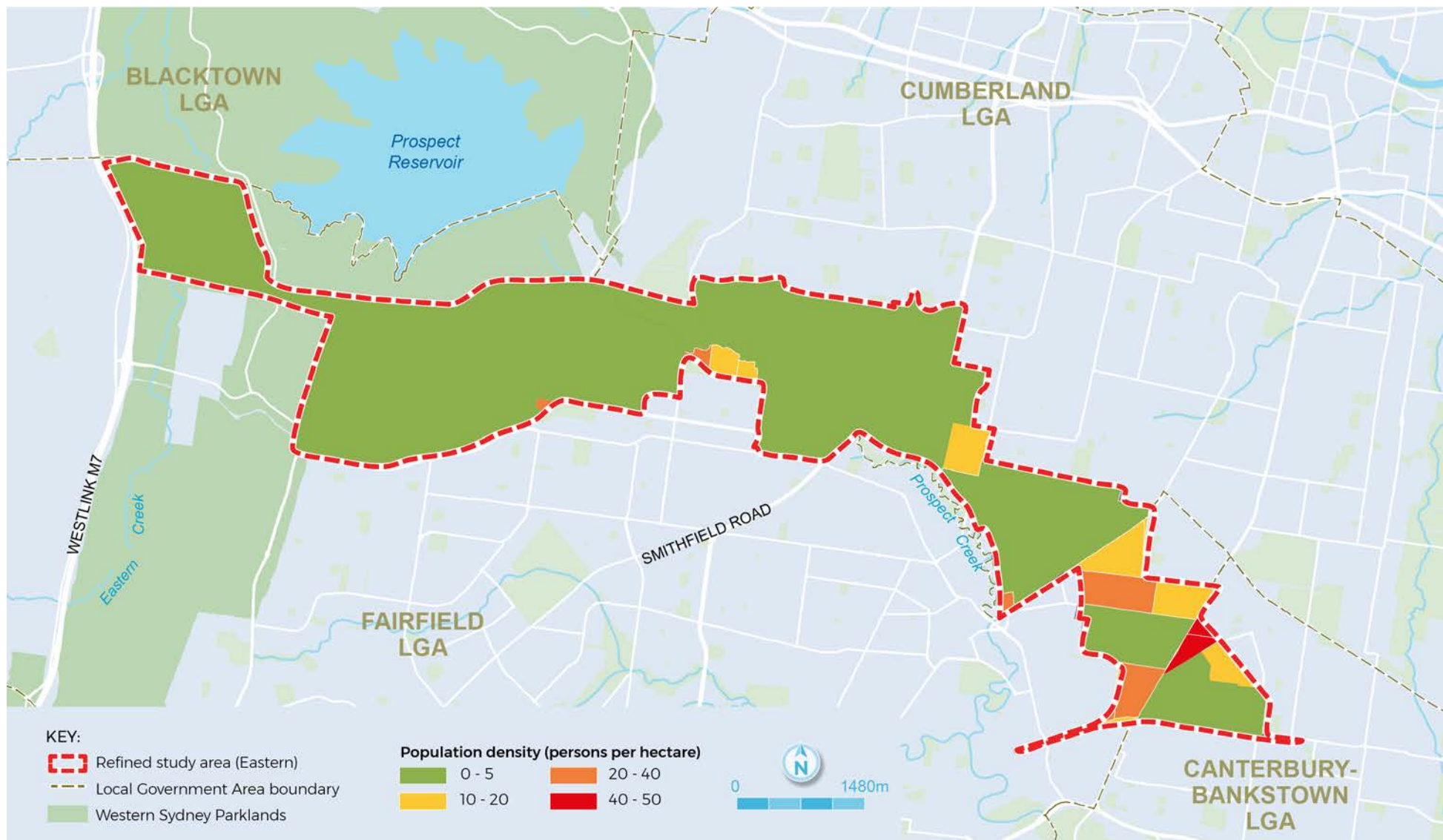


Figure 4.23 Overview of population density eastern refined study area

4.13.3 CULTURAL DIVERSITY

A high-level review of cultural diversity shows that the Fairfield local government area has a large population of residents born overseas, and residents born in non-English speaking countries. Culturally and linguistically diverse communities and populations with lower rates of English proficiency can face barriers to engagement and may be reliant of local networks and family for assistance. These communities may have lower resilience to altered or unfamiliar environments as a result of barriers to communication and understanding.

4.13.4 FACILITIES AND PLACES OF INTEREST

4.13.4.1 COUNCIL PROVIDED FACILITIES

The number of council services and facilities listed on the respective council websites that are located within the western and eastern refined study areas is included in Table 4.6 and summarised below. It is noted that additional services may be provided by community groups or the private sectors and may not be listed on council's websites.

Table 4.6 Council provided services and facilities by LGA

	PENRITH CITY COUNCIL	FAIRFIELD CITY COUNCIL	CUMBERLAND COUNCIL	CANTERBURY BANKSTOWN COUNCIL
Library branches	None	None	None	None
Leisure and aquatic centres	None	None	None	None
Youth centres	None	None	None	None
Community centres, halls and meeting spaces	None	None	None	None
Early learning, preschools, multipurpose services and childcare centres	None	None	None	None
Sports fields, recreation facilities including Parkes and open spaces	None	9	5	None

The following council owned facility has been identified within the western refined study area:

- Horsley Park Memorial Park.

The following council owned facilities have been identified within eastern refined study area, including those which extend across local government boundaries:

- Wetherill Park reserve
- Kaluna Reserve
- Rossford St Reserve
- Fairfield Rd Park
- Ace Reserve
- Malta Park
- Knight Park
- Guilford west sportsground
- Tait Street Park
- Gipps Road Park.

4.13.5 PLACES OF SIGNIFICANCE

The following regional services and attractions are situated within or adjacent to the refined study area:

- Western Sydney Parklands, Horsley Park
- Prospect Reservoir, Prospect.
- Villawood Immigration Detention Centre, Villawood.

4.13.6 SUMMARY OF SOCIAL IMPACT CONSTRAINTS

- Population density varies, however both western and eastern refined study areas generally consist of the lowest rates in each municipality.
- Population density constraints are lowest within the western refined study area.
- Population density is low in industrial areas in the eastern refined study areas, however increases towards the east, as the small pockets of residential properties increase which is considered a constraint in the eastern refined study area.
- The location of local council facilities does not result in any major constraints within the western refined study area, with one parkland identified.
- Constraints based on local council facilities are greater in the eastern refined study area due to the presence of a number of recreational and open space areas which are located predominantly in the Fairfield and Cumberland Local Government Areas.
- A number of places of significance are present within the refined study including, Western Sydney Parklands, the Prospect Reservoir and Villawood Immigration Detention Centre. The Villawood Detention Centre is located in the eastern refined study area in the suburb of Villawood.

5 DEVELOPMENT OF THE RECOMMENDED CORRIDOR

5.1 OPTIONS DEVELOPMENT AND ASSESSMENT PROCESS

An options development and assessment process was undertaken to consider the constraints and opportunities in the development of a recommended corridor for the western section of the Western Sydney Freight Line. A broad study area and a refined study area are shown in Figure 5.1.

The options development and assessment process is an iterative process involving the following key steps:

- Review of the strategic context – Key policy drivers and strategic directions for the development of the Western Sydney Freight Line Corridor were identified.
- Study parameters development – Project objectives, business requirements and evaluation criteria were confirmed in consultation with subject matter experts.
- Constraints identification – Key constraints that influenced the development of a recommended corridor were identified. These included land use planning (including severance), biodiversity, heritage, noise, visual impact, topographical (constructability) and transport and utilities infrastructure constraints. This process resulted in the refined study area.
- Identification of preliminary options – A list of potential corridor options was identified and documented for further evaluation and refinement.
- High level options elimination – Options with significant environmental, infrastructure or constructability constraints did not progress to the short list.
- Detailed MCA of shortlisted options – The shortlisted options in the western section were evaluated in further detail against a range of specific and quantifiable criteria derived from the objectives and the business requirements.
- Recommended corridor – A recommended corridor for the western section was identified for consultation and presented in accordance with Department of Planning and Environment’s strategic environmental assessment scoping requirements.

The process identified a range of corridor options through use of multi-criteria assessments to define the recommended corridor in the western section.

The various constraints in the eastern section and the need for an integrated land use and transport process has meant further engagement with key stakeholders is needed to establish feasible options for assessment. This assessment will be part of a total land use planning outcome that best balances community, environment and industry needs whilst adequately addressing potential future impacts, constraints and options.

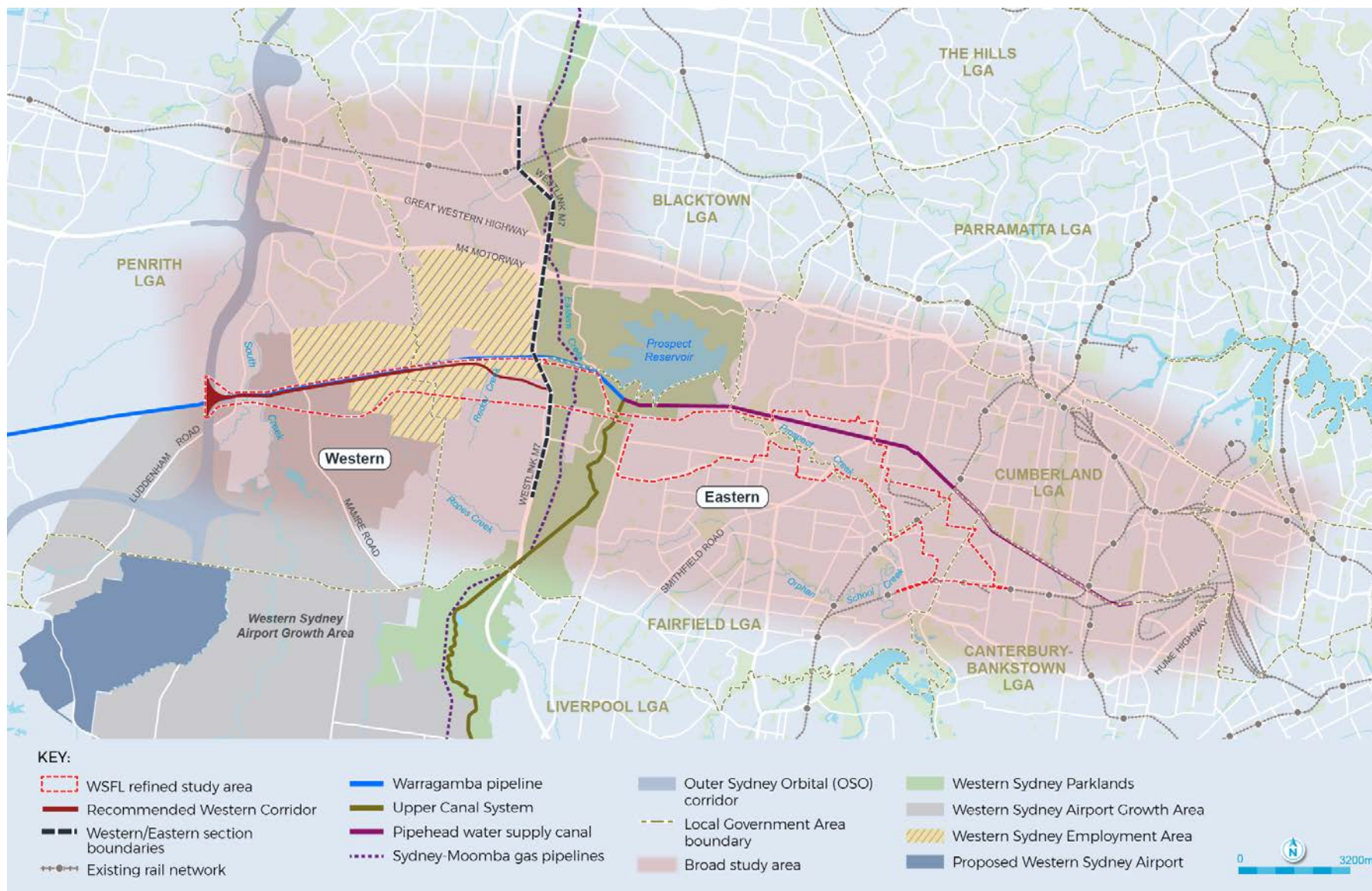


Figure 5.1 Broader study area

5.1.1 CONSULTATION DURING THE OPTIONS ASSESSMENT

Consultation workshops were conducted with relevant agencies, local councils, utility providers and other stakeholders to establish constraints and opportunities in the refined study area. Meetings were held with key stakeholders where investigation was required regarding specific infrastructure and land uses in the study area.

Stakeholders consulted during the options development and assessment process were as follows:

- Department of Planning and Environment
- Roads and Maritime Services
- Office of Environment and Heritage
- Western Sydney Parklands Trust
- Affected councils (Penrith City Council, Blacktown City Council, Fairfield City Council, Cumberland Council and Canterbury-Bankstown Council)
- Sydney Trains
- Department of Trade and Investment, Regional Infrastructure and Services
- Utilities providers
- Sydney Catchment Authority
- Sydney Water
- ARTC
- Deerubbin Aboriginal Land Council
- Gandangara Aboriginal Land Council
- Other key stakeholders on request.

Further consultation with key government agencies including Transport for NSW, Greater Sydney Commission, Department of Planning and Environment and relevant local councils will commence in 2018 for the eastern section to investigate and confirm a recommended corridor within a land use planning framework.

5.2 HIGH LEVEL OPTIONS ELIMINATION

Through initial consideration of the constraints detailed in Chapter 4, options were developed. These were then subject to a high-level options elimination process.

The high-level options elimination process was undertaken to consider key constraints that would be likely to eliminate corridors in subsequent analyses. Key constraints included unacceptable environmental impacts, unacceptable engineering challenges or options that did not meet the minimum business requirements. The analysis revealed that there were a number of constraints between the Southern Sydney Freight Line and Eastern Creek significantly limiting the options available for the Western Sydney Freight Line Corridor. The major constraints identified included:

- existing residential communities within the study area
- existing major infrastructure including the Warragamba pipeline, Westlink M7 and existing rail lines including the Main South Line and the Southern Sydney Freight Line
- high risk of noise and vibration or severance impacts throughout the largely residential areas of Yennora, Villawood and Fairfield
- risks to Prospect Reservoir Water Filtration Plant and associated supply pipeline
- impacts to sensitive Endangered Ecological Communities in the Western Sydney Parklands
- impacts to the Westlink M7, Wallgrove Road intersection and local road networks
- disruption and acquisition requirements to new industrial developments at Eastern Creek in the WSEA and to existing industrial areas in Wetherill Park
- steep gradient requirements at the old Prospect Quarry and throughout Wetherill Park due to topography
- the need to connect the Western Sydney Freight Corridor to the proposed Outer Sydney Orbital connection near Luddenham.

5.3 MULTI CRITERIA ANALYSIS (MCA)

5.3.1 MCA CRITERIA AND THEIR APPLICATION

The MCA process identified criteria and key performance indicators (KPIs) against which corridor options were assessed. These criteria were developed to measure corridor options against project objectives and were used for both the high-level and detailed MCAs. The KPIs were used to derive a score for each corridor against the criterion. KPIs were considered qualitative in the initial stages of the study, with quantitative scores introduced as more technical information became available. The criteria and KPIs are shown in Table 5.1.

