

Outer Sydney Orbital Transport Corridor

DRAFT STRATEGIC ENVIRONMENTAL ASSESSMENT



Roads &
Maritime



Transport
for NSW



MAKING IT HAPPEN

DRAFT

Strategic Environmental Assessment - Draft for Consultation

Client: Transport for NSW

ABN: 18 804 239 602

Prepared by

AECOM Australia Pty Ltd

Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia

T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com

ABN 20 093 846 925

March 2018

Job No.: 60427370

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

© AECOM Australia Pty Ltd (AECOM). All rights reserved.

AECOM has prepared this document for the sole use of the Client and for a specific purpose, each as expressly stated in the document. No other party should rely on this document without the prior written consent of AECOM. AECOM undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. This document has been prepared based on the Client's description of its requirements and AECOM's experience, having regard to assumptions that AECOM can reasonably be expected to make in accordance with sound professional principles. AECOM may also have relied upon information provided by the Client and other third parties to prepare this document, some of which may not have been verified. Subject to the above conditions, this document may be transmitted, reproduced or disseminated only in its entirety.

DRAFT

Table of Contents

Terms and Abbreviations	i
Executive Summary	ii
1.0 Introduction	1
1.1 Background	1
1.2 Process to date	1
1.3 Recommended Corridor	2
1.4 Purpose of this document	4
2.0 Strategic justification and corridor need	10
2.1 Policy and strategic context	10
2.1.1 Australian Government planning policies and strategies	10
2.1.2 NSW Planning and Transport policies	13
2.1.3 Local planning policies	16
2.2 Population, Housing and Employment Trends and Forecasts	18
2.3 Need for the Outer Sydney Orbital Infrastructure	19
2.4 Need for Corridor Protection	19
2.5 Corridor Study Objectives	20
3.0 Corridor development and alternatives	21
3.1 Methodology for corridor development	21
3.1.1 Identifying a study area	21
3.1.2 Understanding constraints and opportunities	23
3.1.3 Development of guiding principles	28
3.1.4 Identifying corridor options	32
3.1.5 Constraints and opportunities of alternative corridor options	34
3.1.6 Evaluation process for corridor options	38
3.1.7 Selecting and refining the Recommended Corridor	39
3.2 Alternatives to Protection of the Recommended Corridor	44
3.2.1 Alternative 1 – Status quo or ‘do nothing/ do minimum’	44
3.2.2 Alternative 2 – Upgrades to existing road and freight rail networks	46
3.2.3 Alternative 3 – Investment to improve public transport	47
4.0 Recommended OSO Corridor location	48
4.1 Design requirements	48
4.2 Corridor location	51
4.3 Width of OSO corridor	56
4.4 Proposed interchanges and rail junctions	59
4.5 Proposed watercourse and floodplain crossings	59
4.6 Interaction with existing and planned road network	59
4.7 Interaction with existing and planned rail network	59
4.8 Potential staging scenarios and timing	60
5.0 Consultation	61
5.1 Introduction	61
5.2 Previous consultation	61
5.2.1 Community and stakeholder consultation	61
5.2.2 Local Aboriginal Land Council (LALC) consultation	62
5.2.3 Government entity consultation	62
5.3 On-going and future consultation	62
5.3.1 Property owner consultation	63
5.3.2 LALC consultation	63
5.3.3 Government consultation	63
6.0 Existing environment of the OSO corridor	64
6.1 Land use	64
6.2 Traffic and transport	66
6.2.1 Road network	66
6.2.2 Rail network	66
6.3 Socio-economic	67
6.3.1 Residents and communities	67

DRAFT

6.3.2	Community infrastructure	67
6.3.3	Community identity, values and aspirations	68
6.3.4	Employment and industry	68
6.3.5	Transport infrastructure	69
6.3.6	Travel patterns	69
6.4	Non-Aboriginal heritage	69
6.4.1	Heritage places and sites	69
6.5	Aboriginal heritage	74
6.5.1	Registered sites	74
6.5.2	Areas with Aboriginal Cultural Heritage Values	75
6.5.3	Areas of Archaeological Sensitivity	75
6.6	Biodiversity	76
6.6.1	Vegetation communities	76
6.6.2	Threatened flora and fauna	81
6.6.3	Wildlife connectivity	81
6.6.4	Protected areas	82
6.7	Surface water and flooding	82
6.7.1	Catchments and waterways	83
6.7.2	Existing flood conditions	83
6.7.3	Flood evacuation	84
6.8	Landscape and visual	88
6.8.1	Landform	88
6.8.2	Land cover	88
6.8.3	Landscape change	89
6.9	Soils and geology	89
6.9.1	Geology and geomorphology	89
6.9.2	Soil landscapes	89
6.9.3	Topography and slope	90
6.9.4	Faults and lineaments	90
6.9.5	Rivers and waterways	90
6.9.6	Acid sulfate soils	90
6.9.7	Mines	90
6.9.8	Geoheritage	91
6.9.9	Contaminated land	91
6.10	Noise and vibration	91
6.10.1	Existing development	91
6.10.2	Planned development	91
6.11	Air quality	92
6.11.1	Meteorology	92
6.11.2	Pollutants	92
6.11.3	Ambient air quality	93
7.0	Strategic assessment of the Recommended Corridor	94
7.1	Land use Impacts	94
7.1.1	Corridor protection and construction/operation of future OSO infrastructure	94
7.1.2	Management and mitigation considerations	114
7.2	Traffic and Transport	115
7.2.1	Corridor protection and potential future infrastructure	115
7.2.2	Management and mitigation considerations	118
7.3	Socio-Economic	118
7.3.1	Corridor protection and potential future infrastructure	119
7.3.2	Management and mitigation considerations	122
7.4	Non-Aboriginal Heritage	123
7.4.1	Corridor protection and potential future infrastructure	123
7.4.2	Management and mitigation considerations	126
7.5	Aboriginal Heritage	126
7.5.1	Corridor protection and potential future infrastructure	126
7.5.2	Management and mitigation considerations	128

DRAFT

7.6	Biodiversity	129
	7.6.1 Corridor protection and potential future infrastructure	129
	7.6.2 Management and mitigation considerations	131
7.7	Surface Water and Hydrology	132
	7.7.1 Corridor protection and potential future infrastructure	132
	7.7.2 Management and mitigation considerations	135
7.8	Landscape and Visual	135
	7.8.1 Corridor protection and potential future infrastructure	135
	7.8.2 Management and mitigation considerations	138
7.9	Soils and Geology (including Contaminated Land)	138
	7.9.1 Corridor protection and potential future infrastructure	138
	7.9.2 Management and mitigation considerations	139
7.10	Noise and Vibration	139
	7.10.1 Road noise assessment criteria	140
	7.10.2 Rail noise assessment criteria	140
	7.10.3 Corridor protection and potential future infrastructure	141
	7.10.4 Noise and vibration mitigation	142
7.11	Air Quality	142
	7.11.1 Corridor protection and potential future infrastructure	142
	7.11.2 Air Quality mitigation	144
7.12	Consideration of potential cumulative impacts	144
	7.12.1 Land use and property	144
	7.12.2 Heritage	144
	7.12.3 Biodiversity	145
	7.12.4 Air quality	145
	7.12.5 Flooding	145
8.0	Economic considerations	146
	8.1 Existing and future environment	146
	8.2 Methodology	146
	8.3 Consideration of potential economic impacts	147
	8.3.1 Corridor Protection	148
	8.3.2 Future construction of OSO infrastructure	150
	8.3.3 Operational OSO Infrastructure Phase	151
	8.4 Summary of findings	154
	8.4.1 Alignment with broader government initiatives and projects	155
9.0	Strategic Planning Considerations	157
	9.1 Strategic implications of protecting the recommended corridor	157
	9.1.1 Section 1 Box Hill to Dunheved	158
	9.1.2 Section 2 Dunheved to Orchard Hills	159
	9.1.3 Section 3 Orchard Hills to Cobbitty	160
	9.1.4 Section 4 Cobbitty to Camden Park	160
	9.1.5 Section 5 Camden Park to Menangle	161
	9.2 Future Land Use Opportunities	161
	9.2.1 Housing and Job Growth	162
	9.2.2 Potential opportunities to effectively integrate new infrastructure with surrounding land uses	162
	9.2.3 Key Interchanges and Infrastructure Connections	163
	9.3 Consideration of potential cumulative impacts	165
10.0	Statutory planning implications	166
	10.1 Introduction	166
	10.2 Objectives for Protection of the Recommended OSO Corridor	166
	10.3 Environmental Planning and Assessment Act 1979 (EP&A Act)	167
	10.4 Other relevant NSW legislation	167
	10.5 EPIs to be amended by the proposed SEPP	168
	10.6 Property acquisition	169
11.0	Environmental risk analysis	170
	11.1 Strategic environmental risk analysis process	170
	11.2 Strategic environmental risk analysis	170

DRAFT

12.0	Corridor justification	174
13.0	References	179
Appendix A		
	SEA Requirements	A
Appendix B		
	Local government policy summary	B
Appendix C		
	Interchanges and road and waterway crossings	C
Appendix D		
	Noise assessment criteria	D

List of Tables

Table 1	Strategic Environmental Assessment Guidelines – Outer Sydney Orbital	5
Table 2	Matters contemplated in relevant policy documents	17
Table 3	Environmental, social and engineering technical factors	23
Table 4	Summary of constraints categorisation	24
Table 5	OSO Corridor Guiding Principles	29
Table 6	Long list option fatal flaws	33
Table 7	Constraints and opportunities of options and alternatives	36
Table 8	Business Requirements	48
Table 9	Feedback provided by community stakeholders	61
Table 10	Heritage-listed resources within and adjacent to the corridor	70
Table 11	Valid AHIMS Sites	75
Table 12	Existing watercourses crossed by the OSO recommended corridor	83
Table 13	Future Employment Areas	120
Table 14	OSO Infrastructure Magnitude of Change Summary	154
Table 15	Related infrastructure projects	155
Table 16	Relevant NSW statutes for recommended corridor protection	167
Table 17	LEPs and SEPPs proposed to be amended to support the recommended OSO corridor	169
Table 18	Environmental risk analysis	171

DRAFT

List of Figures

Figure 1	Outer Sydney Orbital - Recommended Corridor	ix
Figure 2	Recommended OSO corridor	3
Figure 3	Regional context of the OSO	22
Figure 4	OSO corridor long list options	35
Figure 5	OSO corridor interchanges and rail junctions	50
Figure 6	Section 1 Box Hill to Dunheved	53
Figure 7	Section 2 Dunheved to Orchard Hills	54
Figure 8	Section 3 Orchard Hills to Cobbitty	55
Figure 9	Section 4 Cobbitty to Camden Park	57
Figure 10	Section 5 Camden Park to Menangle	58
Figure 11	Key land uses within the OSO Study Area and in relation to the recommended corridor	65
Figure 12	Heritage within the recommended corridor – A	71
Figure 13	Heritage within the recommended corridor – B	72
Figure 14	Heritage within the recommended corridor – C	73
Figure 15	Biodiversity within and adjacent to the recommended corridor – A	78
Figure 16	Biodiversity within and adjacent to the recommended corridor – B	79
Figure 17	Biodiversity within and adjacent to the recommended corridor – C	80
Figure 18	Waterways and features within and adjacent to the recommended corridor – A	85
Figure 19	Waterways and features within and adjacent to the recommended corridor – B	86
Figure 20	Waterways and features within and adjacent to the recommended corridor – C	87
Figure 21	Key Land Uses – Section 1 of Recommended Corridor	97
Figure 22	Land use zoning – Section 1 of Recommended Corridor	98
Figure 23	Key Land Uses – Section 2 of Recommended Corridor	102
Figure 24	Land use zoning – Sections 1 and 2 of Recommended Corridor	103
Figure 25	Land use zoning – Section 2 of Recommended Corridor	104
Figure 26	Key Land Uses – Section 3 of Recommended Corridor	106
Figure 27	Land use zoning – Section 3 of Recommended Corridor	107
Figure 28	Key Land Uses – Section 4 of Recommended Corridor	109
Figure 29	Land use zoning – Section 4 of Recommended Corridor	110
Figure 30	Key Land Uses – Section 5 of Recommended Corridor	112
Figure 31	Land use zoning – Section 5 of Recommended Corridor	113
Figure 32	Proposed Link Road extension in Dunheved Estate	115
Figure 33	Zones of Aboriginal archaeological potential within Wianamatta Regional Park (Source: Godden Mackay Logan Pty Ltd, 2011)	127
Figure 34	Direct and wider impacts of transport investment	153

DRAFT

Terms and Abbreviations

Term	Definition
AHIMS	Aboriginal Heritage Information Management System
ARI	Average Recurrence Interval
BLoR-CC	Bells Line of Road – Castlereagh Connection
DPE	Department of Planning and Environment (NSW)
EEC	Endangered Ecological Community
EIE	Explanation of Intended Effects
EPI	Environmental Planning Instrument
GIS	Geographic Information System
GMGA	Greater Macarthur Growth Area
IMT	Intermodal freight terminal
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LUIIP	Land Use and Infrastructure Implementation Plan
M4	M4 Western Motorway
M5	M5 South West Motorway
M7	Westlink M7 Motorway
MCA	Multi Criteria Analysis
MWRL	Main West Rail Line (also referred to as Main Western Line, Main Western Railway Line, Main West Line and T1 Western Line in other documents)
NPWS	National Parks and Wildlife Services
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
OSO	Outer Sydney Orbital
RMS	Roads and Maritime Services
SEA	Strategic Environmental Assessment
SEPP	State Environmental Planning Policy
SWRLE	South West Rail Link Extension (proposed)
Transport for NSW	Transport for New South Wales
WSEA	Western Sydney Employment Area
WSPGA	Western Sydney Priority Growth Area

DRAFT

Executive Summary

As the fourth largest urbanised area in Australia, Western Sydney will experience unprecedented population and economic growth over the next 20 years. Combined, the population of the Western City and Central City districts of 2,041,000 people is expected to increase by 50% by 2036.

This transformation must be matched by visionary and long-term infrastructure planning and delivery to create a higher-order network that can support a collective area of over 6,800 sq. km - equivalent to nearly three times the size of the ACT.

There is, therefore, an urgent need to protect corridors of land for the future delivery of large-scale transport infrastructure projects, including the Outer Sydney Orbital (OSO), a north-south road and freight rail spine between the growth areas of western Sydney, the Western Parkland City and the Western Sydney Airport. Undertaking this process now will minimise impacts on future land owners and support opportunities to satisfy future transport needs.

The recommended OSO corridor is approximately 80km (equivalent to the M7 and M5 motorways combined) from Box Hill in Sydney's north west to the Hume Highway near Menangle in Sydney's south west. It is intended to comprise a motorway-standard road and a dedicated freight rail line, with the capability to accommodate sections of the North South Rail Line connecting Western Sydney Airport with St Marys. It will ultimately connect Western Sydney to the Illawarra and the Central Coast.

The recommended OSO corridor is one of five critical long-term infrastructure corridors in western Sydney.

This process of corridor protection does not propose specific infrastructure, but strategic design parameters inform the recommended corridor alignment, location and width. The width of the recommended OSO corridor - generally around 200 m - varies to account for local circumstances.

This draft Strategic Environmental Assessment (SEA) explains the strategic justification for the OSO corridor and considers its potential impacts. The draft SEA accords with the Department of Planning and Environment's *Strategic Environmental Assessment Guideline* (SEA Guideline).

Planning for the future

Western Sydney is projected to accommodate more than half the expected population growth in Sydney between 2016 and 2036. The planning for the future growth of western Sydney is underpinned by the draft *Future Transport Strategy 2056*, the draft *NSW Freight and Ports Plan*, the draft *Greater Sydney Region Plan* and the draft *Western City District Plan*. These strategies identify the importance of transport infrastructure to support the growth and prosperity of western Sydney, particularly Western Sydney Airport and four large priority growth areas.

Further, increasing housing densities and NSW Government objectives to encourage and facilitate greater employment growth in western Sydney offer the potential for expanded passenger rail links through western Sydney, as well as the potential for significant freight rail improvements in western Sydney to support the growing freight and logistics businesses in the region.

The *NSW Freight and Ports Plan* identifies that volumes are expected to nearly double over the next two decades, and further network capacity is required to offset potential future congestion on Sydney's motorway and rail networks. Further, movement by rail uses the increasingly constrained metropolitan rail network which is shared with passenger rail services, placing further pressure on both networks.

Separating freight from passenger rail networks increases capacity to meet the needs of both commuters and freight. This is emphasised in the *NSW Freight and Ports Plan*, which identifies the need for long-term corridors such as the proposed OSO. The proposed OSO corridor allows for connection with the Western Sydney Freight Line Corridor and in turn the Main West Rail Line, providing for a freight bypass of Parramatta and Blacktown.

Protecting a corridor of land for long-term infrastructure is the first step in delivering this infrastructure. It is essential that this be achieved before encroachment by urban development.

DRAFT

About the Outer Sydney Orbital

The Outer Sydney Orbital will connect with the Sydney motorway network and, by providing direct road and rail freight links to regional areas, it will also provide for a north-south bypass of Sydney for movements between southern and northern NSW.

As a major road connection for freight and passengers it will facilitate a link for the potential North South Rail Line via the Airport to other key rail lines on the Sydney network, and provide an additional motorway connection for the Western Sydney Airport Growth Area. It will form part of a full orbital road network for this key employment-generating precinct in conjunction with Elizabeth Drive, the new M12 motorway, and the M4, M5 and M7 motorways.

As a major freight connection, it will alleviate pressure on the existing network, and improve direct rail connections to existing dedicated freight networks and Port Botany by connecting with the Western Sydney Freight Line corridor near Luddenham. It will also provide a critical transport connection to western Sydney for freight rail and motorway between Sydney, Melbourne, Canberra and Brisbane that avoids the more congested parts of the Sydney road and rail networks, particularly for those movements that have a destination in western Sydney or need to pass through Sydney without stopping.

Corridor Protection

The efficient delivery of new transport infrastructure needs to be strategically planned, using optimally sized corridors which are set aside for the timely construction of infrastructure. Early protection of a recommended OSO corridor will reduce long-term infrastructure costs and limit disruption for communities.

The intention of this draft SEA is to support the rezoning of a corridor of land for the explicit purpose of the OSO infrastructure. The corridor width will accommodate future motorway and rail freight infrastructure and other key future infrastructure corridors including sections of the recommended North South Rail Line corridor. Additional width has been allowed to cater for associated infrastructure, such as drainage and key road and rail interchanges.

Rezoning the recommended corridor provides clarity to current or future landowners and other stakeholders that the land is required for transport infrastructure in the future. Other benefits include:

- Ensuring the recommended corridor is located in proximity to growth areas where future planning can adequately integrate with the OSO
- Clearly defining the transport corridor so that nearby land use rezoning and improvements may be carried out in the knowledge of future government plans for transport infrastructure
- Supporting appropriate management of the land in intervening years so that there is no prejudice to the future acquisition of the land and development of transport infrastructure
- Identifying a corridor to focus the planning and implementation of major strategic transport facilities at an appropriate future date
- Providing confidence for the planning and development of adjoining land and key centres, which may later benefit from connections to future transport infrastructure
- Informing and influencing government and commercial investment in land use planning for Western Sydney to enable employment-generating development
- Providing greater certainty freight transport planning in the region, including the proposed Western Sydney Freight Line
- Reducing delays and community disruption when delivering new infrastructure

Consultation

This integrated corridor protection planning process has included extensive engagement with stakeholders and the community. This began between June and August 2015 to raise awareness of the strategic planning objectives and obtain information on constraints, opportunities and values that may influence recommended OSO corridor development within the OSO Study Area.

DRAFT

Additional consultation with the relevant local, State or Commonwealth government authorities, service providers, community groups and some landowners was undertaken between 2015 and 2017 to inform the development and assessment of corridor options.

Continued consultation on the recommended corridor in 2018 with impacted landowners, the community, local government and other stakeholders will consider social, operational, environmental and land use values that may be impacted

This draft SEA also represents one of the materials for consultation on the recommended corridor and the corridor protection process.

Alternatives to Corridor Protection

Three alternatives to protecting the recommended OSO corridor were considered:

- **Alternative 1** – Status quo or ‘do nothing/minimum’
- **Alternative 2** – Upgrades to existing road and freight rail networks
- **Alternative 3** – Investment to improve public transport

Alternative 1 does not allow for progressive and strategic acquisition of the land, which could delay the development of future OSO infrastructure. Acquisition could be significantly more expensive, which could affect project feasibility, and it may result in less effective connections or greater impacts to existing communities and development. It may also result in partial delivery of the recommended corridor, undermining the objective for improved and efficient road and freight rail connections between the Illawarra and the Central Coast.

Alternative 2 would not allow higher-order transport network connections beyond the M7 Motorway and planned M12 Motorway. Existing north-south corridors would need to expand to meet future growth – this may have more budgetary and congestion impacts and potentially prevent an effective separation of freight and passengers across the network.

There would also be no motorway connection for heavy vehicle movements associated with Western Sydney Airport Growth Area and South West Growth Area. This could impact on their growth potential and still require further expansion of the surrounding regional road network. Future retrofitting of a major motorway through these growth areas will face strong community opposition and significant project cost.

Further investment in the rail network will deliver minimal rail freight capacity, increasing dependence on road freight. Enhancements to the existing network may not achieve the objective of separating freight and passenger services.

Alternative 3 is addressed by the recommended North South Rail Line corridor between St Marys and Macarthur and the South West Rail Link Extension from Leppington to North Bringelly. These essential works, however, do not provide capacity to satisfy demand for freight movements, and ignores the requirement for an effective motorway and freight rail road network for Western Sydney.

Only the recommended OSO corridor will support future motorway infrastructure that would connect the growing logistics and freight industries in western Sydney with greater access to Port Botany and ultimately better connections to the Illawarra and the Central Coast, and the entire east coast between Sydney, Brisbane and Melbourne. Improving connections to the ports will support economic growth across the Sydney and western Sydney regions and NSW.

Strategic Environmental Assessment objectives and process

The corridor protection process was subject to a Strategic Environmental Assessment (SEA) process. The objectives of this draft SEA are to:

- Protect a corridor of land to enable an expanded motorway and freight rail network in western Sydney
- Allow future improved transport connectivity and efficiency through and within western Sydney and to regions outside Sydney

DRAFT

- Enable further planning to integrate land use and future transport with increased confidence and certainty
- Identify a recommended corridor that balances transport needs with those of the broader community and the environment
- Protect a corridor, or corridors, that enable future cost effective infrastructure delivery and operation
- Identify a corridor that can provide a future north-south motorway link known as the M9, connecting the Hume Motorway in the south with Box Hill in the north and connecting key communities, growth areas and employment areas in western Sydney
- Identify a recommended corridor that provides sufficient land to accommodate connections with other key corridors including the recommended North South Rail Line corridor, the Bells Line of Road – Castlereagh Connection and the Western Sydney Freight Line.

To meet these objectives, the draft SEA process has:

- tested the strategic need for the OSO corridor in the broader context of transport and land use planning for western Sydney, Greater Sydney and NSW
- evaluated relevant statutory, legislative, policy and strategic frameworks
- identified the regional and local baseline conditions in a specific OSO study area
- included consultation with stakeholders and the community
- included strategic impact assessment of various options, and determined where to protect and set aside land to provide adequate capability and capacity to deliver future OSO infrastructure based on:
 - Land use and property impacts
 - Transport planning
 - Biodiversity
 - Aboriginal heritage
 - Non-Aboriginal heritage
 - Landscape character and visual amenity
 - Water quality and hydrology
 - Soils, geology and contamination
 - Noise and vibration
 - Socio-economic considerations
- evaluated and assessed the social, cultural, economic and environmental consequences of the delivery of future OSO infrastructure within the recommended corridor, and options to mitigate and manage these impacts
- identified relevant matters to be taken forward for consideration during future project-level environmental assessment and/ or engineering design refinements for any future transport project within the recommended corridor.

The methodology underpinning the draft SEA process for the investigation and identification of a recommended corridor is:

1. **Identifying a study area** – investigations commenced with a broad OSO study area to identify high level constraints and opportunities
2. **Understanding constraints and opportunities** – an analysis of constraints and opportunities within the study area included prioritisation of constraints as well as identification of key areas and values to avoid during corridor design development

DRAFT

3. **Developing guiding principles** – a list of guiding principles was developed to inform the selection of a long list of corridor options. These principles followed the hierarchy of ‘avoid, minimise, and mitigate impacts’, to allow for the creation of a series of options
4. **Identifying corridor options** – a range of tools, including computer software and specialist advice, was used to identify a long list of corridor options
5. **Evaluating corridor options** – this included specialist investigations of identified options, comparative assessment and multi-criteria analyses
6. **Selecting a recommended OSO corridor** – a continuation of the evaluation process where selection and refinement of a recommended corridor involved multi-criteria assessment, targeted stakeholder consultation and design development
7. **Consulting with the public on the recommended corridor** – to obtain feedback on the recommended OSO corridor. This is the current stage of the OSO study

Each corridor option was evaluated against Transport for NSW’s key objectives, business and design requirements and was assessed for its strategic and development impacts and benefits. Once selected, the recommended corridor was further investigated from engineering, land use and environmental perspectives to optimise the alignment and to further minimise impacts where possible.

Recommended Corridor

The recommended corridor balances engineering, environmental, social and land use considerations. It was informed by local and regional factors as well as feedback from stakeholders, including consultation and engagement with the Department of Planning and Environment (DPE), the Office of Environment and Heritage (OEH) and other key agencies, councils, major land holders and community groups.

The recommended corridor is shown in **Figure 1**. Locating along the South Creek corridor between Marsden Park and Luddenham is likely to require significant viaduct structures; this is considered preferable to protect residential properties and communities.

The location corridor has been selected to protect the development potential of growth areas by traversing the North West Growth Area yet avoiding existing and planned residential development areas, avoiding the entire South West Growth Area and avoiding significant impact on the Greater Macarthur and Wilton growth areas. It will also avoid most existing residential zoned land along the full length of the corridor, including existing residential development at Windsor Downs, St Marys, Werrington, Claremont Meadows and Twin Creeks, and also avoid all rural villages and townships including Windsor Downs, Cobbitty, Mount Hunter, Ellis Lane, and Douglas Park.

The recommended corridor enables rail junctions and road interchanges to be located in areas that may minimise land use impacts. This includes an interchange with the Bells Line of Road extension at Shanes Park, resulting in impacts to Shanes Park and Wianamatta Regional Park that have been discussed with the OEH. The recommended corridor has minimised the area impacted as far as possible given other land use constraints, existing and future residential development, and transport connection objectives.

A full rail interchange at St Marys has been identified without impacting upon any residential development, educational and community facilities, or the St Marys Town Centre. This interchange will also use the existing rail spur line as part of a rail loop to ensure the function of the interchange while also minimising land use impacts.

The recommended corridor is designed to:

- Avoid hospitals and schools, although some Sydney University land will be impacted
- Avoid Defence Establishment Orchard Hills and associated heritage and biodiversity values on the property
- Avoid national parks and biobanking sites, and minimise impacts to Wianamatta Regional Park and priority conservation lands
- Avoid the major Macarthur heritage lands and the steep Razorback Range

DRAFT

- Avoid the need to relocate key existing infrastructure such as the 500kV power lines through western Sydney to later accommodate future OSO infrastructure.

It will enable links to other strategic and planned transport corridors with minimal land segregation including the proposed M12 motorway and interchange, which will link to the M7 motorway, the proposed Western Sydney Freight Line and the proposed North South Rail Line Extension to use the recommended corridor from the Western Sydney Growth Area to meet and interchange with the Main West Rail Line. Future connections could include connections to the Central Coast and Wollongong, and a future rail freight connection to the proposed Maldon to Dombarton Rail Line.

Unavoidable property impacts due to localised circumstances or based on the need to balance social, environmental and engineering considerations have been weighted against other, often more detrimental impacts, of alternative alignments partially at a regional scale.

For example, land in the precinct of Vineyard in the North West Growth Area will be impacted. The land is nominated for future employment-generating land uses, and although the recommended corridor would remove part of this land from future development, the precinct would ultimately benefit from a future interchange at Windsor Road.

The State heritage-listed Clydesdale Estate at Marsden Park is impacted to minimise impacts on future development within the North West Growth Area to the east, and to avoid impacts to residential properties to the west. Impacts have been mitigated by refining the alignment to avoid the homestead building, and there will be opportunities to minimise impacts through design during future development of the infrastructure. These impacts are considered manageable within the context of the site's heritage significance

The interchange with the recommended Bells Line of Road -Castlereagh Connection (BLOR-CC) corridor at Shanes Park will both impact the development potential of this area and have some impact to the former Llandilo International Radio Transmitter Station (Air Services Australia), which is designated as the bio-certification offset for the North West Growth Area.

The impact to Shanes Park and Llandilo however would be mitigated in that these impacts were already identified as part of the bio-certification offset process and recommended corridor would result in only a small increase to the previously identified impact. This will be resolved as part of ongoing consultation with DPE and the OEH. The impacts to the bio-certified areas account for a small fraction of the overall area of land certified and will need to be further offset and the eventual design of infrastructure in the corridor may further reduce impacts on the bio-certified area.

The potential for loss of development land in the Shanes Park Precinct of the North West Growth Area is minimal given flood impacts. The increased accessibility to the Sydney motorway network far outweighs the loss of urban potential.

The recommended corridor traverses and divides the Wianamatta Regional Park, an area recognised for its natural and historical importance in the area, and known to contain threatened vegetation and species, areas of significant archaeological potential and Aboriginal cultural heritage. To mitigate impacts, the recommended corridor has been refined to avoid impacts to the main access and minimise impacts on its associated facilities, which will therefore continue to allow community use. It also avoids the South Creek riparian corridor through the centre of the Regional Park to minimise impacts to significant biodiversity values and areas of Aboriginal cultural sensitivity. This work has been determined in consultation with OEH.

The recommended corridor is located within the South Creek corridor, an area known for significant flooding which also contains some biodiversity values and a number of recreational playing fields and other community uses such as Blair Oval at St Marys which is home to the Nepean Athletics Club, St Marys Tennis Courts, The Kingsway playing fields and rugby fields at St Marys and a portion of Samuel Marsden Reserve which includes the Colyton St Clair Chiefs Baseball Club.

Further, the South Creek corridor is an important green grid with plans to create a continuous open space corridor along the entirety of South Creek that provides ecological protection and enhancement, improved stormwater treatment and a regionally significant recreation and active transport corridor.

To alleviate impacts, the recommended corridor alignment through the South Creek corridor avoids developed and populated areas within the Penrith LGA, including those in St Marys, Werrington and

DRAFT

Claremont Meadows, as well as hospitals and health care facilities and over 20 child care centres and schools in St Marys, Werrington and Claremont Meadows, in particular the Kurrumbene School and Penrith Valley Learning Centre which were impacted by previous corridor options. The eventual design of infrastructure in the corridor may be able to avoid key social infrastructure associated with recreational uses and further reduce impacts.

The recommended corridor traverses the University of Sydney's site at Greendale and its Camden Campus. During community engagement in 2015, the University explained its future expectations for its properties and key areas which should be avoided by future OSO infrastructure. The recommended corridor has generally avoided these identified areas.

While the alignment of the recommended corridor in the Camden area seeks to protect important rural and environmental areas, it also seeks to avoid existing communities at Ellis Lane, Grassmere, Mt Hunter and Cawdor.

The recommended corridor is close to the rural village of Cobbitty. Its location was influenced by topography and the Nepean River, the need to avoid and minimise impacts to rural dwellings to the west, and the need to avoid certified biodiversity lands (Mater Dei Biobanking site) to the east.

Other options included alignments to the west of, or directly through, the Cobbitty Village were less feasible. The west option would have unacceptable impacts to the State heritage-listed Brownlow Hill Estate and other biobanking sites west of Brownlow Hill, and would pass through a floodplain and steeper topography. Alternative central options would have unacceptable impacts to the Cobbitty village itself due to the linear east-west nature of the town, and to other rural residences west of Ellis Lane, and core areas of Sydney University lands.

Instead, the recommended corridor is located to the east of Cobbitty Village. Development of infrastructure within the recommended corridor will create amenity issues such as noise and visual impacts.

While an interchange with Cobbitty Road has been allowed for in the recommended corridor, a decision on the intersection will be subject to further detailed design and network planning. This network planning would also consider an east-west connection north of Cobbitty Road.

The recommended corridor is close to residential development at Ellis Lane. Properties at Ellis Lane fronting Sunnyside Drive, while not directly impacted by the recommended corridor, adjoin its boundary along their northern sides. Depending on the eventual height of future infrastructure, future design measures will be required to protect these existing properties from noise and visual impacts. The detailed design and approval process for the recommended corridor is unlikely to commence in the short term given the potential need for future infrastructure is likely to be decades into the future.

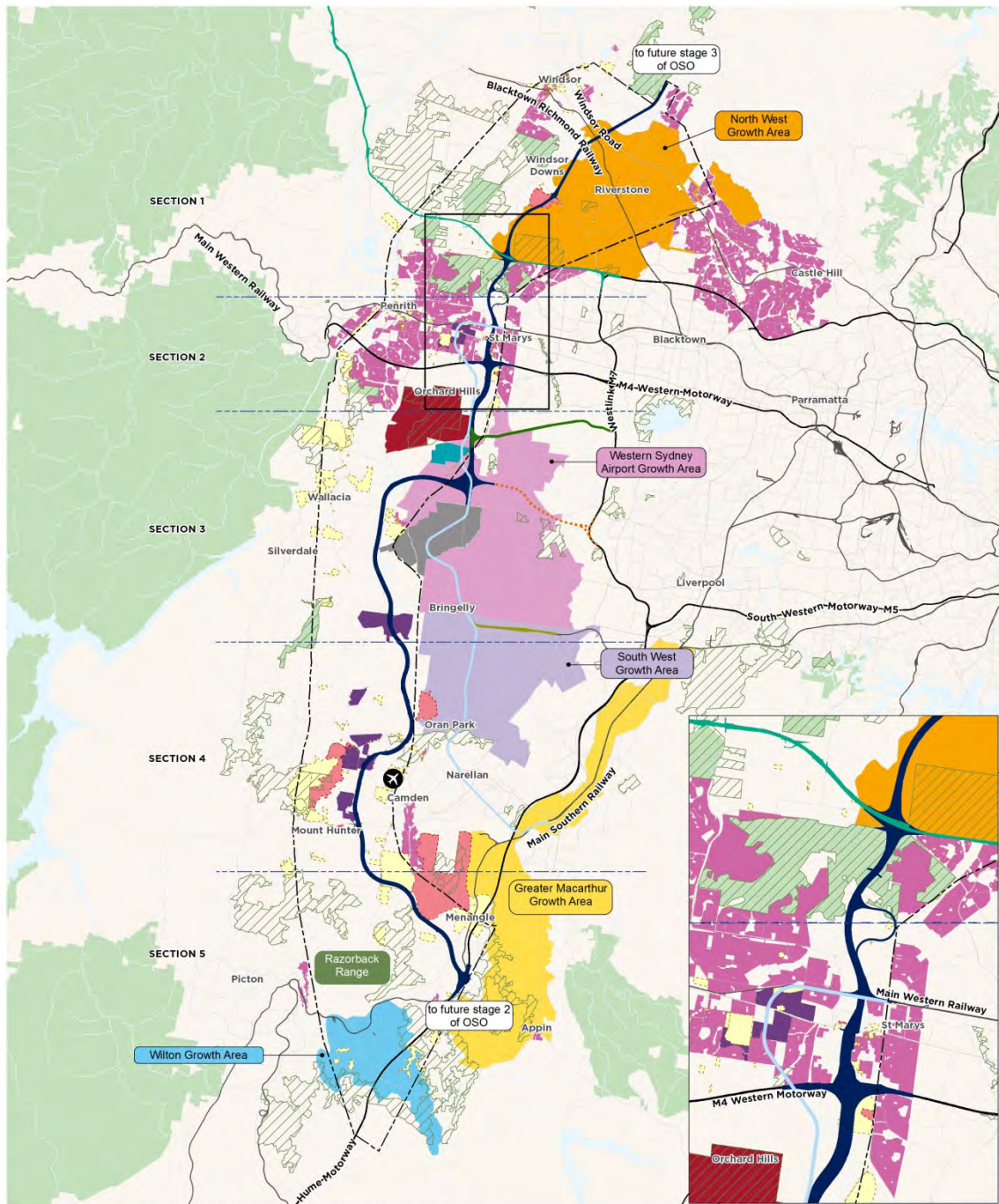
Recommended corridor width

The width of the recommended corridor varies between 200 metres and 300 metres to accommodate the likely future OSO infrastructure incorporating motorway and freight rail lines, including maintenance access, utilities corridors, all proposed motorway interchanges and freight rail junctions, environmental treatments, and modifications to the local road and rail network. Generally, the recommended corridor is wider in the south where the topography is more challenging and earthworks and slope stability are key design considerations. The recommended corridor is also narrower where local circumstances allowed.

Consideration of potential future infrastructure

For the purposes of corridor protection, the recommended corridor has been assumed to eventually consist of a motorway with up to four lanes in each direction and interchanges with the M4 Western Motorway, the Hume Motorway, the proposed M12 Motorway and the proposed future Bells Line of Road – Castlereagh Connection. It will also interchange with Windsor Road, Richmond Road, Great Western Highway, The Northern Road, Greendale Road, Cobbitty Road (or an alternative location north of Cobbitty) and Burragorang Road. The recommended corridor is also assumed to include three freight lines with rail junctions with the Main West Rail Line, the Main South Rail Line and the proposed Western Sydney Freight Line.

DRAFT



OUTER SYDNEY ORBITAL - RECOMMENDED CORRIDOR

- | | |
|---|--|
| OSO Study Area | Priority Conservation Lands |
| Recommended corridor | State Heritage Register |
| North South Rail Line corridor | Locally (LEP) listed heritage sites (Note: LEP listed sites include local sites of State significance) |
| South West Rail Line Extension corridor | Proposed Sydney Science Park |
| Western Sydney Freight Line corridor | University of Sydney land |
| Proposed M12 Motorway | Western Sydney Airport |
| | Defence Establishment Orchard Hills |
| | Residential zoned land |
| | National Park, Nature Reserve or Regional Park |



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 1 Outer Sydney Orbital - Recommended Corridor

DRAFT

Consultation and Corridor Protection Process

It is intended that, following community engagement on the recommended corridor together with any necessary refinements, the corridor will be considered for environmental planning approval. Details of the proposed amendments relevant to affected Environmental Planning Instruments (EPIs) for the recommended corridor are outlined in a separate discussion paper drafted by DPE.

The draft SEA and the feedback received from the exhibition process will be assessed by Transport for NSW and DPE. The corridor will be refined and confirmed and the Strategic Environmental Assessment will be finalised and provided to DPE with a request to protect the final corridor. If considered acceptable, the corridor land will be protected through a State Environmental Planning Policy and subsequently rezoned under the relevant Local Environmental Plans for the purposes of protecting the land.

The engagement process follows the current public review of broader land use and transport planning policies that establish the framework for investigation and protection of long term western Sydney infrastructure corridors. Should planning approval be granted for the protection of the recommended corridor, future construction of infrastructure in the recommended corridor will require further stages of detailed design and environmental approval. This work is not required now and will be the subject of a future business case based on the need for infrastructure and available funding.

DRAFT

1.0 Introduction

1.1 Background

Expected population and economic growth in western Sydney, and a forecast doubling of freight movements by 2050, requires visionary strategic planning for the region's transport network.

To provide certainty for investment and for landowners, and to minimise disruption during construction, the NSW Government has identified an urgent need to protect corridors of land for the future delivery of large-scale transport infrastructure projects.

One of these projects is the Outer Sydney Orbital (OSO). The need for an OSO corridor was identified in the NSW Long Term Transport Master Plan 2012 and draft *Future Transport Strategy 2056*. It is also supported in the draft *Greater Sydney Region Plan*, draft district plans and the *State Infrastructure Strategy*.

This draft Strategic Environmental Assessment (SEA) is the outcome of an investigation to identify a recommended corridor for the OSO. The recommended multi-modal OSO transport corridor represents one component of a larger transport corridor from the Illawarra to the Central Coast, via western Sydney. This larger inter-regional transport corridor is envisaged in three stages:

- **Stage 1:** from Box Hill, north west of the North West Growth Area south to the Hume Motorway at Menangle and the Main South Rail Line.
- **Stage 2:** from the Hume Motorway south to the M1 Princes Highway.
- **Stage 3:** from Box Hill towards the Central Coast to connect with the M1 Pacific Motorway and the Main North Rail Line.

The transport corridor also has the capacity to co-locate, in part, the northern part of the proposed South West Rail Link Extension and North South Rail Line.

The focus of the OSO study and this draft SEA relates to Stage 1. **Figure 2** identifies the recommended corridor that is the subject of this draft SEA

1.2 Process to date

NSW Roads and Maritime Services (RMS) and Transport for NSW (TfNSW) commissioned the Outer Sydney Orbital Corridor Study (OSO study), to identify the most appropriate location for the corridor and to protect land within that corridor for the future provision of critical road and freight rail infrastructure. A State Environmental Planning Policy (SEPP) is proposed to protect the land.

The OSO study involved stakeholder and community consultation on the study area before:

- Identifying a long list of possible corridor options
- Using a staged, fully-integrated multi-disciplinary process to evaluate and shortlist these options based on engineering, environmental and social criteria
- Ultimately identifying a recommended corridor
- Preparing a strategic concept design and draft SEA of the recommended corridor so that it could be identified in relevant local and state planning instruments.

TfNSW consulted with stakeholders throughout the corridor development process and provided information and updates on the OSO study. During 2015, TfNSW consulted with the broader community, property owners, special interest groups, local Aboriginal Land Councils, developers, utility and service providers as well as other State agencies.

Members of the community provided feedback on constraints and opportunities in the OSO study area between 6 June 2015 and 7 August 2015. TfNSW received additional feedback from community drop

DRAFT

in sessions and meetings with key stakeholder groups and communities along the corridor, various environmental groups, local councils and the freight industry.

Stakeholder feedback informed the development of corridor options and specialist studies.

This draft SEA is not a statutory requirement; rather, it provides the evidence to inform statutory planning controls that will protect land for future infrastructure by providing sufficient information to illustrate the implications of protecting the recommended corridor.

1.3 Recommended Corridor

The recommended corridor balances transport, environmental, engineering, social and land use considerations, as explored in the robust planning and optioneering process.

This included identifying a study area, understanding the constraints and opportunities within this area and developing guiding principles for the development of a long list of options. The OSO study then used numerous tools, including multi-criteria analysis, to evaluate the long list of options and select a recommended corridor. This process considered the attributes of the land in the OSO study area and the strategic objectives for the recommended corridor. **Section 3.1** describes how the corridor identification was developed in greater detail.

The recommended corridor aims to avoid, wherever possible, sensitive ecological areas, residential areas and communities, major infrastructure, and existing schools, community facilities and open space. The location of the recommended corridor is also influenced by the need to integrate with current and proposed major road and rail infrastructure, to facilitate future Stages 2 and 3 of the OSO corridor and to accommodate the geometry requirements of future transport modes.

While the comprehensive corridor selection process aims to minimise impacts on communities (for example, noise and air quality impacts) as far as possible, any future development of transport infrastructure within the recommended corridor will create unavoidable impacts to the natural environment including ecology, heritage, landscape and visual values. Engineering constraints and alternative corridor alignments will also result in some unavoidable direct impact to existing built up areas. However, in these cases, the OSO study tries to minimise the likely severity of future impact or any division of communities by locating the corridor as near to the edges of these areas as possible.

The *Planning Guideline for Major Infrastructure Corridors* (DPE 2016) (Planning Guideline) establishes the process for corridor identification and protection and was applied in identifying the recommended corridor. The recommended corridor was selected on the basis of:

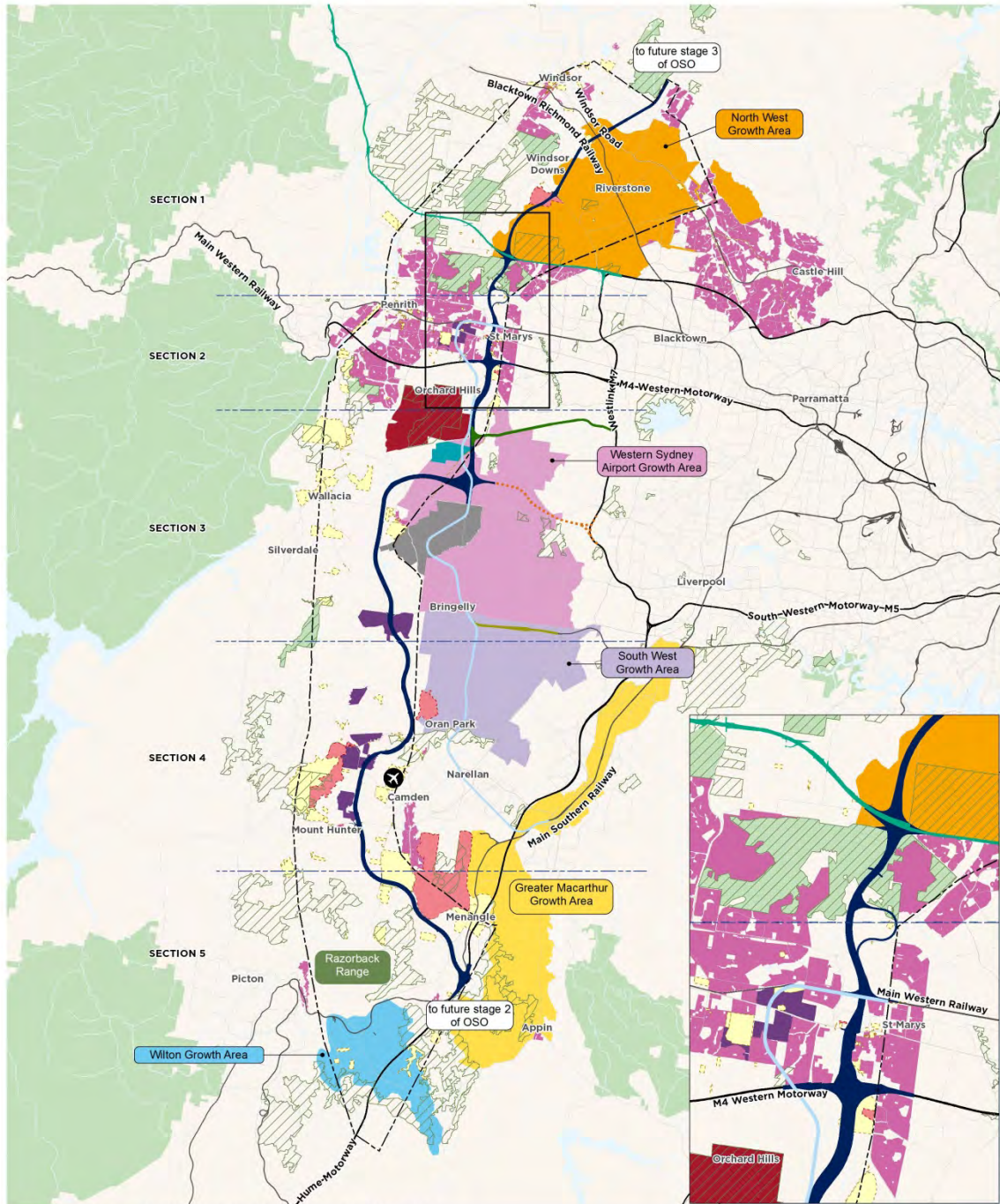
- Extensive analysis of current and future land use and planning considerations.
- High level identification of potential impacts to property, businesses, existing infrastructure and the environment.
- Analysis of existing terrain to identify key engineering constraints when compared to likely design and operational requirements.
- Consultation with relevant stakeholders and agencies.
- Assessment of options and alternatives to identify, refine and optimise a recommended corridor.

Section 3.0 provides a detailed discussion of the process used to identify the recommended corridor.

Figure 2 shows the recommended corridor in five sections:

- **Section one** extends from Box Hill in the north to Dunheved in the south.
- **Section two** extends from Dunheved in the north to Orchard Hills in the south.
- **Section three** extends from Orchard Hills in the north to Cobbitty in the south.
- **Section four** extends from Cobbitty in the north to Camden Park in the south.
- **Section five** extends from Camden Park in the north to Menangle in the south.

DRAFT



OUTER SYDNEY ORBITAL - RECOMMENDED CORRIDOR

- | | |
|---|---|
| <ul style="list-style-type: none"> OSO Study Area Recommended corridor North South Rail Line corridor South West Rail Line Extension corridor Western Sydney Freight Line corridor Proposed M12 Motorway | <ul style="list-style-type: none"> Priority Conservation Lands State Heritage Register Locally (LEP) listed heritage sites (Note: LEP listed sites include local sites of State significance) Proposed Sydney Science Park University of Sydney land Western Sydney Airport Defence Establishment Orchard Hills Residential zoned land National Park, Nature Reserve or Regional Park |
|---|---|



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 2 Recommended OSO corridor

DRAFT

The width of the recommended corridor varies between 200 m and 300 m to allow sufficient area to accommodate future OSO motorway and freight rail lines, including maintenance access, utilities corridors, all future motorway interchanges and freight rail junctions, environmental treatments and modifications to the local road and rail network. Generally, the recommended corridor is wider in the south where the topography is more challenging and earthworks and slope stability are design considerations. This width is also required to accommodate design requirements to achieve the necessary geometric standards.

1.4 Purpose of this document

This draft SEA informs the protection of the recommended corridor. It assesses the strategic environmental impacts of reserving the recommended corridor and considers potential strategic impacts of delivering the future OSO infrastructure.

Any environmental impacts from the specific infrastructure within the recommended OSO corridor will be subject to a full environmental assessment at the time of delivery.

The draft SEA meets the recommendations set out in the Planning Guideline, which requires any agency seeking to protect a major infrastructure corridor to prepare an SEA that explains the strategic justification for that major infrastructure corridor and considers its potential impacts.

The overall form and content of this draft SEA also accords with the DPE *Strategic Environmental Assessment Guidelines* (SEA Guidelines). **Table 1** and **Appendix A** provide further detail on the SEA Guidelines and where they are addressed in this SEA.

The objectives of this draft SEA are to:

- Set out the strategic justification for protecting the recommended OSO corridor as required in the Planning Guideline
- Describe the relevant statutory, legislative and policy framework
- Describe the baseline conditions of the potential future OSO infrastructure and surrounding areas
- Undertake a strategic impact assessment of the potential future OSO infrastructure
- Recommend appropriate strategic mitigation and management measures
- Identify relevant matters to be considered during project-level environmental assessments and/or engineering design refinements as part of any future infrastructure project(s) within the recommended corridor.

The OSO study reviewed existing information, spatial datasets and available online databases to identify environmental, social and land use values within and adjacent to the recommended corridor. The OSO study conducted limited field investigations to verify assumptions, document existing conditions and verify the quality of the resources in areas of key biodiversity and heritage constraints. Detailed studies across all disciplines will also be needed at the delivery stage.

The draft SEA will be updated to reflect the outcomes of the consultation and the final recommended OSO corridor alignment.

DRAFT

Table 1 Strategic Environmental Assessment Guidelines – Outer Sydney Orbital

SEA requirements	Where addressed in this report
General Requirements	-
A Strategic Environmental Assessment is to be prepared as the evidence base to inform the creation of statutory planning controls that secure land for the purpose of a long term infrastructure corridor.	This SEA
Content of the Strategic Environmental Assessment	-
<p>1. The strategic justification</p> <ul style="list-style-type: none"> An outline of the objectives the corridor, including a description of the strategic need for infrastructure; and justification, objectives and long-term outcomes for the proposed future infrastructure. This should take account of existing and proposed transport infrastructure and services in adjoining regions, and, as relevant, the outcomes and objectives of relevant strategic planning and transport policies. 	Section 2
<ul style="list-style-type: none"> A strategic analysis of alternative options to the future project and corridor objectives. This should include an assessment of the strategic costs and benefits of protecting the corridor relative to alternatives and the consequences of not protecting the corridor. 	Section 3
<p>2. The infrastructure components</p> <ul style="list-style-type: none"> A description of the potential future infrastructure components that may be built in the corridor that may affect the design of the corridor alignment, including location and width. This includes all potential transport modes, such as road, rail, cycleway, and key interchanges/connections needed and intermodal terminals. 	Section 4
<p>3. Corridor alignment options</p> <ul style="list-style-type: none"> Strategic study area scoping and analysis of: <ul style="list-style-type: none"> Environmental opportunities and constraints within the study area Existing land uses within the study area (<i>This should include consideration of the key issues identified below</i>). 	Section 3
Identification and assessment of corridor alignment options.	-
<p>4. Recommended corridor alignment</p> <ul style="list-style-type: none"> A description of the recommended corridor alignment, including: <ul style="list-style-type: none"> Proposed corridor (or corridor options if recommended alignment is not known) Location of likely interchanges, stations and intermodal terminals The relationship and/or interaction with other transport network, including existing public and freight transport services (including rail, bus and water-based traffic, and rail and bus stops) the implications of the recommended corridor alignment (in relation to the key issues outlined below). How the recommended corridor alignment integrates with the relevant strategic plan, including supporting identified growth objectives and other objectives with the relevant strategic land use plans. 	Section 4
Notwithstanding the key issues specified, the strategic environmental assessment must include an environmental risk analysis to identify the potential environmental impacts associated with the identified alignment of the recommended corridor.	Section 11

DRAFT

SEA requirements	Where addressed in this report
Where relevant, the assessment of key issues below and any other significant issues identified in the risk analysis, must include:	-
<ul style="list-style-type: none"> Adequate baseline data. 	Sections 6 and 7
<ul style="list-style-type: none"> Consideration of the potential cumulative impacts on the land within the corridor due to other existing and future development in the vicinity of the corridor. 	Section 7.12
The strategic Environmental Assessment must also address the following specific matters:	
Land use and property impacts within the corridor and adjacent to the corridor- including but not limited to:	-
Current land use controls in the corridor	Section 2.3 and 10
<ul style="list-style-type: none"> Potential impacts to residential and industrial lands and impacts to Crown land. 	Section 7.1
<ul style="list-style-type: none"> Potential impacts to open space, reservations, national parks. 	Section 7.1
<ul style="list-style-type: none"> Potential impacts to major other infrastructure networks such as utility networks. 	Section 7.1
<ul style="list-style-type: none"> Potential impacts on key strategic geographical locations. 	Section 7.1
Future land use opportunities surrounding the corridor:	-
<ul style="list-style-type: none"> Commentary on the housing and job growth potential as a result of the future infrastructure project, including likely areas of change and how this aligns with regional and subregional planning. 	Section 1 and Section 10
<ul style="list-style-type: none"> Commentary on potential opportunities to effectively integrate new infrastructure with surrounding land uses (either economic, environmental or residential land uses), and how this aligns with regional and subregional planning. 	Section 9.0
<ul style="list-style-type: none"> Identification of key locations including potential key interchanges and connections with other future major infrastructure projects. 	Section 4.6 and 4.7 9.0
Economic impacts of potential future infrastructure as well as potential impacts of limiting current land uses within and around the corridor- including but not limited to:	-
<ul style="list-style-type: none"> Commentary on the expected economic growth potential created from the future infrastructure project. 	Section 8
<ul style="list-style-type: none"> Potential impact on economic growth of failing to deliver the future infrastructure project as planned. 	Section 8
<ul style="list-style-type: none"> Impact on related infrastructure projects such as the Western Sydney Airport and the Bells Line of Road - Castlereagh Connection and major employment zones such as the Western Sydney Employment Area. 	Section 7.1 and 8
Traffic and transport- including but not limited to:	-
<ul style="list-style-type: none"> Details of how the alignment will meet the traffic and transport objectives of the recommended corridor, taking into account adjacent sensitive land uses and future growth areas as identified in existing and proposed strategic plans 	Section 7.2
<ul style="list-style-type: none"> Strategic assessment of traffic and transport impacts on the regional, state and national road network, and local roads (where known), including identifying future extensions to the network made possible by the implementation of the recommended corridor alignment. 	Section 7.2

DRAFT

SEA requirements	Where addressed in this report
Noise and Vibration- including but not limited to:	-
<ul style="list-style-type: none"> Any location along the corridor or future land uses that may be sensitive to noise or vibration and may be affected by the infrastructure within the recommended corridor. 	Section 7.10
Visual amenity, built form, and urban design- including but not limited to:	-
<ul style="list-style-type: none"> Identifying strategic visual or built form impacts of the proposed future infrastructure and how these could be mitigated or minimised. 	Section 7.8
Soil and water- including but not limited to:	-
<ul style="list-style-type: none"> Strategic water quality issues to be considered, or known impacts, including a strategic assessment of: <ul style="list-style-type: none"> Potential impact on bulk water supply including water storage locations and major pipelines. Identification of areas of acid sulfate soils. Hydrological impacts, including the identification and a strategic assessment of the following: <ul style="list-style-type: none"> Location and nature of flood regimes affecting the recommended corridor. Any known contaminated land within the recommended corridor. 	Section 7.7
	Section 7.7
	Section 7.9
	Section 7.7
	Section 7.7
	Section 7.9
Biodiversity- including but not limited to:	-
<ul style="list-style-type: none"> A strategic assessment of potential ecological impacts of the project with specific reference to vegetation and habitat clearing, connectivity, edge effects, riparian and aquatic habitat impacts and soil and water quality impacts. Outline circumstances where future detailed assessments would be required. The impacts to adjoining waterways, riparian vegetation and aquatic habitats, including consideration of water quality, marine vegetation, fish passage and habitat, soil types (including salinity), erosion and sedimentation and ongoing water management. Avoidance, mitigation and management measures, including details of alternative options considered, and proposed arrangements for long term management. Details of any offset strategies for ecological impacts and native vegetation clearing, taking into account the Principles for the use of biodiversity offsets in NSW (Office of Environment and Heritage 2014). 	Section 7.6
	Section 7.6
	Section 7.6 and Section 7.6
	Section 7.6
	Section 7.6
The assessment should also take into account:	-
<ul style="list-style-type: none"> Threatened Species Assessment Guidelines (Department of Environment and Climate Change 2007). Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation 2004). Policy and Guidelines for Fish Habitat Conservation and Management – update 2013 (Department of Primary Industries 2013.) 	Section 7.6
	Section 7.6
	Section 7.6

DRAFT

SEA requirements	Where addressed in this report
Heritage- including but not limited to	-
<ul style="list-style-type: none"> Potential impacts to State and local heritage (including heritage items, conservation areas, and archaeology) and potential impacts to Aboriginal heritage (including cultural and archaeological significance). 	Section 7.4 and 7.5
<ul style="list-style-type: none"> Outline circumstances where a future detailed assessment would be required. 	Section 7.4 and 7.5
Air Quality- including but not limited to	-
<ul style="list-style-type: none"> Potential for impacts on local and regional air quality, including impacts on sensitive receivers. 	Section 7.11
Social and economic- including, but not limited to	-
<ul style="list-style-type: none"> Strategic assessment of the potential social and economic impacts on the community and community facilities directly impacted by the recommended corridor and the future infrastructure project. 	Section 7.3
Consultation	-
<p>During the preparation of the Strategic Environmental Assessment, there is an expectation that the agency will consult with the relevant local, State or Australian Government authorities, service providers, community groups and affected landowners. This may involve:</p> <ul style="list-style-type: none"> Local, State and Australian government authorities; including engaging with DPE about the preparation of the Sub-regional Plans Specialist interest groups, including Local Aboriginal Land Councils, Aboriginal stakeholders. Relevant utilities and environmental assessment service providers The public, including community groups and adjoining and affected landowners. 	Section 5
<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>	Section 5
Statutory planning considerations	-
<p><u>Current planning framework</u> The Strategic Environmental Assessment should identify the existing Environmental Planning Instruments that need to be taken account of in the preparation of a draft instrument. This includes identifying all:</p> <ul style="list-style-type: none"> Existing Local Environmental Plans within the corridor 	Section 2.3
<ul style="list-style-type: none"> Existing State Environmental Planning Policies and structure plans 	Section 2.3
<ul style="list-style-type: none"> Other relevant policies and development control plans 	Section 2.3
<p>The Strategic Environmental Assessment should identify all the current Environmental Planning Instruments that apply to the land and relevant sections that will be affected by potential statutory planning controls.</p>	Section 9 and Section 10

DRAFT

SEA requirements	Where addressed in this report
<p><u>Future planning framework</u></p> <ul style="list-style-type: none">• Statutory: The Strategic Environmental Assessment may make recommendations on potential draft clauses or instructions for the protection of the corridor. This includes identifying if and where protection controls should differ along the recommended corridor. Where land is being protected, the Strategic Environmental Assessment may also identify what appropriate interim uses should be considered.	Section 10
<ul style="list-style-type: none">• Other: The SEA may make recommendations about appropriate land uses surrounding the corridor for considerations within other planning documents (such as subregional plans, structure plans or master plans) that are or will be prepared within the study area.	Section 10

DRAFT

2.0 Strategic justification and corridor need

The recommended OSO corridor will support and facilitate the creation of essential infrastructure to support Western Sydney as its population grows. The recommended corridor establishes the foundation for effective intra-city and inter-regional connectivity.

This section details the strategic justification for the recommended OSO corridor within the context of current and future planned development policies, strategies and budgetary allocations in Western Sydney, especially in terms of transport and connectivity. It outlines the most significant Australian, State and Local government strategies and actions shaping development in this region, and demonstrates that the protection of the recommended OSO corridor for future infrastructure is integral to the planning for Western Sydney's future.

As discussed in **Section 2.3**, new growth areas in Western Sydney, expansions to the motorway and rail networks and the Western Sydney Airport will deliver significant economic and employment opportunities for Western Sydney communities. Planning for future growth is addressed in draft planning and transport policies that were exhibited at the end of 2017.

The recommended OSO corridor represents the best balance between community, environmental and operational needs based on a detailed examination of land use constraints and applying a range of key planning principles.

2.1 Policy and strategic context

The following summarises key planning policies and strategic directions relevant to western Sydney and the recommended corridor, starting with the most recent and relevant. **Table 2** provides a summary of key considerations.

2.1.1 Australian Government planning policies and strategies

Western Sydney Airport

The Australian Government announced its commitment to develop the Airport in April 2014, with operations expected to start by 2026. It will reach full capacity by 2046. The Australian Government is investing up to \$5.3 billion to fund the first stage of development.

The Environmental Impact Statement (EIS) anticipates around 82 million passenger movements a year, with 224,000 passengers entering and leaving the airport site each day. Freight tonnage is also expected to increase by 2060 as a result of airport operations. In the short term, construction of the planned M12 Motorway and the current Western Sydney Infrastructure Plan (WSIP) roads package (see below) will support this growth.

The EIS references investigations into the future OSO through consultation with TfNSW, to support Airport development and provide for multimodal linkages for freight and passenger movements directly related to the airport. The EIS also notes that rail services would be required at the airport site. The recommended OSO corridor will assist with the expansion of the rail network.

The NSW Government's Western Sydney Airport Growth Area represents a broader investigation into opportunities for new jobs and homes around the proposed Western Sydney Airport. An interim Land Use and Infrastructure Implementation Plan (LUIIP) will guide new infrastructure investment and identify suitable locations for development (see Section 2.1.2).

Western Sydney Infrastructure Plan (WSIP)

In 2015 the Australian Government and NSW Government, announced a 10-year road investment program of over \$3 billion for western Sydney. Related to the recommended OSO corridor is funding for the proposed new M12 Motorway linking the M7 Motorway to the Airport and The Northern Road, and upgrades to The Northern Road to a minimum of four lanes between the M4 Western Motorway and Narellan Road. The recommended OSO corridor would support the WSIP's transport connectivity objectives.

DRAFT

Corridor Protection: Planning and Investing for the Long Term

Infrastructure Australia's *Corridor Protection: Planning and Investing for the Long Term*, released July 2017, modelled potential cost savings associated with protecting a corridor under a range of scenarios:

- No current protection, with acquisition at construction
- Protection and acquisition now
- No current protection with tunnelling in the future.

The analysis found that corridor protection can reduce the future costs of new infrastructure and avoid delays and community disruption. The report recommends that Australian governments take urgent action in the next five years to protect vital infrastructure corridors.

The report analyses Stage 1 of the OSO road and rail link. Early acquisition of the corridor was estimated to save around \$3.665 billion in acquisition costs and \$19.979 billion in today's dollars in construction costs, when compared to later infrastructure provision and tunnelling.

The IA report notes that pressure for rezoning areas near and around the Western Sydney Airport site is likely to increase as the airport becomes operational. This reinforces the current need to protect land for future OSO infrastructure, while ensuring no compromise to future rezoning of land around the airport.

Australian Infrastructure Audit

The Infrastructure Audit released by IA on 22 May 2015 recognises the need for major reforms to the planning, financing, construction, maintenance and operation of Australian infrastructure. It identifies rail, road and public transport infrastructure as facing the most significant challenges in terms of increased demand and current insufficient capacity.

The Audit also identifies the need for an improved framework of corridor protection for transport and other linear infrastructure, and asserts that failure to protect corridors can lead to significantly higher construction costs, making otherwise beneficial projects uneconomical.

The May 2016 Infrastructure Priority List included as a high priority initiative the protection of the recommended corridor for Stage 1 of the OSO to secure future connectivity between western Sydney and the Central Coast/Illawarra, along with the proposed Western Sydney Freight Line.

State of Australian Cities 2014-15

The Australian Government's *State of Australian Cities 2014-15* found that:

- The Sydney Metropolitan Area had the largest increase in the value of international freight from 2006-07 to 2012-13.
- Sydney has the longest transport delays nationally which continue to rise while Melbourne and Brisbane had slight decreases over the same period.
- Sydney Airport is forecast to remain Australia's busiest airport through to at least 2030.
- Simply creating jobs in an area is not necessarily sufficient to increase the employment of residents of that area, as those jobs could be filled by people travelling from elsewhere, directly impacting transport demand, both in distance and mode of travel.
- Major transport infrastructure can play a critical role in shaping the growth of cities, and if properly planned, can direct future housing and employment growth to areas that improve productivity and equality of access to jobs and services.

In considering the Western Sydney Airport the report referred to Bureau of Infrastructure, Transport and Regional Economics modelling that indicated that, for the early stages of the Airport's operation, western Sydney fringe locations (especially in the Campbelltown Local Government Area) are expected to provide a better match to the skills and occupations required by the new airport than many other more established areas of western Sydney. This indicates that there could be a strong demand

DRAFT

for direct and efficient transport links between these locations, which the recommended OSO corridor could provide.

National Land Freight Strategy

In May 2013, the Standing Council on Transport and Infrastructure released the *National Land Freight Strategy*, which identifies how Australia's freight is projected to nearly double over the next two decades and demonstrates the need for dedicated freight rail lines. The recommended OSO corridor is intended to provide a dedicated freight line, rather than shared passenger and freight lines.

National Urban Policy

The *National Urban Policy (Our Cities, Our Future – A National Urban Policy for Productive, Sustainable and Liveable Future)* sets out a national approach to planning and managing Australia's cities and establishes objectives and directions for the future. The relevant objective for corridor protection is the "integration of land use and infrastructure."

The Policy, found that a lack of planning for and protection of, critical infrastructure corridors and sites, as well as a lack of adequate protection of sufficient buffers to prevent facilities from being encroached upon by incompatible land uses are impediments to new infrastructure.

It recommends integrating planning of land use, social and economic infrastructure, investing in urban passenger transport, and protecting corridors, sites and buffers. In this regard, the protection of the recommended corridor aligns with national policy to enable effective integrated development and transport outcomes.

National Ports Strategy

In 2011, IA and the National Transport Commission released the *National Ports Strategy (Ports Strategy)*. It identifies planning for, and protection of, infrastructure corridors as an essential step to improving port performance. The protection of the recommended corridor aligns with this need.

The Ports Strategy identified future OSO infrastructure as essential to the long-term freight needs of NSW, and to interstate freight movements from locations conflicting with passenger and port freight. Reserving a corridor of land for future OSO infrastructure was considered an urgent priority.

Ultimately the Ports Strategy identified a recommended OSO corridor as being at the forefront of integrated transport planning to resolve the following significant modal requirements:

- To provide a rail freight line north from Sydney, beyond the current Southern Sydney Freight Line and Northern Sydney Freight Corridor Project.
- To identify and serve as a corridor for a new orbital road link.
- To provide a connection to the future Western Sydney Freight Line and Western Sydney Intermodal Terminal (IMT).

2015-2024 ARTC Sydney Metropolitan Freight Strategy

The 2015-2024 Sydney Metropolitan Freight Strategy recognises that a Western Sydney intermodal terminal would be connected north and south by the future OSO infrastructure, which could be supported by a Port Botany to Western Sydney Freight line. It also recognises future OSO infrastructure as a long-term project to be delivered beyond 2030, although the section between the Western Sydney Freight Line and the Main West Line would be needed sooner under the current Western Sydney Freight Line proposal.

National Cities Performance Framework

The National Cities Performance Framework launched in December 2017 reported on indicators relating to productivity and progress of Australia's largest 21 cities, including western Sydney. The framework is intended to be updated annually and reviewed every three years. This will provide a range of data including employment growth, work trips by public transport and other factors that can support evidence-based planning and may also provide a basis for timing the delivery of necessary infrastructure, which could include future OSO infrastructure.

DRAFT

2.1.2 NSW Planning and Transport policies

Draft Greater Sydney Region Plan

The Greater Sydney Commission's draft *Greater Sydney Region Plan* establishes a 40-year vision and a 20-year plan to manage growth and change in Greater Sydney. Under this vision, Greater Sydney will be metropolis of three cities to rebalance the distribution of growth, jobs, housing and management of the natural environment across Greater Sydney. The three cities are:

- The Eastern Harbour City, focused around Sydney CBD
- The Central River City, focused around Greater Parramatta
- The Western Parkland City, focused around the future Western Sydney Airport and Badgerys Creek Aerotropolis as well as Greater Penrith, Liverpool and Campbelltown-Macarthur.

The Plan found that the Western Parkland City will accommodate 29.2% of Sydney's housing growth over the next 20 years and 60% of forecasted job growth over the next 20 years.

Western Sydney Airport and the Badgerys Creek Aerotropolis are identified as a strategic centre for the Western Parkland City, and the hub for the Western Economic Corridor from the Sydney Science Park to just north of Narellan.

Much of the recommended corridor is situated within the Western Parkland City, with the northern portion located in the northern region of the Central River City. The draft Plan identifies the future OSO infrastructure as a key road investigation route.

Draft Future Transport Strategy 2056

The draft *Future Transport Strategy 2056* sets the 40-year vision, directions and outcomes framework for customer mobility in NSW, which will guide transport investment over the longer term. It is also serves as an update of the *NSW Long Term Transport Master Plan*.

The draft *Future Transport Strategy 2056* is supported by the *Greater Sydney Draft Services and Infrastructure Plan*, which provides more specifics about planned infrastructure and corridor protection, including the protection of corridors for future rail and road links and the OSO (motorway and freight rail) from Great Western Highway and Main West Line to Badgerys Creek Aerotropolis.

The draft strategy also includes the North South Rail Line connecting the Badgerys Creek Aerotropolis, as an area for investigation in the next 10 years, which may be located within the recommended OSO corridor.

According to the strategy, by 2056 transport networks in Greater Sydney will handle 28 million trips a day and double the metropolitan freight task. Increasing network capacity to ensure efficient and reliable journeys will also support 30-minute access to centres as envisaged in the draft *Greater Sydney Region Plan*.

The future OSO infrastructure, ultimately planned to connect to the Central Coast and to the Illawarra, is identified as a visionary initiative with a 20+ year timeframe.

Draft Western City and Central City District Plans

The five draft district plans for Greater Sydney guide the implementation of the *Greater Sydney Region Plan* (once finalised) at a district level, and will be the link between regional and local planning.

The Western City District includes the Western Parkland City, which comprises Liverpool, Greater Penrith and Campbelltown-Macarthur, clustered around the Western Sydney Airport and Badgerys Creek Aerotropolis. The District includes the local government areas of Blue Mountain, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly.

The Western City District Plan supports the provision of the future OSO infrastructure and recommended corridor:

- Action 27 aims to protect transport corridors as appropriate, including the Western Sydney Freight Line and the Outer Sydney Orbital.

DRAFT

- Major transit connections, such as the potential North South Rail Line, Outer Sydney Orbital, Bells Line of Road-Castlereagh Connection and Western Sydney Freight Line, are identified for their potential to create the structure for a more compact and connected Western Parkland City.
- The land use and transport structure for the Western City District must coordinate land use and infrastructure initiatives across the region including potential new transport corridors.
- By 2036, the Western Sydney Employment Area will be a key destination for cargo, with metropolitan intermodal terminals critical in managing the rapidly growing import container trade and enabling more freight to be moved by rail.
- Future planning must priorities the Western Sydney Freight Line, the Outer Sydney Orbital and a potential intermodal terminal, to help facilitate agribusiness by allocating land within the Badgerys Creek Aerotropolis for agricultural export logistics.
- The Western Sydney Airport Growth Area is considered a regional resource of industrial and employment land that will also serve Greater Sydney.

The Central City District comprises the local government areas of Blacktown, Cumberland, Parramatta and The Hills. The draft Central City District Plan also sees corridor protection, integrated with land use planning, is also seen as an important part of safeguarding the Central City District's planned growth, especially in the North West Growth Area. Priority corridors identified for protection include the Western Sydney Freight Line, North South Rail Line from Schofields to Western Sydney Airport as well as the Outer Sydney Orbital and Bells Line of Road – Castlereagh Connection.

Western Sydney City Deal

The Australian and NSW Government have signed a Memorandum of Understanding to formalise a partnership to work together and with local government on a Western Sydney City Deal that will deliver almost 100,000 jobs, additional housing and improved transport for outer western Sydney. The City Deal will involve Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith, Blue Mountains and Wollondilly councils. It is intended to drive a new economy in the emerging Aerotropolis, incorporating the areas immediately around the Western Sydney Airport, as well as the broader region.

Upgraded infrastructure will be critical for this vision, and corridor protection for future OSO infrastructure will support the provision of future transport infrastructure with greater certainty in land use, investor confidence and reduced risk of land use conflicts.

North West and South West Growth Areas

The North West and South West growth areas are progressively being rezoned from predominantly rural to urban land uses. Once fully developed, they have the potential to accommodate up to 181,000 dwellings and around 500,000 people.

The Growth Area LUIPs have assumed that the recommended corridor will be formally identified in the future, and will inform more detailed planning for precincts yet to be rezoned. For example, the DPE is considering land immediately north of the Vineyard Precinct as providing future opportunities for employment and industry related to the future OSO infrastructure, with detailed planning to commence once the location of the recommended corridor is formalised.

In turn, the recommended corridor is informed by land already rezoned for urban development in the growth area, especially where residential development has occurred. The recommended corridor runs through part of the Vineyard (north) and Marsden Park North precincts, which are still in the early planning phases, as well as Shanes Park, where planning has yet to commence. The recommended corridor will also directly impact the northern edges of Marsden Park precinct, which is zoned E2 Environmental Conservation (for riparian corridors), E3 Environmental Management and RU6 Transition. This means that the recommended corridor does not include residential zones or residential areas.

Land in the South West Growth Area is included in the recommended corridor, but the corridor is adjacent to its western boundary. The future OSO infrastructure will provide a direct link to the

DRAFT

Western Sydney Airport, direct access to the North West Growth Area and improve access to strategic centres.

Part of the South West Growth Area, known as South Creek West, has been announced as a release area of potentially up to 30,000 new homes. This release area is close to, but outside, the eastern boundary of the recommended corridor.

Western Sydney Employment Area

The Western Sydney Employment Area (WSEA) provides land for industries including transport, logistics, warehousing and office space. It will provide for more employment opportunities for western Sydney and will be close to the Western Sydney Airport. The recommended OSO corridor will further support transport-related industries in WSEA, and help to grow and develop employment lands.

Western Sydney Airport Growth Area

The Western Sydney Airport Growth Area has been designated to increase capacity for direct and indirect employment opportunities associated with Western Sydney Airport. This increases demand for direct and efficient links within and to this area.

The NSW Government is reviewing connections between the Western Sydney Airport, Penrith and Liverpool. It is also reviewing planning and funding of essential infrastructure and services. Additionally, a future intermodal terminal location is being considered for this area.

The recommended corridor is located in the Growth Area to provide a connection to the north of the airport site. An interim LUIP for Western Sydney Airport Growth Area will be released in early 2018, which will take into account the planning for the recommended corridor.

Greater Macarthur and Wilton Growth Areas

The Greater Macarthur Growth Area was identified in 2015 as an additional urban release area for western Sydney. Wilton Growth Area, including Bingara Gorge, is planned to accommodate 15,000 homes over 20 to 30 years.

Both growth areas will increase residential and business opportunities adjacent to the recommended corridor and drive much of the future demand for services. They are located north and south, respectively of the recommended corridor at the southern end.

NSW Freight and Ports Strategy 2013 and Draft NSW Freight and Ports Plan

The NSW Freight and Port Strategy estimates that between 2013 and 2031, the NSW freight task will double to 794 million tonnes.

The NSW Freight and Ports Strategy identifies a number of network improvements to ensure efficient road and rail freight movements, including the need to protect long term freight corridors and nodes (such as the OSO, the Western Sydney Freight Line and the Western Sydney Intermodal in the Western Sydney Priority Growth Area). It emphasises the importance of these long term corridors in providing opportunities to move a greater share of freight around the Sydney Metropolitan Area by road and rail. In addition to the overall growth in freight movements, the strategy also notes the importance of increasing rail mode share which will provide benefits to the existing road networks.

Ultimately, the NSW Freight and Ports Strategy states that a failure to protect appropriate long term freight corridors, such as the OSO, would compromise the ability to increase freight capacity across road and rail networks. Corridors such as the OSO and Western Sydney Freight Line are key enablers to separate freight and passenger rail networks, which is an action within the Strategy. Separation of freight and passengers will provide increased passenger network capacity as well as freight benefits.

The draft Freight and Ports Plan was released to coincide with the release of the draft Future Transport Strategy 2056, and builds on the 2013 Freight and Ports Strategy. It estimates that in the next 40 years, freight volumes will double in the Greater Sydney area, and that moving high volumes of goods quickly and efficiently will be vital for the economic prosperity of NSW. It notes the importance of planning for freight associated with the Western Sydney Airport, and increased freight movements predicted to result from the proposed Western Sydney and Moorebank intermodal

DRAFT

terminals. Protecting land for corridors for future transport (road and rail) to provide these freight networks will reduce the risk of encroachment from incompatible land uses.

State Infrastructure Strategy Update 2014

The *State Infrastructure Strategy Update 2014* contains 30 investment recommendations from Infrastructure NSW to reduce congestion, support population growth and stimulate productivity. Relevant to the future OSO infrastructure, funding was confirmed for:

- Commencing feasibility studies for long-term rail network augmentation and corridor protection
- Continuing to protect corridors/sites and commence assessment for the Western Sydney Freight Line and Eastern Creek Intermodal Terminal
- Identifying the OSO and BLOR-CC corridors
- Assessing and prioritising further road and rail projects to serve Western Sydney Airport and preserve site capacity

DPE has advised that the *State Infrastructure Strategy 2018-2038* is due to be released in early 2018.

Rebuilding NSW State Infrastructure Strategy 2014

Under the *Rebuilding NSW State Infrastructure Strategy*, the NSW Government reserved \$100 million for Strategic Environmental Assessments of potential major corridors. The Rebuilding NSW State Infrastructure Strategy recommends that a corridor for the future OSO infrastructure be identified and protected for the future of western Sydney as a long term infrastructure project.

Employment Lands Development Program (2015 Updated)

Since 2008, the NSW Government has run the *Employment Lands Development Program* to monitor supply and demand for employment lands and report on its findings. It is the NSW Government's key program for managing the supply of employment lands for the Sydney and Central Coast regions and assisting associated infrastructure coordination. The 2015 update identified a large amount of proposed and zoned employment lands in the West and South West Sub Regions of Sydney. The OSO would provide increased connectivity to these strategic employment lands.

Potential Home Sites Program

In 2013 the NSW Government released the *Potential Home Sites Program – Evaluation Report*, which identified 29 sites with potential and immediate capability for residential development. Six sites were considered suitable for immediate development, with the others considered as strategic investigation sites.

None of the immediate action sites are within the recommended corridor. However, Cawdor (Camden) and Mayfarm Road, Brownlow Hill (Wollondilly) are within or adjacent to the recommended corridor. Neither has progressed through the planning proposal process under Part 3 of the *Environmental Planning and Assessment Act 1979*. These sites are now being considered as part of the Greater Macarthur Growth Area.

Protecting the recommended corridor would ensure that these, as well as potential new home sites identified for the program, do not conflict with planning for future transport infrastructure within the recommended corridor, providing greater certainty for government, industry and the local community.

2.1.3 Local planning policies

There is a range of key local government strategies, commitments and policies affecting growth and development in the western Sydney region and which may influence the location of future OSO infrastructure. The policies and strategies evaluated, generally aimed to ensure the timely provision of well-connected and integrated transport as a key priority in supporting economic and housing growth in western Sydney, and that rural lands in each LGA are safeguarded.

The protection of land for the recommended OSO corridor will achieve these outcomes in that:

- The opportunity to deliver the recommended corridor will be secured and provided in a timely manner

DRAFT

- It will establish a higher order transport infrastructure hierarchy for western Sydney, that will help inform other integrated transport decisions in this region
- It will support ongoing and future anticipated housing and employment growth in the region
- It will not impact upon local objectives to protect rural land as it may help to identify the boundary between this and urban growth areas
- It will provide certainty and consistency, and will help direct future planning for Local Government Areas

A summary of the various matters contemplated by relevant policy documents related to the recommended corridor is contained in **Table 2**, with a description of each relevant policy in **Appendix A**.

Table 2 Matters contemplated in relevant policy documents

Policy Document	OSO	Protection of Recommended corridor	Freight Transport	Rural Lands	Housing	Employment	Western Sydney Airport
<i>Joint Study on Aviation Capacity for the Sydney Region</i>	Y	N	Y	Y	Y	Y	Y
<i>Western Sydney Airport Draft Environmental Impact Statement (EIS)</i>	Y	Y	Y	Y	Y	Y	Y
<i>Western Sydney Infrastructure Plan</i>	N	N	Y	N	Y	Y	Y
<i>Australian Infrastructure Audit (Infrastructure Priority List 2016)</i>	Y	N	Y	Y	Y	Y	Y
<i>State of Australian Cities 2014-15</i>	N	N	Y	Y	Y	Y	Y
<i>National Urban Policy</i>	N	N	Y	N	Y	Y	N
<i>National Land Freight Strategy</i>	N	N	Y	N	N	N	N
<i>National Ports Strategy</i>	N	N	Y	N	N	N	N
<i>Draft Greater Sydney Region Plan</i>	Y	Y	Y	Y	Y	Y	Y
<i>Preliminary Strategy and Action Plan</i>	Y	N	Y	Y	Y	Y	N
<i>State Environmental Planning Policy (Western Sydney Employment Area)</i>	N	N	Y	N	Y	Y	N
<i>Western Sydney City Deal</i>	N	N	N	N	Y	Y	Y
<i>Draft Western City District Plan</i>	Y	Y	Y	Y	Y	Y	Y
<i>Towards our Greater Sydney 2056</i>	N	N	N	N	Y	Y	N
<i>Draft Future Transport 2056</i>	Y	Y	Y	Y	Y	Y	Y
<i>NSW Freight and Port Strategy</i>	Y	Y	Y	Y	N	Y	N
<i>State Infrastructure Strategy Update</i>	Y	Y	Y	N	Y	Y	Y
<i>Outer Sydney Orbital Corridor: Preliminary Needs Assessment – Draft Final Report</i>	Y	Y	Y		N	Y	Y
<i>Final Report</i>	-	-	-	-	-	-	-
<i>South West Rail Link Extension Corridor Preservation Summary Report</i>	Y	Y	Y	N	N	N	Y

DRAFT

Policy Document	OSO	Protection of Recommended corridor	Freight Transport	Rural Lands	Housing	Employment	Western Sydney Airport
<i>2015-2024 ARTC Sydney Metropolitan Freight Strategy</i>	Y	N	Y	N	N	Y	Y
<i>NSW State Infrastructure Strategy 2014</i>	Y	Y	Y	Y	Y	Y	Y
<i>Employment Lands Development Program (2015 Updated)</i>	N	N	Y	Y	Y	Y	N
<i>Greater Macarthur, North West and South West Priority Growth Areas</i>	N	N	Y	Y	Y	Y	Y
<i>Western Sydney Priority Growth Area</i>	N	N	N	N	Y	Y	Y
<i>Potential Home Sites Program – Evaluation Report</i>	N	N	N	Y	Y	Y	Y
<i>Hawkesbury Community Strategic Plan 2013 – 2032</i>	N	N	N	Y	Y	Y	N
<i>Hawkesbury Residential Land Strategy 2011</i>	N	N	N	Y	Y	Y	N
<i>Hawkesbury Employment Lands Strategy 2008</i>	N	N	Y	Y	Y	Y	Y
<i>Penrith Community Plan (2013)</i>	Y	N	Y	Y	Y	Y	N
<i>Penrith Rural Lands Strategy</i>	N	N	N	Y	Y	Y	N
<i>St. Marys Town Centre Strategy</i>	N	N	N	Y	Y	Y	N
<i>Growing Liverpool 2023</i>	N	N	N	N	Y	Y	Y
<i>Liverpool Rural Lands Study 2012</i>	N	N	N	Y	Y	Y	N
<i>Business Case – ‘Badgerys Creek, The Ideal Location for an Intermodal’</i>	Y	N	Y	N	Y	Y	Y
<i>Camden 2040</i>	N	N	Y	Y	Y	Y	N
<i>Wollondilly Community Strategic Plan 2033</i>	N	N	N	Y	Y	Y	N
<i>Blacktown City 2030</i>	N	N	N	N	Y	Y	N

2.2 Population, Housing and Employment Trends and Forecasts

As detailed in the draft *Western City District Plan*, and the draft *Central City District Plan*, western Sydney¹ currently:

- Accommodates 2,041,000 people, which is around 44% of Greater Sydney’s population of 4.7 million
- Has approximately 727,000 dwellings, or around 44% of all dwellings in Greater Sydney
- Has approximately 810,500 jobs, or 34% of Greater Sydney’s total jobs supply of 2,349,800.

¹ For the purposes of this report, Western Sydney is considered to comprise those LGAs in the Western City District and the Central City District. Current data is from 2016.

DRAFT

Additionally, it is forecast that western Sydney will accommodate an estimated total population of 3,055,950 by 2036, which is a 50% increase from 2016. This will be approximately 48% of Greater Sydney's projected population of 6.4 million by 2036.