Table 5.1 Detailed MCA criteria and KPIs

CRITERIA	KPI	CONSIDERATIONS AND MEASURES
Criterion 1: Delivers improvements to freight movement in terms of operational cost, travel time and separation from passenger rail services	<ul style="list-style-type: none"> — Journey time saving (relative to alternatives) — Length of new track required — Proportion of track where curve radii ≤ 600 m — Proportion of track where curve radii < 1000 m. 	
Criterion 2: Provides efficient access to a viable intermodal terminal option	<ul style="list-style-type: none"> — Extent to which option provides freight access to Yennora Distribution Centre. 	<ul style="list-style-type: none"> — Ease of access to track — Length of train accommodated in Yennora — Ability to accommodate shunting road parallel to main line.
Criterion 3: Has the potential to contribute to efficient intermodal transfer	<ul style="list-style-type: none"> — Not applicable to corridor assessment. 	
Criterion 4: Ability to be constructed efficiently and cost effectively	<ul style="list-style-type: none"> — Ability of option to be staged/upgraded later on. 	<ul style="list-style-type: none"> — Constructing eastern or western connection first — Constructing single line and duplicating in the future.
	<ul style="list-style-type: none"> — Risk of requiring major civil structures (tunnels, viaducts, complex grade separations). 	<ul style="list-style-type: none"> — Requiring tunnels, viaducts, complex grade separations — Complexity and risk.
	<ul style="list-style-type: none"> — Risk of requiring major earthworks. 	<ul style="list-style-type: none"> — Volume and complexity — Topography of site.
	<ul style="list-style-type: none"> — Risk of interface with major services. 	<ul style="list-style-type: none"> — Complexity and risk.
	<ul style="list-style-type: none"> — Risk of unfavourable geotechnical conditions. 	<ul style="list-style-type: none"> — Complexity and risk.
	<ul style="list-style-type: none"> — Major road and rail grade separations. 	<ul style="list-style-type: none"> — Complexity and risk — Roads and Maritime Services requirements.
	<ul style="list-style-type: none"> — General formation and structures construction. 	<ul style="list-style-type: none"> — Potential for future electrification not precluded.

CRITERIA	KPI	CONSIDERATIONS AND MEASURES
	— Ease of construction access.	— Impact on existing roads, business etc. — Availability of potential construction sites.
	— Construction risk.	— Nature of risk: Noise, dust, water, contamination.
	— Risk of requiring extensive flood mitigation measures.	— Proportion of corridor affected by flooding — Effect of corridor on flood level.
Criterion 5: Minimises property and social impacts	— Impact on existing residential property.	— Number of residential and rural residential properties affected — Number of owners.
	— Impact on existing employment property.	— Number of employment properties affected — Proportion of site affected — Number of existing structures affected — Number of owners affected.
	— Risk of negative visual impacts.	— Extent of corridor within visual catchment of existing residential areas.
	— Risk of negative noise impacts.	— Number of sensitive noise receivers exposed to significantly increased level of noise (within approx. 160 m).
	— Risk of community severance.	— Impact on existing residential buildings or community facilities — Extent of segregation of existing communities.
	— Impact on existing/future recreational areas.	— Sports grounds, municipal parks or recreational areas impacted by corridor.
Criterion 6: Minimises environmental impacts	— Extent of native vegetation clearance including flora and fauna.	— Extent and quality of vegetation to be removed — Potential for segregating ecological communities — Availability of environmental offsets.
	— Impact on riparian and aquatic life.	— Proximity of corridors to waterways — Design of crossing structure.
	— Heritage impacts (Indigenous and European).	— Risk of affecting sites of Indigenous heritage — Risk of affecting sites of European heritage — Potential of affecting Indigenous and European heritage site (low, medium and high) i.e. proximity to creeks and level of disturbance.
	— Risk of changing flood conditions off site.	— Proportion of corridor affected by flooding — Effect of corridor on flood level.

CRITERIA	KPI	CONSIDERATIONS AND MEASURES
Criterion 7: Integrates with and supports land use planning, transport infrastructure and services	— Aligns with strategic land use planning.	— Extent to which the strategic goals of the region are satisfied.
	— Impact on and opportunities to influence adjacent land use.	— Relationship to significant planned residential developments — Relationship to significant planned employment uses.
	— Fit with adjacent infrastructure.	— Broader Western Sydney Employment Area Structure Planning process
	— Ability to share existing corridors.	— Locating corridor within existing utilities and roads corridors.
Criterion 8: Current and future availability of corridor.	— Ability of corridor to be protected prior to being constructed.	— Future land use on site — Stage of approval for development applications — Interaction with planned transport infrastructure/services.
	— Ease of acquisition.	— Number of owners, existing approvals and structures.

5.3.2 RESULTS OF MCA PROCESS

5.3.2.1 WESTERN SECTION

Potential requirements for earthworks was a major consideration in the western section. Several major ridge lines are present between the Westlink M7 and Mamre Road limiting corridor options in this area. Adjacent to the Southern Link Road a recommended corridor would need to cross six major ridgelines with up to 30 metres of differential elevation and requiring significant cut and fill in some sections. This topographical constraint was avoidable adjacent to the Warragamba pipeline which benefits from relatively level terrain.

Other key considerations in the western section were:

- disruption to the planned industrial developments in Eastern Creek
- crossing of major road corridors including the Westlink M7, Wallgrove Road and Mamre Road
- implications for crossing the Warragamba pipeline
- the ability to cross over the Westlink M7 where it is in cut, so allowing for a crossing with minimal need for elevation of the crossing structure and avoidance of adverse grades
- connection from the western section into the eastern section and through Western Sydney Parklands
- a number of major creeks such as Eastern Creek, Reedy Creek, Ropes Creek and South Creek which are present in this section. These creeks and their associated flood plains may require major culverts or viaducts to prevent the impact of flooding
- some remnant areas of Cumberland Plain Woodland are present in the western section of the refined study area. Consideration was given to a corridor that avoids this EEC.

A recommended corridor in the western section would require crossing the Westlink M7, Wallgrove Road and Mamre Road. Placement of the corridor next to the Warragamba pipeline was beneficial as it has existing intersections and would have a lower impact on the movement of traffic north-south. In addition, placement of the corridor next to the Warragamba pipeline aligns the corridor with an existing piece of linear infrastructure that intersects with the waterways

and riparian corridors in the area and would reduce the number of crossings for these ecological areas. A single adjoining use along the corridor in Government ownerships also reduces the risks for impacts on the water pipelines from multiple employment uses.

5.3.2.2 EASTERN SECTION

The eastern section of the Western Sydney Freight Line refined study area immediately east of the Westlink M7 is in the Western Sydney Parklands and adjoining Austral Bricks quarry site. The adjoining rural- residential and horticultural activities provide the best opportunities to reduced environmental impacts on the integrity of the parklands. As mentioned, crossing the Westlink M7 at this point also takes best advantage of the motorway in cutting thus simplifying the crossing and avoiding disruption for Westlink M7 users.

Through Horsley Park and Wetherill Park corridor options are constrained by the existing and significant Prospect Dam and environs, including the presence of Cumberland Plain Woodland communities. There are also existing areas of industrial and commercial premises through this area which may present opportunities for renewal. Recreational areas are located along Prospect Creek which further constrain the alignment to the east into Smithfield.

Towards the connection with the Southern Sydney Freight Line the land use is dominated by a mix of residential and industrial land uses that significantly constrains an at grade future infrastructure option.

5.4 SUMMARY OF CORRIDOR OPTIONS

The high-level MCA process ranked options within each section. As a result of this process, two options were identified in the western section (refer to Figure 5.2), one of which followed the Warragamba pipeline to the north and the other the Southern Link Road to the south. Given the constraints within the eastern section, it was determined that further study of integrated land use opportunities is necessary to identify options for the connection into the Southern Sydney Freight Line.

5.4.1 WESTERN SECTION

The recommended corridor for the western section was the highest ranked at the completion of the options development and assessment process. It was considered to represent the best balance between engineering and constructability while minimising any impacts to the community, environmental and land use planning and meeting the objectives of the project.

The advantages of the western section recommended corridor are as follows:

- achieves the best balance between engineering and constructability while minimising impacts on the community and the environment
- has the least impact on existing sensitive land uses, in particular on existing dwellings, by maximising the separation to residential communities, such as the Twin Creeks residential community
- avoids direct impact on several sensitive receivers including the Emmaus Retirement Village, Trinity Primary School and recreational land uses
- has the least impact on critical infrastructure including the Warragamba pipeline, proposed Outer Sydney Orbital Corridor and Westlink M7
- delivers the best operational freight outcomes which includes an alignment that avoids major undulations in landform (important as freight trains require very shallow or flat grades)
- avoids major biodiversity, flooding or heritage impact
- facilitates the development of freight and logistics industries in Western Sydney.

The impact on property associated with the recommended corridor was less significant than other potential alignments given its co-location with the existing Warragamba pipeline. The location of the recommended corridor immediately west of the Westlink M7 was also heavily influenced by the location of a potential crossing of the Westlink M7. The location

under the recommended corridor takes best advantage of the motorway being in cut which facilitates a future grade separated crossing with minimal disruption for the motorway.

5.4.2 EASTERN SECTION

East of the Westlink M7 an indicative study area has been identified for engagement with key stakeholders, industry and the broader community. Key constraints were identified in the eastern section as discussed Chapter 4. This constraints analysis is the basis of future discussions with key stakeholders and the community within the refined study area. The community and key stakeholders will be invited to consider these constraints.

The indicative study area includes existing industrial precincts in Wetherill Park, Smithfield, Yennora and Leightonfield. These precincts would benefit from the provision of a future freight rail connection including the existing Intermodal Terminal at Yennora, which has access to the Old Main South Railway Line.

Following engagement with key stakeholders the eastern section study area will be further refined and meet with the western section such that no modification to the western section corridor alignment will be required. An integrated planning process will be determined by the Department of Planning and Environment, together with the Greater Sydney Commission and Transport for NSW. This planning process will involve key stakeholders during 2018 and work towards establishing a land use framework with a recommended corridor for the Western Sydney Freight Line east of the Westlink M7 through to the Southern Sydney Freight Line near Leightonfield.

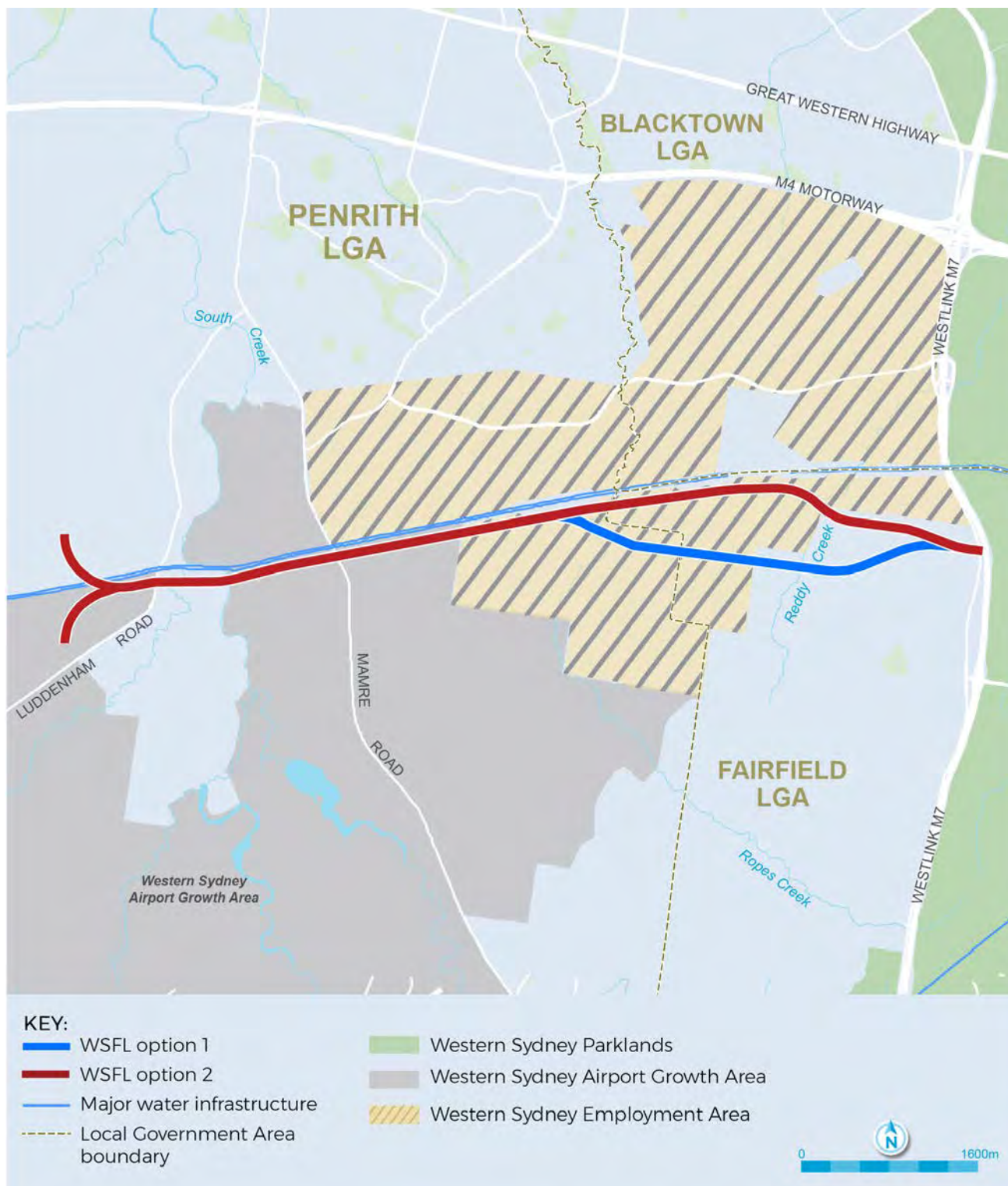


Figure 5.2 Short-listed options within the western section

5.5 RECOMMENDED WESTERN CORRIDOR

The recommended corridor was ranked highest at the completion of the options development and MCA process and is presented in Figure 5.3. It represents the best balance between engineering and constructability while minimising impacts on the community, environment and land use planning and meeting the objectives of the project.

The recommended corridor crosses the Westlink M7 and Wallgrove Road on the opposite side of the Austral Brick site where it continues west, crossing Mamre Road and then joining to the proposed Outer Sydney Orbital Corridor.

As noted above, reservation of the corridor within the western section will be sought. Impact assessments are outlined in Chapter 5 and would be further developed during project development as part of an Environmental Impact Statement process once a final design solution is determined.

5.5.1 CONSTRUCTION METHODOLOGY WESTERN CORRIDOR

The recommended corridor for the western section optimises the balance between engineering and constructability so to avoid complex structures such as significant tunnels or bridges/viaducts. A standard rail construction methodology could be adopted for this corridor and further refined during future design phases to potentially include the following stages:

- Early works including geotechnical investigations, services location and detailed site survey.
- Enabling works including site establishment and set-up of construction compounds along the corridor, protection of sensitive environmental areas such as the crossings of Reedy Creek and Ropes Creek, construction of access roads and fencing, relocation of services – particularly high voltage electricity transmission and distribution lines and underground gas pipelines, protection of critical infrastructure such as the Warragamba pipeline, general clearing of the corridor including clearing of vegetation, minor earthworks and demolition (if required).
- Civil and earthworks including the construction of embankments and cuttings to balance cut and fill so to minimise the import or export of material. Given the location of the recommended corridor, there is the opportunity to explore using excess spoil to backfill surrounding life-expired quarries.
- Structures including construction of rail bridges over existing roads or construction of new road bridges over the recommended corridor. Road crossings will include the Westlink M7/Wallgrove Road, Old Wallgrove Road and Mamre Road. Consideration would be given to using precast bridge spans over existing roads to minimise road closures and disruptions. This stage may also include the construction of viaducts or culverts over existing waterways including Reedy Creek, Ropes Creek and South Creek and crossing of the Warragamba pipeline. A longer, low-level viaduct may be required over the South Creek floodplain. Significant structures may be required for the connection to the proposed Outer Sydney Orbital Corridor, however, this will be subject to further design.
- Rail systems including the construction of track formation and drainage, track structure (combined services routes including signalling and communications, maintenance access roads and noise walls if required).
- Commissioning including the testing and commissioning of the rail systems and structures and bringing the recommended corridor into operational readiness.