This translates to approximately 392,000 additional dwellings by 2036, 54% of all additional dwellings for Greater Sydney by 2036. As an example of what this growth means, the population will increase by 178% in Camden LGA over the next 20 years, and an expected 57,000 jobs will be added in the Western Sydney Employment Area over the next 30 years.

Western Sydney Airport has been projected to deliver approximately 3,200 jobs during construction and around 13,000 airport jobs during operation by 2031, with around 24,000 jobs during operation by 2041. It will deliver significant economic and employment opportunities and grow a strong trade, logistics manufacturing and science-based economy. The draft *Western City District Plan* forecasts that, at full operation, the airport will create at least 60,000 jobs, and will be the anchor for development in the Western Economic Corridor.

Given the rapid pace of growth projected for western Sydney, there is an urgent need to protect the recommended corridor now to minimise impacts on future land owners and support opportunities to address future transport needs.

2.3 Need for the Outer Sydney Orbital Infrastructure

To keep pace with growth, the motorway network has expanded, with the completion of the M7 Motorway in 2005, and commencement of construction of WestConnex and NorthConnex. The Sydney rail network is also expanding to connect growth areas including rail to Leppington (South West Rail Link) and the Sydney Metro North West connecting Epping to Cudgegong Road, due for completion in 2019.

Expansions and new infrastructure must continue to be planned so that Western Sydney is serviced by transport infrastructure to support its growth and prosperity. The future OSO infrastructure is a key part of the planned transport network to connect strategic centres in western Sydney, and beyond.

The recommended corridor is intended to include dedicated freight rail that will relieve pressure on Sydney's passenger rail network and allow both freight and passenger rail networks to grow and meet future demands. A section of the recommended North South Rail Line corridor has also been planned to be accommodated in the recommended corridor immediately north of the Western Sydney Airport.

From a network perspective the future OSO infrastructure will provide for a critical north-south transport spine through western Sydney. In the longer term, its expansion to Central Coast will enable road freight to avoid northern Sydney and rail freight to bypass the rail network, providing a significant time advantage for interstate services.

It will also connect through the Bells Line of Road Castlereagh Connection to the North West Growth Area and west to the M7 Motorway, to the M4 Motorway and Greater Western Highway, and to the planned M12 Motorway and the upgraded The Northern Road

Freight connections will occur between the Western Sydney Freight Line and the Main West Rail Line and to the Main South Rail Line near Menangle. A future Maldon to Dombarton Railway would provide a direct connection between Port Kembla and Western Sydney to support the State's second container port (when developed). An extension to the Illawarra would enable road freight to avoid northern Sydney and rail freight to bypass the congested Sydney rail network.

The provision of a combined road/rail corridor provides significant land use benefits reducing the fragmentation of land and limiting environmental and land use impacts to a single corridor rather than multiple.

2.4 Need for Corridor Protection

Protecting the recommended corridor for the future OSO infrastructure will ensure that land is available for the future stage of transport infrastructure needed to meet Sydney's future growth. This is emphasised in key strategic policies relating to western Sydney (refer to **Table 2** and **Section 2.1**).

DRAFT

Clearly, corridor protection must be done at the earliest possible opportunity to avoid later complexities in planning and delivering infrastructure, primarily due to encroachment of incompatible development. This gives clarity to public and private investment plans with regard to areas suitable for urban development or suitable for supporting transport connections, while also protecting land ready for when it may be required.

Protection of the recommended corridor facilitates augmentation of the transport network, facilitates long-term economic development and separates freight and passenger networks.

While the need for construction of the OSO infrastructure could be years in to the future, the protection of land for its delivery provides the necessary foundation to enable the provision of an affordable infrastructure project and enables staged delivery with the surety that the corridor is not 'built out'.

Nearby land use rezoning and improvements can be carried out in the knowledge of future government plans for transport infrastructure, minimising ad hoc provision of infrastructure and focusing the planning and implementation of major strategic transport facilities and key centres. This appropriate management of the land in intervening years will not prejudice future acquisition of the land so that transport infrastructure can be developed at an appropriate time.

Corridor protection also enables Federal, State and local governments to program and budget for the provision of infrastructure, which may in turn reduce overall costs of delivery.

The recommended corridor would also require the protection of about 2,570 ha over a distance of 80 km – equivalent to the combined length of the M5 and M7 Motorways. Several sections of the recommended corridor are already experiencing significant development pressure (see Sections 6 and 7); it is therefore essential that this corridor be safeguarded as soon as possible.

The recommended corridor balances community, environment and operational needs of future transport. Without the protection of the corridor, the potential for land use conflicts, and economic and social costs of acquiring land for infrastructure could increase, as could the risk that transport network and economic growth expectations for western Sydney cannot be achieved.

The Planning Guideline (DPE 2016) recognises that once there has been identification of a preferred alignment for a major infrastructure corridor, statutory planning controls should be implemented to protect it. The intention is to rezone the recommended corridor land for the explicit purpose of enabling the future delivery of Stage 1 of the OSO.

2.5 Corridor Study Objectives

The identification of a recommended corridor has been based on the following study objectives:

- Protect a corridor of land to enable an expanded motorway and freight rail network that enhances transport connectivity and efficiency through and within western Sydney and to regions outside Sydney
- Enable further planning to integrate land use and future transport
- Identify a recommended corridor that balances transport needs with those of the broader community and the environment
- Protect a corridor, or corridors, that enable future cost effective delivery and operation of a north-south motorway link known as the M9, connecting the Hume Motorway in the south with Box Hill in the north
- Identify a recommended corridor that provides sufficient land to accommodate connections with other key corridors including the recommended North South Rail Line corridor, the Bells Line of Road – Castlereagh Connection and the Western Sydney Freight Line.

These objectives align with the policy and strategic directions set for western Sydney, and more broadly for metropolitan Sydney (see **Section 2.2**).

DRAFT

3.0 Corridor development and alternatives

3.1 Methodology for corridor development

The recommended corridor reflects a balanced outcome of engineering, environmental, social and land use considerations. A robust and comprehensive planning and optioneering process was undertaken to ensure that the identification of a recommended corridor considered the environment, local communities, built form engineering requirements, as well as the economy of western Sydney and NSW.

The following approach was used to develop the corridor for the Outer Sydney Orbital (OSO):

- **Identifying a study area** – the OSO study commenced with a broad study area in which to identify high level environmental attributes and the capacity, constraints and opportunities.
- **Understanding constraints and opportunities** – the study identified key areas to avoid and potential values to secure through an analysis of the constraints and opportunities within the study area.
- **Development of Guiding Principles** – a list of Guiding Principles were developed that considered the hierarchy of avoid, minimise, mitigate to allow a series of options to be developed and inform the selection of a long list of corridor options.
- **Identifying corridor options** – a range of tools, including computer software and specialist advice, were used to identify a long list of corridor options.
- **Evaluation of corridor options** – a staged process was used to reduce the long list of options to a short list of options; this included specialist investigations of identified options, comparative assessment and multi-criteria analyses.
- **Selection of a Recommended Corridor** – as a continuation of the evaluation process (where selection and refinement of a recommended corridor involved multi-criteria assessment, targeted stakeholder consultation and strategic design development), the evaluation involved a multidisciplinary assessment of each key issue, as shown in **Section 7.0**.
- **Public consultation on the recommended corridor** – this current stage, to obtain feedback on the recommended corridor.

3.1.1 Identifying a study area

An indicative OSO corridor was identified in the *Long Term Transport Master Plan 2012* and then in the draft Structure Plan for the former Broader WSEA (2013).

The OSO study area was defined to allow investigation of multi-modal transport corridors to improve road and freight rail connectivity and transport efficiency within western Sydney. **Figure 3** shows the location of the OSO study area in a regional context.

The OSO study area is located within an approximate area bounded by the Hume Motorway to the south, Windsor Road/Box Hill to the north, the Nepean River and the foothills of the Blue Mountains to the west and expanding urban development to the east. This area was refined throughout the OSO study to better meet the project objectives and in response to feedback from key stakeholders and the community.

DRAFT

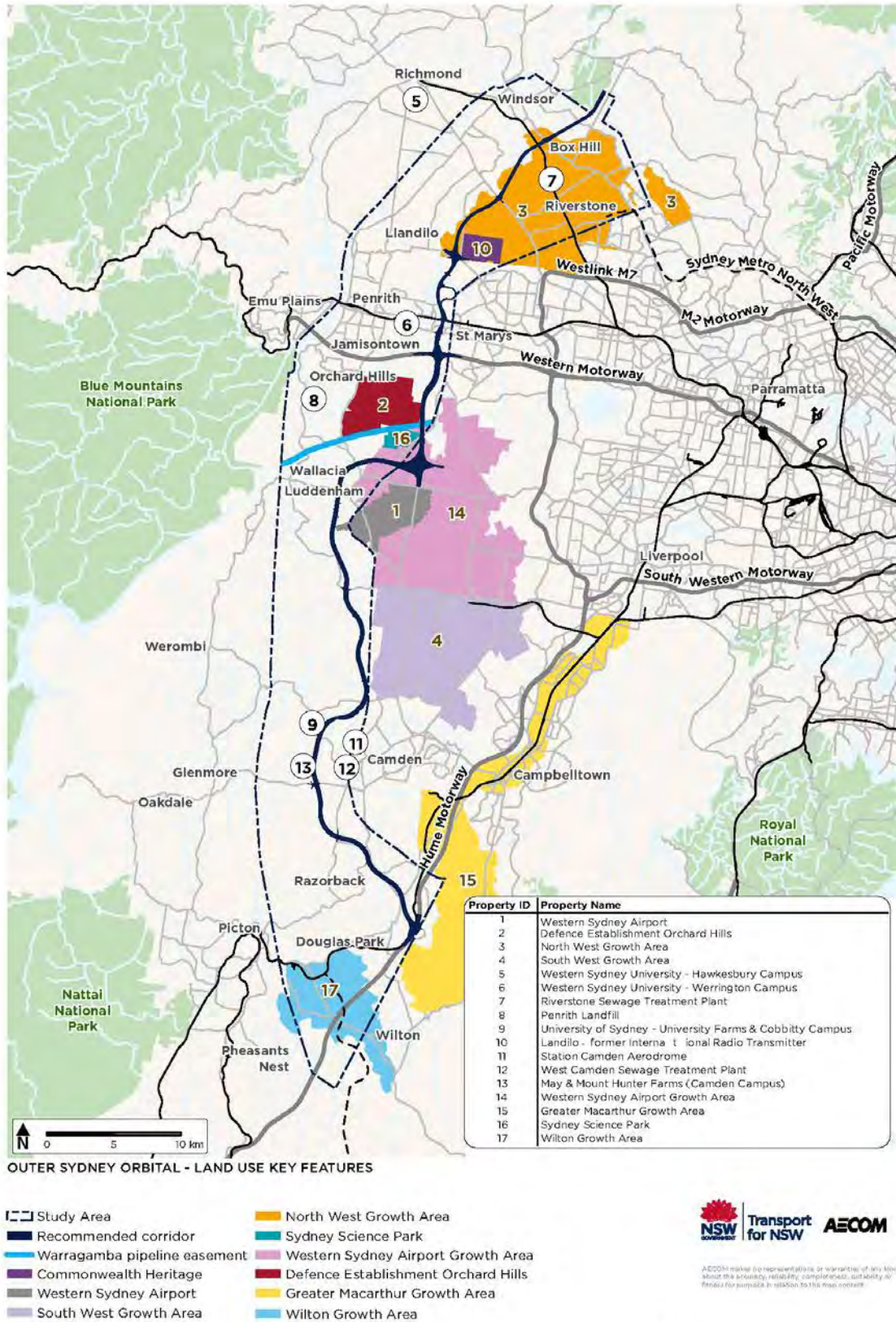


Figure 3 Regional context of the OSO

DRAFT

3.1.2 Understanding constraints and opportunities

The refined OSO corridor study area contains a range of environmental, social and engineering constraints and opportunities for protection of a recommended corridor. A comprehensive review of these constraints has been undertaken to define a recommended corridor that presents a balance between benefits and impacts.

The objective of early stages of the OSO study was to review historical information and previous studies relating to the OSO corridor study area, and evaluate the findings to identify gaps and understand these key issues and constraints.

Table 3 provides a list of the environmental, social and engineering factors that were considered as part of this assessment.

Table 3 Environmental, social and engineering technical factors

Environmental Constraints	Social Constraints	Engineering Constraints
Ecology and Biodiversity Aboriginal Heritage Non Aboriginal Heritage Visual and Landscape Bushfire Hazard Soils and Contaminated Land Surface Water, Groundwater and Flooding Noise and Vibration Air Quality	Land Use Planning Property and Land Ownership (Inc. Native Title) Socio-Economic Amenity	Motorway Connectivity Rail Connectivity (Passenger and Freight) Utility Infrastructure Topography Hydrology and flooding Geology

Attributes and constraints identified during the initial phase of the OSO study were then considered in the context of how they influenced the development of the corridor options. It is noted that the relevance of constraints and opportunities is variable for individual disciplines in driving the corridor options, or influencing the selection process.

The categories assigned to constraints were:

- **High** – will highly influence the development of corridor options; could fatally flaw corridor options or be a significant technical, environmental or engineering constraint.
- **Medium** – potentially significant constraint, but not likely to fatally flaw a corridor option.
- **Low** – not a significant influence on the development of the corridor options; constraint can be easily mitigated through design or best practice environmental management.

The broad initial categorisation applied to each constraint is shown in **Table 4**. This process provided a basis for developing guiding principles for the consideration of environmental, planning and engineering risks in the corridor options development process.

DRAFT

Table 4 Summary of constraints categorisation

Potential constraint	Summary of key constraints	Category
Land use planning and property	Established residential areas including Bligh Park, South Windsor, Cranebrook, Werrington, St Marys, Claremont Meadows, Penrith, Glenmore Park and rural village areas such as Luddenham, Mulgoa and Wallacia. Some of these areas are under consideration for further expansion.	High
	Special uses such as the former Llandilo International Radio Transmitter Station, Defence Establishment Orchard Hills and University of Western Sydney at Werrington.	High
	National Parks, state conservation areas, nature reserves and regional parks including: <ul style="list-style-type: none"> • Scheyville National Park (located just outside the northern boundary of the OSO study area). • Bents Basin and Upper Nepean State Conservation Areas. • Windsor Downs, Castlereagh, Gulguer, Mulgoa and Wianamatta Nature Reserves. Rouse Hill and Wianamatta Regional Parks.	High
	Areas identified for future residential and employment growth including the North West Growth Area, WSEA, South West Growth Area and Western Sydney Airport Growth Area.	Medium
	The Greater Macarthur Growth Area.	Low
	Proposed urban and employment land areas outside the North West and South West Growth Areas, including Cawdor, the Sydney Science Park at Luddenham and Tidapa (west of Oran Park).	Medium
	University of Sydney southern campuses – Cobbitty, May and Mount Hunter campuses, in particular key buildings and infrastructure for these campuses.	Medium
	Other University of Sydney owned land – namely University Farms at Greendale Road and Theresa Park.	Low
	Existing rural zoned land with large lot residential and/or rural land uses.	Low

DRAFT

Potential constraint	Summary of key constraints	Category
Ecology	Commonwealth EPBC Act listed endangered or critically endangered ecological communities including areas of Cumberland Plain Woodland and Shale Sandstone Transition Forest.	High
	State listed (NSW <i>Biodiversity Conservation Act 2016</i>) endangered ecological communities including areas of Shale Sandstone Transition Forest and River Flat Eucalyptus Forest.	High
	Areas containing habitat identified for conservation and vegetation retention as part of the bio-certification order for SEPP (Sydney Region Growth Centres) 2006.	Medium
	Gazetted reserves including national parks, nature reserves, regional parks and state conservation areas.	High
	Areas identified as a priority for conservation as part of the Cumberland Plain Recovery Plan (around 9,400 hectares in total).	High
	An identified habitat corridor Woronora Plateau to Warragamba and other mapped regional habitat corridors (other habitat corridors are likely to occur in the area but require further investigation).	Medium
	Threatened fauna and flora species that have been recorded or are known to occur in the OSO study area.	Low
	Biobanking sites or offset sites not within Office of Environment and Heritage land ownership e.g. Brownlow Hill Estate offset.	High
Aboriginal heritage	Aboriginal heritage landscapes – likely to occur along watercourses, specifically on creek banks and flats (flood/drainage plains), terraces and bordering lower slopes.	Medium
	Aboriginal Heritage Information Management System sites.	Low
	Native Title registered areas.	Medium
Non-Aboriginal heritage	The Greater Blue Mountains World Heritage Area	High
	Four Commonwealth Heritage listed sites including RAAF Base Richmond, Llandilo International Radio Transmitter Station, Shale Woodland Llandilo and Orchard Hills Cumberland Plain Woodland.	High
	State Heritage listed sites across the OSO study area including the Macquarie towns of Richmond and Windsor and historic rural estates such as Clydesdale, Brownlow Hill Estate, Camden Park Estate and Belgenny Farm.	High
	Locally listed heritage items including conservation areas, Lawson's Inn (former inn site), a historic irrigation canal, remnants of former homesteads and estates, Ellensville Farmhouse and Dairy, Cawdor Dairy, WW2 transmitter bunker.	Low
Visual and Landscape	South Creek and Nepean River corridors and associated floodplains.	Low
	Elevated topography associated with Razorback Range.	High
	Rolling rural landscape south of the M4 Western Motorway.	Low
	Patches of remnant bushland such as Bents Basin and Upper Nepean State Conservation Areas; Castlereagh, Mulgoa and Wianamatta Nature Reserves and Wianamatta Regional Park; Llandilo International Radio Transmitter Station; Defence Establishment Orchard Hills; and identified priority conservation areas.	High
	Views to the Greater Blue Mountains along the full length of the OSO study area.	Medium

DRAFT

Potential constraint	Summary of key constraints	Category
Bushfire	Bushfire - not considered to be a significant constraint in terms of selecting a recommended corridor alignment, but is a necessary consideration from a road design perspective.	Low
Topography, geology and soils (including contaminated land)	Underlying geology -presents constraints to design considerations such as cuttings. Due to its strength, Hawkesbury Sandstone is the preferred geology for the OSO. Wianamatta Group shales (Bringelly and Ashfield shales) are of lower strength and susceptible to shrinking/swelling and therefore are a constraint.	Low
	Watercourses such as South Creek, Nepean River and their tributaries and associated floodplain areas - present constraints due to the uncertain geological properties and alluvial soils, which can result in more costly design and construction requirements.	Low
	Elevated areas in the vicinity of Picton and Razorback Range - which are problematic terrain for road and rail construction and can be prone to slope instability.	High
	Mine subsidence areas associated with underground mining in the Picton, Camden and Razorback Range areas - this creates difficulty in predicting likely soil settlement and can affect the integrity or increase the cost of construction of infrastructure such as roads and rail lines.	High
	Faults and lineaments in areas to the north of Penrith and west of Bringelly - which can be associated with weakened soil zones, slope instability, variable depths to rock, concentrations of groundwater and differential settlement.	Low
	Sites with potential for significant contamination such as landfills, cement works, service stations, Defence properties and heavy industrial properties. Low lying areas within the study area - may be subject to the occurrence of acid sulfate soils.	Low
Surface water, groundwater and flooding	NSW Department of Industry – Water has not identified any groundwater dependent ecosystems within the study area.	Low
	Significant concentrations of groundwater bores - particularly in association with rural and agricultural land uses, with particular concentrations in the southern section and around the Penrith Lakes area.	Low
	Watercourses and associated low-lying floodplain areas across the study area primarily associated with South Creek, the Nepean River and their tributaries - the associated flood depths and extents associated with these systems mean that any infrastructure within the floodplain would need to be elevated (e.g. embankments or bridge structures); it is noted that such structures have the potential to affect flood behaviour.	Medium
	There are no drinking water catchments within the study area. However, pollutant loads from road and rail corridors (including possible chemical spills) would need to be appropriately managed before entering any watercourses.	Low
	Improving the condition and capacity of existing stormwater infrastructure to an adequate level in some urban areas of the study area could involve significant costs to address.	Low
Noise and vibration	Any established or proposed residential areas, and in particular medium/high density residential areas and premises such as universities, schools, child care centres, hospitals and aged care facilities - these are considered to be most sensitive from a noise and vibration perspective.	Low

DRAFT

Potential constraint	Summary of key constraints	Category
Air quality	Any established or proposed residential areas, and in particular medium/high density residential areas and premises such as universities, schools, child care centres, hospitals and aged care facilities - these are considered to be most sensitive from an air quality perspective.	Low
Motorway connectivity	The location and future design of OSO interchanges would have implications for a range of issues including functional traffic operations, required land take, technical engineering/cost and visual impacts.	
	The location and future design of the OSO interchanges with the M4 Western Motorway and Great Western Highway would be particularly challenging given: Their relative proximity to each other. The location of existing/proposed interchanges on the M4 Western Motorway. Interaction with the OSO passenger and freight railway line connections with the Main West Rail Line. The proximity to urban development in the suburbs of Claremont Meadows and Caddens, the University of Western Sydney Werrington campus, and the South Creek open space corridor.	
	Crossings of watercourses and floodplain areas with elevated structures which could be technically challenging and costly, and also impact flood storage, riparian vegetation and visual character along the watercourse.	
	Interaction with existing major infrastructure such as high voltage transmission lines; water supply, wastewater and gas pipelines; major roads and railway lines.	
Rail connectivity (freight)	A four way grade separated junction between the OSO and the Main West Rail Line in the Werrington/St Marys area.	High
	South facing grade separated junction between the OSO and the Main South Rail Line.	High
	Connection between the OSO corridor and the West Sydney Freight Line corridor and proposed Intermodal Terminal.	High
	Co-location of North South Rail Line with the OSO between the proposed Western Sydney Airport and the Main West Rail Line.	High
	A connection is proposed with the Main South Rail Line most likely in the area to the south of Menangle and north of Maldon. Constraints in this area include: providing appropriate separation between the OSO and Maldon–Dombarton rail junctions, the Hume Motorway (which runs parallel to the Main South Rail Line), mine subsidence areas, elevated topography in the area around Razorback Range, biodiversity conservation areas and habitat corridors, and future urban development in the Greater Macarthur Growth Area.	Medium
Functional design parameters are also important considerations including train length, design speed, track alignment/geometry, horizontal and vertical clearances, rail junction configuration and design flood levels.	Medium	
Utility Infrastructure	WaterNSW assets including water trunk mains notably the Warragamba to Prospect Water Supply Pipeline and Sydney Water sewer trunk mains.	Medium
	Transmission infrastructure including major substations and high voltage transmission lines.	Medium
	High pressure gas pipelines including the Sydney to Moomba Gas Pipeline, the Northern Trunk Main and Primary Gas Main.	Medium
	Telecommunications and fibre optics including mobile towers and data centres.	Medium

DRAFT

3.1.3 Development of guiding principles

A set of Guiding Principles was developed to capture key environmental and engineering attributes, constraints and opportunities to help identify an initial subset of feasible corridor options. It is important to note that the Guiding Principles were developed for the purpose of an initial, coarse-grain screening to identify a long list of feasible options that would undergo more detailed comparative evaluation. As such, they were not developed to represent a comprehensive suite of potential environmental, land use and engineering issues, but to provide a sufficient basis to identify those options that were more likely to be preferable from these perspectives, and to exclude those options that were not.

A preference rating which represented the degree of influence each Guiding Principle would have in identifying options was allocated to each Principle. These preference ratings were as follows:

- Required – an option must be consistent with this principle.
- Highly desirable – wherever possible an option will aim to achieve this guiding principle.
- Desirable – it is preferable that the option achieves this guiding principle, but it is not strictly required.

The Guiding Principles are presented in Table 3.

DRAFT

Table 5 OSO Corridor Guiding Principles

Issue/const raint	Principle	Rationale	Rating
Environment and land use			
Ecology	Avoid gazetted reserves including national parks and nature reserves (excluding regional parks).	Gazetted reserves (in particular national parks and nature reserves) are protected under legislation to conserve areas containing outstanding, unique or representative ecosystems. Construction and operation of a motorway within a national park is likely to be inconsistent with the ongoing aims and objectives of the <i>National Parks and Wildlife Act 1974</i> as they relate to a national park. Excision of land from national parks would require successful passage of an Act through Parliament to excise the relevant land, which is likely to require broad support of the project by both Houses of Parliament to have a reasonable prospect of success.	Required
	Avoid gazetted reserves (regional parks)	Regional parks are a form of gazetted reserve protected under legislation to conserve areas containing natural or modified landscapes suitable for public recreation. The Wianamatta Regional Park is one such park reserved under the <i>National Parks and Wildlife Act 1974</i> . Although a number of corridor options were canvassed to avoid this park, the OSO corridor's passage through the regional park was considered and weighted against avoiding future and potential substantial and detrimental impacts to built-up and predominantly residential areas of Penrith. Excision of land from regional parks would require successful passage of an Act through Parliament to excise the relevant land, which is likely to require broad support of the project by both Houses of Parliament to have a reasonable prospect of success.	Highly desirable
	Avoid lands identified as Priority Conservation Lands	Priority conservation lands are key areas of larger and/or better connected native vegetation which are considered by the NSW Office of Environment and Heritage as priority areas to conserve ecological values, and where conservation effort is being directed.	Highly desirable

DRAFT

Issue/constraint	Principle	Rationale	Rating
Heritage	Avoid Commonwealth listed heritage items and curtilage	Commonwealth and National heritage items comprise exceptional natural and cultural places that contribute to Australia's national identity and define critical moments in Australia's development as a nation.	Required
	Avoid State listed heritage items and curtilage	State heritage items are places and objects of particular importance to the people of NSW and provide historical evidence and information to help us understand our past and present.	Highly desirable
Land Use	Avoid substantially impacting on Defence properties (Defence Establishment Orchard Hills)	Commonwealth Defence land can contain unexploded ordinance risk and a public access corridor through the land would be a risk to Defence operation and security.	Required
	Avoid rural village communities in rural zoned areas	Prevents fragmentation/severance of existing rural villages in the OSO study area – Luddenham, Mulgoa, Wallacia, Mount Hunter and Douglas Park.	Highly desirable
	Avoid existing residential/urban areas	Prevents fragmentation/severance and potentially minimises impacts to existing residential development.	Highly desirable
	Avoid North West Growth Area	Prevents fragmentation/severance and minimises potential impacts to existing and future development in the North West Growth Area.	Highly desirable
	Avoid Special Uses sites	Prevents fragmentation/severance and minimises potential environmental and operational impacts to various special uses in the OSO study area. These include educational establishments (including university sites and the Camden Aerodrome).	Highly desirable
Strategic planning			
Western Sydney Airport and Badgerys Creek Aerotropolis	Provide opportunities for direct access to the Western Sydney Airport and Badgerys Creek Aerotropolis	Direct access between the WSEA, WSAGA and OSO corridor will help support the development, transport operations and provide alternative transport routes for the Western Sydney Airport and Badgerys Creek Aerotropolis.	Required
Western Sydney Employment Area (WSEA) and Western Sydney Airport Growth Area (WSAGA)	Provide opportunities for direct connections to WSEA and WSAGA	Direct access between the WSEA, WSAGA and OSO corridor will help support the development of the employment lands and provide direct freight rail access.	Required

DRAFT

Issue/constraint	Principle	Rationale	Rating
Connection between the North West and South West Growth Areas	Provide direct connections between the North West and South West Growth Areas	Provides a direct means of connection between the Growth Areas.	Required
Connection between Greater Macarthur Growth Area	Provide opportunity to connect this Growth Area to other parts of western Sydney	Direct access will help provide direct connections between this potential release area and major centres and key activities based on western Sydney.	Desirable
Compatible land uses	Identify land uses that may benefit from the OSO corridor	Supports new urban and other development opportunities in western Sydney that may benefit from the OSO corridor.	Highly desirable
Road connections	Enable sufficient connections to existing key roads in western Sydney	Enables sufficient connections with existing and proposed major east-west roads.	Highly desirable
Rail Connections	Enable sufficient connections to existing and proposed key rail lines in western Sydney	Enables sufficient connections with the Main West Rail Line, Main South Rail Line, proposed Western Sydney Freight Line.	-
Key centres	Support improved access to key and regional centres identified in the the Greater Sydney Commission's <i>Draft Greater Sydney Region Plan</i>	To improve access between and to strategic centres identified in the <i>Draft Greater Sydney Region Plan</i> in the western Sydney.	Highly Desirable
Engineering			
Existing network	Avoid impacts on existing motorways and railways	Avoid negative impacts on the functionality of the existing road and rail network and provide motorway standard connectivity. Of particular importance is ensuring that any new motorway interchanges are an appropriate distance from existing interchanges.	Required
Connectivity beyond OSO study area	Enable future connection to the M1 Motorway (F3) to the north and F6 Princes Highway to the south.	Consideration must be given to the corridor beyond the OSO study area to ensure so that in the future it can connect to the north and south to meet its strategic function.	Required
Efficient use of land	Consider colocation of OSO in other utility corridors	Consideration given to co-locating the OSO corridor with/in corridors already used by utilities (such as high voltage power lines) to reduce land fragmentation.	Desirable
Minimise costs	Avoid impact on high value utilities	Avoid high value utilities that would be expensive to relocate, and where crossing significant utilities, avoid skew angles.	Highly desirable

DRAFT

Issue/constraint	Principle	Rationale	Rating
Minimise costs	Avoid challenging topography	Avoid corridors through challenging topography that would necessitate extensive earthworks or tunnelling.	Highly desirable
Minimise costs	Avoid impacts on existing infrastructure	Avoid options that would necessitate costly modifications of existing infrastructure.	Highly desirable
Minimise costs	Minimise length of corridor in flood prone areas	Minimise the length of corridor in the 100 year ARI flood extent to minimise scale and length of required viaduct.	Highly desirable
Minimise costs	Minimise river crossings	Minimise significant river crossings. When major crossings are required, and avoid skew angles.	Highly desirable
Mine subsidence	Avoid tunnels in mine subsidence areas	In mine subsidence areas in the southern section of the OSO study area, avoid alignments that would necessitate tunnelling.	Required

3.1.4 Identifying corridor options

The Guiding Principles were considered alongside the business and design requirements advised by TfNSW for the multi-modal transport corridor. These requirements are further discussed in **Section 4.1**, and include:

- Geometric requirements of potential future road and rail infrastructure
- Connection requirements to key road and rail infrastructure
- Proposed corridor capacity
- Design requirements such as consideration of flood levels and other applicable design standards.

While no infrastructure or design is currently proposed to be built in the corridor at this stage, it was important to consider strategic design parameters to inform potential future infrastructure components that may potentially be built in the corridor and therefore affect corridor alignment, including location and width.

The scale and complexity of the OSO study area and the volume of information and iterations of corridor options called for a sophisticated approach to capturing project information. A number of tools were used during the corridor development phase to ensure that relevant existing land uses, objectives, constraints and business requirements were captured, understood, considered, made visible and were traceable. Some of the tools used to identify and track corridor options included:

- GIS database
- Quantum engineering software
- MX road alignment software
- InRail rail design software
- Infracore road/rail alignment planning software
- Microsoft Access options database
- Ongoing multidisciplinary team workshops.

Fatal flaw analysis

OSO corridor options were identified using the development methods described above, and assessed against the criteria listed in **Table 6**. Issues and constraints were ranked in order of preference in guiding the development of long list corridor options. This included the identification of fatal flaws

DRAFT

(required constraints) for each discipline. **Table 6** outlines the fatal flaws that were used to guide the initial development of long list corridor options.

The fatal flaw analysis was undertaken to remove the corridor options that either did not satisfy the objectives of the OSO study or contained characteristics that did not meet the guiding principles.

This initial review used available information and provided a high-level, qualitative screening of corridor options as a means to evaluate the large number of possible alternatives. In cases where there was insufficient information to include or exclude the corridor option from further consideration, the corridor option was progressed into the long list evaluation phase.

Table 6 Long list option fatal flaws

Issue/Constraint	Fatal flaw
Environment and land use	
Ecology	Impacts on gazetted reserves including national parks and nature reserves (excluding regional parks)
Heritage	Impacts on Commonwealth listed heritage items and curtilage
Planning	
Land use	Impacts on Defence properties (Defence Establishment Orchard Hills – operations area)
Strategic planning	Lack of direct access to Western Sydney Airport, WSEA and Growth Areas.
Engineering	
Connectivity	Impacts on the functionality and connectivity of existing motorways and railways
Connectivity	Does not enable future connection to the M1 Motorway and Main North Rail Line to the north and the Princes Highway to the south
Tunnelling	Long tunnelling required

Long list options

The initial identification of options during the corridor development phase resulted in a multitude of possible corridor alignments through the OSO study area. These corridor options were identified through a combination of engineering tools and software, and multidisciplinary team workshops. These corridor options traversed and meandered across the width and length of the study area and did not necessarily reflect the guiding principles. A screening process was applied (as discussed previously) in which each option was assessed against the Guiding Principles before a fatal flaw analysis was undertaken.

This initial development and screening of options in line with the Guiding Principles and fatal flaw analysis led to the identification of a long list of options for further investigation. These options are shown in **Figure 4**, and show the breadth of the options within the study area considered during the process. The long list options demonstrate that there are areas within the OSO study area where options significantly deviate from each other to avoid areas of high constraint (e.g. between Windsor Downs and Orchard Hills), and that there are areas of less constraint where options aim to maintain the most direct alignment (e.g. south of Orchard Hills to the west of Oran Park). In some areas (e.g. Camden to Menangle), options were concentrated in the same location due to changes in topography.

The options shown in **Figure 4** were assessed and later reduced to a short list of options, before one option was selected for further refinement. This option has progressed as the recommended corridor described and assessed in this draft SEA.

This evaluation and selection process is discussed in the following sections. Consideration of the options and alternatives throughout the study area is summarised in Section **3.1.5**.

DRAFT

3.1.5 Constraints and opportunities of alternative corridor options

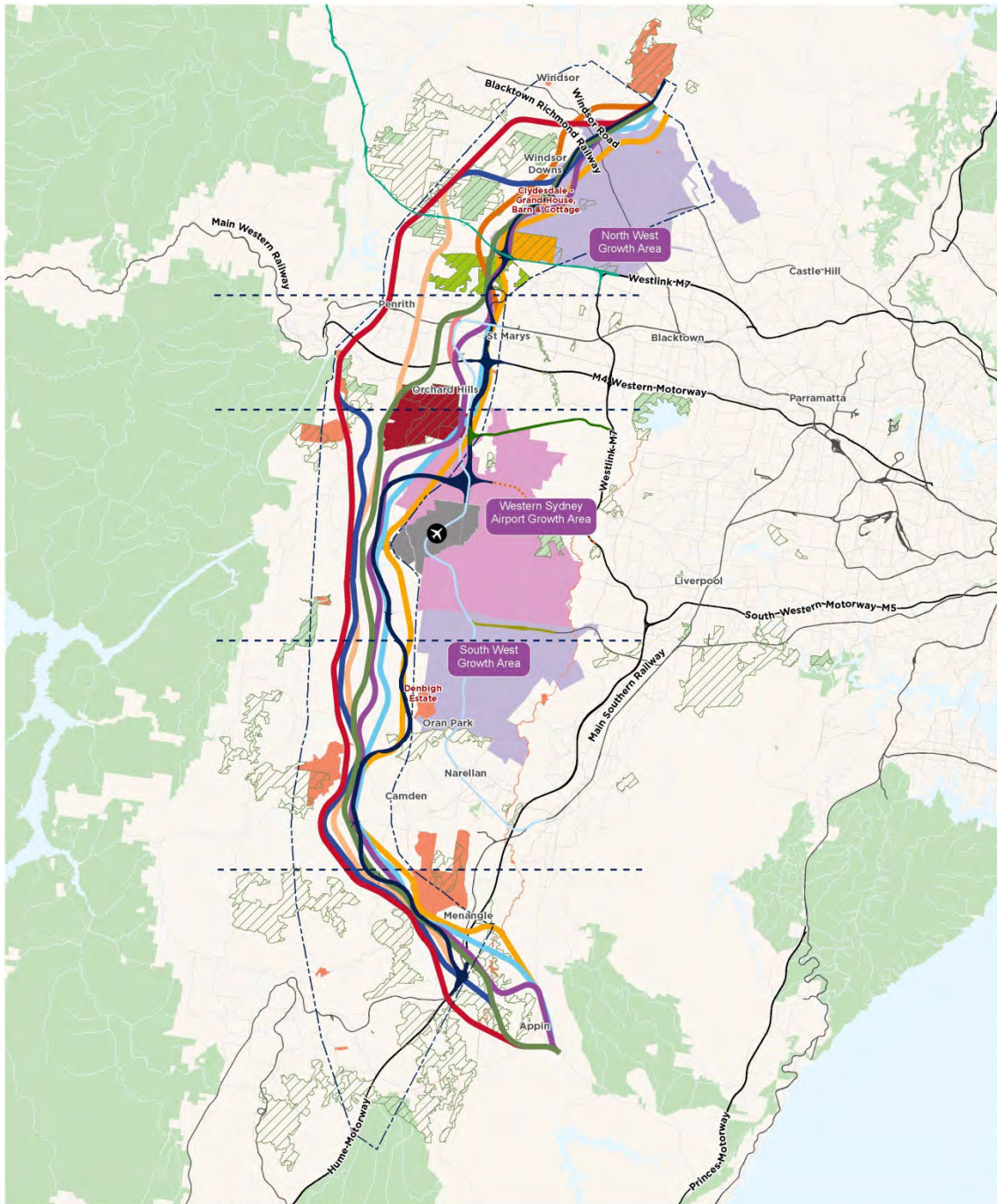
Investigations and stakeholder involvement led to the identification of a wide range of social, land use, built form, infrastructure, economic and environmental constraints and opportunities that may be associated with the protection of the OSO corridor. The key constraints and opportunities considered have directly informed the location of the recommended corridor.

Given the large size of the OSO study area, the key constraints and opportunities for orientation and placement of the OSO were different for different sections of this area. As a result, the approach to identification of a recommended corridor was based on specific local and regional factors that related to each area, subject to the consideration of the strategic design standards..

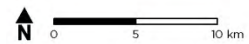
Table 7 explores some of the constraints and opportunities across the OSO study area that informed options and alternatives and how they were either discounted or flagged for further investigation. Avoiding impacts to all constraints was not feasible, so further investigation was required to deliver the best balanced outcome from land use, environmental and social perspectives.

The corridor options were assessed based on their compatibility with local land uses, such as impacts to existing residential properties and businesses, and consideration of the future land uses yet to be realised but identified in current planning processes.

DRAFT



OUTER SYDNEY ORBITAL - LONG LIST OPTIONS



- | | |
|---|-------------------------------------|
| Study area | Priority Conservation Lands |
| Recommended corridor | Commonwealth Heritage |
| Section boundary | State Heritage |
| Bells Line of Road corridor | Western Sydney Airport |
| North South Rail Line corridor | Defence Establishment Orchard Hills |
| South West Rail Line Extension corridor | Wianamatta Regional Park |
| Western Sydney Freight Line corridor | NPWS Reserves |
| Proposed M12 Motorway | |



Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 4 OSO corridor long list options

DRAFT

Table 7 Constraints and opportunities of options and alternatives

Constraints and opportunities guiding options and alternatives	
1. Box Hill to Dunheved	
<p>This section is constrained primarily by a number of gazetted national parks and reserves to the north and west of the OSO study area, existing built up areas to the west, and the North West Growth Area (future residential) to the east. A number of initial corridor options were identified that directly impacted these areas and would either sever and fragment these areas, result in sterilisation of its land use, or have significant impact to existing communities. It was considered that feasible options needed to avoid or minimise impacts to these areas as far as possible.</p>	
Constraints and opportunities	Options and alternatives
<p>The area is constrained due to the site of the former International Radio Transmitter Station at Llandilo, known as Shane’s Park. The site is owned by Air Services Australia and is a Commonwealth listed heritage area and contains substantial areas of EECs. Wianamatta Regional Park constrains the eastern side of the OSO study area and is recognised for its natural and historical importance in the area, and known to contain threatened vegetation and species, areas of significant archaeological potential and Aboriginal cultural heritage. Penrith and adjacent suburbs are located to the west of the study area with a significant number of residential communities.</p>	<p>Options were considered through Penrith and adjacent suburbs and it was noted that these options would result in significant impacts due to the built up nature of the area and number of communities that would be affected.</p> <p>Feasible options were constrained to an area that would impact Clydesdale House State Heritage site and Wianamatta Regional Park. However, a number of options looked at minimising impacts at these locations, including:</p> <ul style="list-style-type: none"> Alignments around and through the Clydesdale property that would minimise direct impacts to the house and other buildings of importance identified under the heritage listing Alignments through Wianamatta Regional Park to the west, a central option through South Creek, and variations on eastern options.
2. Dunheved to Orchard Hills	
<p>This section is constrained primarily by built up areas and existing major transport corridors, three of which are required to connect with the OSO corridor. Options were largely guided by these connection requirements to the Main West Rail Line, Great Western Highway and the M4 Western Motorway while seeking to minimise impacts to existing development.</p>	

DRAFT

Constraints and opportunities guiding options and alternatives	
Constraints and opportunities	Options and alternatives
<p>Railway stations along the Main West Rail Line St Marys and adjacent suburbs Penrith and adjacent suburbs are located to the west of the study area with significant number of residential communities Defence Establishment Orchard Hills</p>	<ul style="list-style-type: none"> Corridor alternative locations in the larger region between St Marys and Penrith were considered in developing a long list of locational options for the corridor. These included traversing through Penrith or along The Northern Road to avoid the need to impact upon Werrington and Claremont Meadows, and to avoid impacts to the Wianamatta Regional Park. The other alternative was through St Marys. However, these other options all resulted in significantly greater impacts and gave rise to higher proportions of property impacts, most notably to a high number of existing residential properties and businesses. Corridor options considered in St Marys generally resulted in highly detrimental impacts to the town centre and/or key community and recreational infrastructure also. <p>Placement of the OSO corridor along the full length of the South Creek riparian corridor was also considered. This was initially eliminated at the short list MCA due to its high cost, potential impacts to flood behaviour, and environmental impacts on the riparian corridor. However following further investigation and consultation, the limited use of South Creek was further considered given the opportunity to significantly reduce property impacts for hundreds of households near St Marys.</p>
3. Orchard Hills to Cobbitty	
<p>This section is primarily rural in nature with key townships located throughout. Options were guided by the need to provide connects to the proposed M12 Motorway, proposed Western Sydney Freight Line and Western Sydney Airport Growth Area in addition to avoid severing townships and minimising environmental impacts to watercourses and threatened vegetation.</p>	
Constraints and opportunities	Options and alternatives
<p>Fernhill State Heritage site north of Mulgoa Warragamba to Prospect Water Supply Pipeline University of Sydney agricultural farming Bents Basin Conservation Area Site of Western Sydney Airport</p>	<p>Options were considered from west to east in this section. Options were preferred to the east in order to provide opportunities for connection to potential future intermodal terminals and the Western Sydney Airport. Options identified to the west of the study area generally had greater impacts within the floodplain of the Nepean River and associated landscapes.</p>
4. Cobbitty to Camden Park	
<p>This section is primarily rural in nature with key townships located throughout. Options were guided by the need to provide opportunity to connect to the South West Growth Centre in addition to avoid severing townships and minimising environmental impacts threatened vegetation, and avoiding key heritage sites.</p>	

DRAFT

Constraints and opportunities guiding options and alternatives	
Constraints and opportunities	Options and alternatives
Cobbitty township Brownlow Hill Estate State heritage area Denbigh Estate State heritage area Nepean River Townships of Cobbitty, Ellis Lane, Grasmere and Mount Hunter University of Sydney education and research facilities	Options were considered from west to east in this section. In the northern portion of this section, corridor options were preferred to the east in order to provide opportunities for connection to the South West Growth Area. Options identified to the west generally had greater impacts on the Nepean River and associated landscapes and floodplain, as well as impacting the area around Brownlow Hill recognised for State significant heritage and certified offsets for threatened vegetation. Central options were identified but resulted in severing the townships of Cobbitty or impacting a number of rural residences east of Brownlow Hill. However, in the southern portion of this section, corridor options were preferred to the west in order to avoid and minimise impacts to the townships of Ellis Lane, Grasmere and Cawdor. All identified options avoided the State heritage listed Denbigh Estate. However, consideration of potential future infrastructure within the corridor has been explored to understand potential indirect impacts (refer to Section 7.5 and Section 7.9).
5. Camden Park to Menangle	
Rural landscapes dominate this section and increased hilly terrain associated with Razorback Range is one of the key limitations to the development of corridor options.	
Constraints and opportunities	Options and alternatives
Camden Park and Belgenny Farm State Heritage site Razorback Range which is mountainous topography constraining future rail infrastructure	Options were primarily guided to the east of the study area to meet the Hume Motorway. Options were explored through Razorback Range but they resulted in significant engineering implications and complexities not desired for a project of this scale due to its steep and unstable topography. Preliminary options traversed through the Camden Park and Belgenny Estate site. This was an undesirable impact so alternatives were explored to avoid these impacts.