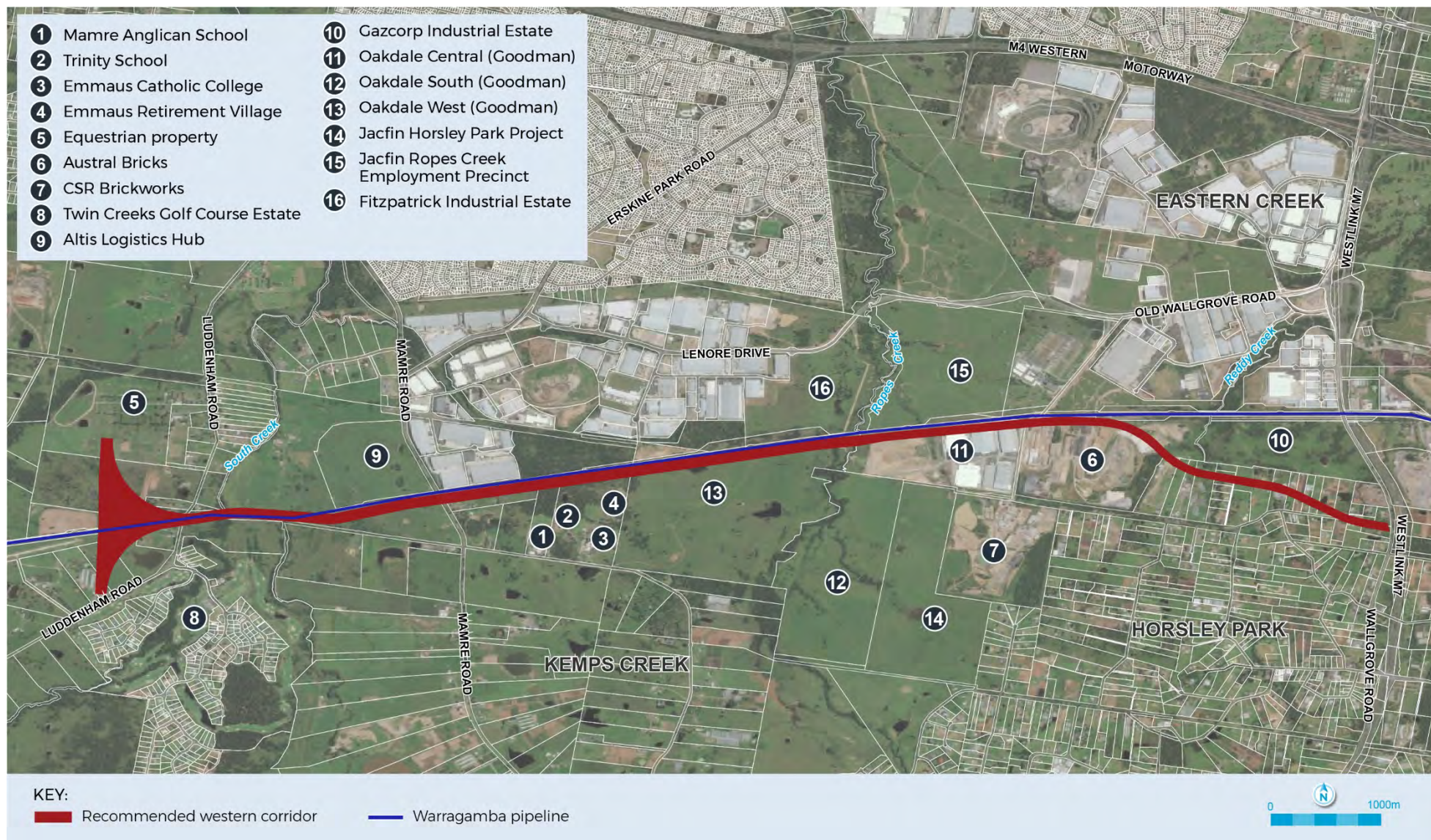


Figure 5.3 Recommended corridor and future land developments

6 STRATEGIC ASSESSMENT – WESTERN SECTION

This strategic assessment chapter addresses the scoping requirements provided by the Department of Planning and Environment for the investigation of Western Sydney Freight Line Corridor. The existing environment and impacts listed in this chapter pertain solely to the protection of the western section (herein referred to as the ‘recommended corridor’) and do not address impacts relevant to the eastern section which will be subject to further study of integrated land use and transport opportunities.

6.1 LAND USE AND PROPERTY

6.1.1 CORRIDOR LAND USE IMPACTS

The recommended corridor is in predominantly employment/ industrial lands on lands to be rezoned for employment. An increasing proportion of land between Westlink M7 and Mamre Road is being design and approved for warehousing, manufacturing and other logistics uses that require large development footprints and sealed areas for parking, loading and storage. To the rear of sites within the recommended corridor is the Warragamba pipeline that provides a physical barrier separating industrial development in Kemps Creek and Horsley Park and Erskine Park and Eastern Creek.

Existing uses adjoining to the south of the Warragamba pipeline within the recommended corridor will in the future experience disruption from the provision of infrastructure in the recommended corridor. Government will need to consult with these land holders and businesses to best manage this disturbance. In total 46 properties, including one dwelling is likely to be impacted by the recommended corridor and provision of infrastructure. Eight of these properties are also impacted by the Outer Sydney Orbital Corridor and the North-South Rail Line Corridor. Land acquisition generally only occurs prior to infrastructure delivery and so existing developments can continue in the interim.

Applications for new development will need to consider the recommended corridor in future master plans and building designs to ensure the delivery of future infrastructure in the recommend corridor is not prevented. Again, future Governments will need to consult with land owners to achieve the best outcomes for the productive use of land in and adjacent the recommended corridor.

Immediately west of the Westlink M7 is a short section of primary production (small lots) zoned land that support a range of land uses. These properties will be partially impacted by the recommended corridor through development restrictions by changes to land use zonings.

6.1.2 FUTURE WESTERN SYDNEY FREIGHT LINE LAND USE IMPACTS AND OPPORTUNITIES

6.1.2.1 LAND DEVELOPMENT

The establishment of the Western Sydney Freight Line would unlock the potential of land identified in the Western Sydney Employment Area. Furthermore, land identified in the Western Sydney Airport Growth Area aims to provide jobs and services adjacent to the Western Sydney Freight Line. It is the primary planning initiative to coordinate housing and employment growth in the region and promote compatible developments. This will assist in maximising the benefits associated with infrastructure investment and minimise potential impacts of proposed infrastructure.

Recent development proposals and master plans are gradually transforming former agricultural land into logistics hubs and light industrial estates. Paired with the recent designation of the area into Western Sydney Employment Area and Western Sydney Airport Growth Area, the employment lands around the future project will continue to develop.

Protection of a corridor for the potential future Western Sydney Freight Line has been considered within the NSW Government's *A Plan for Growing Sydney*, *draft Greater Sydney Region Plan* and *draft Western City District Plan* as part of the strategy to shape Western Sydney and support the Western Sydney Employment Area through a direct connection with Port Botany. Given the primary aim of the potential future Western Sydney Freight Line would be to support economic growth in Western Sydney, it is likely that the Western Sydney Freight Line project would result in an increase of economic activity in the region once completed. The Western Sydney Freight Line project would primarily benefit industrial and commercial premises, and it would have a secondary effect in stimulating jobs closer to areas of existing and planned population. It would also influence employment-led population growth.

Positive impacts to the wider region also include optimised land use and transportation outcomes. The recommended corridor creates an opportunity for integrated transport and land use planning associated with co-location of the future infrastructure adjacent to industrial land uses. This also provides opportunities for rail sidings to be established within adjacent industrial land.

6.1.2.2 PROPERTY ACQUISITION

One of the key objectives for the future Western Sydney Freight Line project is to minimise direct impacts to developed properties whilst meeting the corridor functional considerations. The recommended corridor occurs in an area with established rural residential, agricultural and industrial land uses. Construction of a potential future Western Sydney Freight Line will require acquisition of property within the corridor. The location of the recommended corridor has been based on avoiding infrastructure impacts and being located adjacent to existing linear infrastructure and undeveloped land.

6.1.2.3 PROPERTY SEVERANCE

The project once developed may result in severance, including potential severance or reduction of individual lots predominantly to the west of the Westlink M7 in Horsley Park, as well as severance of movement across the corridor (the potential impact of closure of local roads is discussed further in Section 6.3.1). The recommended corridor is largely located parallel to and bordering the Warragamba pipeline, thereby avoiding severance impacts, in addition, by identifying the recommended corridor early, the impacts to severance can be managed or minimised

It is anticipated that properties within the footprint of the future infrastructure could potentially experience lot size reductions, property severance, displacement and amenity impacts such as noise, vibration and dust. Where possible, impacts to residential land uses have been minimised by avoiding residential properties and maximising separation distances to established residential communities, including the Twin Creeks community and golf club to the south of the corridor (refer Figure 4.1). The intensification of land uses will establish compatible land uses adjacent to the future Western Sydney Freight Line.

6.1.2.4 SENSITIVE LAND USE

Existing sensitive land uses including community facilities, residential and open space areas adjacent to a future Western Sydney Freight Line will experience amenity impacts (such as noise and vibration and visual impact) as a result of the future infrastructure. However, rural residential and agricultural land uses adjacent to the future Western Sydney Freight Line are undergoing land use intensification which will establish land uses that are compatible with the Western Sydney Freight Line.

6.1.2.5 WATERWAYS AND RIPARIAN AREAS

Recreation or open space would be impacted within the recommended corridor. Several vegetated riparian areas associated with South Creek, Ropes Creek, and Reedy Creek which provide passive open space opportunities would be traversed. Minimising impacts to riparian areas would be a key consideration during the design and construction phases of the project.

The recommended corridor intersects three waterways classed as Crown land including Ropes Creek, Reedy Creek and South Creek. No other Crown land parcels are located within the recommended corridor. No native title claims exist within or immediately adjacent to the recommended corridor. The recommended corridor would not impact lands designated as national parks, nature reserves or protected areas listed under the *National Parks & Wildlife Act 1974*.

6.1.2.6 LOCAL ROAD NETWORK

The recommended corridor currently traverses three road corridors. These include Old Wallgrove Road, Mamre Road and Luddenham Road. No immediate impact will occur during the corridor protection phase. There will be potential short term traffic, transport and access impacts during the construction and operation phases and mitigation measures will be explored in more detail during subsequent planning and design phases of the project. During operation, impact to these roads and the broader road network will be dependent on the selection of a grade separated crossing option.

6.1.2.7 132 kV TRANSMISSION LINES

Several 132 kV transmissions lines traverse the recommended corridor and terminate at the Sydney West Substation. Environmental impacts (such as vibration) and physical interface during construction and operation phases will be explored during planning and design stages.

6.1.2.8 LAND USE

As shown on Figure 4.1 the recommended corridor directly impacts on a range of other land uses including:

- **Industrial land** (however impacts to industrial land are primarily dealt with in relation to future land use in section 4.2 – existing industrial uses have been largely avoided).
- **Open space/recreational land** – while the recommended corridor avoids directly impacting formal recreational areas, it crosses several creek lines with passive recreational use, and is in the proximity of the Twin Creeks golf club.
- **Agricultural land** – the project traverses land currently in agricultural use including numerous smallholdings (including a poultry farm), although much of this land is undergoing transformation to industrial use.
- **Extractive industry land** – including impacts to the edge of the Austral Brickworks operational area.

6.1.3 CUMULATIVE IMPACTS

Cumulative land use impacts may be experienced in the area surrounding the recommended corridor due to rapid development as a result of the recently designated Western Sydney Employment Area and Western Sydney Airport Growth Area as well as the protection of the proposed Outer Sydney Orbital Corridor. The potential temporary and permanent changes associated with multiple developments across the wider region is complex to mitigate and is highly dependent on the timing of other projects.

6.1.4 MITIGATION OPTIONS AND FUTURE DETAILED ASSESSMENTS

As part of any future Environmental Impact Assessment for the potential future infrastructure a range of mitigation options and future detailed assessments would be considered. It is expected that a project footprint would be developed to minimise severance of individual lots and maximise the distance sensitive receivers. This has been supported by locating the recommended corridor adjacent to the Warragamba Pipeline to minimise severance and land use impact for most of the recommended corridor. The separation distance between existing community facilities on Bakers Lane and the recommended corridor have been maximised through its placement adjacent the Warragamba pipeline.

The recommended corridor avoids directly impacting on existing large scale developed industrial facilities in Eastern Creek and Erskine Park. However, as discussed in section 4.2 the refined study area traverses several development proposals for large scale warehousing and distribution, and the refined corridor has a direct impact on these. The plans for these projects are progressing rapidly and generally do not take into consideration the recommended corridor. As such, the project has a short-term impact on the planning of these proposals. However, through consultation with the

landowners and developers of those projects, there are opportunities to optimise transport and land use opportunities, including exploring opportunities for location of intermodal facilities and opportunities for direct rail sidings.

At a broader level, the design of the final infrastructure would ensure adequate connectivity (including establishment of grade separated crossings of key roads and rail lines) to minimise potential severance impacts to impacted suburbs and communities in the area). Other mitigation options and future detailed assessments would include the following:

- assessing the cumulative land use impacts
- consultation with adjoining landowners during project development
- coordinate construction activities with the Greater Sydney Commission and proponents of the other major projects
- consultation with residents, communities and stakeholders to provide information about the recommended corridor
- design to minimise the project footprint (for example through use of retaining walls in place of batters) to minimise property acquisition
- design to minimise impacts to riparian areas associated with South Creek, Ropes Creek, and Reedy Creek design to minimise impacts to existing utilities infrastructure through design and interface management.

6.2 ECONOMIC

6.2.1 POTENTIAL IMPACTS

Improving freight rail access to western Sydney is a key factor in enhancing economic productivity for Western Sydney and NSW overall, and the economic case is described in detail in Chapter 3. As noted in Chapter 3, corridor protection reduces the cost of delivering infrastructure and lessens the social costs of acquiring homes and business and disrupting established communities (including increasing the feasibility of delivering an at grade freight railway line as opposed to more expensive tunnelled or elevated solution).

The protection of the recommended corridor and delivery of the future infrastructure would realise a variety of economic effects. Of note, while this Strategic Environmental Assessment generally provides an assessment of the western section only, the economic impacts of the Western Sydney Freight Line generally need to be understood in the context of the entire project, as these impacts will relate to the ongoing operation of the project.

Corridor protection and the future design will have positive and negative impacts on local businesses. Corridor protection will provide certainty around future land use planning. Land acquisition, modified access arrangements and construction of the future Western Sydney Freight Line also has the potential to disrupt business operations during its construction and operation phases.

6.2.1.1 ECONOMIC BENEFITS IN THE LOCAL AND WIDER REGION

Transport for NSW has advised that the potential future Western Sydney Freight Line will have a net positive economic benefit. As discussed in Chapter 3, future infrastructure will realise positive economic impacts in the Western Sydney and broader NSW economy during operation by facilitating increased rail freight from Port Botany to Western Sydney. It would enhance freight capacity across Sydney's transport network, ease existing and forecast road congestion on Sydney's motorways from Port Botany and assist in improving rail freight transit times and costs to support freight movement into regional NSW. Increased volumes of freight would provide economic stimulus for the Western Sydney region and beneficial economic effects for consumers across NSW.

A future intermodal terminal would be a significant employment generator. By way of example the Moorebank Intermodal Terminal precinct in South Western Sydney, when fully developed, is expected to generate approximately 6,800 full-time equivalent employment opportunities within the areas of warehousing, transport, terminal operations, site management and ancillary services (Moorebank Intermodal Company, 2016).

6.2.1.2 CHANGES TO INDUSTRY INVESTMENT AND DEVELOPMENT

The protection of the future Western Sydney Freight Line Corridor would potentially stimulate changes in the surrounding land uses and cause short term, immediate impacts to local businesses, such as changes to patronage, potential relocation costs and changes to their business operations. However, timely protection of the corridor would inform local business and assist them in forward planning investment considerations and early adaption and expansion.

Direct environmental and social impacts during future construction and operational of the freight line, such as from congestion, noise and amenity may impact local businesses and land owners in and adjacent to the recommended corridor. Once operational, the Western Sydney Freight Line may result in agglomeration advantages for Western Sydney (i.e. efficiencies in availability of supplies and labour experienced by businesses near one another).

6.2.1.3 CUMULATIVE IMPACTS

The protection of the recommended corridor, coupled with the recently designated Western Sydney Employment Area, Western Sydney Airport Growth Area, as well as the protection of the proposed Outer Sydney Orbital Corridor and potential associated IMT is likely to have a short term negative effect on local business through future acquisitions, and disruptions during construction and operation (although acquisitions associated with the construction and operation of future employment lands will be on a voluntary basis and most likely to the significant commercial benefit of the original

landowner). These impacts are likely to occur both within the recommended corridor and the surrounding areas. It is anticipated however that the protection of the recommended corridor, proposed Outer Sydney Orbital and potential IMT would result in an overwhelmingly positive benefit to the western Sydney economy. It is likely that long term benefits would offset any short-term impacts, because of certainty around protection and future design of these developments, enhancement of freight capacity, reductions in road congestion, and potential of a potential IMT to be an employment generator.

6.2.2 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

6.2.2.1 KEY ISSUES

The following key economic issues have been identified with relation to the protection of the recommended corridor and future design and construction of the Western Sydney Freight Line:

PROTECTION OF THE RECOMMENDED CORRIDOR

- Increased certainty around future land planning and use
- Impact on future individual businesses and landowners.

DELIVERY OF THE WESTERN SYDNEY FREIGHT LINE

- Disruption of business operations due to future construction
- Usability of residual land
- Changes to properties access
- Transport cost savings due to most direct efficient route to transport freight from Port Botany to Western Sydney
- Development of industries such as retail services to support the growth in business as identified in the Western Sydney Airport Growth Area.

6.2.2.2 MITIGATION MEASURES AND FUTURE DESIGN REQUIREMENTS

Future design and delivery phases of the Western Sydney Freight Line would include the following mitigation measures and design considerations:

- Effective and timely communication would be undertaken with affected businesses and property owners. This would include consultation with stakeholders at critical project design points.
- Community consultation and stakeholder engagement will assist in further refining the corridor.
- Appropriate safeguards and mitigation measures for access impacts would be implemented to minimise impacts to local businesses during a future construction phase.
- The potential future Western Sydney Freight Line will be aligned adjacent to the Warragamba Pipeline to reduce impacts to existing businesses.
- Severance impacts to properties would be avoided where possible. Where this is not feasible, properties would be acquired.
- Short term cumulative economic impacts are likely to be offset by long term economic benefits for the western Sydney region.

6.3 TRAFFIC AND TRANSPORT

6.3.1 POTENTIAL IMPACTS

The recommended corridor will connect with the future Outer Sydney Orbital Corridor and would provide for a dedicated future freight link between the Main West Rail Line at St Marys and the wider freight network. Potential impacts of the recommended corridor on traffic and transport include:

- separation of freight and passenger rail
- future changes to local road networks
- change in future mode shift from road to rail freight
- impact on property access.

Existing roads within the western section of the recommended that will need to be considered during design due to potential impacts are Luddenham Road, Mamre Road, Old Wallgrove Road and Westlink M7. The planned Southern Link Road Network is also expected to traverse the recommended corridor

6.3.1.1 INTEGRATION OF THE WESTERN SYDNEY FREIGHT LINE AND OUTER SYDNEY ORBITAL CORRIDOR

From the west, the primary freight rail link to Sydney would continue to be the Main West Rail Line to St Marys. From here, it would utilise the proposed Outer Sydney Orbital and Western Sydney Freight Line to connect into the existing rail freight network and Port Botany, as well as Kembla and Newcastle once completed.

6.3.1.2 SEPARATION OF FREIGHT AND PASSENGER RAIL

The provision of a dedicated, east-west freight rail route linking western Sydney to the SSFL will result in the diversion of freight away from the passenger rail network onto dedicated freight rail lines, improving both freight and passenger rail capacity and reliability. Specifically, the project would lead to a reduction in freight rail movements on the Main West Rail Line between St Marys and Flemington Junction, including through Parramatta and Blacktown. Allowing for an increase in passenger rail movements or frequency along that corridor.

Freight rail services along the recommended corridor would no longer be subject to passenger priority or curfews limiting operation to off-peak and overnight periods. Freight rail services, particularly container trains between Western Sydney and Port Botany will be less constrained by passenger peak travel periods.

The corollary to reduced freight services on the Main West Rail Line between St Marys and Flemington Junction is increased freight services on the Southern Sydney Freight Line between Sefton and Leightonfield.

Freight rail would not be totally excluded between St Marys and Flemington Junction for some time, as there are existing freight generators and receivers along this section. These include the Holcim Australia Regional Distribution Centre at Rooty Hill, the Veolia Australia Clyde Transfer Terminal, Cement Australia Clyde Terminal and Manildra Harwood Sugars at Clyde.

The challenges associated with shared passenger and freight use on the Main West Rail Line are discussed further in Chapter 3.

6.3.1.3 CHANGES IN MODE SHIFT FROM ROAD TO RAIL FREIGHT

The recommended corridor would provide for a direct freight link between Port Botany and the employment lands of western Sydney, and so will facilitate a mode shift from trucks to trains. This would increase the productivity of Sydney's road networks as there would be a reduced need to transport freight using trucks along the road network.

While rail-based freight would still require road-haulage to complete the freight supply chain to the destination, the potential future Western Sydney Freight Line would likely reduce the length of these road based trips.

The potential future Western Sydney Freight Line would likely contribute to reduced congestion of major road links, including the M4 Western Motorway, M5 South Western Motorway and Westlink M7 as a greater proportion of freight trips between western Sydney and Port Botany will be made by freight rail.

One of the objectives of the potential future Western Sydney Freight Line is to enable the development of an intermodal terminal that would allow containers to be transported to the western Sydney area by train and distributed to surrounding warehouses by truck. One of the indirect impacts of the potential future Western Sydney Freight Line would be the additional traffic on local roads in the Western Sydney Airport Growth Area generated by the intermodal terminal. Although the intermodal terminal development is not part of this assessment, the cumulative traffic impacts should be considered in future design stages and in the development of the local road network in the western area.

6.3.1.4 FUTURE DISRUPTION TO ROAD, RAIL AND CYCLE NETWORK

Construction of the potential future Western Sydney Freight Line would result in short-term impacts to road, rail and cycle networks, however the full extent of the impacts would be assessed at a later stage in the project lifecycle. The impacts may include (but are not limited to):

- temporary road closures
- changed traffic conditions
- diversionary routes and truck detours
- increased construction traffic
- track possessions on the Southern Sydney Freight Line, Main West Rail Line, Bankstown Line and Old Main South Line
- temporary closure and diversion of dedicated off-road cycle paths.

6.3.1.5 IMPACTS FOR PROPERTY ACCESS

It is envisaged that all road-rail crossings of the recommended corridor would be grade separated which would limit the impact to the road network. There may be some instances where local roads are severed, however the full extent of these impacts would be assessed at a later stage in the project lifecycle and identified during design. The placement of the recommended corridor has mostly limited this potential impact to the end of roads or areas where property acquisition is required ensuring that access is maintained to properties.

6.3.1.6 CUMULATIVE IMPACTS

Severance is the most localised impact of the project. This is specific to the project area and is unlikely to trigger any broader cumulative impact. However, cumulative traffic impacts may be experienced during the construction and operational phases of the project given the broader growth of western Sydney. Cumulative impacts during construction is likely to impact on the local road and rail network especially around the interface with the Outer Sydney Orbital. These impacts may include road closures, changed traffic conditions, increased construction traffic and track possessions resulting in interruptions to the local passenger and freight rail network.

In addition, while the project will not generate traffic once operational, it is a catalyst for an intermodal terminal that would connect to the project and generate significant truck traffic (as well as being a catalyst more generally for traffic-generating employment land development in the surrounding area). This traffic, in the context of high rates of background traffic growth associated with the development of Western Sydney, will represent a cumulative impact.

Furthermore, the project will stimulate rail transport and this will result in a corresponding increase in rail movements (and associated impacts on rail network capacity and rail-related environmental impacts) across the broader network between Port Botany and the project.

6.3.2 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

6.3.2.1 KEY ISSUES

Key issues relating to traffic and transport for the recommended corridor include:

- creation of the opportunity for a new freight line to reduce traffic congestion around Port Botany
- creation of the opportunity to separate freight and passenger rail, increasing service reliability on the Main West Line
- facilitation of an intermodal which will have impacts on the local road network.

6.3.2.2 MITIGATION MEASURES AND FUTURE DESIGN REQUIREMENTS

Further detailed assessments, design requirements and mitigation measures that would be considered during subsequent phases of the project lifecycle include:

- further investigation into optimisation of the interfaces with the proposed Outer Sydney Orbital and minimisation of impacts on other existing and proposed transport infrastructure
- further investigations to determine the cumulative impacts on the Southern Sydney Freight Line resulting from both the Moorebank Intermodal terminal and freight traffic accessing a potential future Western Sydney Freight Line
- exploration of design options which would minimise impacts on roads at rail crossings, including the Westlink M7 crossing in cutting
- cumulative traffic impacts would be considered in future design stages and in the development of the local road network in the western area.

6.4 NOISE AND VIBRATION

The review of the potential noise and vibration impacts associated with a potential freight line within the recommended corridor was based on a review by Renzo Tonin Associates (2017), taking into consideration the potential rail operations and guidance in the NSW Rail Infrastructure Noise Guideline (NSW EPA, 2013), and the EPA's Assessing Vibration guideline.

6.4.1 *POTENTIAL IMPACTS*

The desktop review found that impacts would be limited to airborne noise impacts. Vibration and ground-borne noise impacts would be expected to be negligible across the recommended corridor.

Without mitigation, the highest noise impacts would be expected to occur at residential receivers during the 10 pm to 7 am night period as the future Western Sydney Freight Line would operate on a 24 hour, 7 day per week basis. For flat ground conditions without shielding from natural or man-made barriers, noise levels are predicted to exceed the noise trigger levels.

The desktop review indicated that the major noise source contributing to noise exceedances would be wheel/rail noise associated with freight wagons.

The recommended corridor is located within the priority growth area of the Western Sydney Employment Area. Protecting the recommended corridor may assist in reducing potential noise impacts through planning for development controls and design modifications for future developments with the knowledge that a freight line may be located within the area.

6.4.2 *CUMULATIVE IMPACTS*

Cumulative noise and vibration impacts are likely to have the greatest impact on receivers if the construction period of the Western Sydney Freight Line is undertaken at the same time as other large projects in the vicinity such as the Outer Sydney Orbital. This is likely to have the greatest impact on receivers at the western end of the recommended corridor due to the location of the Outer Sydney Orbital..

6.4.3 *SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS*

6.4.3.1 KEY ISSUES

The key issues relating to noise and vibration include:

- potential for noise impacts near the interface with Westlink M7 which may be reduced through the concept and detailed design processes
- potential impacts during construction and operation due to proximity to receivers such as Twin Creeks Golf and Country Club, Emmaus Retirement Village, Emmaus Catholic College, Trinity Primary School and Mamre Anglican School.

6.4.3.2 MITIGATION MEASURES AND FUTURE DESIGN REQUIREMENTS

The recommended corridor has been selected to maximise distances from sensitive receivers, however some noise mitigation may be required when the Western Sydney Freight Line is built, subject to approval, particularly where sensitive receivers are located near the final alignment. A detailed assessment of the construction and operational noise and vibration will be required as part of a future detailed project design and approvals process, in order determine potential noise impacts and noise mitigation requirements.

It is recommended that a future environmental assessment for the Western Sydney Freight Line would:

- include predictions of operational noise and vibration levels at individual receptors
- consider construction impacts in accordance with relevant legislation and guidelines.

A range of noise mitigation measures may include noise barriers or construction within cuttings or at-property treatments, which aim would mitigate residual impacts.

6.5 VISUAL AMENITY, BUILT FORM AND URBAN DESIGN

This section provides an assessment of the potential visual amenity, built form and urban design impacts associated with a future potential freight rail in the recommended corridor.

6.5.1 *POTENTIAL IMPACTS*

The protection of the recommended corridor would not have any impacts to visual amenity and urban design of the areas surrounding the recommended corridor.

There would be a small to moderate impact to receivers surrounding the recommended corridor as the result of the potential delivery of the future infrastructure. Visual impacts of the Western Sydney Freight Line would be minimised where the recommended corridor travels along the Warragamba pipeline as this reduces the impacts of the introduction of a new infrastructure corridor into the landscape.

The highest impact would be felt by rural residential receivers located near the recommended corridor in Kemps Creek and Orchard Hills which have views to the recommended corridor and road users who could view the recommended corridor as they pass the future infrastructure.

Impacts to the visual amenity and landscape character would also be experienced in the agricultural areas surrounding the recommended corridor when the Western Sydney Freight Line is built. However, there is potential that this impact will be lessened as much of the agricultural land surrounding the recommended has been identified as an industrial precinct as part of the Western Sydney Employment Area (refer to section 6.8).

6.5.2 *CUMULATIVE IMPACTS*

The potential cumulative impacts on visual amenity, built form and urban design from the delivery of the future infrastructure are considered in context with the recently designated Western Sydney Employment Area, Western Sydney Airport Growth Area, as well as the protection of the proposed Outer Sydney Orbital Corridor and potential associated IMT.

The recommended corridor traverses agricultural areas to the west of the Westlink M7. The area is planned to undergo large scale changes as a result of the designated development areas, in addition to the proposed corridor protections. These impacts are likely to be experienced by residential receivers located near the recommended corridor and road users who would view the Western Sydney Freight Line Corridor, in addition to the other development projects and corridor protections proposed which would change the existing landscape.

6.5.3 *SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENT*

6.5.3.1 *SUMMARY OF KEY ISSUES*

Visual impacts are also likely to cause temporary changes to landscape during any construction activities within the recommended corridor.

6.5.3.2 *MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS*

As part of any Environmental Impact Assessment for the potential future infrastructure a range of mitigation options and future detailed assessments would need to be considered.

Additional analysis would be required to further assess visual impact, changes to landscape character and to identify design and mitigation measures to minimise impact:

- Any opportunities to minimise vegetation clearing.
- Construction compounds, stockpiles and storage areas should be in previously disturbed areas. These facilities should also be located away from sensitive visual receivers where possible.

- Consideration of other major infrastructure and development projects within the western Sydney area during the design and construction phases.
- Urban and landscape design principles should be considered, including, but not limited to:
 - choice of material colour and finish to ensure built form elements are not reflective and are visually recessive where possible
 - use of screen planting to block views of new structures, particularly in previously undisturbed areas and near sensitive visual receivers.