3.1.6 Evaluation process for corridor options

A series of screening and assessment methods was applied to the options, including comparative assessment and multi-criteria analysis. The Guiding Principles formed the initial series of evaluation criteria against which all the remaining options were assessed. The remaining options were also assessed through integrated inter-disciplinary review workshops by the OSO study team to assess the merits of each corridor option.

The evaluation allowed a factual and evidence-based comparative analysis of the performance of each option based on consistently applied criteria. The comparative analysis considered the planning, environmental and engineering characteristics of each option.

MCA

Multi-criteria analyses (MCA) were completed at two stages during options evaluation. The first MCA was undertaken to narrow the long list of options to a short list; the second MCA narrowed the short list of options to a recommended corridor option.

DRAFT

Stakeholder feedback

Feedback from key stakeholders was received during the initial community engagement process and informed the options development, evaluation and identification of a recommended corridor. This feedback is further discussed in **Section 0**.

3.1.7 Selecting and refining the Recommended Corridor

A MCA was used to inform the selection of a recommended corridor. Once identified, the recommended corridor was further investigated from engineering, land use and environmental perspectives to optimise the alignment and further minimise impacts where possible. Technical specialists have reviewed the recommended corridor and provided feedback and advice as part of this process, which is detailed further in the strategic assessment provided at **Section 7.0** of this SEA.

A number of meetings and workshops with key stakeholders were also undertaken to inform refinement of the corridor. Stakeholders included government agencies such as the Office of Environment and Heritage to optimise the alignment and minimise impacts through areas of known environmental sensitivity (refer to **Section 0**).

Considerations and reasoning for the recommended corridor

The following provides an overview and summary of the considerations and reasoning for the recommended corridor based on the issues and opportunities as they apply to localities and portions of the study area. Strategic assessment and reasoning for the recommended corridor is provided at **Section 7.0**, for each key issue identified in the SEA Guidelines for the project. In particular, **Section 7.1** describes land use impacts and opportunities which strongly influenced the location of the recommended corridor.

Section 1 - Box Hill to Dunheved

- **From its northern most point to Windsor Road** - the alignment of the recommended corridor was determined and based on a number of parameters, including an identified strategic future need to connect into the Central Coast and the identified priority for the OSO to create connectivity to the North West Growth Area. The location of the recommended corridor was determined on the following basis:
 - Avoid the environmentally sensitive Scheyville National Park, and ensure the future northward extension of the OSO (to the Central Coast) would also avoid impacting the National Park
 - Avoid and minimise impacts to existing residences located east of Boundary Road
 - Minimise impacts to the future urban area of Box Hill North, located south east of Boundary Road.
- **Between Windsor Road and Richmond Road** - the location of the recommended corridor was aligned on the following basis:
 - Avoid restriction of planned urban development within the North West Growth Area
 - Avoid impacts to residential communities of Windsor Downs
 - Minimise impacts to existing rural properties west and north west of South Creek, which also forms the boundary to the North West Growth Area
 - Avoid impacts to existing 500 kV transmission lines.

The resulting alignment means the recommended corridor traverses the floodplain to the east of the 500 kV transmission lines, impacting on the precincts of Marsden Park North and Vineyard. Land affected in these precincts is not yet zoned for urban purposes. There is still an opportunity to integrate and incorporate land uses in these precincts that could benefit from the interchanges at Windsor and Richmond Roads, or to select compatible adjoining land uses. Land affected by the recommended corridor in the Marsden Park precinct is flood prone.

- **Between Richmond Road and the interchange of the proposed Bells Line of Road - Castlereagh Connection extension (Clydesdale House)** – the recommended corridor passes between the 500 kV transmission lines and Clydesdale House heritage site, which is situated

DRAFT

between Windsor Downs and the northern portion of the urban development of Marsden Park Precinct. The recommended corridor then traverses through flood prone land in the floodplain of South Creek and within the western fringes of the Marsden Park Precinct. Beyond this and further south, the recommended corridor traverses the central portion of the Shanes Park precinct of the North West Growth Area. This precinct has yet to be zoned for urban purposes as part of the North West Growth Area, but it is noted that a large portion of this land is flood prone. The location of the recommended corridor was aligned on the following basis:

- Prevent the loss of existing dwellings in Windsor Downs and Berkshire Park, and no land take requirement from areas of land zoned residential in the Marsden Park precinct.
- The alignment affects the curtilage of the Clydesdale estate but does not directly affect the house. This potential impact was discussed with the Office of Environmental and Heritage and is discussed in Section 5.1 and Section 7.5.
- Due to the easterly alignment of the recommended corridor further south in the Wianamatta Regional Park, the BLOR-CC and OSO interchange has been located in the Shanes Park precinct and impacts the Air Services Australia site. This potential impact was discussed with the Office of Environmental and Heritage and is discussed in Section 5.1 and Section 7.7.

Although the alignment of the recommended corridor results in impacts to the Shanes Park precinct, the extent of housing and urban development anticipated for this future, and as yet undeveloped precinct, was nominal in comparison to that of other precincts in the North West Growth Area. The placement of the OSO in this location is not expected to significantly compromise planned urban development in the North West Growth Area. Although impacting bio-certified threatened vegetation, the recommended corridor has minimised the area impacted as far as possible given other land use constraints, existing and future residential development, and transport connection objectives. Ecological impacts will be offset as part of a biodiversity offset strategy for the corridor.

- **Between the Bells Line of Road – Castlereagh Connection/OSO Interchange and Dunheved**– the recommended corridor traverses the Wianamatta Regional Park, which has been set aside for conservation and associated passive recreational uses. The recommended corridor alignment through this part of the Regional Park was resolved with Office of Environment and Heritage (National Parks and Wildlife Service) to achieve the least impact to the Regional Park and significant areas within it. This is discussed in Section 5.1 and Section 7.7. The location of the recommended corridor was aligned to:
 - Avoid South Creek riparian corridor through the centre of the Regional Park to minimise impacts to significant biodiversity values and areas of Aboriginal cultural sensitivity
 - Minimise impacts beyond (west of) the Regional Park’s main access
 - Avoid land within the existing residential community of Ropes Crossing and Jordan Springs
 - Avoid St Marys Sewage Treatment Plant, which is an important infrastructure asset and would have been difficult to relocate.

Further information is provided in **Section 7.1** which describes land use impacts and opportunities that strongly influenced the location of the recommended corridor in this section.

Section 2 - Dunheved to Orchard Hills

- **Between Dunheved Precinct and the T1 Main West Rail Line** – the recommended corridor traverses the as yet undeveloped Dunheved Precinct that forms part of the former Australian Defence Industries (ADI) site at St Marys. It passes along the southern edge of the existing Dunheved Industrial Area and through the eastern portion of the Dunheved Golf Course site, impacting on the existing club house and facilities. A rail loop is incorporated in this section of the recommended corridor to encircle the existing industrial area. The land in this area that would be impacted by the recommended corridor represents land that has been identified as potential to provide employment opportunities.

DRAFT

Although the recommended corridor will compromise the use of the Dunheved Golf course and encircle, but not cut off, the Dunheved Industrial Area north of Christie Street, the alignment was considered preferred on the basis that:

- Land use impacts for other options considered in this section (including various configurations of the alignments for both road and rail and the rail loop) were greater as a result of the need to also include a suitable rail junction for the OSO freight line to connect to the Main West Rail Line.
 - The recommended corridor rail loop connection at this point would partially use the disused rail corridor formerly serving the St Marys ADI site and would retain the large majority of this industrial area.
 - The recommended corridor would use existing industrial zoned land on the former St Marys ADI site that hasn't as yet been developed, such that there is no significant loss of existing development in this locality.
 - It avoids impacts to key through roads in this area such as Forrester Road or Christie Street.
 - It avoids impacts to residential suburbs of Werrington and North St Marys to the east and west of the recommended corridor.
 - It removes the need for the rail junction to impact both the northern and southern sides of the Main West Rail Line, which would have compromised the town centre of St Marys and important community infrastructure such as the St Marys High School and other key sporting and recreational facilities in the vicinity.
- **Between Main West Rail Line and the M4 Western Motorway interchange** – this area represents the most densely developed section of the OSO study area and required careful consideration of community and social values and minimisation of land use conflicts. In determining the recommended corridor through this section, a balance was needed that minimised the acquisition of homes, but also maintained amenity and access to open space. In particular, the location of the corridor aimed to avoid severance of communities. As a result, the location of the recommended corridor was aligned to:
 - Avoid existing communities and avoid severing areas of existing or proposed housing, in particular Claremont Meadows and Orchard Hills to the west of the recommended corridor, and St Marys to the east
 - Avoid impacting a number of educational and community facilities, including university land in Werrington east of the recommended corridor, Kurrambene School and the Penrith Valley Learning Centre
 - Avoid impacting some recreational areas such as Cook Park and Lang Park, while minimising as far as reasonably practicable impacts to others such as part of the Kingsway Playing Fields, amongst others. While the recommended corridor impacts a number of recreational uses (refer to Section 7.3) and would be more challenging in terms of flood mitigation and future design implications (significant viaduct structures and potential visual impacts), placement of the recommended corridor along South Creek riparian corridor was preferred in order to significantly reduce property impacts for hundreds of households near St Marys.
 - Minimise segregation of land between the OSO and the proposed North South Rail Line.

Although the location of the recommended corridor in this area means some loss of recreational areas and existing dwellings, this is balanced with the desire to avoid impacting dense housing and planned residential development; to avoid severing communities; and to maintain the amenity of Werrington, Claremont Meadows and St Marys. Further assessment of the need to balance the location of the recommended corridor in this section is provided at **Section 7.1**.

Section 3 - Orchard Hills to Cobbitty

Between the M4 Western Motorway and the Greendale Road (Bringelly Road) interchange (including proposed M12 Motorway Interchange) – the recommended corridor generally traverses rural land through to a connection with the proposed Western Sydney Freight Line and the proposed

DRAFT

M12 Motorway. It has minimal impacts when compared to other portions of the recommended corridor further north. The alignment would pass over the Warragamba to Prospect Water Supply Pipeline and various local roads on bridges, and would skirt the western edge of the Western Sydney Airport site before meeting Greendale Road. The location of the recommended corridor was aligned on the following basis:

- Enable the proposed M12 Motorway and the OSO to function as a higher order interchange to allow for direct access to the Western Sydney Airport, and consolidate these motorways to minimise land take in the Western Sydney Airport Growth Area
- Enable connection of the OSO with the proposed Western Sydney Freight Line
- Minimise segregation of land between the OSO and the proposed North South Rail Line
- Avoid impacts to Defence Establishment Orchard Hills
- Avoid impacting the Western Sydney Airport site
- Avoid the rural township of Luddenham
- Endeavour to minimise severance of large properties.

Further discussion is provided in **Section 7.1** which describes land use impacts and opportunities that strongly influenced the location of the recommended corridor in this section.

Section 4 - Cobbitty to Camden Park

- **Greendale Road (Bringelly Road) and Cobbitty Road interchange** – the recommended corridor traverses primarily rural and vegetated land east of the Nepean River. A number of other options were explored (including western options) as previously outlined in **Section 3.1.5** and further described in **Section 7.1**, the location of the recommended corridor was aligned on the following basis:
 - Avoid, where possible, the extensive floodplain of Nepean River to the west
 - Avoid directly impacting Denbigh Estate State heritage area to the east of the recommended corridor
 - Avoid severing the township of Cobbitty in order to maintain the streetscape and minimise loss of residential properties.

The recommended corridor in this section impacts and dissects the University of Sydney's John Bruce Pye Farm. The alternatives in this area were to move the north-south alignment further west or east, however, in consultation with the University of Sydney, the preferred outcome enables more equal division of the property to result in more useable portions of land. The remaining land that the recommended corridor traverses is characterised by steep terrain and the alignment adopted aims to minimise capital costs of the project. The land in this area is generally rural residential land.

The linear east-west nature of the Cobbitty township was a key concern in selecting a recommended corridor in this eastern portion of the study area. While some options would result in direct impacts or dissect the township, the recommended corridor, while still in close proximity to Cobbitty, has avoided such impacts. Nonetheless, due to its close proximity to the township, a number of considerations for future development of the corridor are acknowledged (and are further explored in Section 7).

While an interchange with Cobbitty Road has been allowed for in the recommended corridor, a decision on the intersection would be subject to further detailed design and network planning in future years. This network planning would also consider an east-west connection north of Cobbitty Road as part of future planning for the South West and Western Sydney Airport Growth Areas, which would avoid the need for an interchange at Cobbitty Road and the consequential road upgrades and social disturbance to the township that would be entailed.

- **Cobbitty Road interchange to Burragorang Road interchange** – the recommended corridor traverses rural land to the west of Ellis Lane and Grasmere. Land uses affected by this portion of the recommended corridor are generally rural residential properties and university land. The

DRAFT

objective for this area was to avoid the urban residential areas while minimising the impacts and land take for the University of Sydney campuses. The location of the recommended corridor was aligned to:

- Avoid the Mount Hunter township and community.
- Avoid severing the township of Cobbitty, and maintain the streetscape and minimise loss of residential properties.
- Allow perpendicular crossing of the Nepean River to minimise riparian impacts and use the existing topography to allow the recommended corridor to be integrated into the landscape; consideration was given to opportunities for cuttings or use of natural landform as part of visual screening and mitigation of future infrastructure design, in particular where the recommended corridor is located in proximity to Cobbitty and Ellis Lane.
- Avoid Mater Dei biodiversity offset site east of Cobbitty and minimise impacts through priority conservation lands on the northern and eastern sides of the Nepean River
- Avoid the existing urban residential communities of Ellis Lane and Grasmere; with the recommended corridor narrowed south of the Nepean River to ensure that the community of Ellis Lane is protected from land take and direct impacts to residential dwellings are avoided
- Minimise impacts and land take to University of Sydney campuses, with the University of Sydney having been consulted to understand priority areas of land to be protected (addressed in Section 5.1).

Further information is provided in **Section 7.1**, which describes land use impacts and opportunities that strongly influenced the location of the recommended corridor in this section.

Section 5 - Camden Park to Menangle

- **Burratorang Road interchange and the Hume Motorway** – the recommended corridor through this section has primarily been governed by the terrain and the engineering constraints of freight rail requirements. With the exception of the proposed urban community of Cawdor, south of Camden, the recommended corridor through this area would have impacts primarily on existing rural residential and associated land. All options identified in this section were found to link adequately to the Hume Motorway and reserved the ability for an extension to then link to the Illawarra region as part of future stages of the OSO. Options considered also avoided traversing or impacting the urban release areas for the Greater Macarthur and Wilton Growth Areas. The location of the recommended corridor was aligned to:
 - Avoid Razorback Range, which comprises unfavourable and unstable topography as well as dense vegetation of conservation value
 - Avoid Douglas Park residential community
 - Avoid direct impacts on the State heritage site of Camden Park Estate and Belgenny Farm.

Consideration of a recommended location for the OSO through this area was directed more by terrain constraints than land use impacts as these were similar for all options.

Further discussion is provided in **Section 7.1**, which describes land use impacts and opportunities that strongly influenced the location of the recommended corridor in this section.

3.1.8 Consultation on the Recommended Corridor

This draft SEA identifies the recommended corridor and describes preferred junction and interchange locations. While a number of interchanges have been allowed for in the recommended corridor, a decision on these locations would be subject to further detailed design and network planning in future years. The engagement process for corridor protection allows for engagement with the community on the appropriateness of the recommended corridor and further consideration of other options.

This draft SEA will be available during the consultation period on the recommended corridor. It describes the process by which the recommended corridor has been identified. It is intended that the public consultation period would allow the community and other stakeholders to provide comment and

DRAFT

feedback prior to the final corridor being protected. A final revision of the SEA will be prepared following consultation.

Further detail on consultation for the recommended corridor is provided in **Section 5.0** of this draft SEA.

3.2 Alternatives to Protection of the Recommended Corridor

The following evaluates what options could be used instead of protecting the recommended corridor, which may also serve the same objectives outlined in **Section 2.1**. It also provides a comparison of the reasons for the need to protect the corridor previously outlined in **Section 0**.

This strategic analysis considers alternative options to the carrying out of the future OSO project and/or protecting the corridor, and includes an assessment of the strategic costs and benefits of reserving the corridor against each alternative. This analysis also includes exploring the consequences of not protecting the recommended corridor. Each option is assessed in the context of the project objectives, the environmental costs and benefits of the project relative to alternatives and the consequences of each, and whether or not each of the options are in the public interest.

The strategic alternatives to the carrying out of the future project were considered as follows:

- **Alternative 1** – Status quo or ‘do nothing/minimum’
- **Alternative 2** – Upgrades to existing road and freight rail networks
- **Alternative 3** – Investment to improve public transport.

Each alternative is described further in **Sections 3.2.1 to 3.2.3**, accompanied by an assessment of the strategic costs and benefits compared to the protection of the OSO corridor.

3.2.1 Alternative 1 – Status quo or ‘do nothing/ do minimum’

The status quo or ‘do nothing/do minimum’ scenario would involve not proceeding with the protection of the recommended corridor as proposed in this report. One possibility of this scenario is there being no dedicated land protected in readiness for the project to proceed, should the OSO be constructed in the future (subject to later detailed assessment and approval). This would mean compulsory acquisition of land over a span of approximately 80 km of land, most of which is currently zoned for rural purposes and is in large land holdings. However, in the future when the land is required for the OSO this land may have already been zoned and developed for other purposes such as housing and employment, and would consequently be further fragmented. Therefore the effect of delivering the OSO infrastructure without the protection of the corridor would likely cause a greater social, environmental and economic impact to existing and a much larger number of communities.

The no protection approach may also mean that the OSO project may be unfeasible in future because of the short time frame available for acquisition of such a large tract of land. If land is not protected, the only other legal means for the NSW Government to acquire the land for the OSO would be to seek approval for its delivery through a State Significant Infrastructure (SSI) application (refer to Section 10.0 for more detail).

Given that the distance required for the OSO is more than the combined lengths of both the M7 Motorway (40 km) and the M5 Motorway (38 km), the acquisition of land at the time when it is required would likely be an insurmountable challenge for a government. This could also mean significant delay to the delivery of the OSO infrastructure. The delay in the delivery of this infrastructure would likely mean increased and unnecessary congestion, and existing road and rail networks reaching and operating at or over their capacities, which may inhibit economic and housing growth in western Sydney.

One of the key benefits of reserving the recommended corridor is that it is being done strategically to integrate with the planning and development now taking place in western Sydney. With the buoyancy of the development sector, the land required for the OSO could quite likely be used for other purposes and/or support further expansion of western Sydney. The locational opportunities for placement of the OSO would be further restricted because of encroachment of development if its protection is left to later. This may also result in land only being able to provide part of the recommended corridor, which

DRAFT

would then undermine the overall objective for the full OSO to connect the Illawarra to the Central Coast.

Not protecting land in readiness for the OSO would result in heavy reliance on the Government's strategic plans, such as the *Draft Greater Sydney Region Plan*, to then support its later delivery. However, this strategic plan does not specifically identify the land required for the OSO, nor is it a matter for consideration in determining development applications for land required for the OSO. Therefore, this plan cannot prevent incompatible development from occurring on land that would be needed for the recommended corridor.

Doing nothing means that there is no firm commitment for this infrastructure now or later, such that this would impact other investment decisions in western Sydney, particularly for development and other infrastructure that will benefit from the future OSO. This is particularly important given the OSO will link key residential centres and employment hubs together in a way that the current road and rail networks do not. Generally when there is more certainty that infrastructure will be delivered, investor confidence is boosted and this would help achieve government objectives for increased employment opportunities.

The proposed Western Sydney Freight Line relies on the section of the Outer Sydney Orbital between the Western Sydney Airport and the Main West Line to be built to complete the effective bypass of the Main West Line through Parramatta. The Western Sydney Freight Line aims to be a dedicated freight rail line that will move freight between Port Botany, a western Sydney intermodal, the Main West Line and regional NSW. Without the key section of the OSO there would be insufficient capacity on the Main West Line for the increasing number of passenger services needed as western Sydney grows.

According to the *Australian Infrastructure Audit* (Infrastructure Australia, 2015) (the Audit), without investment in new transport capacity and/or means of managing demand, car travel times are expected to increase by at least 20% in the most congested corridors of most major cities, including Sydney, over the next 16 years, and in some cases it will double. Additionally the Audit indicates that Australia's capital cities contributed \$854 billion to the Australian economy in 2011; this is expected to grow by 90% to a contribution of \$1.6 trillion by 2031. Currently, increasing road, rail and public transport congestion threaten to undermine this projected growth. Specific to freight rail, the mode share of rail freight with the national freight task in NSW is also expected to grow by over 80% between 2011 and 2031. These projections are not far into the future, and this timeframe does not account for the time required to construct the OSO before it is likely to be needed.

Based on these reasons the option to do nothing would leave the delivery of the OSO highly uncertain, as it may:

- Not be able to be delivered when required because of delayed property acquisition over an 80 km stretch of land
- Result in high land acquisition costs because this land would have been developed for other purposes and would be further fragmented
- Result in selecting an option for the OSO that may have greater impacts to communities
- Force the selection of an alternative route that may not serve its key purpose to connect all major urban and employment hubs and key centres throughout western Sydney, thereby reducing the effectiveness of any corridor
- Result in only partial delivery of the OSO, such that it would undermine the larger objective for road and freight rail connections between the Illawarra and the Central Coast.

The other possible scenario would be where the recommended corridor is neither protected nor is the OSO constructed. This alternative would not achieve the objectives outlined in Section 2.1. Moreover, if the need for the OSO was later required on an ad-hoc basis this would result in a difficult land use planning and development approval where:

- Development may have occurred on land within the corridor, making the implementation of the infrastructure more costly (land acquisition, demolition of structures, etc) and disruptive to established land uses and development patterns

DRAFT

- Incompatible or other sensitive development may have occurred in proximity to the corridor in a manner contributing to land use conflicts and/or unacceptable impacts from the major infrastructure; and resolution of these conflicts, or unacceptable impacts, may be costly (infrastructure design changes, additional mitigation and management measures, acquisition of adversely affected properties)
- Land use and development patterns will not have been given sufficient time to establish or adjust in anticipation of delivery of the major infrastructure, and as a consequence, once the major infrastructure is implemented, there may be a significant subsequent period during which transitional land uses 'catch up' with provision of the infrastructure.

For the above reasons the status quo and no protection approaches are not considered to meet infrastructure planning objectives for western Sydney.

3.2.2 Alternative 2 – Upgrades to existing road and freight rail networks

This scenario would involve upgrades to existing road and freight rail networks to fulfil the planned function of the OSO. This would mean heavier reliance on the existing networks, some of which are already forecast to, or are being upgraded to, accommodate anticipated economic growth and urban development in western Sydney.

Aside from the M7 Motorway, the M4 Western Motorway and the M5 Motorway, all other existing road networks in western Sydney are generally of a lower order/classification and generally serve as regional road connections (such as The Northern Road and Camden Valley Way, Cowpasture Road and Mamre Road). Only the M7 Motorway provides a key north south motorway link through this region. The Northern Road is currently being upgraded and widened to provide greater capacity by being duplicated from two lanes to a four-lane divided road along its 31 km length. The provision of a wide median will also allow for a six lane road to be provided in the future. Although this road will be upgraded and will help to reduce travel times and improve connectivity it will not function as a motorway. The key purpose for its upgrade and widening is to improve its current capacity. Specifically, existing operational concerns with The Northern Road are increasingly evident with a number of its existing intersections currently performing at low levels of service, with severe queuing and congestion occurring during both morning and evening peak periods. The upgrades will continue to maintain The Northern Road as the key road that serves local and other regional roads through western Sydney. This arrangement doesn't facilitate direct road connections between key regions of western Sydney or facilitate interregional connections which are objectives of the OSO. Despite the short and long term upgrades to The Northern Road, it would not be able to deliver these higher order outcomes that can be achieved by the OSO.

The *NSW Long Term Transport Masterplan* has identified the need for the M7 Motorway to be widened in part between Seven Hills and Prestons, to increase its capacity. This motorway currently serves as the most direct route between the Hume Motorway and the M2 Hills Motorway (which provides connections to the M1 Motorway via Pennant Hills Road and will in the near future connect to NorthConnex). The M7 Motorway forms part of the 110 km Sydney motorway network, which also includes the M5 Motorway, M2 Hills Motorway, the Lane Cove Tunnel, Gore Hill Freeway, Warringah Freeway, the Sydney Harbour Tunnel, Eastern Distributor, Southern Cross Drive and General Holmes Drive, and will later include parts of WestConnex. The purpose of this 'ring road' network is to connect most parts of Sydney via an integrated motorway road network. The M7 Motorway has started to suffer from traffic congestion, and according to the Australian Infrastructure Audit Report (2015) the M7 Motorway will be at 85% capacity during the morning peak period by 2031 (or 14 years from now). Additional capacity that may be achieved by its widening will only help it to better serve its purpose as part of this larger orbital road network for Sydney.

In contrast, the OSO will alleviate the need for inter- regional travel along the M7 Motorway by connecting the regional areas of the Illawarra and the Central Coast with a more direct link, reducing travel times between the Western Sydney Airport, the Growth Areas and key strategic centres of western Sydney. Any upgrades and widening of the M7 Motorway will not be able to fully fulfil these outcomes. Transport for NSW has advised that demand for the freight rail task is expected to double over the next 25 years and the existing Southern Sydney Freight Line is expected to be at capacity in 10 to 27 years' time. The recently released *NSW Freight and Port Plan* provides further evidence of the need to plan for future corridors as western Sydney continues to grow its freight and logistics

DRAFT

sector. In addition, the current freight rail network for the most part runs through Sydney. Currently the freight rail network is shared with the passenger network and the limited opportunities to separate the freight lines from the passenger lines is constrained by the availability of additional land along these corridors. This is expected to result in the significantly reduced ability to manage freight rail services through the metropolitan area. The effect of this is that these services will become particularly constrained on the Main West Line. The options and opportunity to expand or optimise existing freight rail services is restricted. The OSO would provide a dedicated and direct freight line that would support cross metropolitan, interstate and interregional freight task movements. Further investment in the existing rail network will deliver minimal rail freight capacity to western Sydney, resulting in an increased dependence on road freight. Enhancements to the existing network may not achieve the objective of separating freight and passenger services resulting in freight services operating through established urban areas.

Based on the consequences of these scenarios, the alternatives to further expand and/or optimise existing road and freight rail networks to accommodate anticipated road and freight rail traffic are not likely to deliver a satisfactory outcome.

3.2.3 Alternative 3 – Investment to improve public transport

Investment in public transport infrastructure in western Sydney is an important aspect of supporting economic and housing growth in this region, especially as better public transport is part of the solution that could reduce demand for car travel on Sydney's road network. Progress has already been made, with commitment by the NSW Government for the delivery of Sydney Metro North West and Sydney Metro City and South West and the commencement of investigations into the suitability to extend South West Rail Link as well as Sydney Metro South West from Bankstown to Liverpool. The NSW Government is also addressing this need through the identification of the recommended North South Rail Line corridor between St Marys and Macarthur and the South West Rail Link Extension from Leppington to North Bringelly.

Upgrading existing or providing new public rail transport networks would have no benefit or enhancement to freight rail services, nor will it assist in curbing expected increases in road freight as public transport serves only to benefit passenger demands. Therefore the OSO objectives to improve freight connections and meet future increases in demand cannot be supplemented by new or improved public transport infrastructure.

The NSW Government is also investing in bus connectivity improvements in western Sydney. The bus network will rely on the emerging road network, including the OSO, to meet commuter needs. In order to achieve efficient and effective on-time running, it will be essential to ensure the road network is not highly congested. The implementation of the OSO would help ensure the road network does not become unacceptably congested.

The recommended OSO corridor has been selected to provide direct links between strategic centres and Growth Areas as well as the proposed Western Sydney Airport. However, the delivery of the OSO will not be immediate nor will it be a direct result of the protection of a corridor for the OSO. The protection of the OSO corridor will therefore enable coordinated delivery of the OSO at a time when improvements to public transport can be put into place to support growth throughout western Sydney. Further, it does not preclude opportunities for improvements to public transport. Motorways still form a key component of Sydney's transport network and are seen as part of an integrated transport system that supports the metropolitan and regional networks. Both the North West and South West Growth Areas are expected to house a further 500,000 people over the next 25-30 years, which is approximately 110,000 more people than the current population of Canberra. The current and/or upgraded regional road network in western Sydney is not expected to be able to operate effectively to cater for resulting demand. Therefore, the protection of the OSO lays the foundation for the future delivery of this important transport infrastructure.

Based on this, improvements to the existing and/or the provision of new public transport infrastructure will not, in themselves, be able to meet the higher order road needs for western Sydney or the anticipated regional freight demands that can be met by the OSO.

DRAFT

4.0 Recommended OSO Corridor location

Following is a description of the recommended corridor location. In addition, the likely requirements for interchanges, bridges and potential staging options have been described. The recommended OSO corridor and associated interchanges are shown in **Figure 5** below.

4.1 Design requirements

TfNSW has determined the Business Requirements for the OSO. These include the scope and the design standards that are to be adopted for a future motorway and freight rail. These design requirements were subsequently used as part of the assessment process for selection of the recommended corridor as described in Section 3.0. The main Business Requirements that relate to the determination of the SEA are shown in **Table 8**.

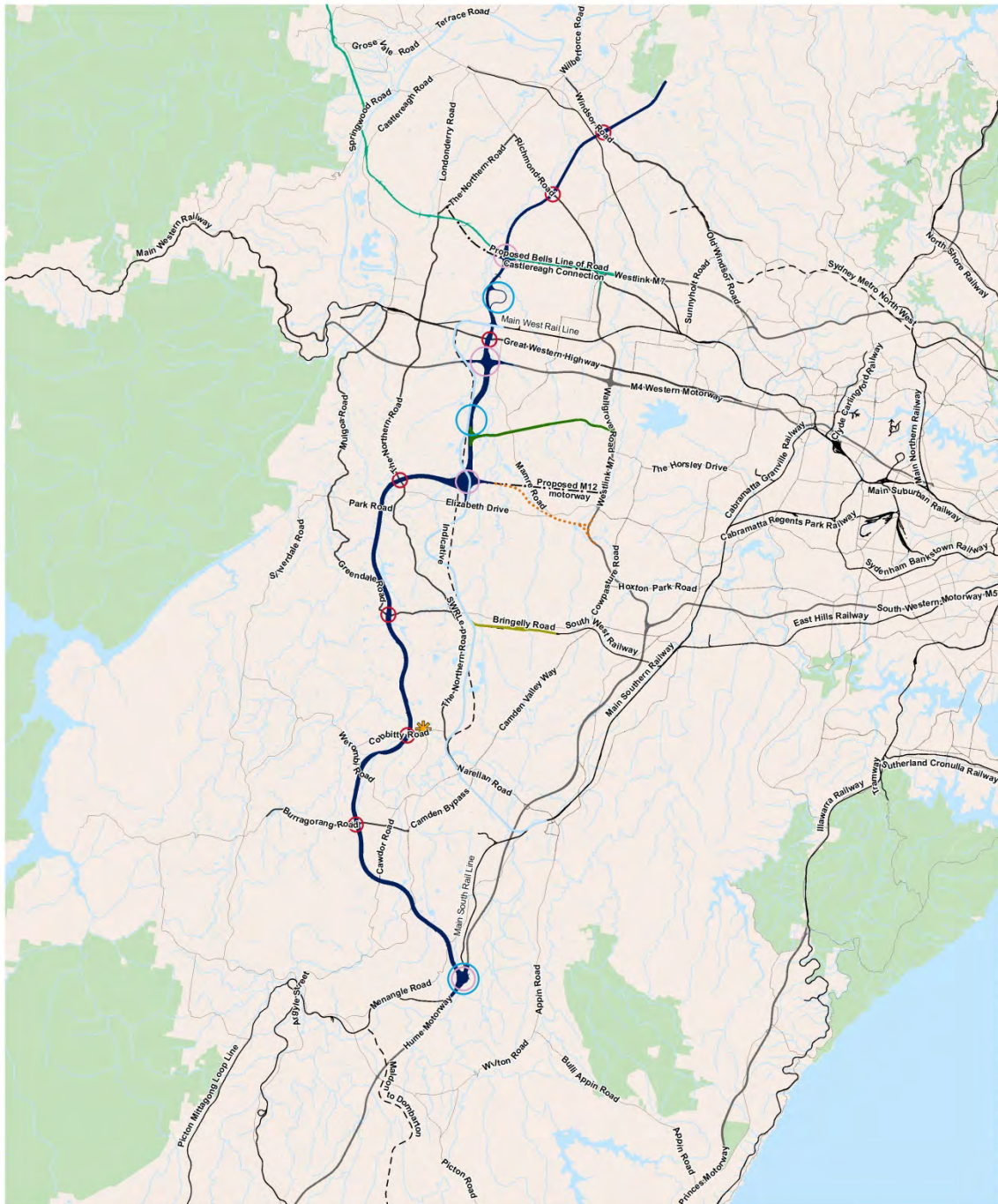
Table 8 Business Requirements

	OSO Freight Rail	Future OSO Motorway
Geometric		
Cross Section Requirements	60 m maximum corridor width to include standard gauge (1,435 mm) double track formation (2 tracks at 6.4 m centres), access roads and supporting structures/ancillary infrastructure (including signalling huts, power / communications infrastructure etc.). Potential to co-locate rail corridors for OSO Freight Rail and passenger rail between WSA and St Marys.	Initially 16.5 m formation each for two carriageways, each comprising three lanes 3.5 m wide, outer shoulder 3 m wide, 1 m verge and inside shoulder of 2 m. Ultimate 74 m for twin four lane carriageways, each 19 m wide with 3 m wide allowance for central barrier and bridge piers. Provision for 6 m wide utilities corridor adjacent to motorway boundary.
Vertical Clearance	7.1 m vertical clearance desirable.	Minimum 5.4 m clearance height (pavement surface to any overhead structural element, internal surface, fitting of item of equipment).
Train/vehicle type/length	1800m train length	Design vehicle – 26 m B-double Checking vehicle – 36.5 m B-triple
Track design standard / design speed	Track built to interstate freight standards including heavy duty concrete sleepers and 60 kg/m rail head hardened on curves <600 m radius. Desirable speed of 115 km/h.	Design speed 110 km/h.
Grades	1:100 max (desirable)	Minimum 0.5% Maximum 6%
Curves	To permit 80 km/h operation (desirable) 115 km/h where possible. Where possible radii minimum of 1500 m to minimise rail lubrication requirements.	Minimum radius 600 m at the maximum super-elevation.
Maintenance access	Maintenance access points to public roads.	Provision of minimum 3 m maintenance access at boundary (behind noise walls where needed). May be integrated with utilities corridor requiring another 4 m, for a total of 7 m.

DRAFT

	OSO Freight Rail	Future OSO Motorway
Design requirements		
Design Flood Level	100 year ARI	100 year ARI
Bridges and Viaducts	<ul style="list-style-type: none"> • Double track structures (desirable) • On-structure maintenance access (walkways, etc.) and safe egress for fire and life safety (train crew only – no provision for passengers) • Inspection access to structures, including viaducts and piers. 	<p>46 m total width required Initially twin two lane bridges (lane widths 3.5 m wide) and then:</p> <ul style="list-style-type: none"> • Twin four lanes with 3.5 m lane widths; and • 3 m outside shoulder width • 2 m inside shoulder width • 0.6 m central and outer barriers <p>Minimum 3 m maintenance widths on the outer extremities of the bridge barriers.</p>
Tunnels	<ul style="list-style-type: none"> • Not appropriate • Minimised (particularly length and grade) with constraints/costs identified • Fire and life safety access/egress (assumed freight only). 	<ul style="list-style-type: none"> • None preferred
Electrification	Non-electrified (Note: electrification should not be precluded in the future).	N/A

DRAFT



INTERCHANGES AND RAIL JUNCTIONS

- █ Recommended corridor
- Service interchange
- System interchange
- Rail junction
- Proposed roads
- Proposed and under construction railway lines
- ★ The preferred location of an interchange at or north of Cobbitty Road requires future investigation and integration with the wider network planning at/around the South West Priority Growth Area
- █ Bells Line of Road corridor
- █ North South Rail Line corridor
- █ South West Rail Line Extension corridor
- █ Western Sydney Freight Line corridor
- Proposed M12 Motorway



AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 5 OSO corridor interchanges and rail junctions

DRAFT

4.2 Corridor location

The recommended OSO corridor is approximately 80 km in length. The recommended corridor location is described below by section, starting with Section 1 from Box Hill in the north and ending with Section 5 at Menangle in the south where it is proposed to connect with the existing Hume Motorway. Each section is described below and **Figure 6** to **Figure 10** show each section of the recommended corridor in relation to surrounding land.

Section 1 - Box Hill to Dunheved

This section is shown in **Figure 6** and is summarised as follows:

- Starts in the vicinity of Box Hill between Scheyville National Park and Boundary Road
- Passes through the suburbs of Oakville and Vineyard
- Crosses Windsor Road and the Richmond Rail Line north of Vineyard Station and continues along the South Creek corridor
- Passes to the west of the North West Growth Area
- Includes interchanges at Windsor Road and Richmond Road
- Passes along the eastern edge of Windsor Downs through flood-prone land, avoiding existing housing
- Passes through the grounds of the Clydesdale Estate avoiding the existing homestead
- Passes through the Shanes Park Precinct of the North West Priority Growth Area at Llandilo, to the west of the former Air Services Australia International Radio Transmitter Station site
- Includes an interchange with the Bells Line of Road – Castlereagh Connection corridor
- Continues south and crosses through Wianamatta Regional Park to the west of Ropes Crossing.

Section 2 - Dunheved to Orchard Hills

This part of the recommended corridor is shown in **Figure 7** and includes the following features:

- It passes to the west, avoiding St Marys Sewage Treatment Plant and continuing south through the Dunheved Golf Club
- A freight rail junction passes through the Dunheved Industrial Area and connects to the Main West Rail Line
- It follows the South Creek corridor and passes to the east of Werrington
- It crosses the Main West Rail Line allowing for a junction with the Main West Rail Line for proposed freight
- It includes interchanges with the M4 Motorway, and Great Western Highway in the South Creek Corridor
- It passes to the eastern side of the Werrington Arterial
- It then continues south to the east of the Defence Establishment Orchard Hills.

Section 3 - Orchard Hills to Cobbitty

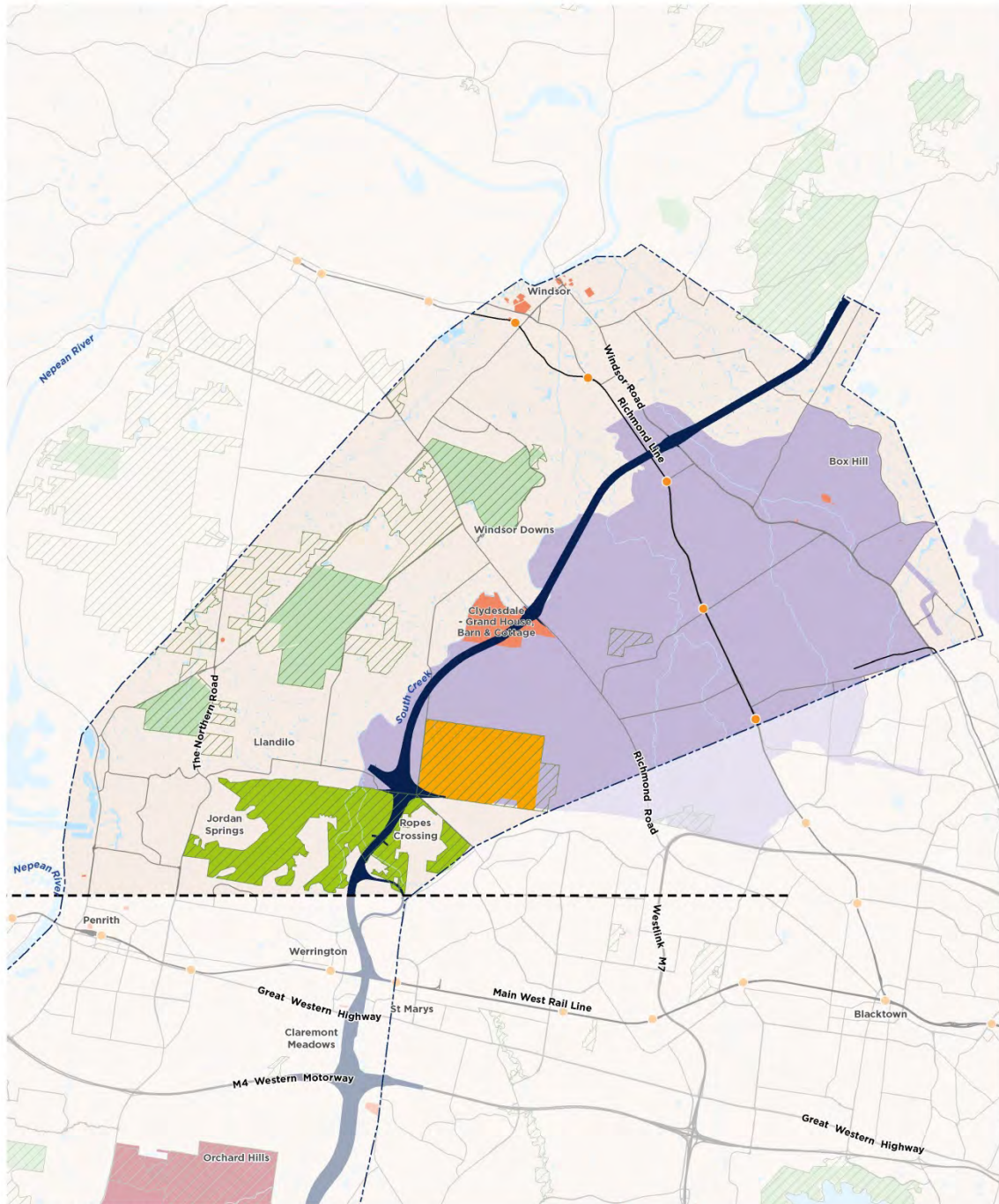
This section is shown in **Figure 8**:

- Crosses the Warragamba to Prospect Water Supply Pipeline west of Luddenham Road
- Provides a freight junction with the WSFL
- Has the potential to be co-located with the North South Rail
- Passes through the eastern side of the proposed Sydney Science Park

DRAFT

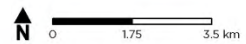
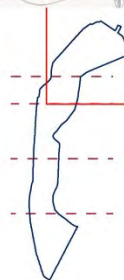
- Passes west of Twin Creeks Golf and Country Club and residential area, impacts on the western edge of the golf course
- Continues south to cross over Luddenham Road to an interchange with the proposed M12 Motorway
- Heads west to an interchange with The Northern Road north west of the proposed Western Sydney Airport site
- Continues south on the western side of the proposed Western Sydney Airport to an interchange with Greendale Road
- Crosses through the University of Sydney's John B Pye, Wolverton and Coates Park Farms south of Greendale Road.