6.6 SOILS AND WATER

6.6.1 *POTENTIAL IMPACTS*

The protection of the recommended corridor would not have an impact on soils and water, however there are a range of potential impacts which may occur because of potential construction and operation of a potential future Western Sydney Freight Line in the recommended corridor. These impacts would include:

- disturbance of acid sulphate soils, although this is considered to have a low probability
- potential to impact areas of contaminated land due to previous agricultural or industrial land use
- flood impacts associated with any structure or embankment constructed within floodplain areas within the Reddy Creek, Ropes Creek and South Creek catchments
- impacts to drainage and flooding characteristics of the recommended corridor as a result of any new structures which intersect flood plains or watercourses
- potential water quality impacts from changed run-off, erosion and contamination and soil disturbance. In addition to operational stormwater drainage and impacts to water quality.

These risks are common to rail infrastructure development and as such, commonly used, best practice design and construction measures such as erosion and sediment controls, and stockpile and waste management would be implemented to avoid or reduce these impacts.

6.6.2 *CUMULATIVE IMPACTS*

The greatest cumulative impact associated with soils and water is the impact of the future Western Sydney Freight Line on the flooding characteristics of the broader catchment with the introduction of additional infrastructure associated with Western Sydney Employment Area, Western Sydney Airport Growth Area, as well as the proposed Outer Sydney Orbital Corridor.

There may also be cumulative impacts to the water quality of local creeks such as South Creek, Ropes Creek and Reedy Creek due to changed run-off from changes in land uses.

6.6.3 *SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS*

6.6.3.1 *SUMMARY OF KEY ISSUES*

The key issues for soil and water within the recommended corridor when the potential Western Sydney Freight Line is constructed include:

- the management of potential acid sulphate soils within low lying areas
- management of the potential for unidentified contamination of lands throughout the agricultural and industrial land use areas
- management of flood risk and changes to hydrology within creek catchments (Reedy Creek, Ropes Creek and South Creek)
- management of water quality impacts during construction activities and operational storm water management.

6.6.3.2 *MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS*

As part of any Environmental Impact Assessment for the future infrastructure a range of mitigation options and future detailed assessments would be considered including:

- Detailed geotechnical assessment to inform the design of any slopes, earthworks and foundations.
- Preliminary contamination assessment including an inspection, sampling and detailed assessment of the land use history of the recommended corridor. This would inform requirement for further assessment and enable implementation of appropriate engineering controls and environmental management measures where required.

- Detailed flood and hydrology modelling to inform design, minimise changes to the flooding regime, minimise impacts to properties and maintain the existing hydrological conditions of the recommended corridor. Detailed modelling would inform the following design considerations:
 - flood plain crossings
 - cross drainage requirements to minimise flooding and maintain existing hydrological conditions
 - the impact of climate change to the frequency and severity of extreme rainfall events which may change the 100-year flood event parameters.
- Where necessary acid sulphate soil management plans would be implemented during delivery.
- Cumulative impacts to hydrological conditions such as changes to local waterway flow regimes and impacts to water quality because of future planned developments around the recommended corridor would be considered during the detailed design of a potential future Western Sydney Freight Line.

6.7 BIODIVERSITY

The biodiversity review identified the ecological values and constraints within and adjacent to the recommended corridor including areas of critical and high ecological value. Ecological constraints and values were categorised as follows:

- Critical – Larger occurrences of *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed critically endangered vegetation communities (>5.0 ha); known or potential habitat for substantial populations of EPBC Act listed threatened plants; regional scale wildlife corridors.
- High – EPBC Act listed critically endangered vegetation communities (0.5–5.0 ha); *NSW Biodiversity Conservation Act 2016* (BC Act) endangered ecological communities in moderate to good condition; known or potential substantial populations of BC Act listed threatened plants and sedentary animals; small populations of EPBC Act listed threatened plants; local scale wildlife corridors.
- Moderate – BC Act listed endangered ecological communities in poor condition.
- Low – Cleared lands with little or no native vegetation.

An overview of the ecological values present within and immediately surrounding the recommended corridor is shown in Figure 4.15 in Section 4.7.

6.7.1 POTENTIAL IMPACTS

A strategic assessment of the potential ecological impacts of the recommended corridor is provided below. Ecological impacts would occur primarily during the construction phase of potential future infrastructure. Where possible, potential biodiversity impacts were initially avoided through the options development and assessment process by identifying large patches of Threatened Ecological Communities as a constraint. The recommended corridor also aligned with the existing Warragamba pipeline infrastructure which avoided further fragmentation and edge effects.

6.7.1.1 VEGETATION AND HABITAT CLEARING

The land within the recommended corridor is a mix of rural, low density and rural-residential, recreational, and industrial land with conservation and environmental land use around riparian areas. As a result of the land use, most remaining native vegetation stands correspond to Threatened Ecological Communities listed under the BC or EPBC Act and as such, any clearing required for a future freight line would be likely to directly impact Threatened Ecological Communities and require offsets. Approximately 18.63 ha of native vegetation described as a Threatened Ecological Community either under the BC or EPBC Act occurs within the recommended corridor.

Clearing during construction of the potential future infrastructure may impact the habitat of the 12 identified threatened plant species and 20 threatened fauna species. The fauna species likely to be at greater risk include the less mobile species such as the Cumberland Land Snail and the Green and Golden Bell Frog.

6.7.1.2 CONNECTIVITY

The vegetation within the recommended corridor is largely fragmented and composed of many small isolated stands. Narrow continuous vegetation occurs along Ropes, Reedy and South Creeks which are considered important to biodiversity values at a regional and local level. The recommended corridor crosses these creek lines adjacent to the Warragamba pipe which increases the distance between patch sizes at these locations.

6.7.1.3 EDGE EFFECTS

Edge effects refer to the impacts of habitat fragmentation on local flora, fauna and ecological communities. Edge effects are likely to occur at the interface of the potential future infrastructure and adjacent areas of native vegetation or habitat particularly around the identified creek lines and the larger vegetation patch north of Emmaus Retirement Village in Kemps Creek. The following impacts may occur due to increased edge effects within the recommended corridor:

- altered soil moisture conditions
- altered light conditions such as reduced-shading or artificial lighting
- noise and vibration impacts
- increases in weed dispersion.

These effects of fragmentation are likely to reduce the suitability of habitat adjacent (generally within 20 metres) of the potential future infrastructure.

6.7.1.4 RIPARIAN HABITAT AND AQUATIC VEGETATION

Major creeks crossed by the recommended corridor include Ropes Creek, Reedy Creek and South Creek. These are freshwater creeks and do not support marine vegetation. There are no other adjoining waterways within the catchment of the recommended corridor or wetlands within or adjacent to the recommended corridor. There is potential for disturbance of instream aquatic habitat due to the following:

- construction of creek crossings
- increased sediment run-off
- contamination from spills
- indirect impacts such as shading.

6.7.1.5 SOIL AND WATER QUALITY

The construction of the potential future infrastructure within the recommended corridor has the potential to uncover contaminated lands and impact the water quality of the catchment.

Construction activities associated with the potential future infrastructure such as earth works, also have the potential to impact surface water quality of the catchment. Operational impacts of the potential future infrastructure are likely to be limited to stormwater management to ensure the protection of water quality within the catchment.

A further description of the impact on soils and water including local hydrology, erosion and sediment, and salinity is provided in Section 4.8.

6.7.1.6 CUMULATIVE IMPACTS

The potential cumulative impacts on biodiversity values from the delivery of the future infrastructure are discussed here within the context of the existing environment, present and likely future impacts.

Development in the locality has led to extensive vegetation clearing at the local and catchment scale. Remaining native vegetation communities and habitat have also been affected by a variety of disturbances, including clearing of undergrowth, grazing by domestic animals, altered fire regimes, feral animals and weed invasion. This has resulted in the local extinction of several species which are less tolerant of habitat loss and disturbance (e.g. woodland birds and small mammals) and an increased risk of extinction to several vegetation communities. Isolated remnant populations of disturbance-sensitive threatened species in the recommended corridor may be susceptible to local extinction from seemingly small reductions in habitat area or quality.

In assessing the cumulative impact of a project, it is important to consider whether the additive effects of multiple projects may cause such a critical threshold to be reached for any threatened biodiversity affected. Within Western Sydney, there are several significant projects and initiatives including:

- Western Sydney Airport
- Western Sydney Infrastructure Plan

- South West Priority Growth Area
- North West Growth Area
- Western Sydney Airport Growth Area
- Outer Sydney Orbital Corridor
- South West Rail Line Extension
- North-South Rail Line Corridor
- Greater Macarthur Land release.

A variety of other smaller scale developments are underway or planned within the recommended corridor, some of which may also impact threatened biodiversity. These developments would result in increased urbanisation in the region and have an additive effect on the likelihood of extinction of threatened biodiversity, especially to the threatened Cumberland Plain Woodland and associated species. Cumulative impacts would need to be assessed as part of the Environmental Impact Assessment of the future infrastructure.

6.7.2 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

6.7.2.1 SUMMARY OF KEY ISSUES

The key issues for biodiversity within the recommended corridor are the loss of Threatened Ecological Communities and habitat for threatened flora and fauna. These impacts are concentrated around the creek lines and vegetation to the north of Emmaus Retirement Village.

Areas of South and Reedy Creeks have been classified as protected natural areas, and ‘visionary parkland and reserve’ within the Our Greater Sydney, 2016 draft, Draft Regional Plan for Sydney.

6.7.2.2 MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

As part of any Environmental Impact Assessment for the potential future infrastructure a range of mitigation options and future detailed assessments would be considered including:

- Avoidance of significant ecological values as a priority during the detailed design process. This may include consideration of alternative engineering methods, narrowing the footprint, or prioritising the re-use of existing disturbed areas particularly in areas of Cumberland Plain Woodland endangered ecological community.
- Detailed ecological assessments following the Biodiversity Assessment Methodology (BAM) as per NSW *Biodiversity Conservation Act 2016*. These assessments would inform the design and delivery phases of a potential future Western Sydney Freight Line and may include:
 - scheduled seasonal ecological surveys to minimise delays resulting from seasonal constraints for target threatened species
 - targeted vegetation surveys within paddocks or pasture grassland areas to determine possible presence of derived native grasslands Cumberland Plain Woodland. These surveys should be conducted during late spring to mid-autumn to ensure native ground cover species are at their highest cover and diversity
 - aquatic surveys within the identified creek lines with consideration of the *Draft Policy and Guidelines for Fish Habitat Conservation and Management – Update 2013* (Department of Primary Industries 2013).
- Further assessment on connectivity and corridor issues to determine appropriate mitigation measures such as potential fauna underpasses and over passes. These should include but not be limited to, exploring the construction of vegetated bridging structures and use of elevated open-deck bridging of waterway crossings to address any potential reduction in habitat connectivity that may result from the establishment of the rail corridor.
- Early preparation of a Biodiversity Offset Strategy to identify potential offset locations where required. The offset requirements would be assessed as per the BAM and EPBC Act offsets assessment guides and calculators and prepared in discussion with the Western Sydney Parklands Trust, NSW Department of Planning and Environment,

NSW Office of Environment and Heritage and Commonwealth Department of Energy and Environment. The strategy would identify potential offset site locations and EPBC Act referrals. Identification of offset areas may potentially take substantial time to locate and negotiate and as such should be initiated early.

6.7.3 *BIODIVERSITY OFFSETS POLICY*

Should the delivery of a potential future Western Sydney Freight Line identify impacts to threatened biodiversity, offsets would be required as part of the approvals process under the BC Act and/or EPBC Act. This legislation establishes frameworks for avoiding, minimising and offsetting biodiversity impacts resulting from development and clearing through the Biodiversity Offsets Scheme (BC Act) and Environmental Offsets Policy and related Offsets Assessment Guide (EPBC Act). Both the state and Commonwealth policies use an 'offsets calculator' approach to determine the offsets required.

6.8 HERITAGE

6.8.1 *POTENTIAL IMPACTS*

A strategic assessment of the potential heritage impacts of the Western Sydney Freight Line recommended corridor is provided below. Heritage impacts would occur primarily during the construction phase of any potential future infrastructure.

6.8.1.1 ABORIGINAL HERITAGE

The recommended corridor generally follows the Warragamba pipeline which lowers risk of impacts to Aboriginal heritage sites as this is a previously disturbed corridor. Nevertheless, there would be potential for impacts to Aboriginal artefacts, deposits and potentially sensitive landforms in the recommended corridor, particularly around the creek lines.

Eight Aboriginal heritage sites (artefact sites) were recorded within the recommended corridor, three sites (artefact sites) within 50 m, and a further 13 sites within 200 m of the recommended corridor.

Potential impacts as a result of the protection of the recommended corridor and eventual delivery of a potential future Western Sydney Freight Line would include:

- temporary benefit to Aboriginal sites and potential archaeological sites during the corridor protection phase through the restrictions on further development in the short term
- during construction of the future infrastructure, high impact to artefacts located within the recommended corridor by complete or partial removal or destruction during construction of the future freight rail line
- indirect impacts from vibration associated with the construction or operation of a future potential Western Sydney Freight Line.

A summary of Aboriginal heritage sites potentially impacted by the recommended corridor are included in Figure 6.1.

6.8.1.2 NON-ABORIGINAL HERITAGE

Dependent on the design and delivery methodology for the future infrastructure, potential impacts to non-Aboriginal heritage items may include direct impacts such as changes to the fabric, setting or curtilage of heritage items and indirect impacts such as vibration damage or impacts to visual and aesthetic settings of items. Within the recommended corridor there is one locally listed heritage item listed on the Penrith City Council Local Environmental Plan (the Luddenham Road Alignment), and no State Heritage items. The Western Sydney Freight Line in the recommended corridor would not be expected to have any significant impacts to this item, however this would be confirmed as part of the Environmental Impact Assessment of the future infrastructure.

A future potential Western Sydney Freight Line may have direct impacts to undiscovered areas of non-Aboriginal archaeology during the construction phase or indirect impacts because of vibration. Area of specific potential for undiscovered archaeology within the recommended corridor include the area around the former alignment of Luddenham Road, Lochwood Estate and Horsley Park. Archaeological remains on the Lochwood Estate associated with the nineteenth century would potentially be of state significance, however some heritage investigations have already occurred in this area and have not identified any such remains. In addition, the identified Lockwood and Horsley Park sites, are currently under development identified as the Oakdale West and Jacfin Horsley Park Project.