DRAFT



SECTION 1 - BOX HILL TO DUNHEVED

- Study area
- Recommended corridor
- Priority Conservation Lands
- Commonwealth Heritage
- State Heritage
- North West Growth Area
- Defence Establishment Orchard Hills
- Wianamatta Regional Park
- NPWS Estate

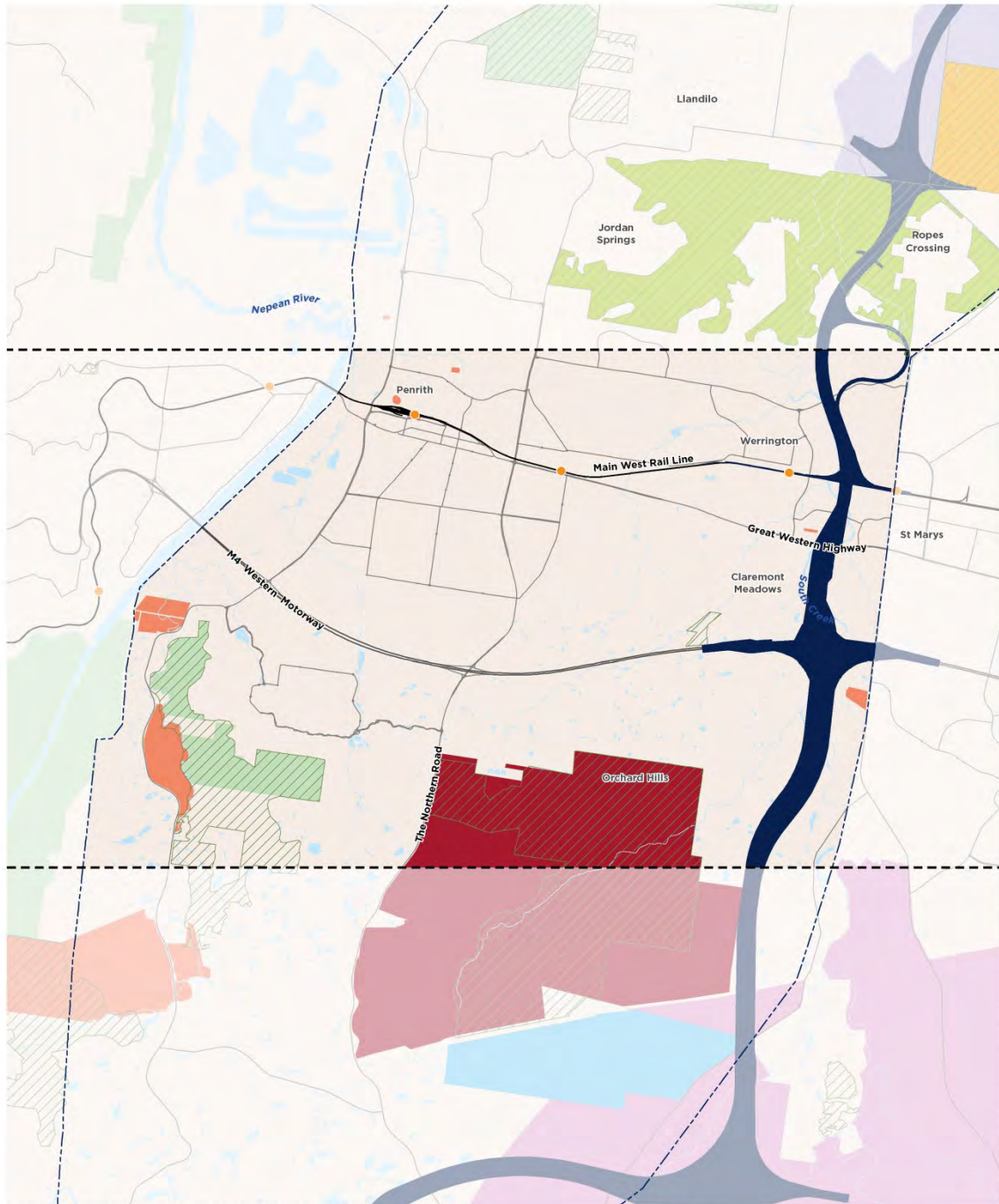


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

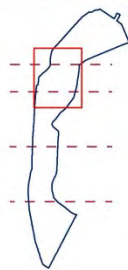
Figure 6 Section 1 Box Hill to Dunheved

DRAFT



SECTION 2 - DUNHEVED TO ORCHARD HILLS

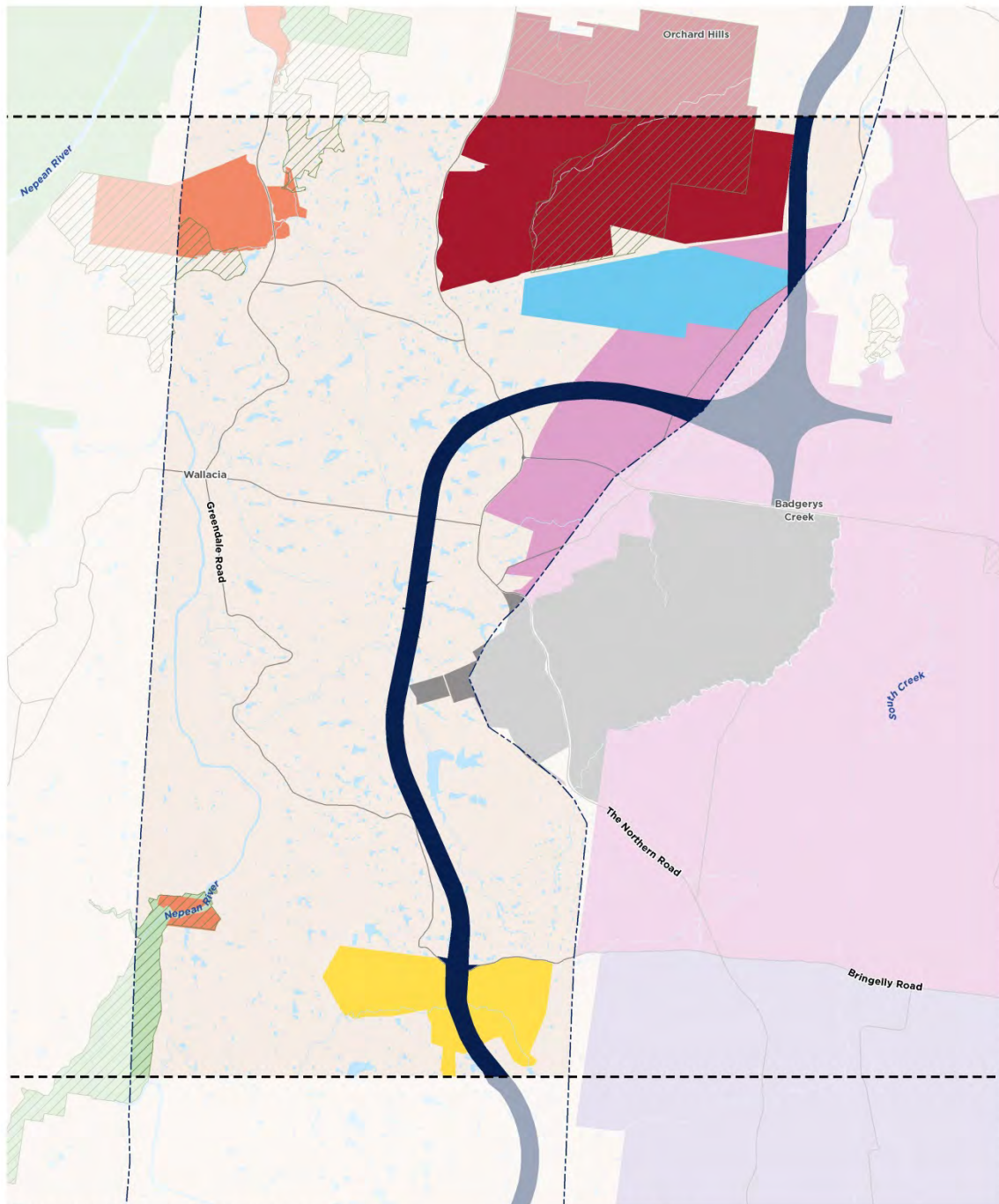
- Study area
- Recommended corridor
- Priority Conservation Lands
- Commonwealth Heritage
- State Heritage
- North West Growth Area
- Western Sydney Airport Growth Area
- Defence Establishment Orchard Hills
- Proposed Sydney Science Park
- Wianamatta Regional Park
- NPWS Estate



Data used has been provided by OEH and has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

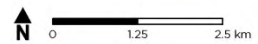
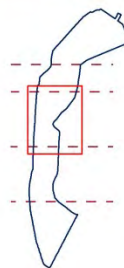
Figure 7 Section 2 Dunheved to Orchard Hills

DRAFT



SECTION 3 - ORCHARD HILLS TO COBBITTY

- Study area
- Recommended corridor
- Priority Conservation Lands
- State Heritage
- Proposed Western Sydney Airport
- South West Growth Area
- Western Sydney Airport Growth Area
- Defence Establishment Orchard Hills
- University of Sydney land
- Proposed Sydney Science Park
- NPWS Estate



Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 8 Section 3 Orchard Hills to Cobbitty

DRAFT

Section 4 - Cobbitty to Camden Park

Section 4 is shown in **Figure 9** and is summarised as follows:

- Continues south, through Cobbitty to the west of the South West Growth Area
- Passes west of Denbeigh homestead which is located outside the study area
- Includes an interchange at Cobbitty Road east of Cobbitty village. TfNSW has advised that this interchange will be the subject of further future detailed design.
- Crosses the Nepean River and passes through the eastern side of the University of Sydney's Camden Campus
- Follows the Nepean River north of Ellis Lane
- Crosses Werombi Road between Sickles Creek and May Farm Road in the suburb of Brownlow Hill
- Passes through Grasmere
- Passes through the eastern corner of the University of Sydney's May and Mt Hunter Farm
- Provides an interchange at Burragorang Road.

Section 5 - Camden Park to Menangle

This section is shown in **Figure 10**. It:

- Continues south-east to Cawdor and crosses Westbrook Road and Cawdor Road
- Crosses Cawdor Road a second time as well as Remembrance Drive
- Continues south-east and crosses Finns Road at Menangle
- Crosses Menangle Road just east of its intersection with Finns Road
- The motorway passes over the Main South Rail Line, while the freight line has a grade separated southern connection to the Main South Rail Line.
- Includes an interchange at the Hume Motorway between Menangle Park and Douglas Park, north of Douglas Park Drive, avoiding the existing area of Douglas Park.

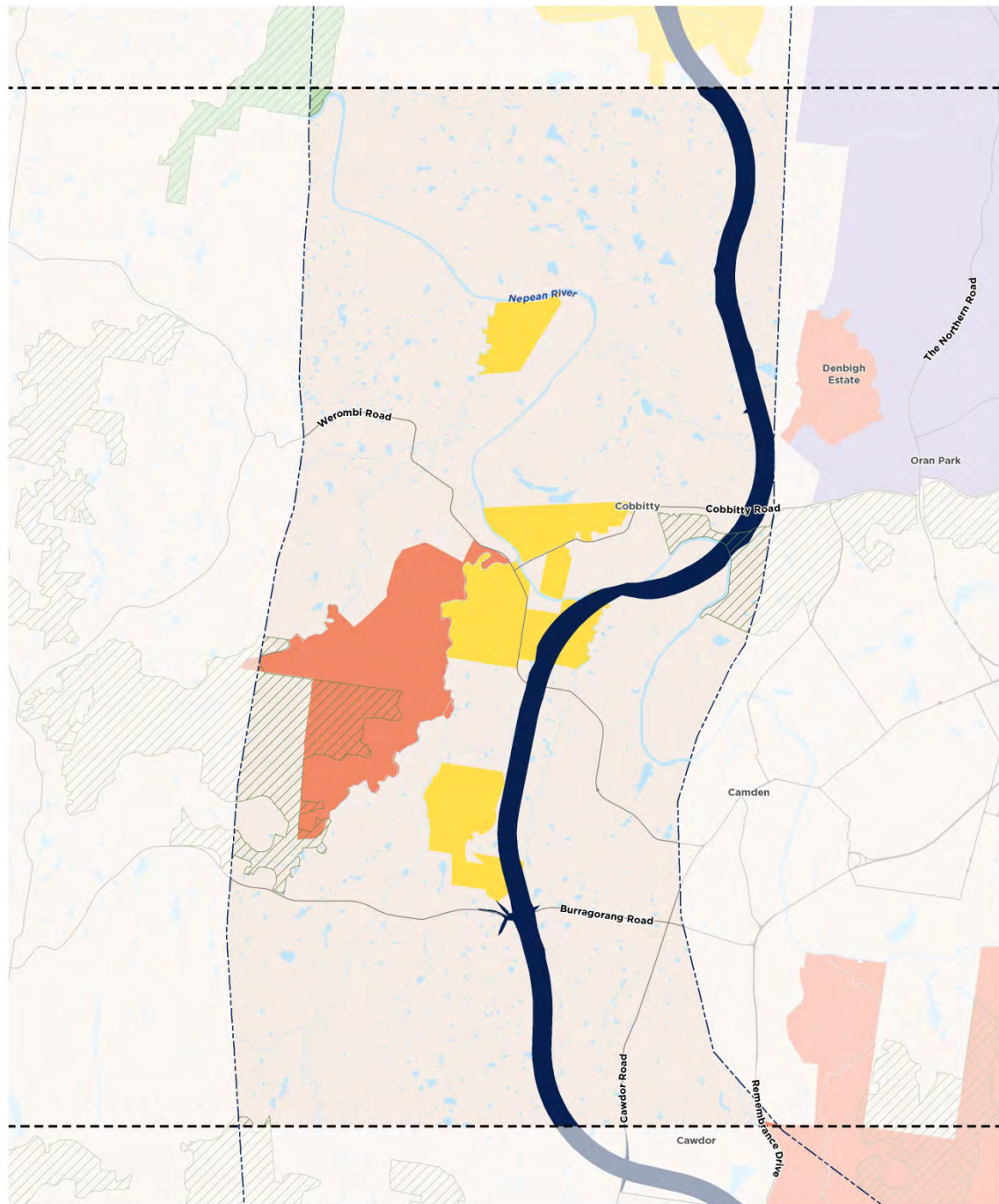
4.3 Width of OSO corridor

Generally, the recommended corridor is 200 m wide, however the width varies up to 300 m wide in some places to account for local circumstances such as topography, drainage requirements and interchanges. Specifically, the recommended corridor includes the width required to accommodate:

- Future OSO motorway and freight rail lines, including maintenance access, utilities corridor, etc.
- All proposed interchanges and rail junctions outlined in Section 4.4
- Environmental treatments including (but not limited to) stormwater treatment basins and swales, noise walls, fauna crossings, and others
- Modifications to the local road and rail network required to accommodate the proposed future OSO infrastructure.

The recommended corridor tends to be wider in the south where the topography is more challenging. This additional width will accommodate slope stability and drainage requirements associated with the cuttings and embankments to achieve the adopted geometric standards.

DRAFT



SECTION 4 - COBBITTY TO CAMDEN PARK

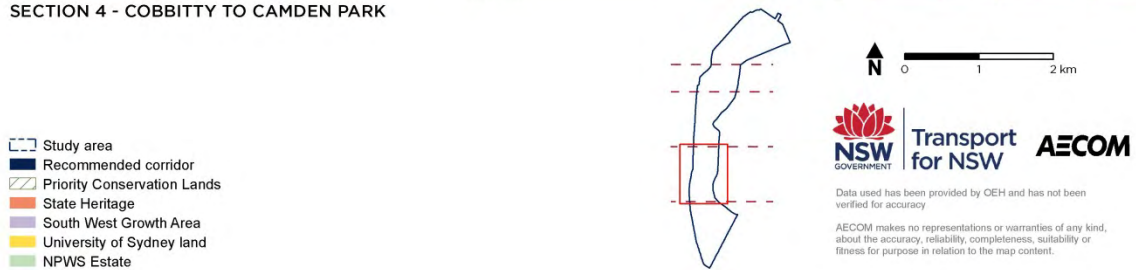
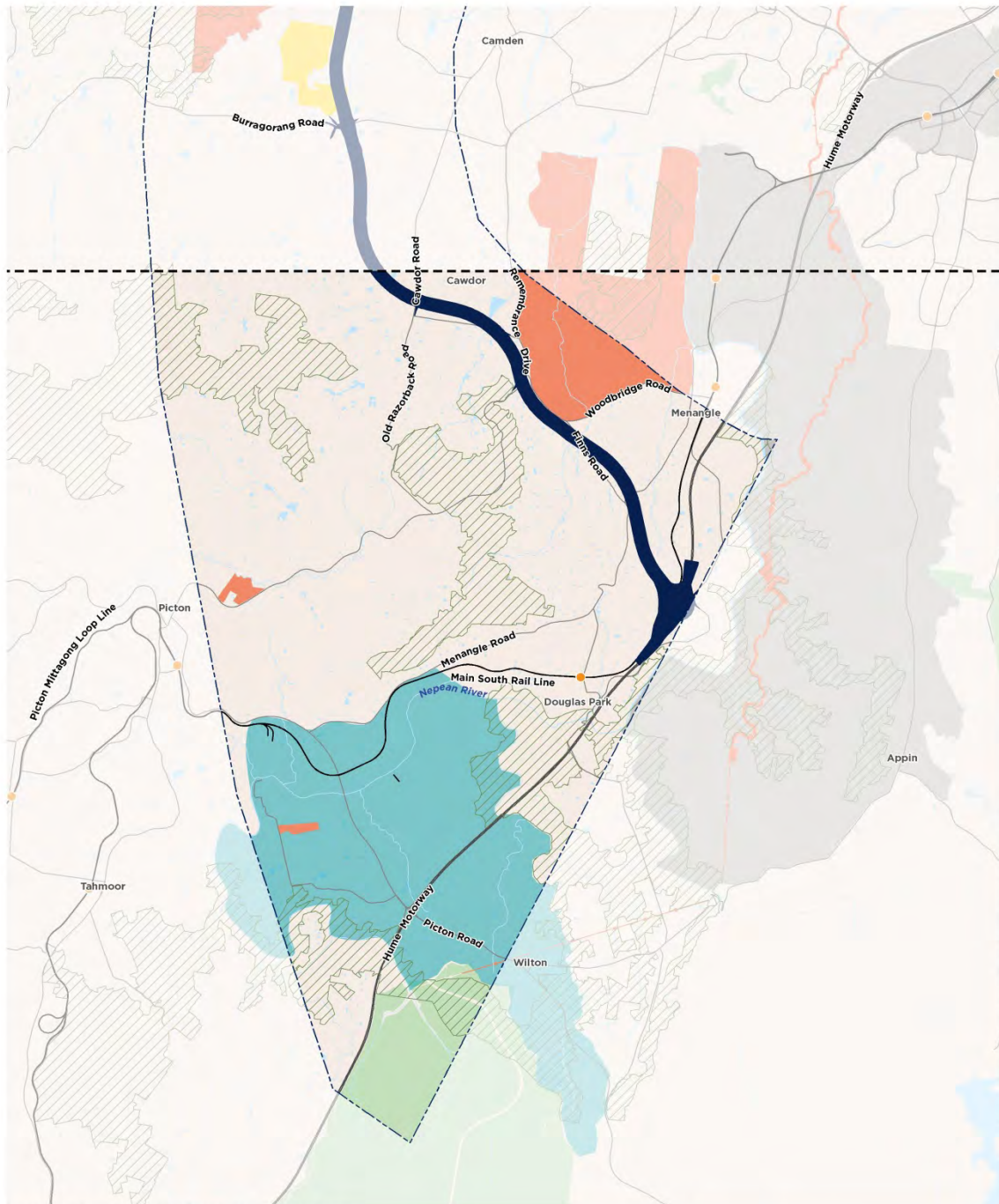


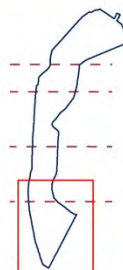
Figure 9 Section 4 Cobbitty to Camden Park

DRAFT



SECTION 5 - CAMDEN PARK TO MENANGLE

- Study area
- Recommended corridor
- Greater Macarthur Growth Area
- Wilton Growth Area
- Priority Conservation Lands
- State Heritage
- NPWS Estate



Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 10 Section 5 Camden Park to Menangle

DRAFT

4.4 Proposed interchanges and rail junctions

There are two types of proposed motorway interchange. System interchanges are required where the OSO will intersect with other motorways. A system interchange allows free flow of traffic from one route to another using grade separation to remove conflict points where roads cross. Service interchanges are required at locations between system interchanges to connect and provide access to the arterial and local road networks. A service interchange connects traffic at-grade (at ground level) by a priority or controlled intersection after safely exiting (or before joining) the higher speed environment. The interchange and rail junction locations are shown on **Figure 5** and listed in **Appendix C**.

The draft SEA proposes rail junctions where the recommended OSO (freight rail) corridor intersects with the Main West Rail Line with the Main South Line and with the Western Sydney Freight Line. The more complex rail junction is the intersection with the Main West Rail Line which occurs in Section 2 and has to allow for movements in all directions. The investigations considered a number of grade separated rail junction options such as diamond-shaped junctions and multiple 'loop' options for this rail intersection. The preferred junction is a loop to the east of the recommended OSO corridor around the Dunheved Industrial Area. This option impacts only one side of the rail corridor rather than both; it primarily utilises industrial land rather than impacting residential areas; it provides better connectivity to Werrington Station; and it allows for a 1,800 m freight train to be held immediately adjacent to the connection point with the existing network. The draft SEA proposes a 'Y' junction with the proposed Western Sydney Freight Line (Section 5) and a grade separated south facing connection for the junction with the Main South Rail Line, near Menangle (Section 5).

The road interchanges shown in the report are potential interchanges subject to further detailed design and environmental approval as part of a future application for infrastructure within the recommended corridor. Future detailed design work will include further network integration.

4.5 Proposed watercourse and floodplain crossings

There are a number of watercourses and floodplains that are crossed by the recommended OSO corridor. The constraint assessment considered these watercourses, and identified areas where cross drainage would be required. **Appendix C** outlines the significant watercourses and floodplains that require bridging. Feasible options for the development of future OSO infrastructure include either a viaduct or bridge structure. These would be investigated and designed in detail with the development of future OSO infrastructure.

4.6 Interaction with existing and planned road network

A number of local roads are crossed by the recommended corridor. Continued accessibility for local roads is an important aspect of future OSO infrastructure planning. The draft SEA has therefore included consideration of local road interactions. This demonstrates how any impacts to the local road network can be appropriately managed and allowed for in any future detailed design.

Appendix C summarises how the recommended corridor incorporates local road accessibility as part of future OSO infrastructure. Some of these roads will be maintained either above or below future infrastructure, while others will be segmented where there are unavoidable crossings.

While local road treatments have been identified as feasible options, these would be subject to further investigation and detailed design when future infrastructure is developed.

4.7 Interaction with existing and planned rail network

Future OSO infrastructure will need to connect with other rail infrastructure including the Main West Rail Line at Werrington, the proposed Western Sydney Freight Line near Orchard Hills and Main South Rail Line near Menangle, as described in Section 4.4. Further details about the rail lines and proposed connections with the recommended OSO are provided in **Appendix C**.

DRAFT

4.8 Potential staging scenarios and timing

Timing for the delivery of future OSO infrastructure is not yet known but it is likely to be built in stages associated with travel or freight demand between different interchanges or junctions. Road and rail components may be implemented at the same time or as part of different projects.

DRAFT

5.0 Consultation

5.1 Introduction

As set out in Section 3, Transport for New South Wales (TfNSW) is committed to engaging with stakeholders and the community as part of the process to identify the most suitable option for a protected OSO corridor within the study area. This process balances stakeholder and community inputs with the wider engineering and environmental requirements associated with recommending a corridor for the Outer Sydney Orbital (OSO).

In line with this commitment, TfNSW undertook a set of consultation activities with relevant local, State and Commonwealth government authorities, service providers, community groups and impacted landowners. These consultation activities aimed to reflect the purpose of each stage while also allowing TfNSW to consult:

- With the wider community between June and August 2015 to create awareness of the strategic planning objectives and obtain information on constraints, opportunities and values that may influence corridor development for the OSO within the OSO study area.
- On-going communication directly with some impacted landowners, community groups, government and other key stakeholders to consider social, environmental and land use values that may be impacted.

This document represents one of the materials for consultation on the recommended corridor.

5.2 Previous consultation

TfNSW has consulted with all relevant local, State or Commonwealth government authorities, service providers, community groups and impacted landowners on multiple occasions during the corridor development process. TfNSW shared the feedback from this consultation with AECOM to help guide the development of corridor options, inform specialist studies and provide useful information and updates from the results of the OSO study.

During the 2015 consultation the following consultation activities were undertaken:

5.2.1 Community and stakeholder consultation

TfNSW sought feedback on constraints and opportunities in the OSO study area from members of the community between 6 June 2015 and 7 August 2015. TfNSW further captured feedback from community drop in sessions and meetings with key stakeholder groups, including representatives of residents, various environmental groups, local councils and the freight industry. Specific issues raised during these sessions are presented in **Table 9**.

Table 9 Feedback provided by community stakeholders

Issue raised	Detail
Property impacts	Concern regarding the impact of the project on property values
	Concern about residential property acquisition
	Consideration of the use of South Creek to avoid residential areas
Environment	Concern about future air quality and noise impacts
	Protection of the natural environment, flora and fauna
	Importance of avoiding nature and conservation reserves, including Cumberland Plain Woodland
Heritage	Maintaining heritage values (community and agricultural)

DRAFT

Issue raised	Detail
Social	Maintaining rural amenity and unique character of communities throughout the study area
	Concern over the potential for diminished sense of community and community severance in several locations
Existing infrastructure	Cumulative impacts of projects in the area (future motorway, freight line, passenger rail line and airport)
	Making use of existing corridors to avoid impacts
Planning process	Need for a thorough environmental assessment as part of the corridor protection process

5.2.2 Local Aboriginal Land Council (LALC) consultation

The three LALCs located in the OSO study area have been consulted. TfNSW held meetings with representatives from the project team, including Roads and Maritime Services' (RMS) Aboriginal Liaison Officer, with the Gandangara, Deerubbin and Tharawal LALCs. This process was undertaken in accordance with the requirements of the Stage 2 Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) process.

During the meeting, TfNSW provided maps of the OSO study area to LALC representatives, with known Aboriginal sites and areas of archaeological sensitivity labelled, in order to seek advice on other areas that may be of Aboriginal cultural significance. During the meeting there was also a discussion of future fieldwork, with the involvement of Aboriginal representation in field investigations along with further consultation with the LALCs.

5.2.3 Government entity consultation

Meetings were held with a number of government entities, including the Federal Department of Infrastructure and Regional Development, Department of Defence, Department of the Environment and each of the six local councils along the corridor. This helped TfNSW gain an understanding of the issues affecting the location of the corridors. This knowledge was then passed to AECOM to help guide the corridor development process, including specialist studies.

TfNSW also worked closely with Department of Planning and the Environment (DPE) and RMS in developing the recommended corridor. In particular, TfNSW worked closely with RMS to develop the road infrastructure needed to provide access to the proposed Western Sydney Airport.

Meetings were also held with Infrastructure NSW and State Emergency Services representatives regarding flood evacuation for the Hawkesbury-Nepean catchment; as well as with Urban Growth and utility and service authorities (including Transgrid) to discuss potential implications arising from the OSO corridor and subsequent infrastructure.

TfNSW also held several meetings with the Office of Environment and Heritage to discuss biodiversity and heritage issues, including existing biobank sites, wildlife corridors, Cumberland Plain Priority Conservation Lands, the Wianamatta Regional Park and the former Air Services Australia Llandilo International Radio Transmitter Station site at Shanes Park; as well as with the Heritage Office regarding State heritage, including Clydesdale Estate.

5.3 On-going and future consultation

This draft SEA will be made available during the consultation period to allow the community and other stakeholders to provide comment and feedback on the recommended OSO corridor. TfNSW will hold a series of community drop-in sessions as part of the consultation process to capture community feedback.

In addition, and as part of the corridor protection process, TfNSW will engage with impacted landowners, local, State and Commonwealth government agencies, service providers and developers through the following engagement strategy:

DRAFT

5.3.1 Property owner consultation

TfNSW will notify and consult with impacted landowners located within the recommended corridor. Various communication channels and engagement opportunities will be available to capture feedback. Consultation will include information regarding the corridor identification process, an overview of the corridor protection process, on-going land use arrangement and future land acquisition processes.

Opportunities for property owners to view detailed information, including land to be rezoned, will be available at the community meetings.

5.3.2 LALC consultation

Aboriginal representatives are able to identify areas of cultural significance and comment on the larger cultural landscape containing the known sites and areas of Aboriginal archaeological sensitivity. TfNSW will undertake further consultation and field investigation with LALC representatives prior to the delivery of the OSO infrastructure. This will serve to identify cultural constraints and to ground-truth known Aboriginal sites (recorded within the NSW Office of Environment and Heritage Aboriginal Heritage Information Management System (AHIMS) database) and areas of Aboriginal archaeological sensitivity.

5.3.3 Government consultation

Government endorsement of a corridor is an important component of the corridor protection process and, as such, all levels of government will continue to be consulted and involved in the process.

TfNSW will continue to hold meetings with each of the councils during the corridor protection process to discuss issues affecting the location of the corridor from their perspective. TfNSW will continue to consult with Commonwealth and State government entities, as necessary, to discuss impacts to sites within and adjacent to the corridor. These include: Defence Establishment Orchard Hills; the North West, South West and Western Sydney Priority Growth Areas; the proposed Western Sydney Airport site; and the former Air Services Australia International Radio Transmitter Station at Llandilo.

As the project progresses, TfNSW will continue to consult with DPE, Roads and Maritime Services, the Office of Environment and Heritage and ARTC, to ensure that they obtain and are able to respond to their inputs regarding a range of issues associated with the corridor. Furthermore, TfNSW will also work with Infrastructure NSW and State Emergency Services regarding flood evacuation; and with services authorities, including Transgrid, to resolve any constraints and potential management measures applicable to the delivery of the OSO in the future.

DRAFT

6.0 Existing environment of the OSO corridor

The multi criteria analysis in **Section 3.0** illustrates the rationale behind the recommended corridor. This chapter describes the existing environment of the recommended corridor. **Section 7.0** describes the impacts on recommended corridor's existing environment and, where a potential impact is identified, any required mitigation measures.

6.1 Land use

Western Sydney is diverse, comprising a complex mix of built and natural features, ranging from high density urban areas to national parks, nature reserves and ecologically endangered communities such as Cumberland Plain Woodland. Land uses include residential, rural, industrial, agricultural, commercial, educational and military.

Western Sydney contains some of Australia's most significant historic landmarks, as well as growth areas that will accommodate a significant proportion of Sydney's future population.

Much of the land within the recommended corridor is zoned for rural and associated land uses. However, specific areas and assets that informed the location the recommended corridor include five nominated areas (North West, Western Sydney Airport, South West, Wilton and Greater Macarthur growth area and an investigation area for new growth area at Penrith and Orchard Hills. These will be home to 590,000 people once fully developed. The Western Sydney Airport at Badgerys Creek is another key land use.

Established residential areas include Ropes Crossing, Jordan Springs, St Marys, Werrington and Claremont Meadows, while established rural village areas include Luddenham, Mulgoa, Wallacia and Cobbitty.

Other uses range from the former International Radio Transmitter Station site at Llandilo, which may potentially become a Regional Park; the former St Marys ADI site; the Commonwealth-owned land at the Defence Establishment at Orchard Hills; Camden Aerodrome; and the Warragamba to Prospect Water Supply pipeline.

The University of Sydney's various campuses include Veterinary Science, University Farms, Greendale Road, Greendale; Werombi Road and Cobbitty Road, Cobbitty and the May and Mount Hunter Camden Campus, and the Western Sydney University has campuses at Kingswood, Werrington North and Werrington South

Agricultural industries or intensive development sites include the Leppington Pastoral Company, The Northern Road, Luddenham; Patons Lane quarry, Orchard Hills; Elizabeth Drive, Luddenham; Greendale Road, Greendale; Willowdene Avenue, Luddenham; Woodbridge Road, Cawdor; and the Boral Concrete Plant, Picton Road, Maldon.

Scheyville National Park, Bents Basin Conservation Reserve; Mulgoa Nature Reserve; Penrith Lakes recreation area, Cranebrook; Castlereagh Nature Reserve; Windsor Downs Nature Reserve; Wianamatta Nature Reserve and Regional Park, Cobbitty Park form part of the area's parks and reserves network.

The land use impacts of reserving the recommended OSO corridor were also examined in the context of other major transport infrastructure in Greater Sydney, considered against policy and strategic planning for growth; the delivery of Western Sydney Airport; Australian and NSW Government objectives for freight services, both for rail and road; and the need to facilitate more employment opportunities in western Sydney, especially through the Western Sydney Airport Growth Area.

DRAFT

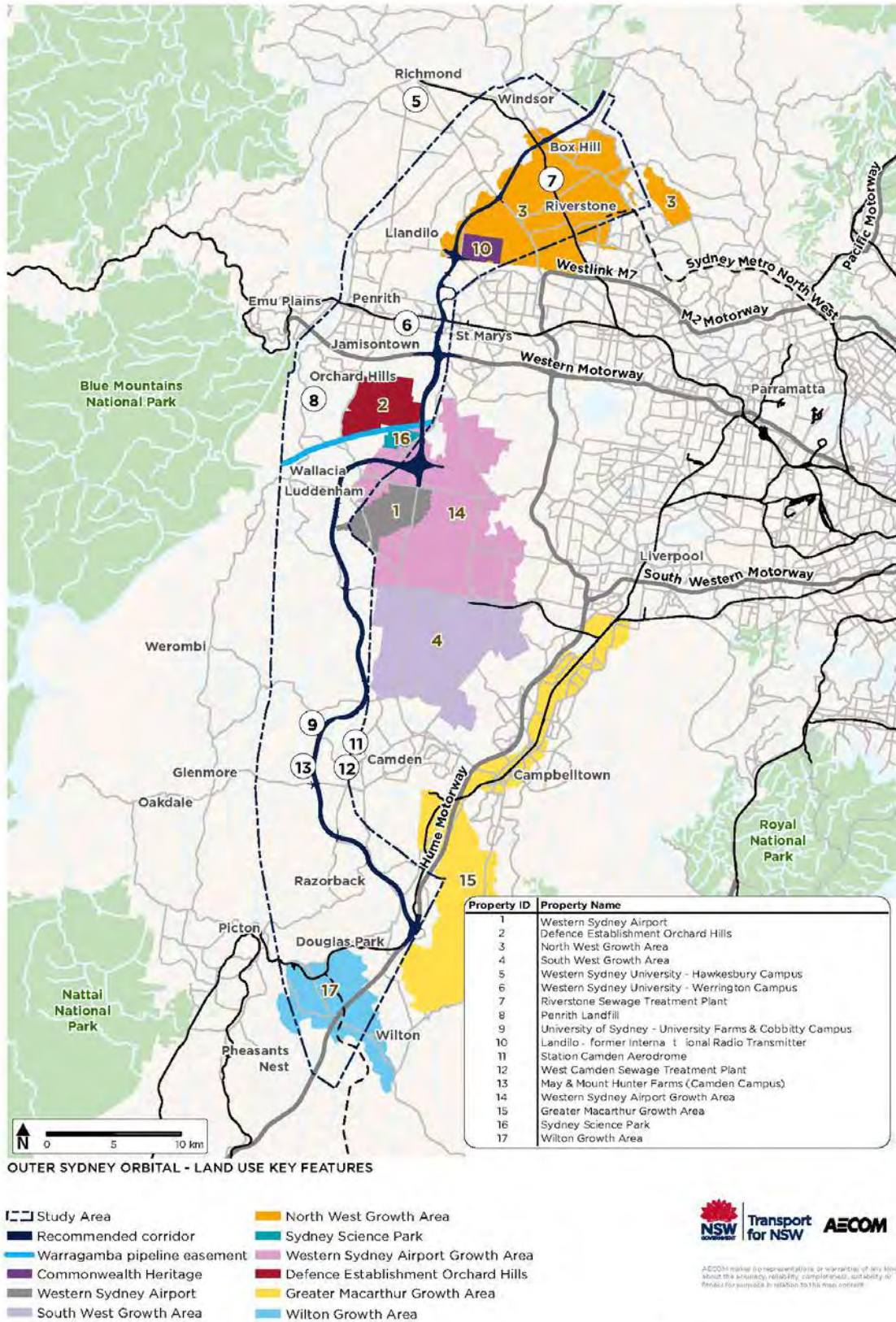


Figure 11 Key land uses within the OSO Study Area and in relation to the recommended corridor

DRAFT

6.2 Traffic and transport

6.2.1 Road network

Major road corridors in the study area experience various levels of congestion, particularly during peak hours, and generally provide lower levels of service and increased travel times for road users.

Passenger road network

State roads are major arterial links and include the main traffic carrying and linking routes that connect the major urban centres such as Sydney and Newcastle and the State's major regional towns. Roads in the OSO study area include:

- M7 Motorway, which provides access to the surrounding western Sydney suburbs, including Blacktown and Rouse Hill
- M4 Western Motorway, which links Parramatta Road at Strathfield with the Great Western Highway at Lapstone at the base of the Blue Mountains
- Hume Motorway, which forms one of Australia's major inter-city highways between Sydney and Melbourne
- Great Western Highway, the major arterial road connecting the Blue Mountains, Penrith and Parramatta and running parallel to the M4 Western Motorway; the main freight route between Sydney and the central west of NSW; a tourist route for destinations such as the Blue Mountains, Jenolan Caves, and Mudgee; and a local road route connecting the many towns and villages
- Richmond Road, which is the main arterial road connecting Blacktown to Richmond
- The Northern Road, a north-south arterial link (part of route A9) that passes through Oran Park, Bringelly, Luddenham, Mulgoa and Glenmore Park
- Castlereagh Road/Mulgoa Road, a major arterial road connecting Castlereagh, Cranebrook, Jamisontown and Glenmore Park to the Penrith CBD
- Picton Road, the arterial road linking Picton to the Hume Motorway and the Princes Highway.

Road freight network

Roads within and immediately adjacent to the OSO study area that are utilised for freight movement include the M4 Western Motorway, Great Western Highway, Hume Motorway, Windsor Road, The Northern Road, Richmond Road, Mulgoa Road, Burragorang Road and Picton Road. Depending on the specific road, heavy vehicles can make up between 10 and 13% of the total traffic volume.

6.2.2 Rail network

Freight rail network

The Metropolitan Freight Network extends from Lidcombe/North Strathfield in the north to Sefton Junction in the west and Marrickville/Port Botany in the south and east.

The Main West Rail Line extends westward from an interface with the Metropolitan Freight Network at Lidcombe effectively to the limit of electrified services at Lithgow. The Main West Rail Line is dominated by passenger rail services. Freight movements are constrained by limited flexibility of freight pathing due to peak period freight curfews (ARTC, 2015). Therefore, the current greater Sydney Metropolitan rail freight network is generally a shared rail network where freight services operate on the same tracks as passenger rail services. In the vicinity of the OSO study area, the freight rail network includes shared freight and passenger lines where passenger services are given priority and curfews limit freight movements during peak periods. As demand for passenger rail increases, restrictions freight services will also increase.

Passenger rail network

Sydney Trains operates passenger rail services along the Main West Rail Line between Central and Emu Plains and the Richmond Line between Blacktown and Richmond. Along the Main South Rail Line, NSW TrainLink operates passenger rail services between Central and Goulburn via

DRAFT

Campbelltown. Freight services share the rail network with passenger services along the Main West and Main South Rail Lines. Freight trains do not operate along the Richmond Line.

Bureau of Transport Statistics (BTS) for rail passenger flows in March 2014 show that approximately 7,000 passengers travelled between Richmond and Blacktown on an average weekday and that 21,000 passengers travelled between Penrith and Blacktown for ongoing travel to Parramatta or Sydney CBD. By Parramatta, approximately 52,000 passengers travelled from the west to the city on an average weekday.

6.3 Socio-economic

The study area includes land in Blacktown, the Blue Mountains City, Canterbury-Bankstown, Camden, Campbelltown, Cumberland, Fairfield, Hawkesbury, Liverpool, City of Parramatta, Penrith, The Hills Shire and Wollondilly LGAs.

A socio-economic review of the broader communities that would experience changed access, traffic and rail conditions in their region as a result of the recommended OSO corridor involved establishing the environmental baseline, assessing the strategic impact of a future motorway and freight line within the recommended OSO corridor on socio-economics and identifying strategic mitigation and management measures.

A social indicators methodology informed the development of the recommended corridor, as changes to key social indicators, such as community demographics, infrastructure and services, may result in potential socio-economic positive and negative impacts.

The study area for the socio-economic assessment considered the broader OSO study area, as well as local and regional study areas determined by geographical statistical boundaries as defined by the Australian Bureau of Statistics (ABS) (ABS, 2010). Regional and local study areas have been used primarily for statistical assessment and comparison of the socio-economic composition of the corresponding regions.

Further assessment of the recommended corridor on key community features is provided in **Section 7.3**.

6.3.1 Residents and communities

Most urban development occurs at the northern section of the recommended corridor, where some communities are well-established, and others are growing (e.g. Rouse Hill, Box Hill and Marsden Park).

By 2031, the OSO study area is expected to grow to 1.9 million residents, meaning more residential development and/or rezoning of land will occur in the near future.

6.3.2 Community infrastructure

Local and regional town centres within or adjacent to the recommended corridor provide education, health, aged care and community facilities that are essential to meeting the local needs. Other essential infrastructure includes emergency services facilities, places of worship and recreational areas.

Community facilities within and around 1 km of the recommended corridor are detailed below.

Educational facilities

Educational facilities are predominantly clustered around local and regional town centres, and mainly in the north, which correlates with the presence of established and developing urban areas. These include primary and secondary schools within neighbourhood centres.

No child care centres, primary or secondary schools are located within the recommended corridor. However, 23 educational facilities are located within a kilometre from the centre line of the recommended corridor, with the majority of these facilities located in Sections 2, 3 and 4.

The two University of Sydney campuses within sections 3 and 4 of the recommended corridor were established in 1936. The University of Sydney also has other land holdings in Camden, Cobbitty, Bringelly and Badgerys Creek. The recommended corridor runs through the John B Pye, Wolverton

DRAFT

and Coates Park Farms, the Camden and Cobbitty Campus as well as the south east portion of the May and Mt Hunter Farms site.

The Camden-Cobbitty campus has established research facilities, teaching operations and supporting infrastructure that would be difficult to replicate. The campus is used as a veterinary/agricultural teaching school, and includes Veterinary Teaching Hospital and Veterinary Hospital Camden Clinics, Plant Breeding Institute, Centre for Carbon Water and Food, Precision Agricultural Laboratory, Pulsford Laboratory, Hydrology and Geo-Information Sciences Laboratory, Resources, Energy and Environmental Markets, a robotic dairy and specialist piggery. Approximately 1,200 students and 250 research, teaching and administrative staff use the facilities each year.

The Western Sydney University has campuses located in Bankstown, Nirimba (Quakers Hill), Campbelltown, Hawkesbury, Lithgow, Parramatta/ Westmead and Penrith (Kingswood, Werrington North and Werrington South). The location of Western Sydney University campuses do not influence the location of the recommended corridor.

Health and aged care facilities

Health and aged care facilities are also primarily clustered around local and regional centres in the north. While there are no local health facilities in the recommended corridor, two aged care facilities are within a kilometre of Section 1.

Major health centres at Westmead, Kingswood (Nepean Hospital), Blacktown, Fairfield and Campbelltown are not within the vicinity of the recommended corridor.

Community facilities

Community facilities, including libraries, town halls, community halls, community centres and places of worship are clustered around local and regional centres along the recommended corridor. The eastern portion of the Dunheved Golf Club and the St Marys Tennis Centre are located in Section 2 of the recommended corridor. Twelve other facilities are located within a kilometre of the corridor centre line.

Active and passive recreational land

Recreational land represents around four per cent of land in the OSO study area. Section 1 of the recommended corridor passes through the Wianamatta Regional Park at Ropes Crossing, which has been recently upgraded to improve community access and includes picnic areas and walking and cycling tracks.

Five recreational spaces within Section 2 of the recommended corridor include Blair Oval at St Marys which is home to the Nepean Athletics Club, St Marys Tennis Courts, The Kingsway playing fields and rugby fields at St Marys, and a portion of Samuel Marsden Reserve which includes the Colyton St Clair Chiefs Baseball Club. A paintball centre at Cawdor is located within Section 5 of the recommended corridor. An additional 62 recreational facilities are located within a kilometre of the corridor.

6.3.3 Community identity, values and aspirations

The recommended corridor would transect different community types, including local and regional town centres, areas of established urban development, greenfield land release areas, and rural and agricultural land.

A review of community strategic planning documents relevant to each LGA identified values and aspirations specific to each community to gain an insight into how the community may perceive potential socio-economic impacts and assists in the assessment of indirect impacts on community identity, cohesion and sense of place.

6.3.4 Employment and industry

As noted in Section 2.0, the Western Parkland City is identified as a trade, logistics, advanced manufacturing, tourism, health, education and science hub, anticipated to accommodate a third of Greater Sydney's jobs, underpinned by investment in Western Sydney Airport. Analysis for the Department of Infrastructure and Regional Development (DIRD) estimates that by 2031 Western Sydney Airport will provide an additional 13,169 direct and 14,777 indirect jobs related to airport operations, airport retail and business park activity (Ernst & Young, 2017).

DRAFT

To meet this ambition, the Broader Western Sydney Employment Areas, near Luddenham and the Western Sydney Airport Growth Area, which includes part of the Broader Western Sydney Employment Area, will include dedicated land for future employment uses. The North West, South West, Greater Macarthur and Wilton growth areas are planned for future residential and mixed use development.

Much of the land related to the recommended corridor is zoned for rural and associated land uses. The prevalence of rural zoned land within the recommended corridor indicates that this land may generate income for owner-occupiers as well as employment in agricultural related industries.

6.3.5 Transport infrastructure

Demand for passenger and freight movements in the region will increase as a result of strong population and employment growth and investment is also needed to address Sydney's road and rail transport network deficiencies.

The *Western Sydney Infrastructure Plan* described in **Section 2.1.1** aims to leverage the economic investment in Western Sydney Airport to deliver upgrades to roads and transport linkages.

6.3.6 Travel patterns

In 2016, 75.2 per cent of residents in the study area travelled to work as either a driver or passenger via private vehicle. By comparison, the proportion of people travelling to work via private vehicle as either driver or passenger in Greater Sydney 59.8 per cent.

Trips taken by truck comprised 2.3 per cent of the average weekday travel mode share in the local study area. By comparison, the proportion of people travelling to work by truck in Greater Sydney was 1.1 per cent.

In the local study area, 4.8 per cent of residents travelled to work by train compared to 10.9 per cent in Greater Sydney. Train travel is not considered a key method of transport for journeys to work in the study area.

6.4 Non-Aboriginal heritage

Cultural significance is defined in the Australia ICOMOS Charter for the conservation of places of cultural significance (the Burra Charter) as meaning "aesthetic, historic, scientific or social value for past, present or future generations" (Australia ICOMOS, 1999). Australia's cultural resources are assessed and based on the level of significance, listed on one of a number of databases including the World Heritage List, Commonwealth Heritage List, National Heritage List, Register of the National Estate (non-statutory), NSW State Heritage Register, NSW State Heritage Inventory, Section 170 Registers, Regional Environmental Plans, relevant LEPs and the NSW National Trust Heritage List (non-statutory).

This draft SEA includes a review of statutory and non-statutory heritage databases, available reports and Statements of Significance for items identified within the recommended corridor, utilising the guideline *Assessing Heritage Significance* (NSW Heritage Office, 2001) and, if relevant, *Assessing Significance for Historical Archaeological Sites and 'Relics'* (NSW Heritage Branch, 2009).

6.4.1 Heritage places and sites

As far as possible, heritage sites have been avoided during corridor development, in particular sites recognised for Commonwealth, National and State heritage values. However, a number of heritage items and places still fall within or adjacent to the recommended corridor.

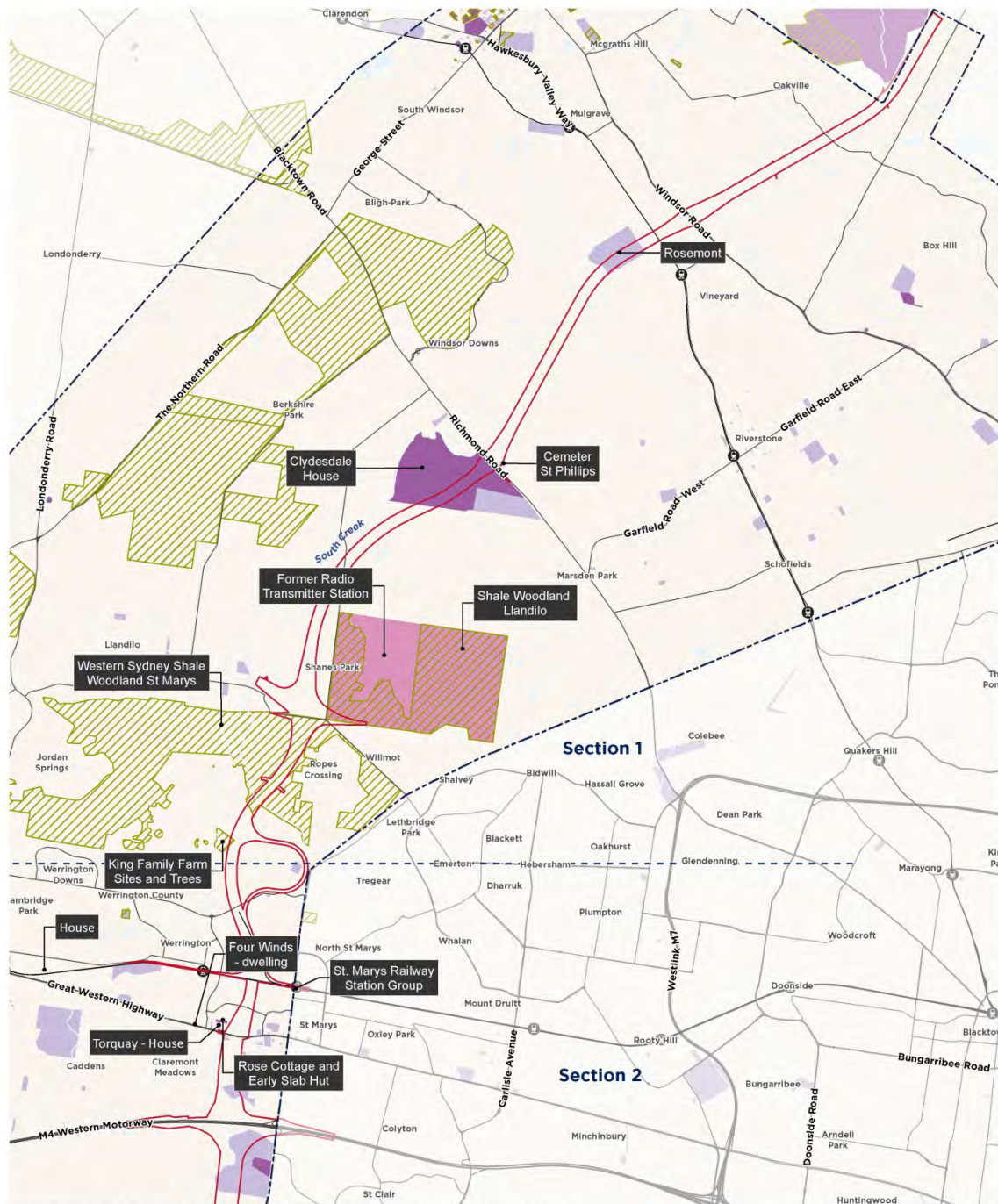
Many local listings are associated with previous rural and agricultural land uses and homesteads, primarily within the central and southern sections of the recommended corridor. The recommended corridor incorporates a number of non-Aboriginal heritage sites including State-listed sites and the associated floodplain landscapes within which they are sited. **Table 10** outlines the non-Aboriginal heritage listed resources within the recommended corridor and these are shown in **Figure 12** to **Figure 14**. Strategic assessment of the recommended corridor on these heritage items is provided in **Section 7.4**.

DRAFT

Table 10 Heritage-listed resources within and adjacent to the corridor

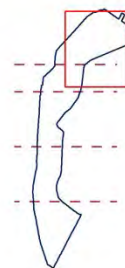
Section	Heritage Resource	Designation	Location in relation to the recommended corridor
1	Shale Woodland Llandilo	Commonwealth Heritage List – Listed place	Within the corridor (part)
	Scheyville National Park	State Heritage Register curtilage	Adjacent to the corridor
	Clydesdale House and curtilage – Grand house, barn and cottage	State Heritage Register curtilage	Within the corridor (part)
	Cemetery – St Phillips	Local Heritage	Within the corridor (part)
	Rosemont	Local Heritage	Within the corridor (part)
2	St Marys Railway Group	State Heritage Register Local Heritage	Within the corridor (part)
	Wool Pack Inn Ruin	Local Heritage	Within the corridor (wholly)
	Torquay - House	Local Heritage	Within the corridor (part)
	Margaret Farm – house, barn and tannery site	Local Heritage	Within the corridor (part)
	Memorial Cairn	Local Heritage	Within the corridor (part)
3	Luddenham Road Alignment	Local Heritage	Within the corridor (part)
	McGarvie-Smith Farm	Local Heritage	Within the corridor (part)
	The Fleurs Radio Telescope Site	Local Heritage	Within the corridor (part)
4	Pomere Grove Teen Ranch	Local Heritage	Within the corridor (part)
	Cobbity Weir	Local Heritage	Within the corridor (part)
	Denbigh Estate	State Heritage Register curtilage	Adjacent to the corridor
5	Cawdor Creamery Site	Local Heritage	Within the corridor (part)
	Cawdor Dairy	Local Heritage	Within the corridor (part)
	Wooden Mileposts	Local Heritage	Within the corridor (wholly)
	Camden Park Estate and Belgenny Farm	State Heritage Register curtilage	Adjacent to the corridor

DRAFT



OUTER SYDNEY ORBITAL - NON-ABORIGINAL HERITAGE ITEMS WITHIN THE OSO CORRIDOR - NORTH

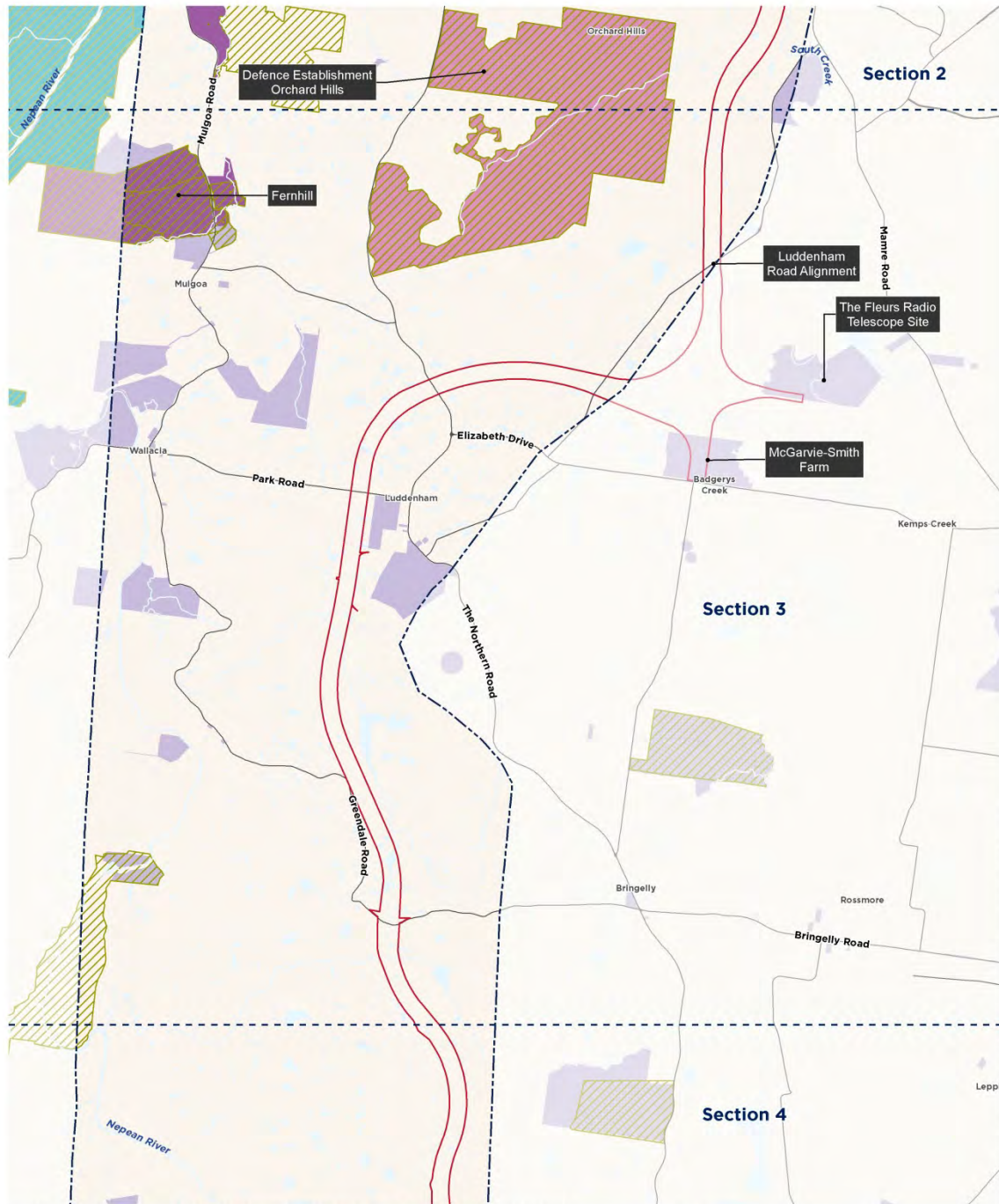
- OSO Study Area
- Recommended corridor
- Commonwealth Heritage
- State Heritage
- Local Heritage



Data provided by OEH has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

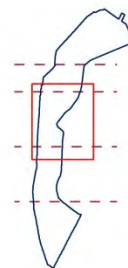
Figure 12 Heritage within the recommended corridor – A

DRAFT



OUTER SYDNEY ORBITAL - NON-ABORIGINAL HERITAGE ITEMS WITHIN THE OSO CORRIDOR - CENTRAL

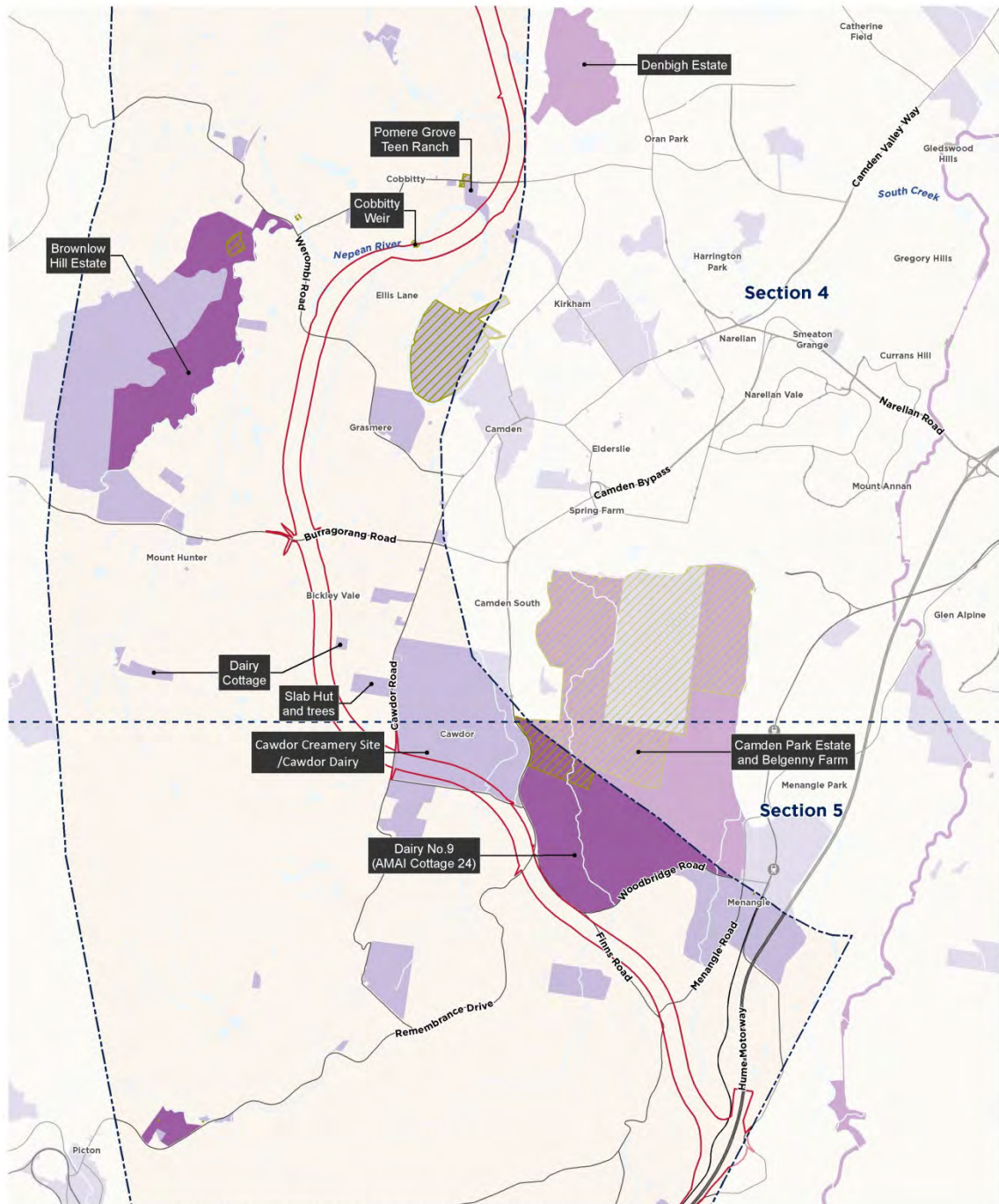
- OSO Study Area
- Recommended corridor
- Commonwealth Heritage
- National Heritage List
- State Heritage
- Local Heritage



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

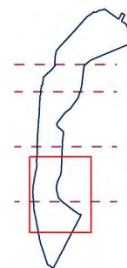
Figure 13 Heritage within the recommended corridor – B

DRAFT



OUTER SYDNEY ORBITAL - NON-ABORIGINAL HERITAGE ITEMS WITHIN THE OSO CORRIDOR - SOUTH

- OSO Study Area
- Recommended corridor
- State Heritage
- Local Heritage



Data provided by OEH has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 14 Heritage within the recommended corridor – C

DRAFT

6.5 Aboriginal heritage

Aboriginal heritage can be seen as the material traces (stone or glass artefacts, scarred trees) left by people in the past, as well as the intangible aspects (cultural knowledge and practices) of a society. Aboriginal heritage is interwoven into Australian non-Aboriginal heritage and efforts to maintain links to traditional lands, practices and interests.

An understanding of Aboriginal heritage in the study area is based on a desktop review of:

- the Aboriginal Heritage Information Management System (AHIMS) register for previously recorded Aboriginal sites and places within the OSO study area
- relevant Aboriginal archaeological assessment reports, Growth Area Plans and other relevant plans such as the Wianamatta Regional Park Plan of Management
- existing environment, with specific consideration of archaeologically sensitive landscapes and Aboriginal archaeological implications.

Consultation with the relevant Local Aboriginal Land Councils has also occurred.

The known Aboriginal heritage values are represented in the AHIMS sites registered within the bounds of the corridor, and unknown values can be considered through landscape sensitivity analysis.

6.5.1 Registered sites

The Office of Environment and Heritage (OEH) maintains the AHIMS, which includes information about Aboriginal objects that have been reported, information about Aboriginal Place which have been declared by the Minister of the Environment to have special significance with respect to Aboriginal culture and archaeological reports.

AHIMS sites identified in the recommended corridor may be impacted. The significance of sites is based on cultural value (determined by Aboriginal representatives) and the scientific value, determined by factors such as research potential and rarity. While artefact scatters and isolated artefacts are common, the rarity of sites with art, grinding grooves, quarries and stone arrangements generally lead to them being assessed as having higher cultural and scientific significance. As a result, these rarer site types are likely to represent increased sensitivity constraints.

The site types that are known to occur in the recommended corridor include:

- Artefact scatters - objects such as stone tools, spears, manuports, grindstones, discarded stone flakes, modified glass or shell demonstrating evidence of use of the area by Aboriginal people
- Isolated artefact sites - the same possible material as in an artefact scatter but consisting of only a single artefact
- Potential Archaeological Deposits (PADs) – an area where artefacts may or may not have been identified where further subsurface artefacts and/or other cultural materials are thought likely to occur in a subsurface deposit.

While other site types have been identified within the OSO study area (grinding grooves, rock shelters, modified trees, art sites, Ceremony and Dreaming sites or stone arrangements), these were not identified within the recommended corridor. It should be noted that AHIMS sites are only those that have been previously identified; the system does not account for subsurface potential that may be associated with the surface artefact. AHIMS sites within the recommended corridor are identified in **Table 11**. Sites that have been identified as 'destroyed' have not been included in the assessment.

DRAFT

Table 11 Valid AHIMS Sites

Section	AHIMS ID	Site Type
1	45-5-0992	Quarry
	45-5-3180	Artefact Scatter
2	45-5-0270	Artefact Scatter
	45-5-1070	Artefact Scatter
	45-5-1071	Artefact Scatter
	45-5-3567	Isolated Artefact
	45-5-3568	Artefact Scatter
3	45-5-3804	Isolated Artefact
	45-5-4786	Artefact Scatter
	45-5-4936	Artefact Scatter
	45-5-4748	Artefact Scatter
	45-5-4750	Artefact Scatter
	45-5-4747	Artefact Scatter
5	52-2-3193	Artefact Scatter
	52-2-3841	Artefact Scatter
	52-2-3224	Artefact Scatter
	52-2-3194	Isolated Artefact
	52-2-3054	PAD
	52-2-3193	Artefact Scatter
	52-2-3841	Artefact Scatter
	52-2-3672	Artefact Scatter
	52-2-3224	Artefact Scatter
	52-2-3194	Isolated Artefact
	52-2-3054	PAD
	52-2-3193	Artefact Scatter
	52-2-3224	Artefact Scatter
	52-2-3194	Isolated Artefact
	52-2-3054	PAD

6.5.2 Areas with Aboriginal Cultural Heritage Values

Values relating to the Aboriginal cultural significance of the recommended corridor can only be determined through consultation with Aboriginal representatives. As only limited consultation has occurred so far, it is not possible to fully assess the cultural values. Cultural attachment to the previously recorded AHIMS sites has not been determined, nor has assessment of other cultural values across the wider landscape. Further Aboriginal consultation is required.

6.5.3 Areas of Archaeological Sensitivity

Areas of archaeological sensitivity were mapped (refer **Figure 12** to **Figure 14**) in relation to sensitive landforms close to watercourses, specifically on landforms such as creek banks and 'flats' (i.e. flood/drainage plains), terraces and bordering lower slopes. While surface material may not be present at these locations, they can be classified as areas of archaeological sensitivity, where Aboriginal objects are considered likely to occur in subsurface deposits.

Approximately 477 hectares of potential archaeological sensitivity associated with higher-order watercourses which may be impacted by the recommended corridor. These areas would undergo

DRAFT

further field investigation to determine if Aboriginal archaeological sites are present and to assess identified areas.

6.6 Biodiversity

A desktop review of biodiversity constraints referenced:

- Threatened Species Records - Atlas of NSW Wildlife (Bionet) (OEH).
- Vegetation Mapping - Native vegetation community mapping of the Cumberland Plain (OEH).
- Western Sydney Priority Areas - Priority areas for conservation identified through the Cumberland Plain recovery plan (OEH).
- Protected lands - NSW NPWS Estate (OEH).
- Western Sydney Growth Areas non-certified lands (DPE).
- Mapped Existing native vegetation (ENV) within the Western Sydney Growth Areas (DPE).
- Cumberland subregion Biodiversity Investment Opportunities Map (BIO Map) (OEH).
- Biobanking site register.
- Wianamatta Regional Park Masterplan.

Identified biodiversity values are primarily areas of threatened vegetation that provide significant habitat for threatened flora and fauna species. Some of these areas include gazetted reserves, as well as areas that have been previously identified as 'Priority Conservation Lands' as part of the Cumberland Plain Recovery Plan (DECC 2010) and associated regional biodiversity corridor linkages. An overview of the biodiversity values present within the recommended corridor are shown on **Figure 15 to Figure 17**.

Land management and biodiversity conservation reforms commenced on 25 August 2017. The reforms repealed the *Threatened Species Conservation Act 1997* (TSC Act) and several parts and provisions of the *National Parks and Wildlife Act 1974* that dealt with threatened species and communities, and protected wildlife. Provisions under the EP&A Act that dealt with threatened species impact assessments were also repealed. These provisions have been replaced with the *Biodiversity Conservation Act 2016* (BC Act).

6.6.1 Vegetation communities

Vegetation communities throughout the recommended corridor include native and exotic communities, as well as threatened ecological communities (TECs). Approximately 230 hectares of threatened ecological communities (TECs, vegetation listed as an EEC or CEEC under the TSC Act or *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), occurs throughout the recommended corridor in varying condition. The larger proportion of this vegetation occurs within Sections 1 and 4 of the corridor. The majority of the threatened vegetation in good condition within this corridor option occurs within Section 1.

TECs identified in the study and listed under the NSW BC Act are:

- Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (EEC).
- Cumberland Plain Woodland in the Sydney Basin Bioregion (CEEC).
- Moist Shale Woodland in the Sydney Basin Bioregion (EEC).
- River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions (EEC).
- Shale Gravel Transition forest in the Sydney Basin Bioregion (EEC).
- Shale Sandstone Transition Forest in the Sydney Basin Bioregion (CEEC).
- Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (EEC).

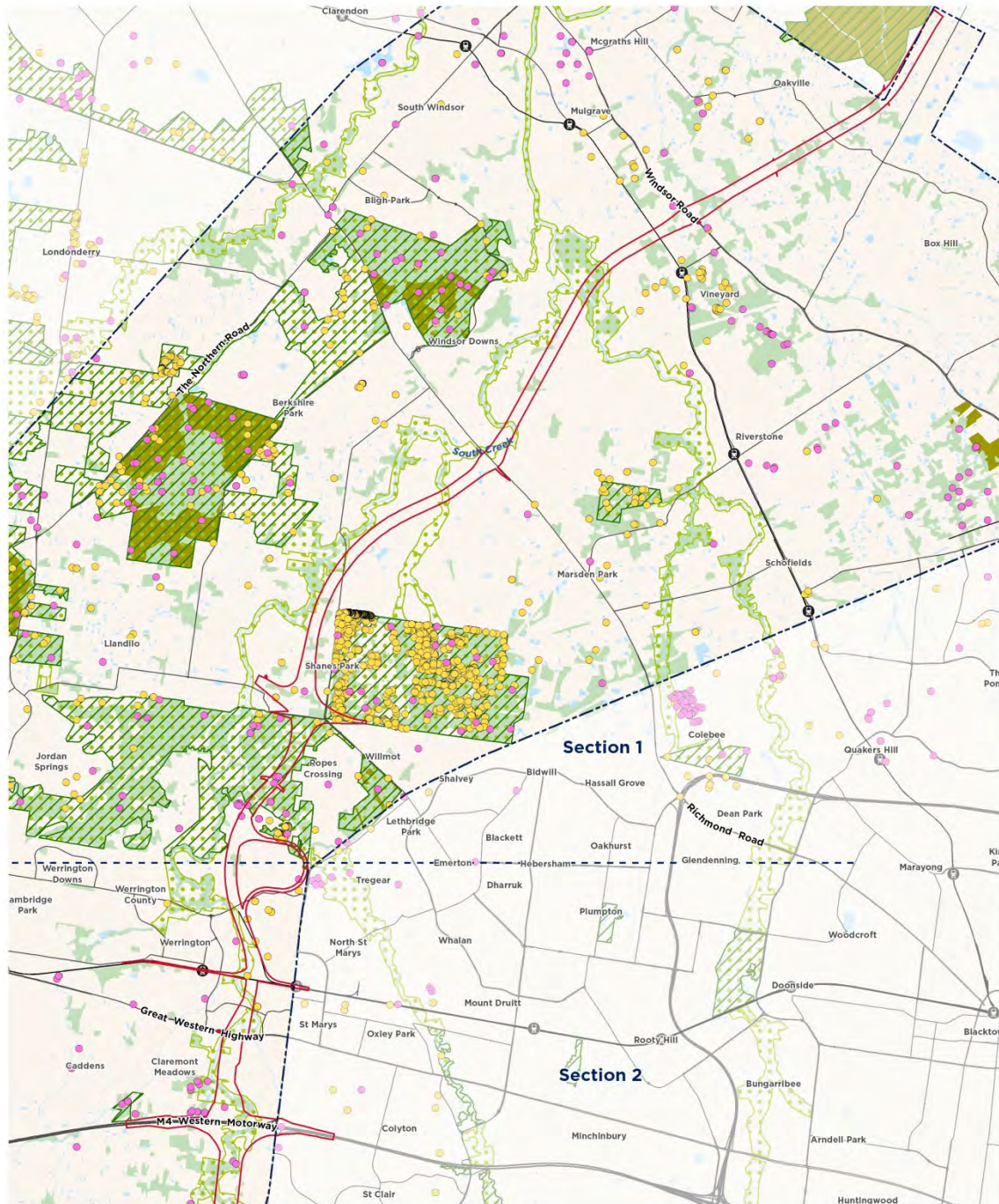
DRAFT

- Western Sydney Dry Rainforest in the Sydney Basin Bioregion (EEC).

Four critically endangered ecological communities found in the study area and listed under the EPBC Act are:

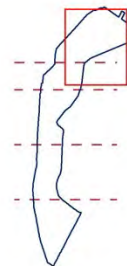
- Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion.
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest.
- Shale Sandstone Transition Forest of the Sydney Basin Bioregion.
- Western Sydney Dry Rainforest and Moist Woodland on Shale.

DRAFT



OUTER SYDNEY ORBITAL - BIODIVERSITY - NORTH

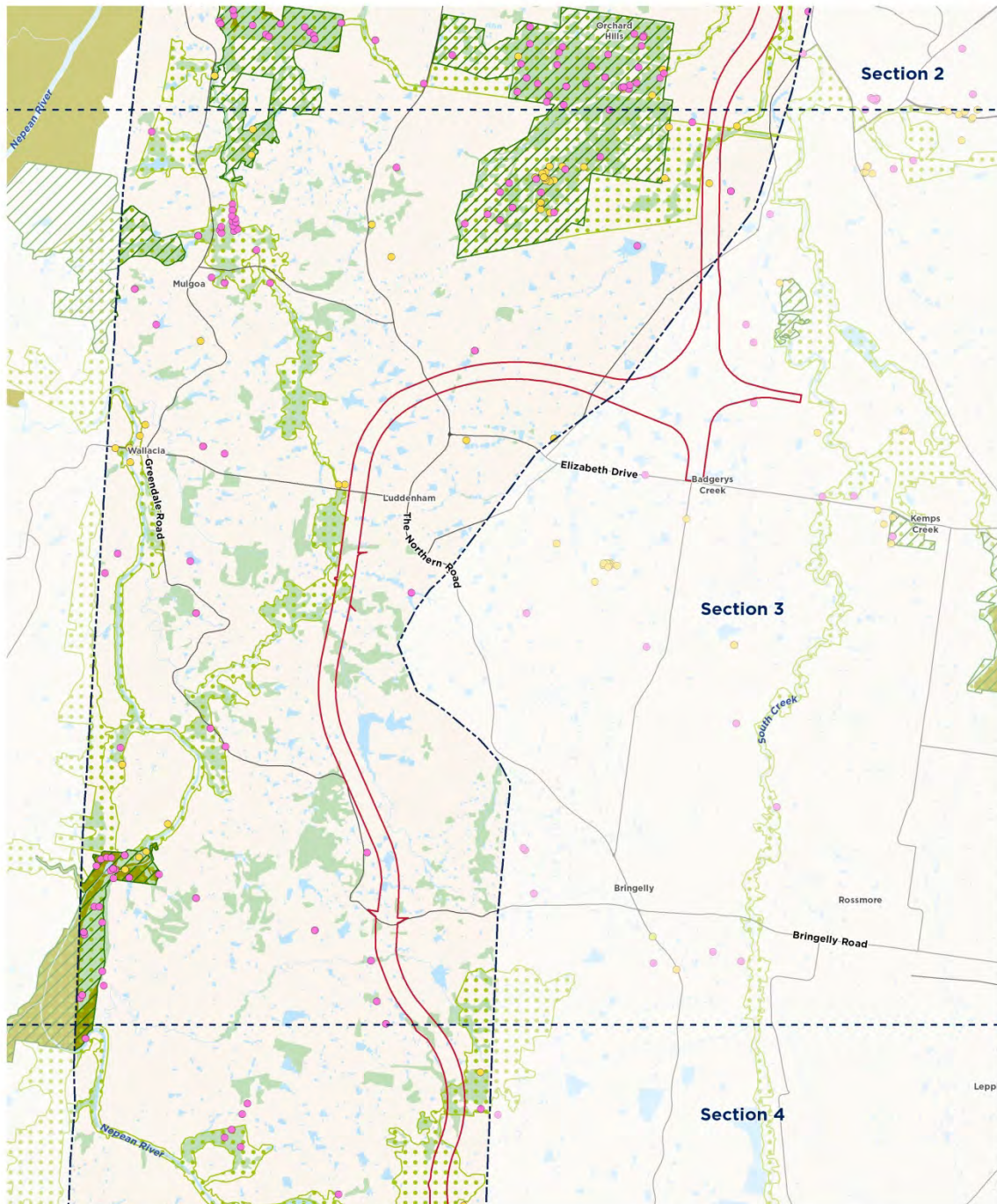
- OSO Study Area
- Recommended corridor
- Fauna record
- Flora record
- Cumberland Plain Priority Conservation Lands
- Regional corridors
- Threatened Ecological Communities
- NPWS Estate



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

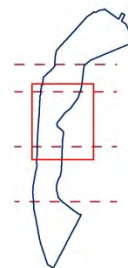
Figure 15 Biodiversity within and adjacent to the recommended corridor – A

DRAFT



OUTER SYDNEY ORBITAL - BIODIVERSITY - CENTRAL

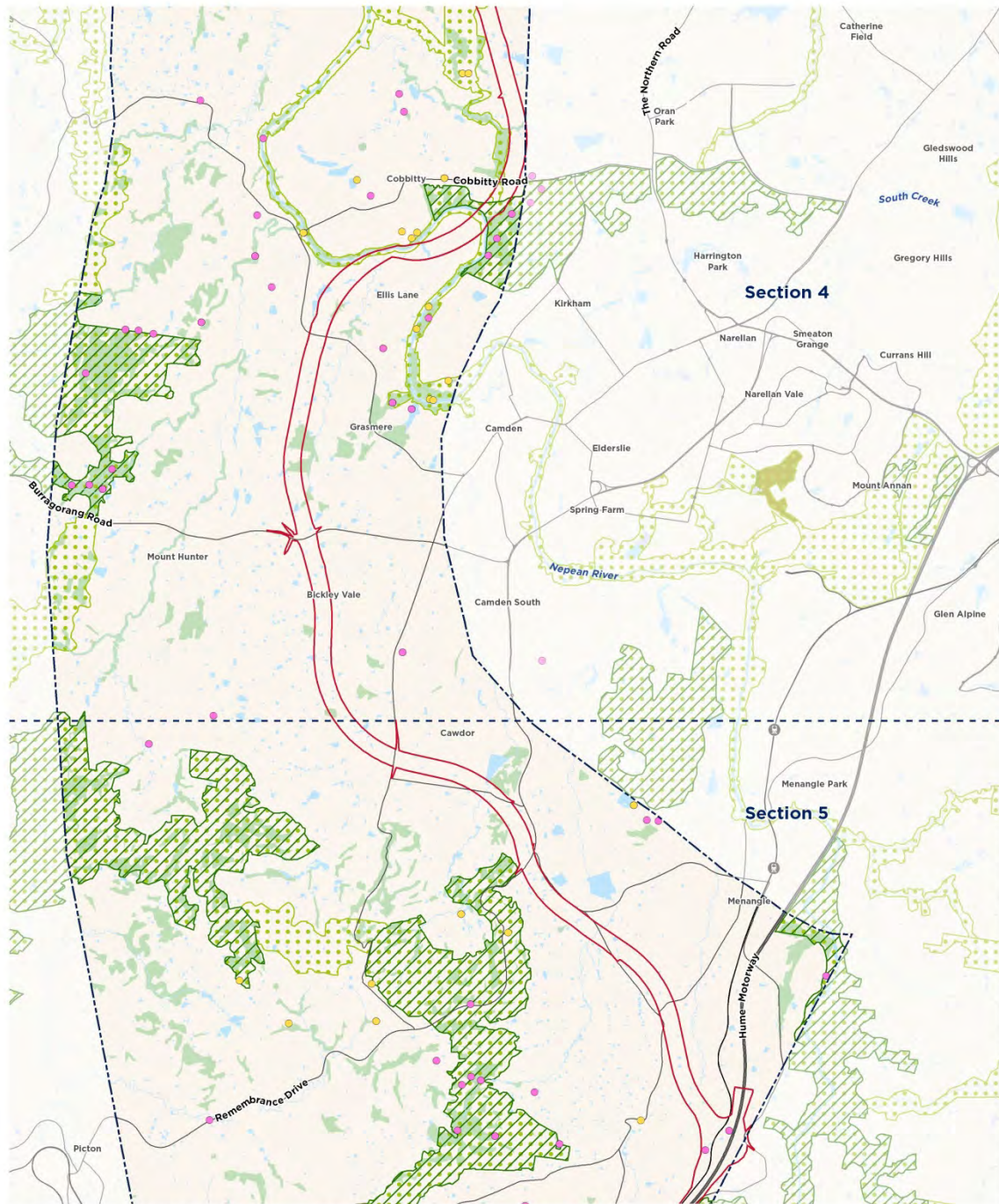
- OSO Study Area
- Recommended corridor
- Fauna record
- Flora record
- Cumberland Plain Priority Conservation Lands
- Regional corridors
- Threatened Ecological Communities
- NPWS Estate



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

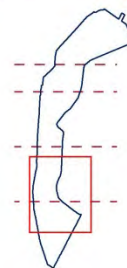
Figure 16 Biodiversity within and adjacent to the recommended corridor – B

DRAFT



OUTER SYDNEY ORBITAL - BIODIVERSITY - SOUTH

- OSO Study Area
- Recommended corridor
- Fauna record
- Flora record
- Cumberland Plain Priority Conservation Lands
- Regional corridors
- Threatened Ecological Communities
- NPWS Estate



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 17 Biodiversity within and adjacent to the recommended corridor – C

DRAFT

The recommended corridor also includes areas of non-certified land containing existing native vegetation (ENV) within the North West Growth Area that has been identified for conservation and vegetation retention as part of the biocertification order for SEPP (Sydney Region Growth Centres) 2006. These lands contribute to an offset target as part of the development of the Growth Area and are generally made up of vegetation communities, such as Cumberland Plain Woodland, which have a high offset demand in the Cumberland Plain and are becoming more difficult to secure as offsets. The recommended corridor passes through approximately 124 ha of non-certified land, including approximately 21 hectares of ENV.

The study area includes ten priority conservation land (PCL) areas identified in the Cumberland Plain Recovery Plan. These are larger, consolidated, viable areas of significant habitat within the Cumberland Plain containing a large proportion of threatened vegetation communities. They are core biodiversity areas and will be secured for biodiversity conservation and protection as an offset to impacts in the Cumberland Plain.

The recommended corridor traverses three PCLs, mainly impact threatened native vegetation at Shanes Park, Llandilo and Wianamatta Regional Park in Section 1 and at Cobbitty in Section 4.

6.6.2 Threatened flora and fauna

Of the 40 threatened species identified as occurring in the OSO study area, a number have limited or localised habitat throughout the corridor and species that have a close association with the more prevalent threatened ecological communities in the corridor. The key species identified include:

- Giant Burrowing Frog – in and around the Riverstone area (localised habitat)
- Green and Golden Bell Frog – in the north of the recommended corridor (localised habitat)
- Cumberland Plain Land Snail – across the central and northern parts of the recommended corridor occurring within Cumberland Woodland
- Dural Land Snail – across the central and northern parts of the recommended corridor associated with Shale Sandstone Transition Vegetation. The snail has been recently listed as endangered (EPBC Act)
- Large-footed Myotis – across the recommended corridor (habitat is prevalent within existing threatened ecological communities)
- Koala – primarily in the south of the corridor (localised habitat)
- Grey-headed Flying-fox – occurs across the recommended corridor, with a lesser potential to occur in the very south (woodland communities habitat with identified Grey-headed Flying-fox camps occurs in the lower Blue Mountains adjacent to the OSO study area)
- Threatened owl species (Powerful Owl, Masked Owl, and Barking Owl) – occur across the recommended corridor, in the areas of native vegetation containing trees with large hollows suitable to be used for nesting by these species (associated with the larger, more consolidated areas of native vegetation).

Of the 28 threatened species listed under the BC Act and EPBC Act identified as occurring in the area, prevalent threatened flora species are:

- *Dillwynia tenuifolia* - across the northern half of the recommended corridor
- *Grevillea juniperina* subsp. *juniperina* – across the northern part of the recommended corridor
- *Persoonia nutans* – across the northern part of the recommended corridor
- *Pimelea spicata* – in areas around Llandilo and Mulgoa.