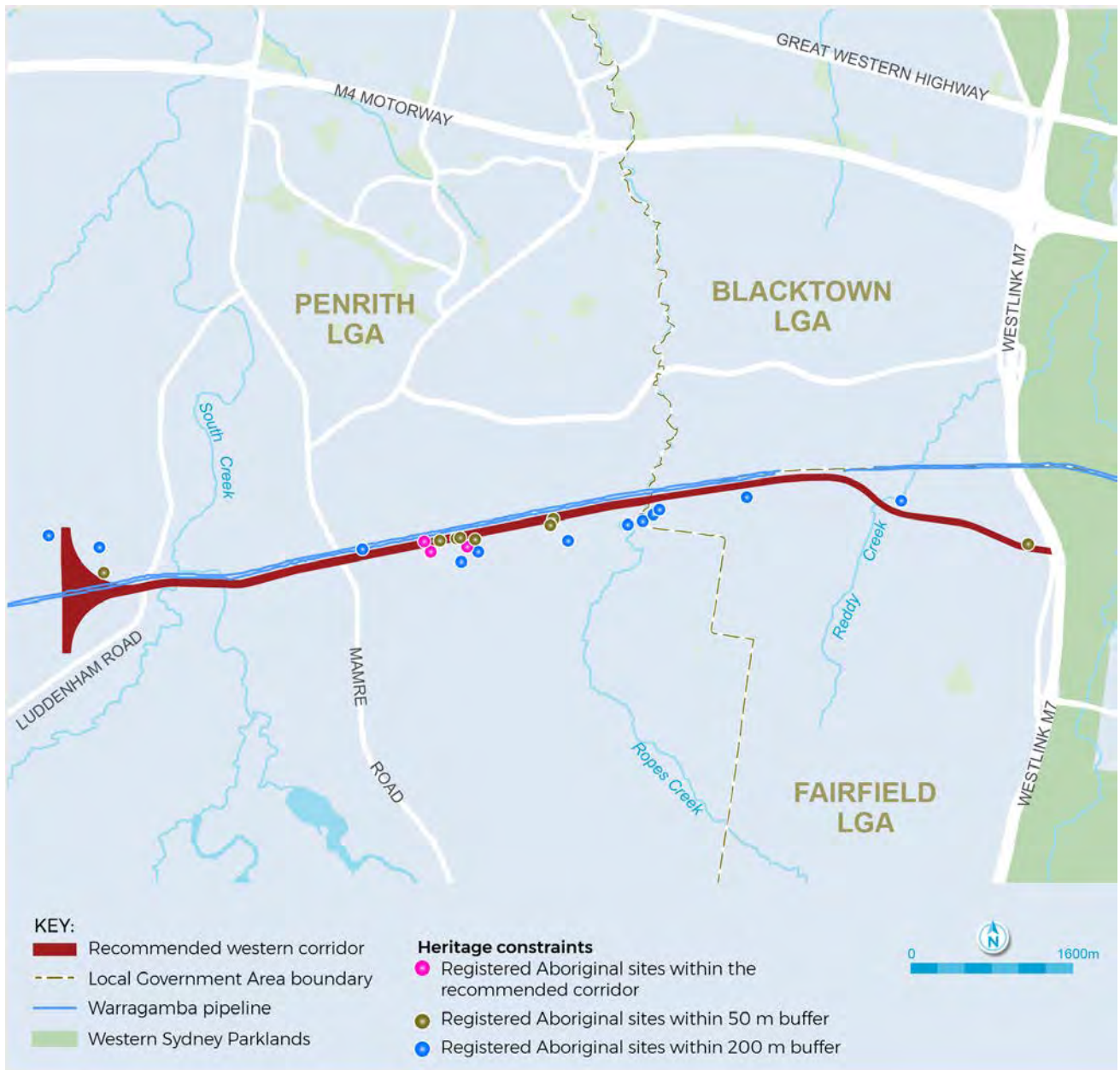


Figure 6.1 Aboriginal heritage values within the recommended corridor

6.8.1.3 CUMULATIVE IMPACTS

The cumulative impacts of the future Western Sydney Freight Line upon Aboriginal heritage is assessed as being minor, in the context of current and future infrastructure development. Most of the recommended corridor traverses through areas which although having potentially archaeologically sensitive landforms, have some level of disturbance. Additionally, large areas of the recommended corridor and surrounding areas have already been developed.

The overall cumulative impact of the Western Sydney Freight Line upon non-Aboriginal heritage is considered to be minor in respect to current and future infrastructure projects. While there is potential for undiscovered archaeology, several investigations have been completed in the area, which have thus far not identified sites.

6.8.2 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

6.8.2.1 SUMMARY OF KEY ISSUES

The key issues for Aboriginal heritage within the recommended corridor include:

- presence of eight Aboriginal artefact items in or close to the corridor
- high potential for undiscovered Aboriginal artefacts and sites due to the presence of several creeks and associated tributaries and ridgelines throughout the area.

6.8.2.2 MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

As part of any Environmental Impact Assessment for the potential future infrastructure a range of mitigation options and future detailed assessments would be considered including:

- Detailed non-Aboriginal and Aboriginal heritage assessment in accordance with the relevant guidelines and legislation. The assessments would include, but not be limited to:
 - ground-truthing to confirm location and extent of recorded heritage sites, curtilages, artefacts and areas
 - following ground-truthing, test excavation would be performed to identify previously unrecorded heritage items and salvage excavation if required. This would also be undertaken in areas which have had relatively little previous assessment to inform management and design
 - detailed recording, reporting and archival of any artefacts or sites uncovered
 - mapping of heritage items, sites and potentially sensitive archaeological areas.
- Avoidance of impacts to listed sites, artefacts and potentially sensitive archaeological areas as a priority in the detailed design stage of a potential future Western Sydney Freight Line.
- Where this is not feasible or reasonable, a detailed Statement of Heritage Impact or Aboriginal Cultural Heritage Assessment would be prepared in accordance with relevant guidelines and policies. This would allow for specific mitigation measures to be prepared to minimise impacts to heritage items and values.
- Cumulative impacts as a result of future planned developments in the recommended corridor would be considered during the detailed design and environmental assessment phases.
- Consultation would be undertaken throughout the project delivery phase with relevant owners of heritage items, community heritage groups and Aboriginal stakeholders including Local Aboriginal Land Councils in line with the relevant guidelines and legislation.

6.9 AIR QUALITY

6.9.1 POTENTIAL IMPACTS

Protection of the recommended corridor would not in itself have impacts to the regional or local air quality values; however, construction and operation of the future infrastructure may generate air pollutants from use of fossil fuels during construction and operation and as such, may contribute to changes to the ambient air quality of the region.

During construction dust and emissions from plant and equipment are the primary air quality considerations.

During operation, diesel locomotives used to shift freight containers would be the most likely source of air pollutant emissions. The future operations would emit particulates (PM₁₀ and PM_{2.5}) and NO_x. Other emissions associated with the use of diesel locomotives include CO, SO₂ and VOCs, however these would be considered as a lower risk compared to particulates and NO_x. Office of Environment and Heritage (OEH) monitored levels of NO_x, SO₂ and CO are consistently below the regulatory limit, and any increase from the future infrastructure on nearby sensitive receivers is likely to only have a minimal impact risk from these pollutants. However, further detailed modelling and assessment of air quality impacts would be conducted prior to the delivery of any potential future Western Sydney Freight Line.

At a regional level, the project will result of the mode shift from trucks to trains for the freight task between Port Botany and western Sydney. This is likely to have a small positive impact on air quality in the Sydney basin due to the lower emissions intensity of rail transport.

6.9.2 CUMULATIVE IMPACTS

The cumulative impacts from the construction of the future infrastructure are likely to be local and short term. In the event that a number of construction projects are undertaken during the same period these local impacts may increase. At a regional level, the operation of the future infrastructure project would likely result in a decrease in congestion of major roads and a reduction in overall truck kilometres travelled due to the project's role in facilitating a road shift from road to rail transport. This would result in an overall reduction in vehicle emissions. These vehicle movements and vehicle emissions however may be offset by an increase in local traffic and emissions of air pollutants due to the establishment of the Western Sydney Airport Growth Area.

6.9.3 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENT

6.9.3.1 SUMMARY OF KEY ISSUES

Key air quality issues can be summarised as:

- the protection of the recommended corridor would not have an impact on the local air quality
- the main impacts are likely to be experienced during the construction and operation of the future infrastructure
- the key emission of concern during construction is dust
- the key emissions of concern during operation are particulates and NO_x
- the operation of the future infrastructure is likely to result in a small air quality benefit at a regional scale.

6.9.3.2 MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

As part of any Environmental Impact Assessment for the potential future infrastructure a range of mitigation options and future detailed assessments would be considered including:

- Targeted air quality monitoring and assessment as part of the Environmental Impact Assessment, including cumulative air quality impact assessment. This assessment would require a robust data set of baseline air quality concentrations for the primary pollutants of concern (PM₁₀, PM₂₅) and be prepared in line with the procedures set out by the OEH.
- Several other developments in western Sydney are proposed and approved (refer to Section 6.8). As such an assessment of cumulative air quality impacts in the region because of these developments should be undertaken as part of the Environmental Impact Assessment of the future infrastructure.
- Ongoing liaison with freight operators to achieve ongoing improvements to air quality emissions of rolling stock.

6.10 SOCIAL

6.10.1 POTENTIAL IMPACTS

The impact of a potential future Western Sydney Freight Line within the recommended corridor would be experienced differently by the affected parties depending on a wide variety of factors, including the scale of impact and their resilience to cope with change. An assessment of the impact on community and community facilities/services was undertaken.

The recommended corridor traverses predominantly agricultural and industrial land uses, and has been chosen to minimise impacts to the community, and specifically residential properties within the area. Most community facilities and services are not located within industrial areas, and thus the recommended corridor has been chosen to reflect this.

The highest social impacts would be experienced at sensitive land uses such as schools, aged care facilities and residential properties such as those schools and aged care facilities located off Bakers Lane in Kemps Creek.

6.10.1.1 DEMOGRAPHIC AND COMMUNITY IMPACTS

The demographic review of LGAs within the recommended corridor found that it would not significantly interfere with existing areas of substantial residential density. There are however likely to be impacts associated with the acquisition of properties within the corridor, impacts to neighbouring communities, and community facilities and open spaces (such as riparian areas associated with creek lines) within the recommended corridor.

The highest level of impact would be felt by those residents where property acquisitions would be required. These areas include rural residential properties in Horsley Park. Secondary impacts would be felt by residents within the general area up to 500 metres of the recommended corridor.

At a general community level, impacts would be likely in areas where open space and community facilities are. There are three school facilities within 500 m of the recommended corridor within the Penrith LGA and three within Fairfield LGA.

The remainder of the recommended corridor is in industrial and commercial areas. Impacts to businesses in the area are likely, including land acquisition, business relocation and changes to business access. These have the potential to temporarily impact the community, and local employment. However, it is expected in the long term there will likely be a positive benefit to the community and local region.

6.10.2 CUMULATIVE IMPACTS

There may be some short term cumulative social impacts associated with the construction of the future Western Sydney Freight Line and other projects in the area such as the Western Sydney Employment Area, Western Sydney Airport Growth Area and the proposed Outer Sydney Orbital however it is likely that overall any long term cumulative impacts are likely to be positive. This is through the provision of updated infrastructure, improved passenger rail journeys, greater employment opportunities and easing of congestion.

6.10.3 SUMMARY OF KEY ISSUES, MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

6.10.3.1 SUMMARY OF KEY ISSUES

The recommended corridor traverses Penrith and Fairfield LGAs. Population densities within the recommended corridor are considered low in line with the assessed land use of agriculture, and industrial uses. No community facilities or council maintained open space or parks are located within the recommended corridor. Three schools are located adjacent to the recommended corridor as discussed in the chapter 6.1.

6.10.3.2 MITIGATION MEASURES AND FUTURE DETAILED ASSESSMENTS

As part of any Environmental Impact Assessment for the future infrastructure a range of mitigation options and future detailed assessments would be considered including:

- stakeholder consultation with local government, state and federal agencies
- community engagement reflecting the diverse range of communities that live within the impacted region
- engagement with impacted businesses within the proposed corridor
- a social impact assessment should be completed to understand and plan for any future social impacts
- cumulative social impacts as a result of future planned developments in the recommended corridor.

6.11 ENVIRONMENTAL RISK ANALYSIS

6.11.1 OVERVIEW

An environmental risk analysis has been carried out to identify and confirm key strategic environmental issues for the recommended corridor. An initial environmental constraints identification process was undertaken as part of the Options Development process (refer to section 5.1). Strategic Environmental Assessment Guidelines have also identified a range of key issues that must be addressed for the project and a risk workshop was carried out as part of the corridor protection process to address these issues.

The environmental risk analysis included:

- identification of environmental constraints, including key issues in the Strategic Environmental Assessment guidelines and any other issues
- examination of potential impacts in relation to the identified environmental issues
- identification of mitigation measures in relation to the identified environmental issues
- consideration of the nature and extent of impacts likely to remain after the application of the proposed mitigation measures.

Based on this analysis, an environmental risk category was assigned to each potential impact. This provided a basis for an appropriately detailed assessment of these key issues in this Strategic Environmental Assessment.

6.11.2 STRATEGIC ENVIRONMENTAL RISK ANALYSIS

ISSUE	ADDITIONAL INVESTIGATIONS	STAGE
Property	Landowner negotiation; budget allocation; create further opportunities for minimisation through delivery phase design adjustments.	Corridor protection, project delivery
Land use	Engage with local community and relevant stakeholders to discuss future infrastructure timeframes and the next stages of design, approval and delivery.	Corridor protection, project design and delivery
Utility	Comprehensive utility surveys and consultation with service providers.	Project design and delivery
Economic	Progress with corridor reservation without delay. Develop cabinet submission and business case.	Corridor protection
Traffic and transport	Detailed traffic and transport modelling and assessment.	Project design and delivery
Noise and vibration	Detailed noise and vibration modelling and assessment.	Project design and delivery
Biodiversity	Early engagement with the Office of Environment and Heritage to agree on an approach to offset planning. Avoidance of high value ecological areas during design to minimise offset requirements.	Project design and delivery Project design

ISSUE	ADDITIONAL INVESTIGATIONS	STAGE
Heritage	<p>Further assessment including field inspections to characterise corridor impacts. Consideration given to avoiding, interpreting or relocating significant items/features.</p> <p>Engagement with local Aboriginal community.</p> <p>Test archaeological survey of the recommended corridor including ground-truthing of previously identified Aboriginal sites.</p> <p>Mitigation and management strategies to be developed including a protocol for unexpected finds of Aboriginal heritage.</p>	Project design and delivery
Air quality	Air quality impact assessment.	Project delivery, project operation
Visual amenity, built form and urban design	Detailed visual impact assessment.	Project design and delivery
Soils and water	<p>Detailed geotechnical, hydrological and flooding assessment.</p> <p>Detailed contamination assessment.</p>	Project design and delivery
Social	<p>Effective and comprehensive stakeholder engagement.</p> <p>Detailed social impact assessment.</p>	Project design and delivery

7 STAKEHOLDER CONSULTATION

Transport for NSW is committed to engaging with stakeholders and the community throughout the corridor protection process for the Western Sydney Freight Line, initially for the protection of the recommended corridor within the western section and the during the future integrated planning process for the eastern section. Stakeholder and community consultation provides the opportunity to share information about the refined study area, identify constraints, inform specialist studies and provide an integrated approach to planning for infrastructure and future development in the area.

7.1 GOVERNMENT STAKEHOLDER ENGAGEMENT

Transport for NSW has consulted with other NSW government agencies on the Western Sydney Freight Line since the options development phase in 2014.

7.1.1 DEPARTMENT OF PLANNING AND ENVIRONMENT

The Department of Planning and Environment has been involved throughout the project from the high-level options assessment through to the establishment of the Strategic Environmental Assessment scoping requirements to ensure that key issues are considered when identifying a corridor and creating statutory planning controls to protect land for the Western Sydney Freight Line Corridor.

The Department of Planning and Environment will exhibit the draft state environmental planning policy for the protection of the recommended corridor together with this draft Strategic Environmental Assessment.

7.1.2 WATERNSW

In June 2017 WaterNSW was provided with a detailed briefing on the project regarding the potential impacts on the Prospect Reservoir and Upper Canal. WaterNSW advised that it wished to commence a collaborative work program with Transport for NSW regarding the potential alignment of the corridor with the Warragamba pipeline. The consultation was considered in the update of the broader engineering guidelines that address construction near WaterNSW assets. These guidelines address maintenance, new pipeline construction and risk management. Specific risks included the impact of vibration from a freight line to the pipelines, potential additional pipelines and tunnelling under the Upper Canal.

7.1.3 WESTERN SYDNEY PARKLANDS TRUST

Transport for NSW consulted with Western Sydney Parklands Trust to provide advice on the potential corridors through the parklands. Western Sydney Parklands Trust provided information to inform constraints mapping through the Parklands. Transport for NSW will continue to consult with the Western Sydney Parklands Trust throughout the corridor protection process.

7.1.4 AGENCY WORKSHOPS

During the options development and assessment process (Chapter 4), two major workshops and associated meetings were conducted with key NSW Government agencies, local councils and utilities to help with identifying a recommended corridor. These workshops considered land use, and environmental and infrastructure constraints. Stakeholders consulted included:

- representatives from various Transport for NSW divisions
- Department of Planning & Environment
- Roads and Maritime Services
- Office of Environment and Heritage (OEH)
- Western Sydney Parklands Trust
- affected councils (Blacktown, Holroyd (now Cumberland), Bankstown, Penrith, Parramatta and Fairfield)

- Sydney Trains
 - Department of Trade and Investment, Regional Infrastructure and Services
 - utilities providers
 - Sydney Catchment Authority
 - Sydney Water
 - key developers and major land owners in the western section.
-

7.2 ONGOING CONSULTATION

Transport for NSW will continue to engage with other government agencies, utilities, developers and landowners throughout the corridor protection process. This draft Strategic Environmental Assessment will be publicly displayed and landowners, community and stakeholders will be invited to provide feedback. This consultation will include community information sessions as part of the exhibition process.

8 STATUTORY AND PLANNING FRAMEWORK

The Statutory and Planning Framework chapter outlines the relevant legislation that may be involved in the protection of the recommended corridor and in the delivery of a potential future Western Sydney Freight Line. The legislation and environmental planning instruments outlined in this chapter pertain solely to the protection of the recommended corridor in the Western Section and do not discuss or outline legislation in relation to the Eastern Section (subject to further investigation).

8.1 NEW SOUTH WALES LEGISLATION

8.1.1 NSW ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) provides for the management, development and conservation of land and for the rezoning of land through the creation of environmental planning instruments. Section 24 of the EP&A Act provides for environmental planning instruments, including State Environmental Planning Policies (SEPPs) and Local Environmental Plans. The Governor can make a SEPP to address matters of State or regional environmental planning significance and this document may make provision for controlling development on the land to which it applies. The EP&A Act aims to increase opportunity for public involvement and participation in environmental planning and assessment. Before the Governor recommends the making of a SEPP, a publication must be made to explain the intended effect of the proposed instrument and seek submissions from the public on the matter.

The EP&A Act refers to the fate of existing approved land uses prior to the commencement of the instrument. Existing uses are defined as land uses that were lawfully granted development consent before the instrument came into effect.

The EP&A Act also provides for the assessment and approval regime for a potential future Western Sydney Freight Line. If it were developed today, the freight line would most likely be considered State Significant Infrastructure and would be assessed under Part 5.1 of the EP&A Act. Some legislation and approvals are not applicable to State Significant Infrastructure as described in section 115ZG of the Act. The assessment process would include the preparation of an Environmental Impact Statement (EIS) to be submitted to the Secretary of the Department of Planning and Environment. The EIS would consider the environmental and social impact, including on biodiversity, noise, air quality, water quality land use and visual amenity. It would be placed on public exhibition for a minimum of 30 days during which government agencies, proposal stakeholders and the community can make a written submission to the Department for consideration in its assessment of the proposal.

8.1.2 CONTAMINATED LAND MANAGEMENT ACT 1997

The *Contaminated Land Management Act 1997* establishes a framework for the regulation and management of land considered to be contaminated. Section 60 of the Act requires either a person whose activities have contaminated or the owner of land that has been contaminated to notify the Environment Protection Authority (EPA) in writing. If significantly contaminated land is declared at a site, the EPA may issue an action in relation to the management of the land or management orders requiring the responsible party to submit a plan of management for the land.

8.1.3 HERITAGE ACT 1977

The *Heritage Act 1977* provides for the conservation of buildings, works, archaeological sites and places of non-indigenous heritage. It achieves this by listing, and therefore protecting, heritage items under a number of registers. This includes the State Heritage Register (SHR), the heritage and conservation register, Local Environmental Plan heritage schedules, section 170 registers and interim heritage orders.

The *Heritage Act 1977* requires a statement of heritage impact to be prepared where a proposal has the potential to impact on listed or recorded items. Further assessment would be required during the design and delivery stage to identify additional Aboriginal or non-Aboriginal heritage sites and avoid impacts to these items where feasible. Approvals under section 139 of the Act would not be required should a future project in the recommended corridor be designated State Significant Infrastructure.

8.1.4 BIODIVERSITY CONSERVATION ACT 2016

The *Biodiversity Conservation Act 2016* provides for the protection of threatened species, populations and ecological communities in NSW and aims to conserve biological diversity and promote ecologically sustainable development. If any species, population or community listed under the *Biodiversity Conservation Act 2016* falls within the recommended corridor then a biodiversity development assessment report must be prepared consistent with Section 5 of the EP&A Act.

8.1.5 FISHERIES MANAGEMENT ACT 1994

The *Fisheries Management Act 1994* provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. This includes conservation of fish stocks, key fish habitats, threatened species, populations and ecological communities of fish and marine vegetation and the promotion of ecologically sustainable development. As described in section 115ZG of the Act be required to satisfy the Minister that minimal harm would be done to any aquatic habitats and systems. The requirement for approvals under section 201, 205 and 219 of the Act would not be required should the project be declared State Significant Infrastructure.

8.1.6 NATIONAL PARKS AND WILDLIFE ACT 1974

The *National Parks and Wildlife Act 1974* provides for the conservation of:

- natural habitats, landforms, ecosystems and diversity.
- objects and places of cultural value within a landscape including:
 - objects and sites of Indigenous heritage
 - places of social value to the people of the state
 - places of historical, architectural or scientific significance.

A due diligence assessment should take reasonable steps to ascertain the likelihood that Aboriginal sites would be disturbed during the delivery of a potential future Western Sydney Freight Line in the recommended corridor. If an impact to Aboriginal sites was identified, an Aboriginal Heritage Impact Permit would normally be required under section 90 of the Act, however the provisions of the *National Parks and Wildlife Act 1974* would not apply if the project were declared State Significant Infrastructure.

8.1.7 WATER MANAGEMENT ACT 2000

The *Water Management Act 2000* aims to provide sustainable and integrated management of water sources in NSW for the benefit of present and future generations. It sets out requirements for water use, water management and activities approvals. Under section 115ZG of the EP&A Act these approvals (other than an aquifer interference approval) are not required for the approval of State Significant Infrastructure. An aquifer interference approval would be required for any works that involve the intersection of a groundwater source. The delivery of a potential future Western Sydney Freight Line would be required to satisfy to the minister that minimal harm would be done to any water source.

8.1.8 NATIVE TITLE (NEW SOUTH WALES) ACT 1994

There are no existing Native Title claims in the recommended corridor.

8.1.9 CROWN LANDS ACT 1989

The *Crown Lands Act 1989* sets out conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with. The act is intended to ensure that crown land is managed for the benefit of the NSW

people. Crown land can be made unavailable for private use through a 'reservation' or 'dedication' on the land's title. Dedicated crown land may only be revoked with the agreement of both Houses of NSW Parliament whereas reservations may be revoked by the minister without consideration by the parliament. Three Crown waterways are affected by the recommended corridor (Ropes, Reedy and South Creeks). No other Crown land parcels are affected by the recommended corridor.

8.1.10 LAND ACQUISITION (JUST TERMS COMPENSATION) ACT 1991

The *Land Acquisition (Just Terms Compensation) Act 1991* sets out the framework for land acquisition and compensation in NSW. The act sets out the process for acquisition of privately owned land required by the government for public purposes. Section 23 and 24 of the act provide terms for land owners to establish 'hardship' directly resulting from identification of their land for acquisition (as would be the case if their land is formally reserved under the corridor preservation process). If hardship is established, this allows for an owner-initiated acquisition process.

8.2 STATE ENVIRONMENTAL PLANNING POLICIES (SEPPS)

Several State Environmental Planning Policies (SEPPs) would apply to the development of a potential future Western Sydney Freight Line including SEPPs that apply to all developments within the state, and those that apply to specific areas or purposes. In addition to the range of state-wide SEPPs, the following SEPPs specifically apply to the refined study area.

8.2.1 SEPP (INFRASTRUCTURE) 2007

State Environmental Planning Policy (Infrastructure) 2007 (the Infrastructure SEPP) aims to facilitate the delivery of infrastructure across the state while mitigating environmental impacts. The Infrastructure SEPP is applicable once a potential future Western Sydney Freight Line is operational. The provisions of the Infrastructure SEPP are key to ensuring that operational and planned rail lines are not encroached by sensitive development or development that could damage rail infrastructure during construction. In addition, the Infrastructure SEPP will apply to new land use developments adjacent to a potential future Western Sydney Freight Line.

8.2.2 SEPP (WESTERN SYDNEY EMPLOYMENT AREA) 2009

State Environmental Planning Policy (Western Sydney Employment Area) 2009 aims to protect and enhance the land within the Western Sydney Employment Area. It provides consistency in land use zoning provision across the Western Sydney Employment Area and a platform to coordinate commercial and industrial development across the area.

The recommended corridor is partially located in the Western Sydney Employment Area on land zoned for industrial use apart from areas adjacent to Ropes Creek that are zoned as environmental conservation. The objectives of these zones are as follows:

8.2.2.1 IN1: GENERAL INDUSTRIAL

- Provide industrial and warehouse land uses.
- Encourage employment opportunities.
- Minimise any adverse effect of industry on other land uses.
- Support and protect land for industrial uses.
- Enable other land uses that support the needs of workers in the area.
- Minimise adverse impacts on the natural environment.

8.2.2.2 E2: ENVIRONMENTAL CONSERVATION

- Protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.
- Prevent development that could destroy, damage or otherwise have an adverse effect on those values.
- Provide for passive recreational activities that are compatible with the land's environmental constraints.

It is considered that the protection and delivery of the recommended corridor for the Western Sydney Freight Line would be compatible with the objectives of the industrial land use zone and that areas of sensitive ecological habitat would be avoided where feasible.

8.3 LOCAL ENVIRONMENTAL PLANS

The recommended corridor for the Western Sydney Freight Line covers two local government areas including Penrith City Council and Fairfield City Council. Local Environment Plans associated with the current and former Councils apply to areas within the recommended corridor as follows:

- Penrith Local Environmental Plan 2010
- Fairfield Local Environmental Plan 2013.

These Local Environmental Plans establish the land use controls applicable to the local government area and permissible development in the relevant land use zone. The recommended corridor also runs along the southern border of the Blacktown City Council LGA. While the corridor is not located directly within this LGA, it is noted that the provisions of the Blacktown Local Environmental Plan may be applicable should any design refinements or associated works be required within this LGA. Section 5.1 provides information regarding land use and zoning within the corridor.

8.4 DEVELOPMENT CONTROL PLANS

Typically, development control plans created by councils exist to guide developments that occur within their local government area. Development control plans generally apply to developments that are granted consent through a development application process. Councils can also create 'deemed Development Control Plans' or precinct-specific development control plans which apply only to a specific development or site within the local government area.

Planning for a potential future Western Sydney Freight Line project may need to consider aspects of development control plans, especially where they are specific to a potentially impacted development site. This would include the following 'deemed' Development Control Plans associated with Blacktown City Council:

- Eastern Creek Business Park Precinct Plan (Stages 1 and 2)
- Ropes Creek Precinct Plan and Development Control Strategy.

8.5 COMMONWEALTH LEGISLATION

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the framework to protect and manage matters of national environmental significance: nationally important flora, fauna, ecological communities and heritage places.

The EPBC Act requires referral to the Commonwealth for proposals or actions that 'have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land'. There are currently nine matters of national environmental significance protected under the EPBC Act:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities

- Migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coalmining development.

There is potential for the presence of threatened species and ecological communities within the Western Sydney Freight Line Corridor.

8.6 FUTURE PLANNING FRAMEWORK

The desired land-use outcome is the protection of the recommended corridor that allows the Western Sydney Freight Line project to be delivered in the short to medium term (within 10 to 15 years), while allowing current land owners to undertake approved activities in the meantime. A draft SEPP has been prepared to support the protection of the recommended Western Sydney Freight Corridor through rezoning land as a future infrastructure project so to actively inform other Environmental Planning Instruments (including council Local Environmental Plans), land use plans and future strategies to assist in shaping the strategic vision for the area.

The draft SEPP for the protection of the recommended corridor will not prevent current landholders from continuing established land uses or from making amendments to land uses that are consistent with that existing use. However, the draft SEPP for the protection of the recommended Western Sydney Freight Corridor would prevent new development applications for an intensification or change of use from being enacted. This will slow the rate of development in the corridor while providing a pathway for current land owners to continue with day-to-day activities and to allow the Government to effectively plan for the future.

This draft SEPP aims to protect the recommended corridor for the western section which spans from the connection at the proposed Outer Sydney Orbital Corridor in the west (west of Mamre Road) to Westlink M7.

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APPENDIX A

STRATEGIC ENVIRONMENTAL
ASSESSMENT SCOPE – DEPARTMENT OF
PLANNING AND ENVIRONMENT



STRATEGIC ENVIRONMENTAL ASSESSMENT SCOPE

The following table represents the scope requirements that were sent to Transport for NSW by the Department of Planning and Environment. The relevant section where the scope requirement is met is detailed in the table.