6.6.3 Wildlife connectivity

An identified habitat corridor 'Woronora Plateau to Warragamba' crosses the very southern end of the corridor from east to west associated with the path of the Nepean River. This habitat corridor is part of an important habitat connection from the coast to the mountains.

DRAFT

Regional habitat corridors that provide significant habitat connectivity in the region are associated with the riparian areas of the rivers and creeks in the recommended corridor. These have also been identified as forming a series of habitat linkages between PCLs across the landscape. Many of the habitat corridors including riparian areas also include threatened vegetation and potential fish habitat. These are found along the Nepean River in the south of the recommended corridor and South Creek in the north.

The recommended OSO corridor traverses identified regional habitat corridors that link priority conservation lands, primarily between Box Hill and Dunheved (Section 1) and Cobbitty and Camden Park (Section 4). The recommended OSO corridor traverses the South Creek regional habitat corridor for the majority of Section 2 as a consequence of avoiding residential communities such as St Marys and Werrington.

South Creek and the Nepean River are identified by the NSW Department of Primary Industries as containing "Key Fish Habitat". They provide important habitat for a number of native fish species (such as the Australian bass) and macroinvertebrates (insects, prawns, crayfish and freshwater mussels) particularly in areas which are supported by riparian vegetation.

6.6.4 Protected areas

Gazetted reserves across the OSO study area are reserved for biodiversity conservation, public recreation and education under the *National Parks and Wildlife Act 1974* (NPW Act). Gazetted reserves have been specifically avoided in selection of the recommended corridor wherever possible. However, the Wianamatta Regional Park (in part) was recently gazetted as a regional park under the NPW Act and is traversed by the recommended corridor as a consequence of balancing priorities to avoid and minimise impacts to residential communities.

A Plan of Management and a Landscape Masterplan for Wianamatta Regional Park identifies core areas for heritage and biodiversity conservation. The biodiversity values include threatened ecological communities, such as Cumberland Plain Woodland, Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest, and River-Flat Eucalypt Forest.

These vegetation communities provide habitat for threatened species recorded within and in the vicinity of Wianamatta Regional Park and provide an important habitat link along the South and Ropes Creek corridor. The core area of the Regional Park identified for biodiversity conservation is based around the central and western parts of the Regional Park, where there has been the least disturbance. Areas to the east of the Regional Park have the greatest history of disturbance and have been identified as a visitor precinct.

Sites with established biobanking agreements made under the former TSC Act (now transferred to the BC Act) in the study area include two sites at Mulgoa and five sites from Cobbitty to Appin. The majority are associated with the PCLs identified in the Cumberland Plain Recovery Plan. Biobanking sites within the recommended corridor have been specifically avoided in selection of the recommended corridor.

6.7 Surface water and flooding

There are two major river catchments and a number of other waterways within the recommended corridor. Once delivered, the OSO has the potential to influence flooding, water quality and water use. As such, an assessment was undertaken based on:

- Base GIS layers such as watercourse lines, topographic contours, cadastral parcels, roads, rail, terrain mapping (LiDAR) and aerial imagery
- GIS layers such as acid sulfate soils, environmentally sensitive areas, and supplied drainage infrastructure layers from Blacktown and Penrith councils
- Previous flood and floodplain risk management studies and/or compilation of flood mapping within the study area:
 - *Penrith Overland Flow Flood "Overview Study"* (Cardno, August 2006) - Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3) – flood extent database.

DRAFT

- *Hawkesbury Floodplain Risk Management Study and Plan Volumes 1-3* (Bewsher, 2012) – flood mapping database.
 - *Rouse Hill Flood Study* (WMA, 2014) – flood model results.
 - *Updated South Creek Flood Study* (Worley Parsons, Jan 2015) – flood model results.
 - *Nepean River Flood Study* (Worley Parsons, July 2014), Draft Issue No. 2 – flood model, results and reporting.
 - *RMS 2015 Probabilistic Drawdown Flood Surfaces* (Infrastructure New South Wales, 2015) – flood mapping dataset.
 - South Creek TUFLOW model developed for assessment of the recommended corridor (AECOM, 2016).
- Flood results and mapping obtained for the 100 year ARI, in accordance with the primary 100 year ARI (i.e. 1% AEP) minimum flood immunity design criteria adopted for both the road and rail infrastructure.

Watercourses and areas of flooding are shown in **Figure 18** to **Figure 20**.

6.7.1 Catchments and waterways

South Creek and its tributaries generally run south to north through Sections 1, 2 and 3 of the corridor. From its headwaters in Section 3, South Creek runs through St Marys and Werrington before its confluence with the Hawkesbury River around Windsor.

The headwaters of the Nepean River flow into Lake Nepean, Lake Avon, Lake Cordeaux and Lake Cataract before passing through Douglas Park and Menangle. The Nepean River passes Camden and Cobbitty and continues to its confluence with the Hawkesbury River at Wallacia.

The recommended corridor crosses 14 significant watercourses and floodplains. As part of the options assessment for the OSO, these watercourses have been considered and areas where cross drainage is required have been identified. **Table 12** outlines the significant watercourses and flood plains that would require structures.

Table 12 Existing watercourses crossed by the OSO recommended corridor

Section	Waterway crossings
Section 1	McKenzies Creek Killarney Chain of Ponds Eastern Creek South Creek (and tributaries) Ropes Creek
Section 2	South Creek (and tributaries) Blaxland Creek
Section 3	Creek near Patons Lane, Luddenham Cosgroves Creek Bringelly Creek Duncans Creek
Section 4	Cobbitty Creek Nepean River Sickles Creek
Section 5	Matahil Creek Navigation Creek Creek near Remembrance Drive, Camden Park

6.7.2 Existing flood conditions

The description of existing flooding conditions is based on hydrodynamic modelling. The existing flood conditions from Box Hill to Cobbitty (Sections 1, 2 and 3), compare a model covering the South Creek

DRAFT

floodplain with results from modelling for Blacktown and Penrith councils. A hydraulic model of the Nepean River floodplain, originally developed for Camden Council, has informed the description of the existing flood conditions for Sections 4 and 5.

The flooding conditions affecting the corridor are mostly influenced by South Creek and the Nepean River. South Creek and its tributaries generally run south to north through Sections 1, 2 and 3 of the corridor. Sections 4 and 5 are subject to a combination of long duration flooding, where the corridor traverses the floodplain of the Nepean River, and shorter duration flooding associated with smaller local tributaries which intersect the corridor.

Existing flood conditions in Section 1 are influenced by backwater from the Hawkesbury-Nepean River system. Significant flood events in the Hawkesbury-Nepean can inundate the lower portion of the South Creek floodplain to over 10 metres. The critical duration for South Creek is approximately 36 hours while that of the Hawkesbury-Nepean River system, at the confluence of South Creek, is 72 or more hours. The recommended corridor is therefore most vulnerable to long duration storms and flood events.

The section of the recommended corridor between Badgerys Creek and Cobbitty contains a combination of terrains. The terrain towards the north of the section is similar to Section 2, with some floodplain areas of South Creek, Badgerys Creek and Cosgroves Creek adjacent to the recommended corridor. The critical durations of waterways in Section 3 are shorter than for Sections 1 and 2 as they are closer to the headwaters of the South Creek Catchment.

The most significant flooding in the recommended corridor between Cobbitty and Cawdor (Section 4) is experienced where the corridor crosses the Nepean River just south of Cobbitty. The Nepean River is generally incised but at this point the floodplain is also wide with backwater from the Nepean River affecting Sickles Creek. The floodplain is not subject to the same level of development and modification of floodplain storages as has occurred in Section 2, with most development situated on higher ground. The corridor also crosses ephemeral streams in the south of Section 4. The flooding at these crossings is of a shorter critical duration compared with the main Nepean River crossing.

The corridor does not cross major waterway in Section 5 but viaduct crossings will be required for Matahil Creek and Navigation Creek. The critical duration of flooding in these two catchments is short and both have small creek channels with floodplain storage. There is an existing large dam located within the recommended corridor at the edge of floodplain as it crosses Matahil Creek. This dam attenuates flows generated in the Matahil Creek catchment but would be decommissioned to facilitate construction of the main embankments.

Due to the 'bathtub' nature of the Hawkesbury-Nepean Basin, flooding in the Hawkesbury River has historically impacted large areas of the basin. Some significant historical events include the 1867, 1956, 1961, 1964 and 1978 floods.

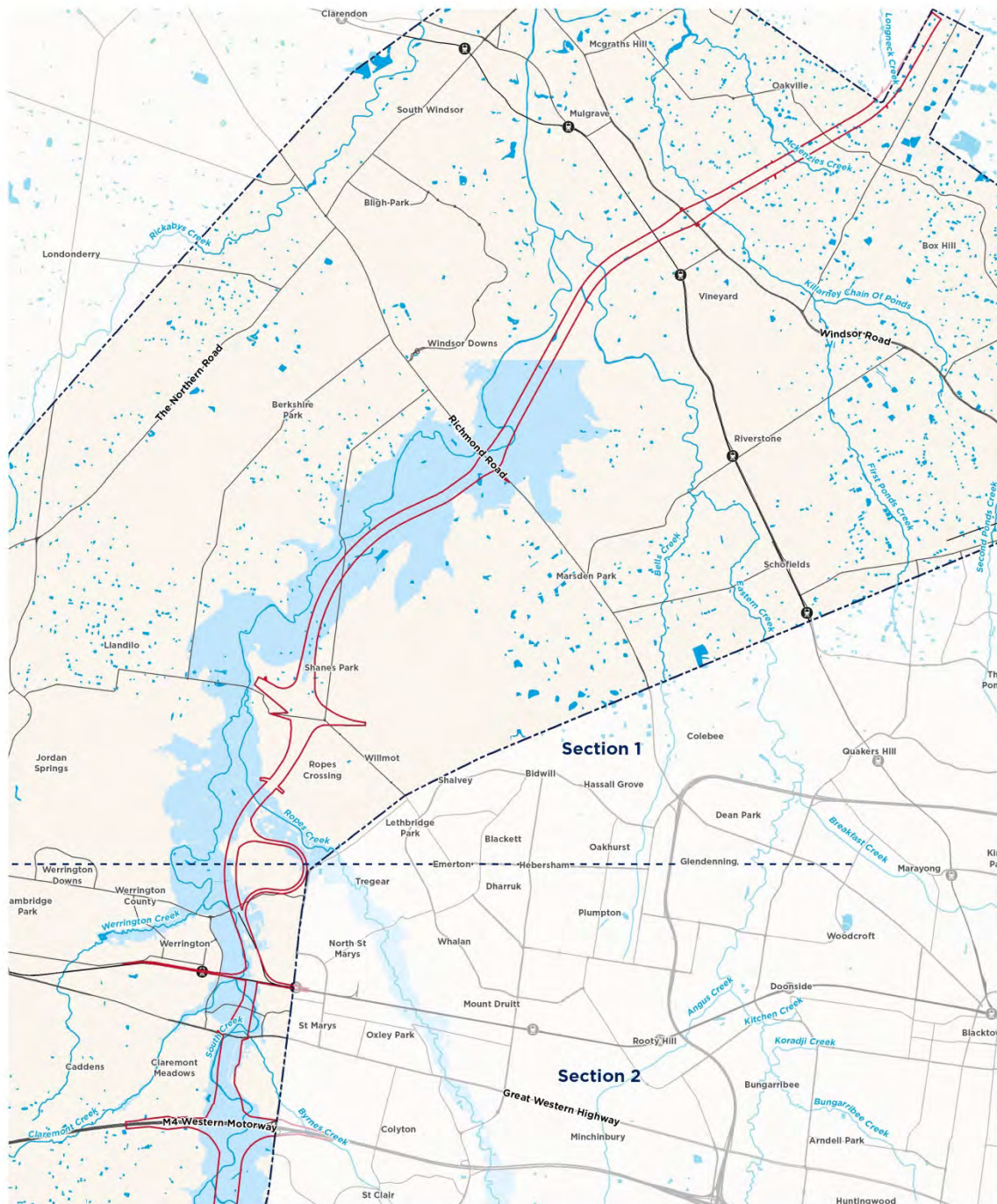
Flood-related infrastructure in the Hawkesbury-Nepean Basin relevant to the OSO includes the Warragamba Dam, weirs at Wallacia and Menangle and flood levees at St Marys and Werrington.

6.7.3 Flood evacuation

Flood evacuation routes relevant to the recommended OSO corridor are identified in the *Hawkesbury-Nepean Flood Plan* (NSW SES, 2015), and include Richmond Road, The Northern Road, Llandilo Road, Great Western Highway and M4 Motorway.

Construction of the future OSO infrastructure has the potential to provide significant flood evacuation benefit to the communities in the South Creek and Nepean River catchments. The evacuation sectors (defined by the State Emergency Services) which may benefit most are Windsor, Bligh Park, Windsor Downs and Wallacia. The future OSO infrastructure would provide these sectors with a route that would have 100-year ARI flood immunity, which the current routes do not provide. A limitation would, however, be that the roads connecting to the future OSO infrastructure would require at least 100-year ARI immunity to get the full flood evacuation benefit.

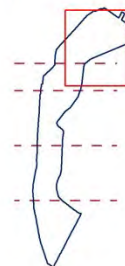
DRAFT



OUTER SYDNEY ORBITAL - HYDROLOGY - NORTH

- OSO Study Area
- Recommended corridor
- Named watercourse
- Waterbody
- 100yr flood extent

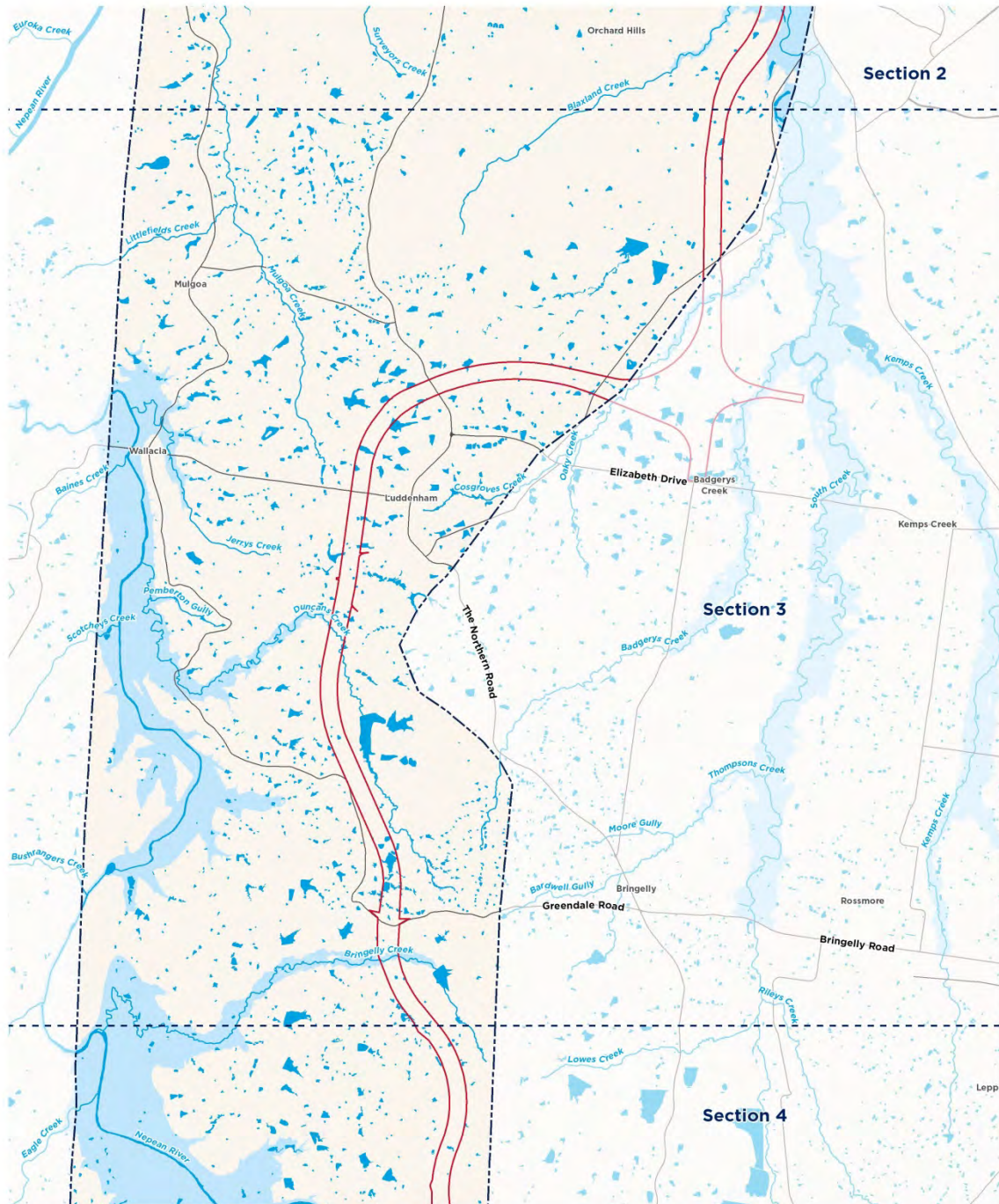
Flood extents included here are not to be used for flood planning purposes.
Sources: Updated South Creek Flood Study (2015), Nepean River Flood Study (2015)



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 18 Waterways and features within and adjacent to the recommended corridor – A

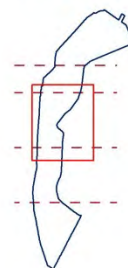
DRAFT



OUTER SYDNEY ORBITAL - HYDROLOGY - CENTRAL

- OSO Study Area
- Recommended corridor
- Named watercourse
- Waterbody
- 100yr flood extent

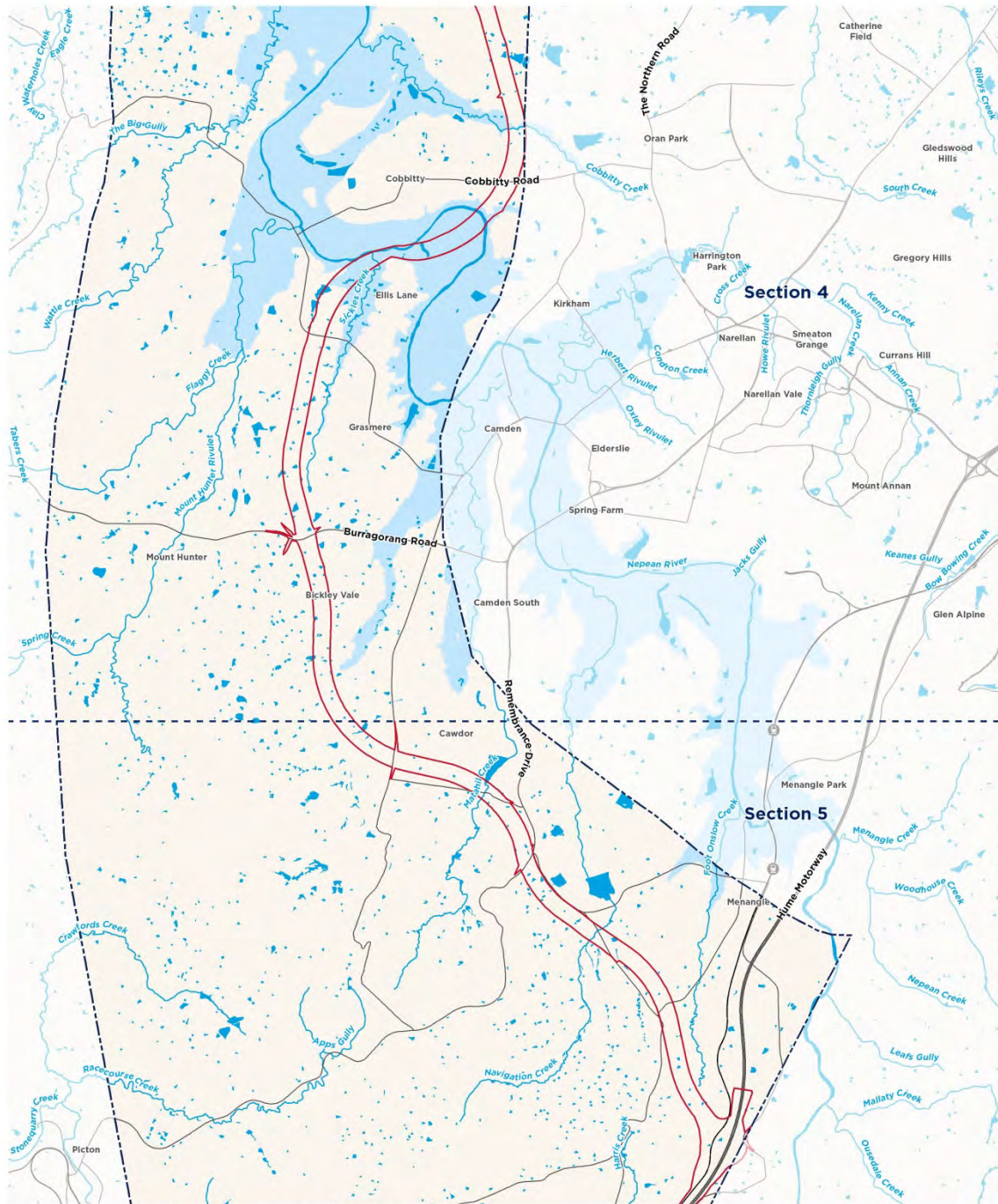
Flood extents included here are not to be used for flood planning purposes.
Sources: Updated South Creek Flood Study (2015), Nepean River Flood Study (2015)



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 19 Waterways and features within and adjacent to the recommended corridor – B

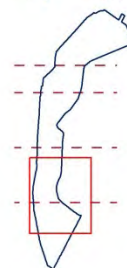
DRAFT



OUTER SYDNEY ORBITAL - HYDROLOGY - SOUTH

- OSO Study Area
- Recommended corridor
- Named watercourse
- Waterbody
- 100yr flood extent

Flood extents included here are not to be used for flood planning purposes.
Sources: Updated South Creek Flood Study (2015), Nepean River Flood Study (2015)



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 20 Waterways and features within and adjacent to the recommended corridor – C

DRAFT

6.8 Landscape and visual

Important scenic qualities associated with western Sydney and the backdrop of the Blue Mountains have the potential to be impacted by potential future OSO infrastructure.

This landscape and visual context considers existing landform, land cover and landscape change, which contribute to the visual setting and character of the recommended corridor. However, the assessment of strategic impacts from a visual perspective relates primarily to consideration of potential future infrastructure within the corridor, which is further discussed in **Section 7.8**.

6.8.1 Landform

South Creek catchment

The recommended corridor traverses South Creek in the northern and central portions of the study area, which has substantial low-lying areas subject to flooding from midway through the catchment, to extensive flood prone areas in the lower catchment.

The recommended corridor is located within extensive flood prone areas through Shanes Park and west of St Marys, where the recommended corridor is located within the South Creek corridor to avoid residential developments.

The South Creek corridor includes a well vegetated riparian corridor that provides a natural screen from development in rural areas, and supports recreational uses such as playing fields in more densely populated urban areas. Elevated landforms are less pronounced than those associated with the Hawkesbury-Nepean catchment, with gently rounded landforms visible across the area.

Hawkesbury/Nepean catchment

The recommended corridor traverses the Nepean River and its associated catchment, with one major crossing near Cobbitty. The upper and lower catchment areas have extensive low-lying land, much of which is subject to flooding due to large upstream catchment areas. Landform within much of the catchment has gentle to moderate slopes and presents as gently undulating to rolling, rounded forms visible across the area.

Razorback Range

The southern section of the recommended corridor incorporates the foothills of the Razorback Range, and a low plateau area to the east which is deeply dissected by the Nepean River and densely forested tributaries. Razorback Range projects some 200 metres above the surrounding plain, and extends across the recommended corridor near Cawdor. This area is also constrained by historic sites including Camden Park Estate and Belgenny Farm, located on the fertile floodplain of the Nepean River.

Where possible the elevated areas of the Razorback Range have been avoided and opportunities investigated to position the recommended corridor on the lower slopes where it will be viewed against the more elevated forested backdrop.

Rural Land

The undulating rural landscape south of the M4 Western Motorway incorporates extensive drainage lines that are often vegetated and fall west towards the Nepean River. This occurs in conjunction with remnant vegetation cover set within a primarily open rural landscape.

Strategic agricultural land is highly productive with unique natural resource characteristics (such as soil and water resources) as well as socio-economic value. The recommended corridor includes a portion of strategic agricultural land where it crosses the Nepean River at Cobbitty.

6.8.2 Land cover

Large urban bushland remnants

The recommended corridor contains large remnant urban bushland patches classified as PCLs. These areas provide biodiversity value and important visual elements. The recommended corridor aims to avoid and minimise the impact on these areas; despite this, key areas where large bushland is unable

DRAFT

to be avoided includes the area surrounding Shanes Park, Wianamatta Regional Park and an area east of Cobbitty.

Great Western Highway urban corridor

The recommended corridor crosses the Great Western Highway in an area characterised by residential development surrounding the South Creek floodplain, Dunheved Golf Course and industrial development. The floodplain immediately to the north is in a moderately natural state and incorporates one of the Cumberland Plain PCLs, part of the Wianamatta Regional Park between Jordan Springs and Ropes Crossing.

Non-Aboriginal heritage

The landscape settings of heritage places are important contextual elements. In the north of the recommended corridor, non-Aboriginal heritage sites that contribute to the visual setting and character include Clydesdale Estate the surrounding settlement of Windsor Downs and the associated floodplain landscape. The historic Denbigh Estate and Camden Park Estate and Belgenny Farm are located in the southern part of the recommended corridor.

6.8.3 Landscape change

The recommended corridor has the potential to be a catalyst for development. This new urban development, together with the corridor itself, has the potential to change the landscape and visually sensitive areas.

6.9 Soils and geology

The diversity of landforms formed as a result of complex interactions between subsurface geology, tectonic movements and surface processes include hilly areas near Picton and the Razorback Range, with undulating hills in the central part of the corridor in the Cumberland Plain. A range of landforms can be challenging for the implementation and design of an infrastructure project.

6.9.1 Geology and geomorphology

Geology can present variations in rock strength, weathering profiles, weathering products, and intrinsic material properties.

The Wianamatta Group shales (Bringelly and Ashfield Shales) and Hawkesbury Sandstone are the most prominent geological rock units in the corridor. The shales underlie most of the corridor from south of Campbelltown to Windsor. Sandstones underlie the shales across most of the corridor, and, as such, the sandstones are only exposed in the southern section where the shales are no longer present.

The shale rocks of the Wianamatta Group were deposited in a low energy, coastal marine delta environment and comprise black to dark grey shale, siltstone and laminite (thinly interbedded shale, siltstone or sandstone). The shale typically exhibits a weathered profile, comprising between two and five metres of residual clay and extremely weathered shale, becoming less weathered with depth. These residual soils may be reactive, undergoing shrinkage or swelling in response to changes in moisture content. The Hawkesbury Sandstone unit was deposited in a large braided river system. The unit comprises fine to coarse grained quartz sandstone with minor shale and laminite lenses. It is generally higher strength than the overlying shales. The residual soils are generally thin, less than a metre thick, but may be deeper in gullies and depressions.

The floodplains of the Hawkesbury/Nepean River and South Creek are located towards the northern part of the recommended corridor and generally comprise alluvial soils of variable composition and depth.

6.9.2 Soil landscapes

The soil landscapes in the recommended corridor are representative of historical processes and key landscape features. Residual soils, derived from weathering of the underlying rock, are the predominant soil type and are spread across the entire corridor. Alluvial soils align with the fluvial landscape and floodplains of the Hawkesbury/Nepean River, South Creek and their tributaries. Colluvial soils align with steeper topography in the southern parts of the corridor. Erosional soils are more prevalent in the northern and central parts of the corridor abutting fluvial systems.

DRAFT

The types of soils have influenced design considerations for the selection of the recommended corridor due to associated flood, shrink-swell and erosional risks.

6.9.3 Topography and slope

Elevation varies from about 320 metre Australian Height Datum (AHD) in the south to less than 10 metre AHD in the north of the recommended corridor. Elevated areas are located in the vicinity of Picton and the Razorback Range to the south and gentle undulating hills through the centre of the corridor. The Cumberland Plain and the Hawkesbury/Nepean River floodplain are present towards the northern extent of the recommended corridor. Landform types such as higher and steeper areas of slope generally contribute to higher levels of geotechnical hazard or instability. Additionally, cliff areas and drainage lines represent difficult areas for road construction. Cliff lines can also constitute rock fall risk to infrastructure during operation.

Elevated residual soil profiles and erosional soil profiles can be prone to slope instability due to slumping and soil creep. The high clay content of these soils results in poor drainage and subsequently saturation during periods of high rainfall or where natural drainage has been disturbed. The Razorback Range towards the south of the corridor is known for large scale instability features.

Landslide is a general term for a number of forms of slope failure. It includes rock falls, soil creep and slump flow landslides, on often steep and/or wet slopes. It may lead to severe damage to buildings, infrastructure and services or may result in recurring problems such as shifting foundations or increased maintenance requirements for infrastructure.

6.9.4 Faults and lineaments

Fault lines can constitute zones of differential ground response to applied foundation loads and may need special treatment for design of large structures. Fault lines can represent hydrogeological boundaries with concentrated groundwater flow in these areas. In addition, fault lines can represent zones of concentrated movement in mine subsidence areas.

A number of lineaments (linear geological features) run through the Blue Mountains National Park close to the corridor, where the Lapstone Monocline linear feature marks the eastern boundary of the elevated Blue Mountains Plateau. A single lineament (Camden Syncline) is located in the area west of Bringelly.

There is not sufficient geotechnical information available at this stage to determine the characteristics and behaviour of these lineaments; however, typically drainage lines are expected to follow them. Potential effects of lineaments include weakened soil zones, slope instability, variable depth to rock and concentration of groundwater.

6.9.5 Rivers and waterways

The recommended corridor crosses 18 significant watercourses and floodplains. The geological properties in the vicinity of riverbeds and riverbanks at these crossings will vary. These areas would also be prone to inundation during flood events.

River crossings require particular consideration due to the geotechnical characteristics of riverbeds and banks, which generally require constructing bridging structures in generally poorer ground conditions than the surrounding terrain.

6.9.6 Acid sulfate soils

Low lying areas within the recommended corridor, such as the South Wianamatta Creek around Windsor, are mapped as having a low probability of acid sulfate soils (ASS) occurring. Elsewhere in the recommended corridor, ASS has not been mapped, but due to the topography it is assumed that these areas would have no known occurrences.

6.9.7 Mines

Mine subsidence occurs when surface landforms sink to a lower level as a result of earth movements due to underground mining operations. Horizontal ground movements also occur. There are mining leases in the southern part of the recommended corridor, to the east of Picton and within the Razorback Range.

DRAFT

Subsidence from worked out mines can create zones of surface instability, and the need to provide resilient infrastructure in areas of future mining will be considered during detailed design. Subsidence is unlikely to be a constraining factor during construction.

6.9.8 Geoheritage

Based on a review of state and national heritage registers, no known geoheritage areas are present within the recommended corridor.

6.9.9 Contaminated land

A search of the contaminated land record of notices maintained by the Environment Protection Authority (EPA) was conducted on 7 December 2017 to identify known and regulated contaminated sites within the local government areas traversed by the recommended corridor. No sites were identified. Sites identified by the EPA are only those subject to regulatory action under the *Contaminated Land Management Act 1997* (NSW) and do not include all possible contaminated land.

There remains a risk that other properties not shown on the record of notices may be contaminated, and this potential will be considered when undertaking the detailed assessment of the corridor. As a general principle, higher risk land uses (such as industrial land uses, rail corridors, service stations, landfill sites etc.) have been avoided to minimise the risk of encountering contaminated land (including contaminated groundwater), although this does not remove this risk entirely.

6.10 Noise and vibration

The recommended corridor consists predominantly of rural land, with pockets of suburban and urban developments. The noise environment largely depends on the existing transport infrastructure which affects a range of sensitive receivers within and adjacent to the recommended corridor. Rural receivers may have quite low existing noise levels with background noise levels potentially below 30 dB(A). Other areas closer to arterial roads may be impacted by noise levels that already exceed the applicable noise criteria.

6.10.1 Existing development

The selection process for the recommended corridor sought to avoid and provide separation to areas of existing development wherever possible. Some low density communities will be located near the recommended corridor; however, given the lower density of these areas, the number of affected receivers would not be as substantial as the number of affected receivers in higher density residential areas avoided by the recommended corridor. Design considerations have been incorporated into the recommended corridor alignment where there are sensitive noise and vibration receivers.

6.10.2 Planned development

Planned development in the northern and central sections of the recommended corridor (Sections 1 and 3) include the North West Growth Area in Section 1, the South West Growth Area between Sections 3 and 4 and the Greater Macarthur Growth Area south of Section 5, outside the recommended corridor. Where the recommended corridor is located close to planned growth areas, there is a risk of affecting large numbers of future noise sensitive receivers; equally there is an opportunity to design efficient and effective noise mitigation early and include appropriate development controls in the SEPP as part of the recommended OSO corridor protection.

Urban and suburban areas with denser residential developments are located between Dunheved and Orchard Hills (Section 2), including the suburbs of Werrington and Claremont Meadows. Although these areas are considered to have medium to high noise constraints with limited options to mitigate impacts, mitigation measures will be developed during the design and delivery of the OSO to address EPA requirements.

While the recommended corridor may not be built in for some time and other significant infrastructure such as the Western Sydney Airport and new residential, commercial and industrial development will impact the noise environment in the study area and recommended corridor, it is difficult to determine the extent of potential noise impacts. Background noise levels are likely to increase with development and noise levels associated with traffic and freight rail may also change.

DRAFT

6.11 Air quality

Motor vehicles and freight trains emit carbon monoxide (CO), nitrogen oxides (NO_x), particulate matter (PM₁₀ and PM_{2.5}), sulfur, and volatile organic compounds (VOCs). These pollutants are generated through the combustion of fossil fuels, such as petrol and diesel. Emission levels depend on the type of fuel used and the temperature of combustion, as well as the vehicle loading.

This analysis of air quality impacts focuses on pollutants that have the potential to approach or exceed regulatory criteria, particularly PM₁₀, PM_{2.5} and NO₂. Other pollutants (CO and VOCs) not typically present in concentrations approaching their regulatory limits and are omitted from this analysis.

From an air quality perspective, the conditions that may affect the project can be broadly divided into:

- Existing ambient air quality concentrations in the Sydney Basin and recommended corridor
- Industrial source emissions as reported under the National Pollutant Inventory (NPI) and National Greenhouse and Energy Reporting (NGER)
- Meteorological influences on dispersion within the recommended corridor and western Sydney
- Physical influences of the local area including location of receptors relative to the recommended corridor and terrain of the region surrounding the recommended corridor.

6.11.1 Meteorology

Sea and land breeze circulation influences air quality. Due to the mountainous topographical boundaries to the north, west and south, Greater Sydney is located in what is known as a 'closed' basin, which means the air pollution generated in the basin cannot escape the area due to the topographical features, and can recirculate over the area throughout the day.

Cold, dense air accumulates overnight over the Blue Mountains, which flows down into the Sydney Basin in the early morning hours and combines with early morning pollution. At mid-morning the cold basin air moves towards and beyond the Sydney coastline, taking with it the accumulated morning air pollution.

As the land heats up during the day, the air above becomes less dense and starts to rise. The dense cooler air over the sea moves to occupy the space of the rising air, creating a sea breeze effect. These sea breezes bring the morning air pollution that was out to sea back towards the west of the Sydney Basin, collecting emissions from afternoon air pollution sources on the way. The effect is a concentration of both morning and afternoon air pollution within the west, and particularly the south west, of the Sydney Basin.

As such, meteorology both transports and disperses pollution from all emitters of air pollution whether they are anthropogenic or natural sources of pollution. Data from four Bureau of Meteorology (BOM) meteorological monitoring sites in the OSO study area have been used to consider the potential variability of the meteorological parameters across the corridor.

Data relating to conditions of calm demonstrated a large degree of variability across all four locations. Calm winds result in slower atmospheric dispersion of pollutants and typically result in higher ground-level pollution concentrations closer to the source than would be expected under stronger wind conditions.

The calm data demonstrates that, generally, the meteorology recorded at the northern and southern extents of the corridor (Richmond and Camden respectively) have higher percentages of calm wind conditions. The implication of this is that there is the potential for poorer dispersion conditions and potentially higher ground level concentrations in these areas.

6.11.2 Pollutants

Differences in air quality would be expected along the recommended corridor, with the highest pollutant levels near major roadways, industrial areas and in valleys (particularly in winter, when wood smoke tends to accumulate).

While NSW is considered to have generally good air quality in relation to international standards, transport emissions are a significant contributor to pollutant levels in urban areas and can cause adverse health effects in sensitive populations, particularly in relation to fine particulate emissions.

DRAFT

The *NSW State of the Environment Report* (EPA, 2015) states that transport emissions are an important human-related source of air pollution in Sydney.

Pollutants from vehicles and trains travelling on surface roads and railways normally stay close to the ground and collect around the emission point, with dispersion dependent on passive diffusion and the movement of nearby objects. Vehicle emissions at ground level tend to disperse up to around 300 metres from the emission point. As such, receivers located within 300 metres of the recommended corridor would be most affected by transport emissions.

6.11.3 Ambient air quality

As part of previous studies, levels of pollution within the recommended corridor have been measured at various locations over 12 months and found that ambient levels of nitrogen dioxide (NO₂) have been consistently below the relevant criteria from both a short and long term perspective. Annual mean values of particulate matter (PM₁₀) are approximately half the relevant criteria or lower depending on the location of the monitoring station along the study corridor.

The highest 24 hour average PM₁₀ concentration and the annual mean and highest 24 hour average PM_{2.5} concentrations are approaching or exceeding the relevant criteria levels at times.

The ambient air quality along the recommended corridor is similar to air quality throughout the Sydney Basin (arginal to poor performance for particulates and relatively low concentrations of NO₂). Given how close the short and long term average concentrations are to the advisory reporting standards, additional data and modelling will be needed to identify the relative contribution of the proposed OSO infrastructure to background levels in the future.

DRAFT

7.0 Strategic assessment of the Recommended Corridor

The corridor options development process set out in Section 3.0 is undertaken so that the recommended corridor, and the eventual transport infrastructure, can be provided while avoiding or minimising as far as practicable any potential environmental, social and economic impacts.

This chapter summarises the strategic assessment that defines where and how the recommended corridor avoids impacts as far as practicable, and the potential impacts of the future construction and operation of the OSO infrastructure that will need further mitigation work. The information in this chapter will guide detailed environmental impact assessments and mitigation work.

This work is informed by a strategic concept design for the recommended corridor, including corridor width, interchanges, rail junctions and local road treatments. The design was developed in parallel to the corridor selection process to demonstrate the feasibility of meeting the requirements and objectives of the OSO while minimising impacts.

Future development of the OSO infrastructure will require a rigorous and detailed design phase. The strategic concept design has only been used to inform a high-level assessment of impacts.

7.1 Land use Impacts

As well as the strategic concept design, the strategic assessment considered existing land uses and zonings, proposed developments, planned and existing infrastructure corridors and facilities, major waterways and open spaces.

The assessment also considered relevant strategic directions and policy by the Australian, State and local governments; particularly those relating to the North West, Western Sydney Airport, South West, Wilton and Greater Macarthur growth areas.

7.1.1 Corridor protection and construction/operation of future OSO infrastructure

The specific implications of the recommended corridor and alternative corridor options for land uses addressed below demonstrate how significant impacts have been avoided, minimised, and/or can be mitigated. This section also provides a land use impact assessment of the future OSO infrastructure in the recommended corridor.

This land use impacts assessment has been completed in identified sections along the recommended corridor from north to south as shown in **Figure 22** to **Figure 32**.

The assessment of land use impacts is addressed across the 5 sections of the corridor. Subsequently the table below provides property impact figures across the full length of corridor for reference.

Figure 21 Property and Dwelling Impacts

Total Properties Impacted	Total Dwellings Impacted
612	190

Section 1 Box Hill to Dunheved

As shown in **Figure 22** and **Figure 23** the recommended corridor starts in Oakville west of newly developing urban areas of Box Hill North and east of the Scheyville National Park. It then traverses through Vineyard interchanging with Windsor Road and then along the western edge of the North West Growth Area. It crosses over the Eastern and South Creeks at different points and traverses the edges of the suburbs of Windsor Downs and Llandilo. It then intersects with the Bells Line of Road – Castlereagh Connection (BLOR CC) at Shanes Park and traverses through the central part of the former St Marys ADI site, now the Wianamatta Regional Park.

The recommended corridor balances existing rural residential communities and proposed future and new communities in the North West Growth Area, while trying to minimise impacts to national parks and reserves where possible.

DRAFT

In this regard, the recommended corridor avoids the Scheyville National Park and proposed and existing dwellings located to the east of Boundary Road in the new release area of Box Hill North, south west of Boundary Road. This limits land use impacts to existing rural residential properties east of Midson Road in Oakville. This outcome avoid impacts to the National Park and greater impacts to hoes in Box Hill North. Properties west of Boundary Road will remain unaffected by the corridor, limiting impacts to less rural residential properties than if the corridor were located centrally between the National Park and Boundary Road.

The recommended corridor passes through the suburb of Vineyard west of Windsor Road and north of Boundary Road. This impacts some rural residential properties in this area. From Old Pitt Town Road the alignment of the recommended corridor runs parallel to the existing 330 kV Transmission line to Commercial Road. This enables these infrastructure uses to be confined and co-located, thereby constricting impacts in this area.

The alignment of the recommended corridor avoids Stage 1 of the North West Growth Area Precinct of Vineyard, south of Chapman and Menin Roads in Vineyard and Oakville which is yet to be rezoned. Therefore the recommended corridor alignment in this area will not impact on forward planning for this future urban release area.

The recommended corridor passes through the northern and Stage 2 portion of Vineyard Precinct, which is yet to be rezoned for urban employment purposes. There is potential to incorporate and integrate the corridor as part of the forward planning for this precinct. Land affected by the recommended corridor in this area is currently used for rural residential purposes, with some key rural industries including the Elf Mushroom and the Laymour Poultry Farm. These will be impacted by the recommended corridor and ultimately the future OSO infrastructure. However, in the context of the intention to rezone this land for urban employment purposes, it would be expected that that these rural industries will be relocated elsewhere and other industries and business would replace these. Access to the future OSO infrastructure would also support potential urban employment land uses in this part of the precinct, with improved access to Sydney's Motorway network and ultimately better regional connections.

From Vineyard the alignment of the recommended corridor passes west over the Richmond Rail line and then heads south west through the edge of the North West Growth Area Precinct of North Marsden Park. The recommended corridor runs through flood affected and rural zoned land, such that future OSO infrastructure is expected to be constructed on viaduct. This precinct is yet to be rezoned for urban development purposes from its current rural zoning. However, given the flood prone nature of the land on which the recommended corridor is located, it is not expected to be developed for future residential development. The recommended corridor is therefore not likely to impact the future development capacity of this part of the North West Growth Area. The alignment of the recommended corridor in this area would therefore safeguard the future potential of the large majority of the Marsden Park North Precinct for future urban development as intended by the NWGA LUIIP.

The recommended corridor alignment interchanges at Richmond Road, which will in future provide a full intersection with the OSO infrastructure, providing a secondary access for the North West Growth Area to Sydney's Motorway network and beyond.

The alignment of the recommended corridor does run through the State Heritage listed site of Clydesdale, but does not impact the key buildings within the site's curtilage. For more detailed assessment see Section 7.4. This alignment through this site was positioned to strike a balance by avoiding impacts to the existing rural residential dwellings within Windsor Downs and Berkshire Park and avoiding the newly developing urban release area of Marsden Park (also known as the North West Growth Area Precinct of Marsden Park).