PARAMETER	DETAILS	RELEVANT SECTION
Content of the Strategic Environmental Assessment:	<p>The Strategic Environmental Assessment should address:</p> <p>1 The strategic justification:</p> <p>This section should provide a description of the strategic need for the future infrastructure project, as well as provide the rationale for why reservation of a corridor is required at this time. This section should detail the overall objectives of the project as well as how the reservation fits within current government strategic plans and policies at all levels (Local, State and Federal). The scope for this section includes:</p> <ul style="list-style-type: none">— An outline of the long-term transport planning context of the Sydney Region and the project's broader application to the NSW transport network.— Providing the strategic justification of the proposed future infrastructure, the overarching objectives of the project and the long-term outcomes it seeks to achieve. Consideration should be given to:<ul style="list-style-type: none">— the strategic transport need for the proposed future infrastructure— how the proposed future infrastructure will integrate with the broader transport network (existing and proposed) in the adjoining districts and region— how the corridor reservation and proposed infrastructure project aligns or conflicts with strategic plans or policies (Local, State and Federal).— Analysis of alternative solutions that could be undertaken to address the strategic need identified above. This should include:<ul style="list-style-type: none">— other transport scenarios (such as a 'do-nothing' scenario or a 'build when required' [without reservation] scenario)— assessment of the strategic costs and benefits of reserving the corridor compared to the alternative transport solutions and consequence of these other solutions.	Chapter 3

PARAMETER	DETAILS	RELEVANT SECTION
	<p>2 The infrastructure project and its components</p> <p>This section should provide an overview of the business requirements of the potential future infrastructure which will be used to inform the corridor alignment. The scope for this section includes:</p> <ul style="list-style-type: none"> — A high-level description of the business requirements of the future infrastructure and any related considerations that will form part of determining the corridor alignment. These include: <ul style="list-style-type: none"> — identifying the strategic locations that the future infrastructure project needs to connect (e.g. servicing future growth areas, access to intermodal terminals) — width needed for a future corridor (e.g. differing infrastructure needs/design over the extent of the corridor) — strategic connections to other infrastructure networks (e.g. rail, road and cycle modes or key interchanges) — strategic design requirements (e.g. slope or topography, design standards). 	Section 1.4 – 1.6
	<p>3 Corridor alignment constraints analysis</p> <p>This section should identify and provide a strategic assessment of the corridor investigation area constraints. The scope for this section includes:</p> <ul style="list-style-type: none"> — Strategic environmental opportunities and constraints within the corridor investigation area. — Existing land uses within the corridor investigation area. — Outline the process by which corridor alignment constraints were identified and corridor options assessed. This should include: <ul style="list-style-type: none"> — description of the process of how the corridor options were derived (e.g. investigation area, constraints analysis) — explanation of multi-criteria analysis used to assess the constraints within the corridor investigation area — a summary of the assessment of corridor alignment options — relevant summary of how corridor options have considered the key issues in sections 5-15 of these requirements. 	Chapter 4

PARAMETER	DETAILS	RELEVANT SECTION
	<p>4 Identified corridor alignment</p> <p>This section should provide a detailed description of the identified corridor alignment and how it achieves the overarching objectives of the corridor and the potential future infrastructure, with reference to how the corridor alignment integrates and supports strategic plans. The scope for this section includes:</p> <ul style="list-style-type: none"> — A description and map of the identified corridor alignment and potential construction methodology for the future infrastructure. This includes notation of above or below ground construction. — An overview which outlines how the identified corridor alignment: <ul style="list-style-type: none"> — meets the overarching objectives of the project — relates and interacts with existing and proposed infrastructure and transport networks — integrates with strategic plans and supports broader objectives of the Sydney region, including its connections to the wider freight network (e.g. growth planning, land use and infrastructure strategies). — Identification of the sections of the identified corridor alignment which require reservation (e.g. sections at grade requiring rezoning or tunnel sections requiring design considerations to be applied). — Details on how the identified corridor alignment has considered the key issues in sections 5-15 of these requirements. 	Chapter 5

PARAMETER	DETAILS	RELEVANT SECTION
Key Issues	<p>The Strategic Environmental Assessment must also address the following specific matters for the identified corridor alignment. An assessment of all key issues is required for the sections of the identified corridor alignment requiring reservation. Sections of the identified alignment that are proposed to be underground (and therefore will not be reserved) are only required to address the matters that are marked with an asterisk (*).</p> <p>5 Land use and property impacts</p> <p>This section should identify the land use and property impacts within the identified corridor and adjacent to the identified corridor alignment. This section should also describe how land use and property impacts were avoided, minimised and/or offset to reduce potential impacts of the identified corridor alignment on surrounding land uses and properties. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identifying the current land uses within the identified corridor alignment and describe the potential impacts of the identified corridor alignment on: <ul style="list-style-type: none"> — residential land uses — industrial land uses — open space/recreational/national parks — agricultural land — extractive/mineral/energy resources* Utility infrastructure* — major transport infrastructure*. <p>For each land use specify the number of existing lots and potential lots (based on draft environmental planning instruments and development proposals) affected by the identified corridor alignment.</p> <ul style="list-style-type: none"> — Consideration of the potential implications of relevant legislation or protected land ownership, for example: <ul style="list-style-type: none"> — Crown Lands — <i>Native Title Act 1993</i> — <i>National Parks & Wildlife Act 1974</i>. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts of the identified corridor alignment on surrounding land uses and properties.* — A broad outline of the suite of possible mitigation options to address the remaining impacts of the potential future infrastructure on surrounding land uses and properties.* — Consideration of any potential cumulative impacts on the land within the identified corridor alignment created by the potential future infrastructure and other existing and future infrastructure development. — An outline of where future detailed assessments may be required as part of the Environmental Impact Assessment of the future infrastructure.* 	Section 6.1

PARAMETER	DETAILS	RELEVANT SECTION
	<p>6 Future land use opportunities</p> <p>This section should identify possible future land use changes or opportunities that could be capitalised on as a result of the potential future infrastructure within the identified corridor alignment. The scope for this section includes:</p> <ul style="list-style-type: none"> — An outline of potential future land use opportunities surrounding the corridor as a result of the potential future infrastructure, including commentary on potential: <ul style="list-style-type: none"> — economic growth — areas of change (such as interchanges or major connections with other major infrastructure projects (current and future) — housing growth. — Consideration of the potential future infrastructure in relation to the Regional and District Plans (current and proposed/draft). 	Section 6.1
	<p>7 Economic impacts</p> <p>This section should provide an overview of potential future economic impacts and opportunities that may be created by the potential future infrastructure. Economic impacts to the wider region are also to be commented on, providing short, medium and long term scenarios. The scope for this section includes:</p> <ul style="list-style-type: none"> — Commentary on the potential economic impacts of both reserving the corridor and the delivery of the potential future infrastructure. Including: <ul style="list-style-type: none"> — Expected economic (or productivity) change created by the potential future infrastructure. This includes: <ul style="list-style-type: none"> — consideration of the wider economic impact of the potential future infrastructure on the Sydney region, regional NSW, strategic and district centres and key employment locations — consideration of whether the potential future infrastructure may generate opportunities for new employment locations or centres — the potential cumulative economic impacts of the corridor when considered alongside other infrastructure projects. 	Section 6.2

PARAMETER	DETAILS	RELEVANT SECTION
	<p>8 Traffic and transport</p> <p>This section should provide an assessment of the potential impacts of the identified corridor alignment and potential future infrastructure on the surrounding area of the corridor. The scope for this section includes:</p> <ul style="list-style-type: none"> — A description of how the identified corridor alignment will meet the transport related objectives of the corridor and potential future infrastructure. Consideration to be given to: <ul style="list-style-type: none"> — sensitive land uses — future growth areas — strategic plans (current and proposed/draft). — An assessment of the traffic and transport impacts on the local, regional, State and National road and rail network. This includes opportunities for potential extension of these networks or identifying where networks may need to be severed due to the potential future infrastructure project and corridor alignment. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative traffic and transport impacts on the surrounding traffic flows and transport demand. — A broad outline of the suite of possible mitigation options to remaining impacts of the potential future infrastructure on surrounding traffic flows and transport demand (e.g. future design considerations or operational requirements). — Consideration of the potential cumulative impacts on the transport infrastructure within the corridor created by the potential future infrastructure and other existing and future infrastructure development. — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.3
	<p>9 Noise and Vibration*</p> <p>This section should assess the potential noise and vibration impacts of the potential future infrastructure in the vicinity of the identified corridor alignment. An indicative map of the potential noise and vibration impacts within the vicinity of the corridor. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification of sensitive land uses (current and future) surrounding the corridor likely to be impacted by the potential noise and vibration of the potential future infrastructure. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative noise and vibration impacts on the surrounding sensitive land uses. — A broad outline of the suite of possible mitigation options to address the remaining noise and vibration impacts of the potential future infrastructure on surrounding sensitive land uses (e.g. future design considerations). — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.4

PARAMETER	DETAILS	RELEVANT SECTION
	<p>10 Visual Amenity, Built Form and Urban Design</p> <p>The visual impact of the identified corridor alignment and subsequent potential future infrastructure should be identified, with consideration given to visual amenity, built form and urban design of the areas surrounding the corridor. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification of strategic visual, built or urban form impacts of the potential future infrastructure on the surrounding area. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts on the surrounding visual, built or urban form. — An outline of the urban design principles and objectives to guide further design and assist in addressing the impacts of the potential future infrastructure on surrounding visual, built or urban form. — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.5
	<p>11 Soils and Water*</p> <p>This section should identify soil and water issues related to the identified corridor alignment. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification and description of the geological and hydrological conditions within and surrounding the identified corridor alignment. Consideration is to be given to: <ul style="list-style-type: none"> — key hydrological features (e.g. watercourses, dams) — water supply — acid sulphate soils — contaminated land. — Description of the hydrological and geological impacts in relation to the identified corridor and potential future infrastructure, including the strategic assessment of: <ul style="list-style-type: none"> — location and nature of flood regimes affecting the corridor or to be affected by the potential future infrastructure — potential impacts on surface water, groundwater, soils, flooding, riparian areas and potable water. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts on the surrounding hydrological and geological features. — A broad outline of the suit of possible mitigation options to address the remaining impacts of the potential future infrastructure on surrounding hydrological and geological conditions (e.g. future design considerations). Consideration of the potential cumulative impacts on the hydrological and geological conditions surrounding the corridor created by the potential future infrastructure and other existing and future infrastructure development. — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.6

PARAMETER	DETAILS	RELEVANT SECTION
	<p>12 Biodiversity</p> <p>This section should evaluate the current ecological values within the identified corridor alignment and identify potential impacts on those ecological values as a result of the potential future infrastructure. This section should also identify how offset obligations will be addressed after the corridor is reserved. The scope for this section includes:</p> <ul style="list-style-type: none"> — A strategic assessment of the potential ecological impacts of the corridor reservation and potential future infrastructure both within the corridor and adjoining with specific reference to: <ul style="list-style-type: none"> — wetlands — vegetation and habitat clearing — connectivity — edge effects — riparian/aquatic habitat and marine vegetation — soil and water quality — adjoining waterways — salinity, erosion and sedimentation — ongoing water management. — Where applicable, an outline of how the identified corridor alignment has avoided, minimised and/or offset its impacts on the ecological values of the corridor investigation area. This may include: <ul style="list-style-type: none"> — outlining the approach to offset strategies for ecological impacts and native vegetation clearing — consideration of the <i>Biodiversity Conservation Act 2016</i> and NSW Biodiversity Offsets Policy for Major Projects (<i>Office of Environment and Heritage, 2014</i>). — A broad outline of the suite of potential mitigation options to address the remaining impacts of the potential future infrastructure on surrounding ecological values and within the corridor (e.g. future design considerations or operational requirements). — Consideration of the potential cumulative impacts on the ecological values surrounding the corridor created by the potential future infrastructure and other existing and future infrastructure development. — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. <p>All biodiversity assessments should take into account:</p> <ul style="list-style-type: none"> — Impacts on features of High Environmental Value, as described in the relevant Regional and/or District Plan (current and proposed/draft). — <i>Draft Guidelines for Threatened Species Assessment</i> (Department of Environment and Conservation/Department of Primary Industries 2005). — <i>Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities</i> (Department of Environment and Conservation 2004). — <i>Draft Policy and Guidelines for Fish Habitat Conservation and Management - Update 2013</i> (Department of Primary Industries 2013). — <i>Guidelines for Aquatic Habitat Management and Fish Conservation</i> (Department of Primary Industries 1999). 	Section 6.7

PARAMETER	DETAILS	RELEVANT SECTION
	<p>13 Heritage</p> <p>This section should identify the impact of the identified corridor alignment and subsequent potential future infrastructure on aboriginal and non-aboriginal heritage. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification of the State and local aboriginal and non-aboriginal heritage affected by the identified corridor alignment including: <ul style="list-style-type: none"> — heritage items — conservation areas — areas of cultural and archaeological significance. — Description of the potential impacts of the identified corridor alignment and potential future infrastructure on the identified State and local aboriginal and non-aboriginal heritage in the corridor. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts on the aboriginal and non-aboriginal heritage in or directly adjacent to the identified corridor alignment. — A broad outline of the suite of potential mitigation options to address the remaining impacts of the potential future infrastructure on aboriginal and non-aboriginal heritage in the corridor. — Consideration of the potential cumulative impacts on the aboriginal and non-aboriginal heritage in the corridor created by the potential future infrastructure and other existing and future infrastructure development. — An outline of where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.8
	<p>14 Air Quality</p> <p>This section should identify possible air quality impacts of the potential future infrastructure with consideration of local and regional air quality. The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification of possible air quality impacts of the potential future infrastructure and corridor reservation on the local and regional air quality with specific consideration given to sensitive receivers. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts on the local and regional air quality (e.g. future design considerations or operational requirements). — A broad outline of the suite of possible mitigation options to address the remaining impacts of the potential future infrastructure on local and regional air quality. — Outline where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.9

PARAMETER	DETAILS	RELEVANT SECTION
	<p>15 Social</p> <p>This section should evaluate the impacts of the identified corridor alignment and subsequent potential future infrastructure on the directly affected community and its facilities and/or services should be identified and discussed in this section. The scope for this section includes:</p> <ul style="list-style-type: none"> — A strategic assessment of the social impacts of the identified corridor alignment and potential future infrastructure on the directly affected community and community facilities/services. — Where applicable, an outline of how the identified corridor alignment has avoided or minimised negative impacts on the community and its facilities/services. — A broad outline of the suite of possible mitigation options to address the remaining impacts of the potential future infrastructure on the community and its facilities/services. — Consideration of the potential cumulative impacts on the community and its facilities/services created by the potential future infrastructure and other existing and future infrastructure development. — Outline where future detailed assessments would be required as part of the Environmental Impact Assessment of the future infrastructure. 	Section 6.10
	<p>16 Environmental Risk Analysis*</p> <p>This section is to include an environmental risk analysis summary which should identify the potential environmental impacts associated with the identified corridor alignment.</p> <p>The scope for this section includes:</p> <ul style="list-style-type: none"> — Provide a matrix assessment of the potential impacts associated with the identified corridor alignment and the potential future infrastructure (as identified in sections 5-15) with specific attention given to: <ul style="list-style-type: none"> — strategic mitigation measures and their staged application — potentially significant residual environmental impacts after mitigation measures are applied 	Section 6.11

PARAMETER	DETAILS	RELEVANT SECTION
Consultation*	<p>During the preparation of the Strategic Environmental Assessment, there is an expectation that the agency will consult with the relevant local, State and/or Commonwealth Government authorities, service providers, community groups and affected landowners. This may involve:</p> <ul style="list-style-type: none"> — Local, State and Commonwealth government authorities, including engaging with Department of Planning and Environment about the preparation of the District Plans or Regional Plans — specialist interest groups, including Local Aboriginal Land Councils, and others such as Aboriginal stakeholders — relevant utilities and Environmental Assessment service providers — the public, including community groups and adjoining and affected landowners. <p>The Strategic Environmental Assessment should describe the consultation process and the issues raised and identify where the design of the project or the project alignment has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>	Chapter 7
Statutory Planning Considerations	<p>Statutory planning considerations: Current planning framework*</p> <p>This section should identify the existing Environmental Planning Instruments that apply to the identified corridor alignment and relevant sections or clauses that will be affected by potential statutory planning controls in relation to the corridor reservation.</p> <p>The scope for this section includes:</p> <ul style="list-style-type: none"> — Identification of the existing Environmental Planning Instruments that apply to the identified corridor and relevant sections or clauses that will be affected by potential statutory planning controls in relation to the corridor reservation. This should include: <ul style="list-style-type: none"> — all existing relevant local environmental plans — all existing relevant State Environmental Planning Policies — all existing relevant structure plans and Local Action Plans and Development Control Plans — all existing relevant Land Use and Infrastructure Strategies — other plans, policies and strategies relevant to the identified corridor. <p>Statutory planning considerations: Future planning framework*</p> <p>This section identifies the land use outcomes that the environmental planning instrument should achieve. This section should not propose zoning recommendations or development controls.</p> <p>The scope for this section includes:</p> <ul style="list-style-type: none"> — Identifying the sections of the identified corridor alignment that need to be reserved. — Identify the sections where reservation is not required, but design outcomes of permissible uses may need to be managed. For example, limitation on the depth of basement car parks. 	Chapter 8

ABOUT US

WSP is one of the world's leading engineering professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, environmental specialists, as well as other design, program and construction management professionals. We design lasting Property & Buildings, Transportation & Infrastructure, Resources (including Mining and Industry), Water, Power and Environmental solutions, as well as provide project delivery and strategic consulting services. With 36,000 talented people in more than 500 offices across 40 countries, we engineer projects that will help societies grow for lifetimes to come.