None of the residential zoned land within the Marsden Park Precinct would be affected by the recommended corridor. However, there are northern portions of this precinct that are zoned E3 Environmental Management, E2 Environmental Conservation, RE2 Private Recreation and RU6 Transition that are affected by this option. These areas are not yet developed.

Of these zones, dwelling houses are only permitted in the E3 and RU6 zoned land. The minimum permitted allotment size in the RU6 zone is 5ha, whereas the minimum lot size for land in the E3 zone is 120ha. Despite this these areas have limited future development capacity given they have very limited number of land uses permitted and are flood affected.

DRAFT

The alignment of the recommended corridor in this area ensures that those areas proposed and currently being developed for residential development are protected, but also acts as a buffer between urban and rural lands.

The southern part of the Shanes Park Precinct within the North West Growth Area is located within the recommended corridor at the future interchange of the OSO with the BLOR CC corridor. This location is presently within the protected Castlereagh Freeway corridor and the majority of land within the recommended corridor is flood affected.

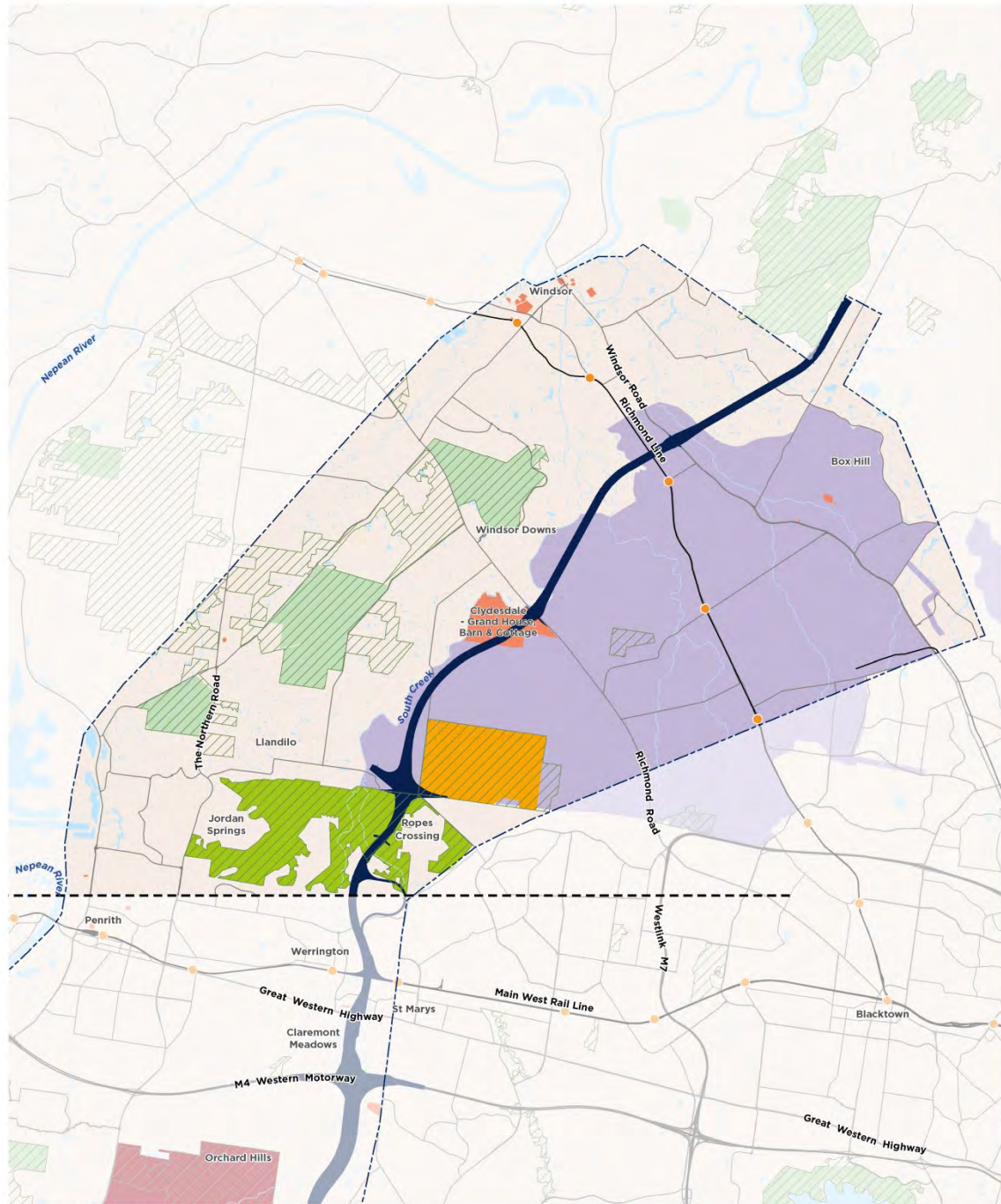
The interchange with the BLOR CC involves the foot print extending in the former International Radio Transmitter Station site at Shanes Park, and ecological offsetting will be required.

The residual land that is not flood affected between the recommended corridor and Stony Creek Road and the former International Radio Transmitter Station site at Shanes Park, may accommodate some urban land uses, but may be better suited to non-residential uses given the land is only 200m wide and will be isolated between the corridors and the Stony Creek Road and former International Radio Transmitter Station (Air Services Australia) site.

The recommended corridor option avoids direct impacts on the existing suburbs of Ropes Creek or Jordan Spring East either side of the Wianamatta Regional Park. The portion of the park within the Blacktown LGA has already been transferred to NSW National Parks and Wildlife Services in accordance with the Deed of Agreement entered into by Lend Lease for the development of the former St Marys ADI site. The alignment through the park was considered reasonable by OEH in the context of potential impacts to more ecologically and culturally sensitive areas of the park and desire to avoid impacts to existing and planned urban development.

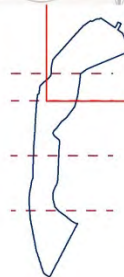
The recommended corridor will pass over part of the Precinct of Dunheved in the St Marys ADI Site. This site has yet to be developed for employment purposes. Despite this impact the recommended corridor alignment will avoid the St Marys Sewage Treatment Plant and maintenance depot, north of Links Road. This outcome is considered appropriate in order to protect existing service infrastructure.

DRAFT



SECTION 1 - BOX HILL TO DUNHEVED

- Study area
- Recommended corridor
- Priority Conservation Lands
- Commonwealth Heritage
- State Heritage
- North West Growth Area
- Defence Establishment Orchard Hills
- Wianamatta Regional Park
- NPWS Estate

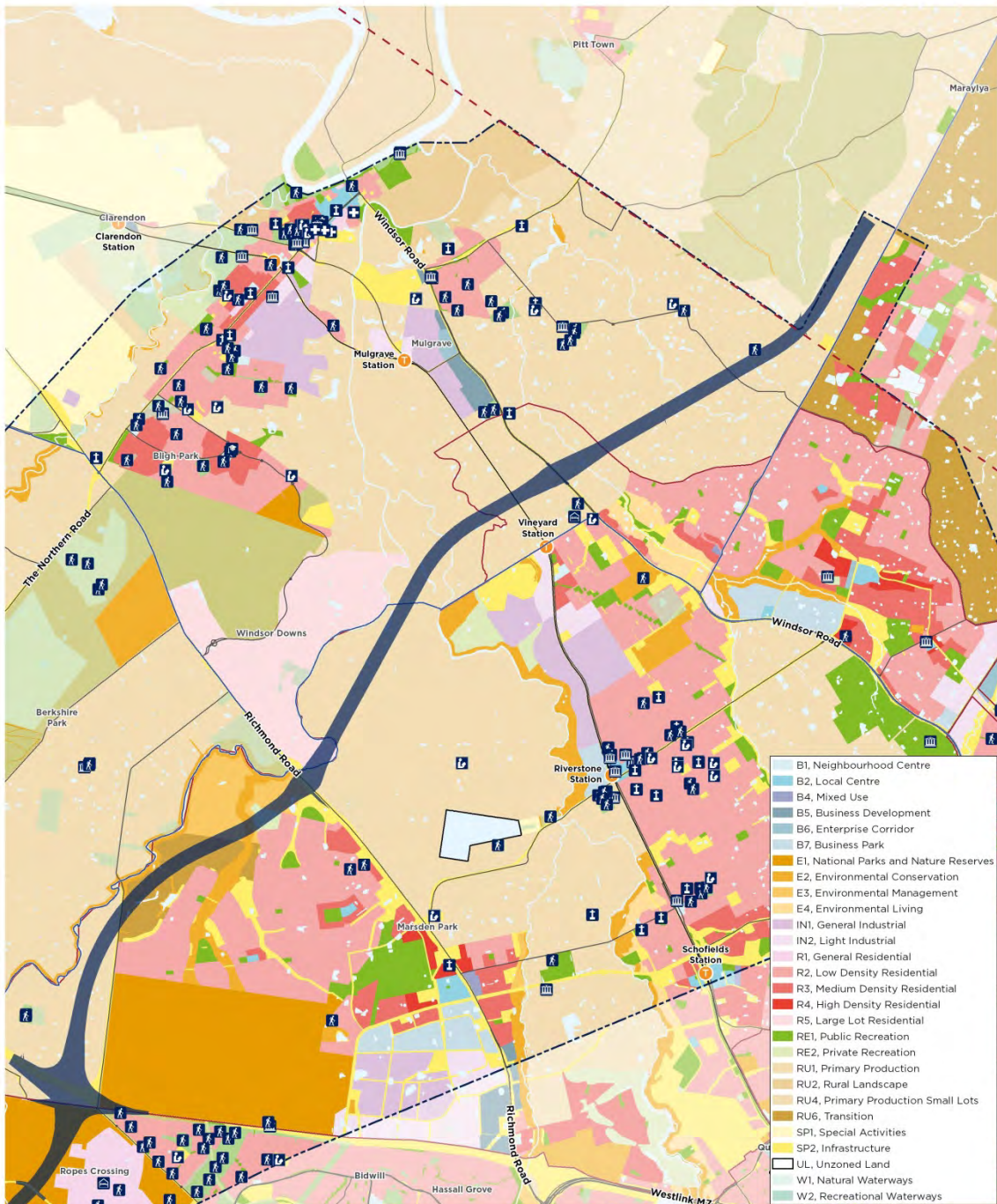


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

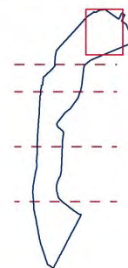
Figure 22 Key Land Uses – Section 1 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE
SECTION 1 BOX HILL TO DUNHEVED - NORTH

- OSO Study Area
- Recommended corridor
- Section boundary
- Local Government Area
- Growth Area
- Aged care
- Community services
- Further education
- Health care
- Park / sport / recreation
- Place of worship
- School



Data provided by OEH has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 23 Land use zoning – Section 1 of Recommended Corridor

DRAFT

Section 2 Dunheved to Orchard Hills

As shown in **Figure 24**, **Figure 25** and **Figure 26** this section of the recommended corridor traverses through the western portion of the industrial estate of Dunheved and through the eastern part of the Dunheved Golf Course site. It then crosses over the Main West Rail Line, the Greater Western Highway and the M4 Motorway while maintaining an alignment west of St Marys through the riparian corridor for South Creek. The recommended corridor does not traverse the adjoining residential parts of the suburbs of Werrington, Claremont Meadows or St Marys. After the M4 Motorway the recommended corridor shifts south west out of the South Creek riparian corridor over rural residential land. The alignment for the recommended corridor traverses a similar course to the existing 500kV transmission lines through this part of the OSO Study Area.

Section 2 is the most densely developed part of the OSO Study Area. Therefore a range of corridor alignment options were evaluated to try to find a balance between minimising future impacts while ensuring the alignment of the corridor would provide future functional road and rail connections over a short distance to the M4 motorway, the Great Western Highway and the Main West Rail line. Additionally, options canvassed sought to minimise conflict with major infrastructure, such as the 500kv line in the South Creek riparian corridor and the St Marys Sewage Treatment Plant at Dunheved (see Section 3.1).

Corridor options were considered across an area stretching between St Marys and Penrith. Including, most notably, traversing along The Northern Road and through various parts of Penrith to avoid impacts to the Wianamatta Regional Park. These generally resulted in detrimental impacts to the Nepean Hospital, further widening and duplication of The Northern Road and/or impacts to the scenic area of Mulgoa.

Other alignment alternatives were considered though Penrith and St Marys. However, all of these options brought about significantly greater impacts than the recommended corridor, and gave rise to significant property impacts; most notably resulting in impacts to a high number of existing residential properties and businesses. All alignment options considered for these suburbs also resulted in detrimental impacts to the corresponding town centres, key community and health infrastructure and/or educational facilities.

Options were also considered to move the OSO corridor further west than Penrith, outside of the OSO study area, to avoid steep terrain and/or flooding. These resulted in corridor alignment options that would fail to serve their strategic purpose of providing good connections to the Main West Rail line, the M4 Motorway or the Great Western Highway. They would also fail to enable direct links between the North West Growth Area and the Western Sydney Airport, thereby potentially reducing the functionality of the future OSO infrastructure.

With these constraints in mind the selection of the corridor through this area had to rely upon the South Creek riparian corridor where possible. This alignment avoids the 500kV line and ensures that the future OSO infrastructure can later tie into the M4 via a future interchange that would not compromise the functionality of the existing M4 interchange at Mamre Road, further east.

The South Creek corridor runs north-south past Dunheved, St Marys Town Centre and Orchard Hills communities and provides an opportunity for the recommended corridor and future rehabilitation of the existing creek system. The South Creek corridor also contains an existing 500 kV electricity easement and tower structures. The recommended corridor is aligned with the electricity easement and therefore will not jeopardise future infrastructure in the corridor.

Locating the recommended corridor in a relatively short section of the South Creek corridor avoids significant impacts for existing communities particularly at junctions with the M4 Motorway, Great Western Highway and Main West Railway Line. At these locations the extent of corridor land needed for future infrastructure connections to existing road and rail networks is much greater than main line sections of the corridor. These junctions have minimum road and rail curve radii that are needed for future safe operation of the motorway and freight rail line.

The recommended corridor location in this section does not directly impact any urban residential zoned properties in full or in part.

The Dunheved Industrial Precinct is impacted by both the main corridor alignment and the rail loop alignment. Notable business and industrial premises located are affected by these in this area. The co-

DRAFT

location of a proposed freight rail loop corridor is located partially within the existing and now disused Dunheved Rail line; however it could not be fully accommodated in the full corridor as the loop was required to link back to the main corridor. This results in impacts to existing industrial premises along the northern and eastern parts of the Dunheved Industrial Estate. This outcome is balanced with ensuring that future freight rail infrastructure is not located within the existing suburbs of Werrington, St Marys and Claremont Meadows, thereby protecting numerous existing homes.

The South Creek corridor between Dunheved and Orchard Hills provides sufficient space for the recommended corridor and opportunities to integrate future potential infrastructure without impacting nearby residential communities and the St Marys Town Centre. This is particularly evident at proposed junctions with the M4 Motorway, Main Western Railway Line and the Great Western Highway.

The alignment of the recommended corridor does impact upon the eastern parts of the public recreational areas in the South Creek riparian corridor and the eastern edge of the Dunheved Golf Course. These impacts will however ensure that:

- The main public open spaces areas west of the creek are maintained, including the Troy Adams Archery Field
- The Dunheved Golf Course is only partially impacted
- Only the very eastern edges of the Colonial Golf Course are impacted.

Consideration of reduced road accessibility to the Dunheved Golf Course site and the Dunheved Industrial Estate should be addressed as part a detailed land use impact assessment to support a future application for construction and operation of the future OSO infrastructure within the recommended corridor. Suggested access alternatives are outlined below in **Section 7.1.2**.

Placing the recommended corridor away from the 500kV line in the South Creek corridor and enabling suitable and functional future road interchanges at the M4 and the Great Western Highway results in some potential impact to existing local and regional open space areas within the South Creek riparian corridor. However the future infrastructure would be constructed on a viaduct through the South Creek riparian corridor and as such, would have a narrow and minimal footprint in the riparian corridor, allowing rehabilitation of native vegetation and its dependent fauna.

In particular, the recommended corridor passes south of the Main West Rail Line through the Blair Athletic Fields, the BMX Track, the St Marys Tennis Club site, and part of the Kingsway Playing Fields and the South Creek Park. The potential future delivery of road and rail infrastructure on elevated structures through this flood plain area could allow for co-location of recreational uses and connectivity along the South Creek corridor and may be able to safeguard the use of some or all of these lands for these recreational purposes.

Consideration of co-location of the infrastructure and maintaining open spaces uses in this part of the recommended corridor should be explored as part of and in support of a future application for construction and operation of the future OSO infrastructure within the recommended corridor. Suggested strategies to seek to try and achieve this outcome are outlined below in **Section 7.1.2**.

The recommended corridor is aligned with the existing 500kV electricity line along the South Creek corridor. As part of future detailed investigations and approval for future infrastructure in the recommended corridor, further consideration is needed on how these infrastructure elements, and the future potential of South Creek for improved recreational and environmental functions, can best be achieved. The potential future delivery of road and rail infrastructure on elevated structures along the flood plain can achieve co-location of recreational uses and connectivity along the South Creek corridor.

The alignment of the recommended corridor will allow for preservation of the Gipps Street Recreational Reserve for future recreational uses as intended by Penrith City Council. This approach also ensures that this future, and as yet unembellished, open space reserve is connected to and will be able to serve the adjoining residential community of Claremont Meadows.

A total of six rural residential properties with existing dwellings located west of Schleicher Street, St Marys will be impacted by the alignment of the recommended corridor. All of these properties are zoned part RE1 Public Recreation and part E2 Environment Conservation under *Penrith Local Environmental Plan 2010* (Penrith LEP 2010). Therefore, the future intention for the use of these lands

DRAFT

for future infrastructure will still be for a public purpose, however changed from recreational uses to that for the recommended corridor for the future OSO infrastructure. Given that these lands do not currently accommodate recreational uses, the change of land use zoning will not give rise to loss of current useable recreational open space.

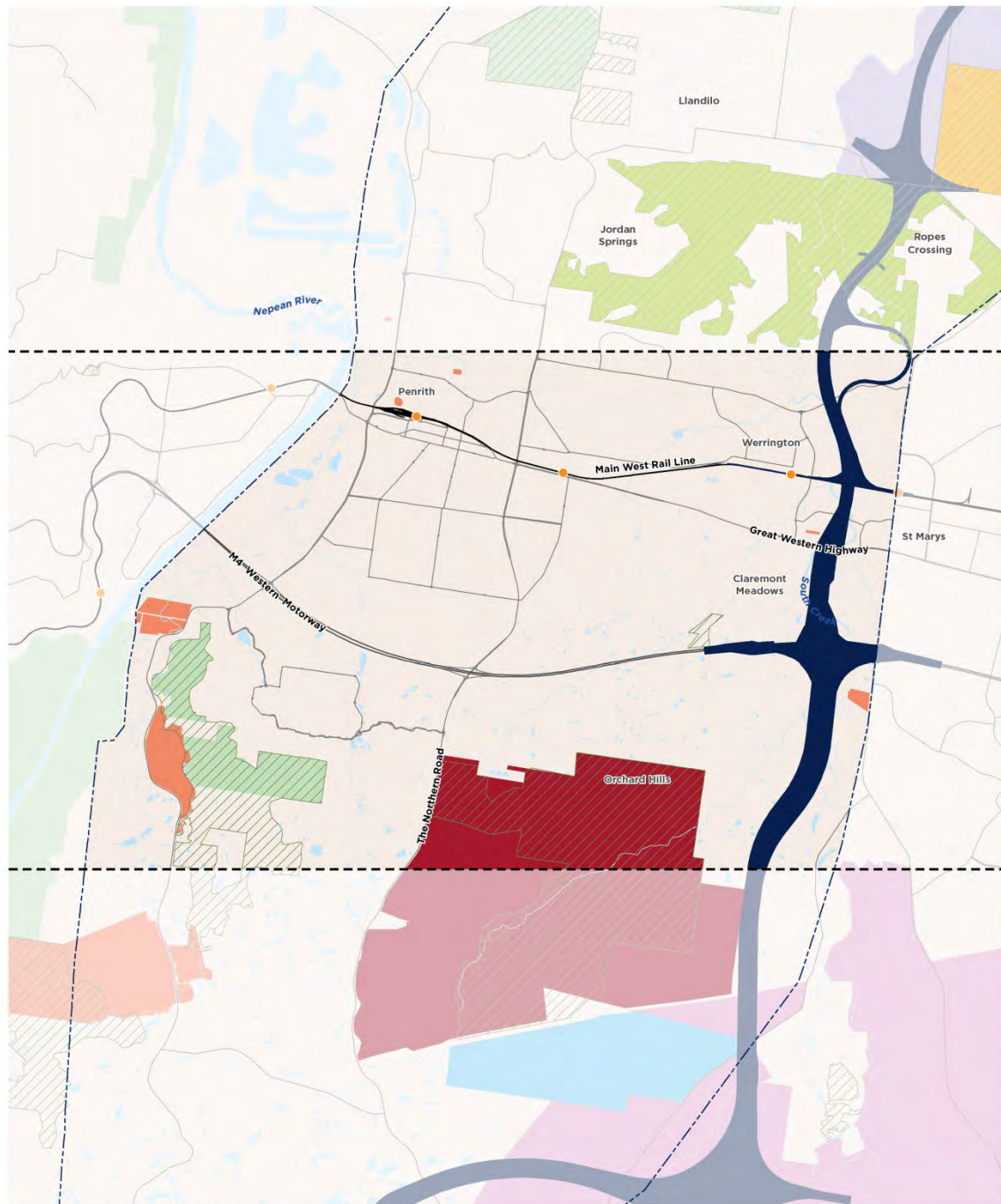
The alignment of the recommended corridor has avoided the newly developed areas of Claremont Meadows east of Gipps Street.

The recreational areas south of the M4 Motorway will be impacted by the recommended corridor. This includes the Samuel Marsden Reserve, which includes baseball facilities. While this is the case it is noted that much land to the east of the corridor zoned RE1 Public Recreation is not yet embellished or utilised for open space purposes and will be relatively unaffected by the recommended corridor. This land for future recreation uses could be embellished as part of the development of the future OSO infrastructure. Notwithstanding, the future OSO infrastructure will be elevated on viaduct due to the flood prone nature of this part of the corridor land. This structural arrangement may provide the opportunity for co-location and retention of some or all of the existing recreational uses in this land and the future OSO infrastructure. This outcome would minimise the impacts of the future OSO infrastructure in this area.

All existing dwellings in the suburb of Orchard Hills will be avoided by the recommended corridor, including those dwellings and properties in the small rural residential community of The Vines.

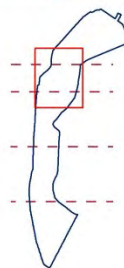
The alignment of the recommended corridor will avoid the existing Erskine Park Quarries site at Patons Lane and the Defence Establishment at Orchard Hills.

DRAFT



SECTION 2 - DUNHEVED TO ORCHARD HILLS

- Study area
- Recommended corridor
- Priority Conservation Lands
- Commonwealth Heritage
- State Heritage
- North West Growth Area
- Western Sydney Airport Growth Area
- Defence Establishment Orchard Hills
- Proposed Sydney Science Park
- Wianamatta Regional Park
- NPWS Estate

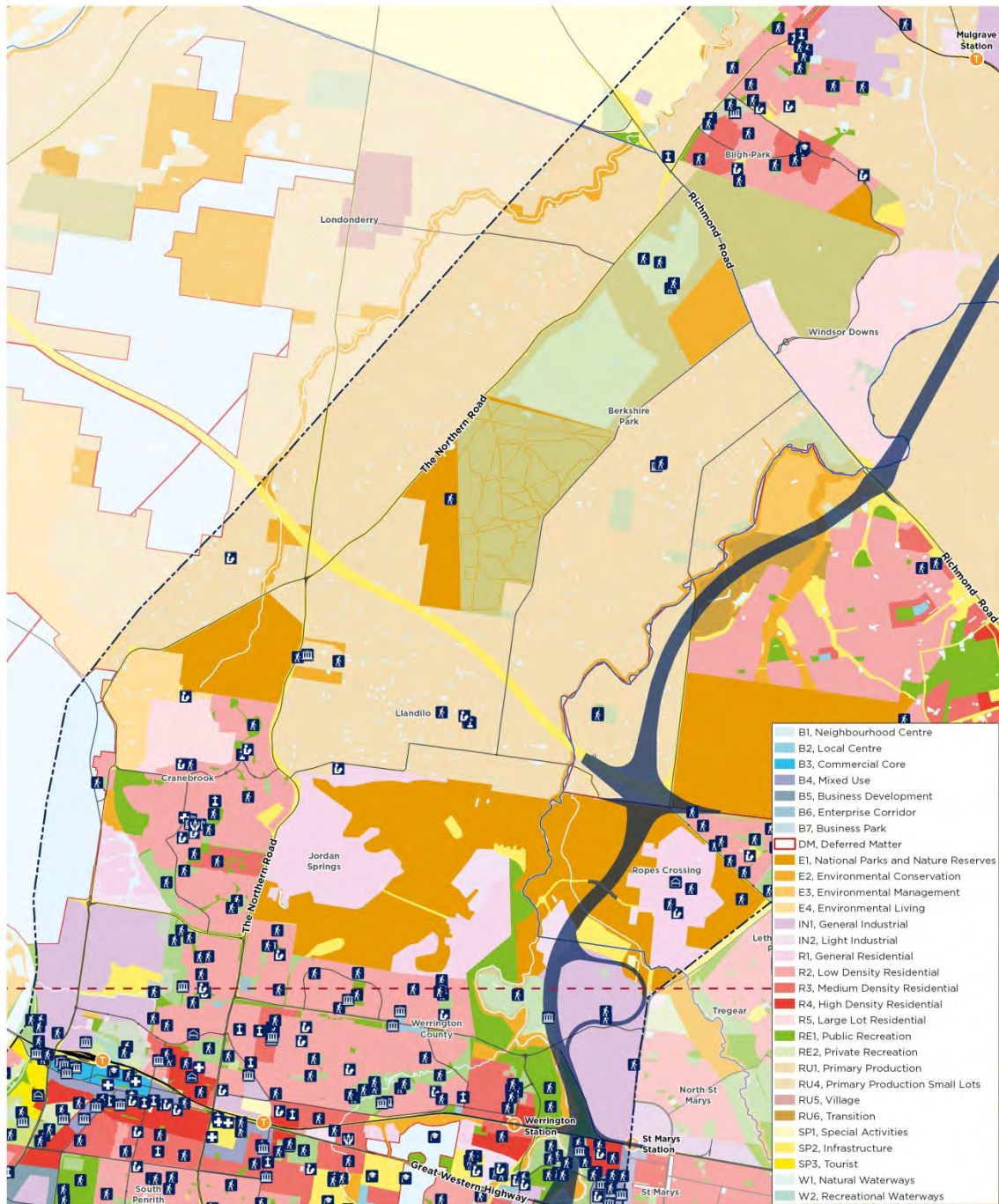


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

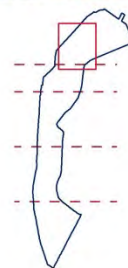
Figure 24 Key Land Uses – Section 2 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE
SECTION 1 BOX HILL TO DUNHEVED - SOUTH

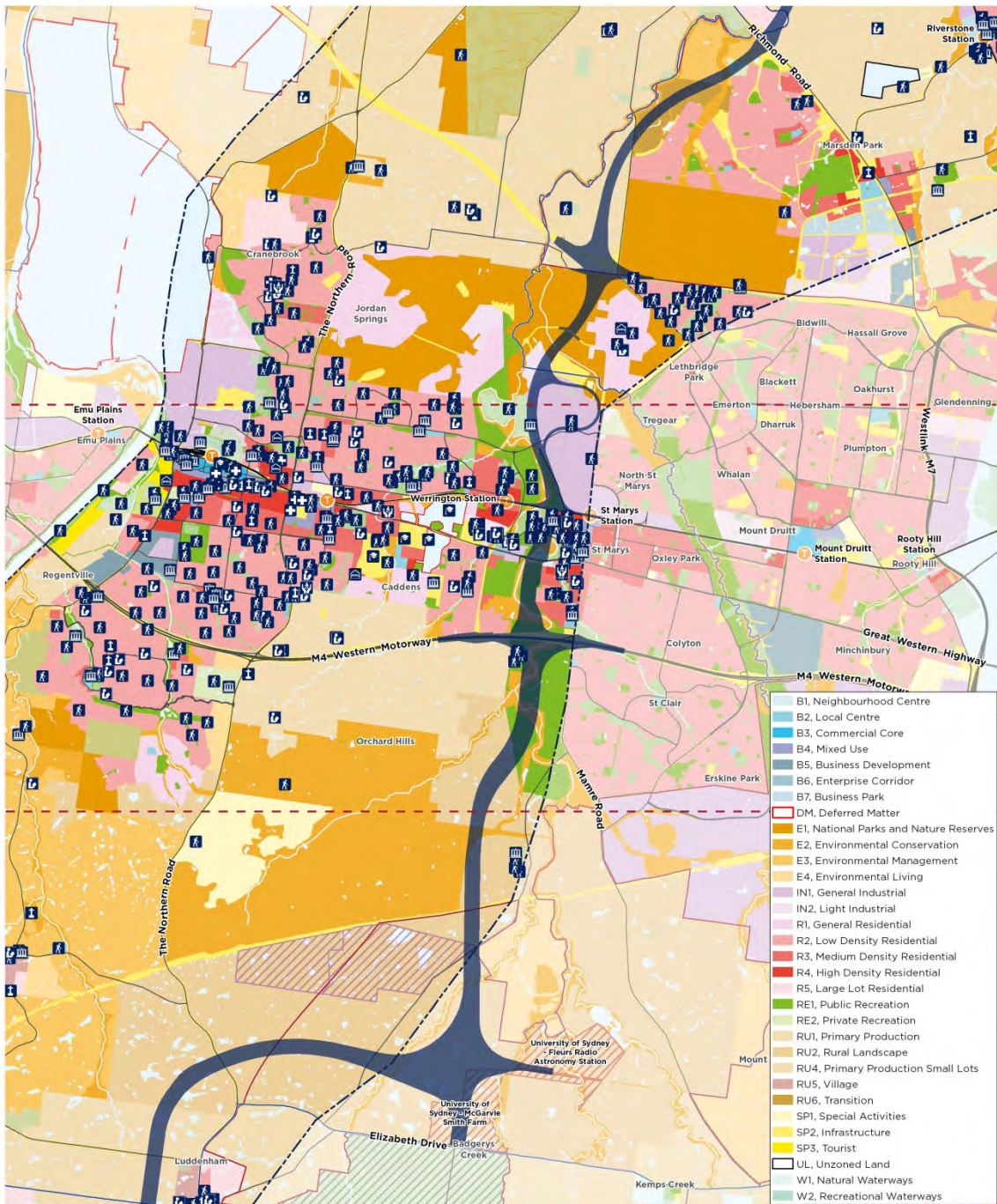
- OSO Study Area
- Recommended corridor
- Section boundary
- Local Government Area
- Growth Area
- Aged care
- Childcare
- Community services
- Further education
- Health care
- Park / sport / recreation
- Place of worship
- School



Data provided by OEH has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

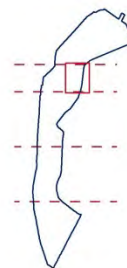
Figure 25 Land use zoning – Sections 1 and 2 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE ZONING SECTION 2 DUNHEVED TO ORCHARD HILLS

- | | |
|------------------------|---------------------------|
| OSO Study Area | Aged care |
| Recommended corridor | Childcare |
| Section boundary | Community services |
| Local Government Area | Further education |
| Growth Area | Health care |
| Sydney Science Park | Park / sport / recreation |
| University of Sydney | Place of worship |
| Western Sydney Airport | School |



Data provided by OEH has not been verified for accuracy.
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 26 Land use zoning – Section 2 of Recommended Corridor

DRAFT

Section 3 Orchard Hills to Cobbitty

As shown in **Figure 27** and **Figure 28** this section of the recommended corridor traverses south from Orchard Hills over the Water Supply Pipeline and through the eastern edge of the Sydney Science Park site. The recommended corridor then runs south and forms part of the future interchange with the M12 Motorway north of the Western Sydney Airport site. It also intersects with The Northern Road, skirting the western boundary of the Western Sydney Airport site and dissects the University of Sydney's John Bruce Pye Farm site located to the south of Greendale Road.

Parts of the recommended corridor north of the Western Sydney Airport site are expected to also accommodate the North South Rail Line and the Western Sydney Freight lines. Separate draft SEAs have been prepared to assess the need for, and potential impacts of these. Adequate corridor width has been provided to accommodate the combined arrangements for freight rail, passenger rail and motorway.

Land required for the recommended corridor in this section of the study area is mostly zoned rural. However, approximately a third of this rural zoned land has been proposed as future employment land known as the Western Sydney Airport Growth Area, and/or has been recently rezoned for the proposed Sydney Science Park. The current planned intent for the remainder of the land affected by the recommended corridor is outside the growth area and Sydney Science Park site and is nominated by the *Draft Greater Sydney Region Plan* as 'Metropolitan Rural Area'.

The recommended corridor through this section requires a small proportion of the Sydney Science Park, although its location doesn't strictly align with the current masterplan for the park site. The potential impact of the recommended corridor is less than that for the initial masterplan for the Sydney Science Park; however it is understood that it was the land owners (Celestino's) intention that there would be a passenger rail station for the North Sydney Rail Line provided on the park site also. This is discussed further in the draft SEA for the North South Rail Line.

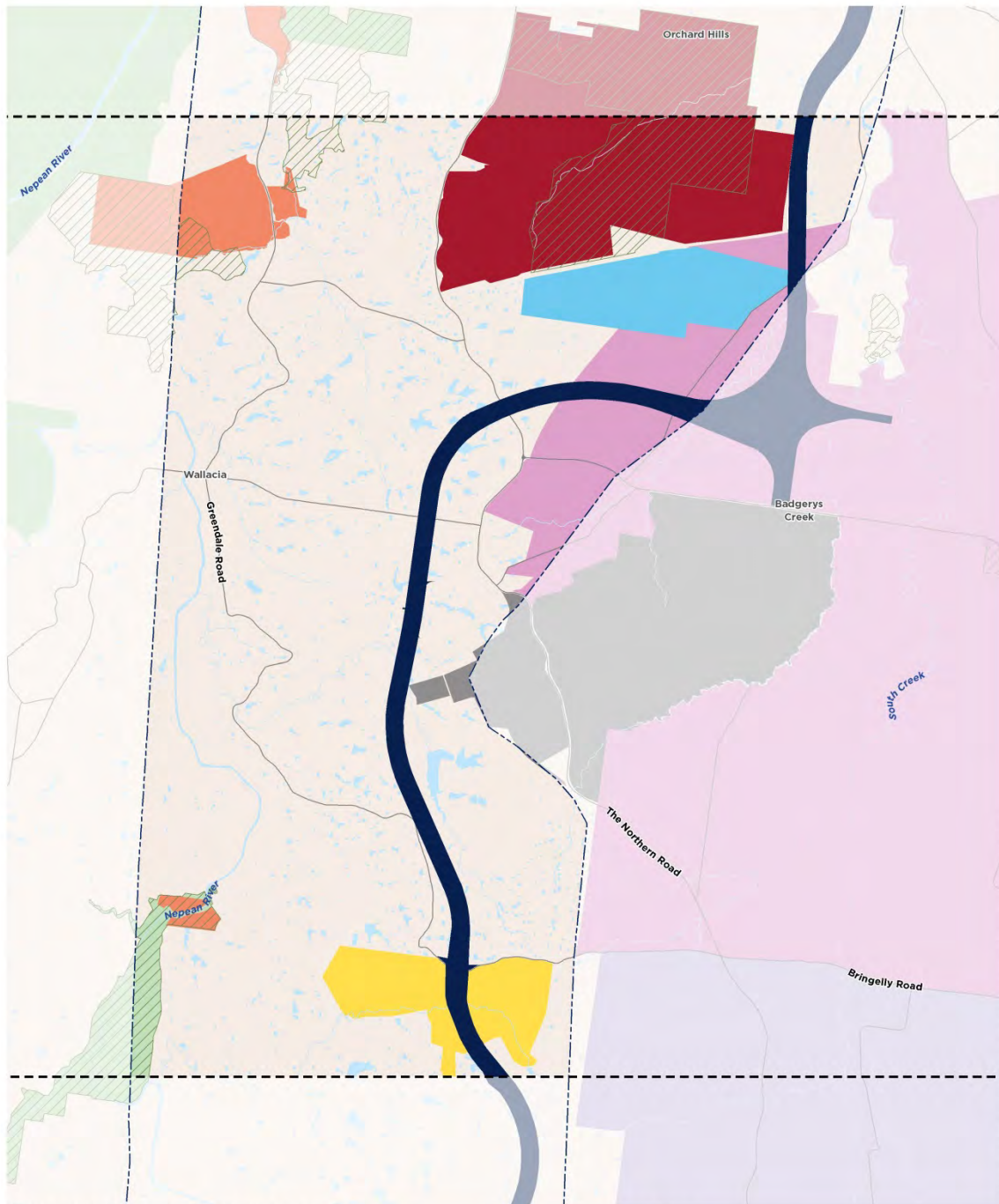
The south western corner of the Twin Creeks residential community is potentially affected by the recommended corridor. The affected area would be located adjacent to Luddenham Road and may affect a small portion of the golf course, but this does not impact on any existing dwellings or residential allotments within the estate.

The recommended corridor will not only provide an interchange with the proposed M12 and the upgraded Northern Road, but will also provide direct access to the Western Sydney Airport site. This approach reinforces the ability to link the future OSO infrastructure with the M12 Motorway, The Northern Road and the Western Sydney Airport. The recommended corridor and the M12 corridors intersect and integrate north of the Western Sydney Airport, providing key future motorway access to the airport, while also being able to accommodate a future freight rail line.

The recommended corridor alignment avoids the rural village of Luddenham, but does impact a number of rural residential properties along this section of the corridor. This outcome is considered acceptable as the corridor is located as close as possible to the west of the Western Sydney Airport site in order to reduce the length of the corridor, and thereby minimises the number of rural properties affected.

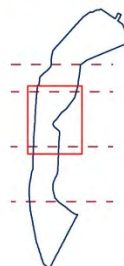
Immediately south of the proposed interchange with Greendale Road, the recommended corridor will divide the University of Sydney's John Bruce Pye Farm campus. Based on consultation meetings this outcome was considered acceptable by the University of Sydney as it would result in creating an equal portions of the divided campus site area and thereby safeguarding more useable portions of university land on either side of the recommended corridor.

DRAFT



SECTION 3 - ORCHARD HILLS TO COBBITTY

- Study area
- Recommended corridor
- Priority Conservation Lands
- State Heritage
- Proposed Western Sydney Airport
- South West Growth Area
- Western Sydney Airport Growth Area
- Defence Establishment Orchard Hills
- University of Sydney land
- Proposed Sydney Science Park
- NPWS Estate

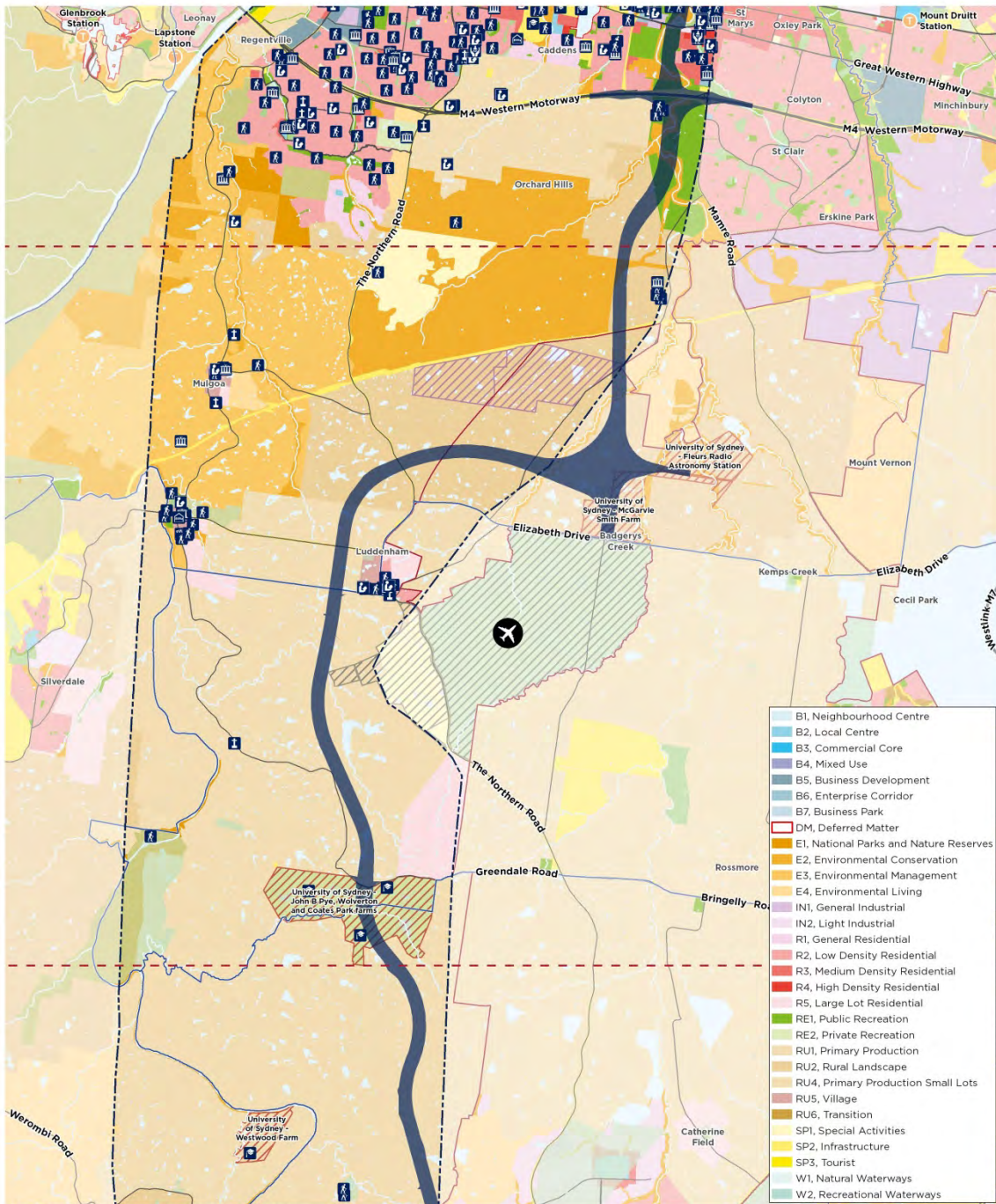


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

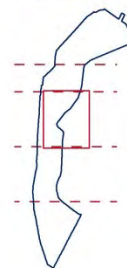
Figure 27 Key Land Uses – Section 3 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE ZONING SECTION 3 ORCHARD HILLS TO COBBITTY

- OSO Study Area
- Recommended corridor
- Section boundary
- Local Government Area
- Growth Area
- Sydney Science Park
- University of Sydney
- Western Sydney Airport
- Aged care
- Childcare
- Community services
- Further education
- Park / sport / recreation
- Place of worship
- School



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 28 Land use zoning – Section 3 of Recommended Corridor

DRAFT

Section 4 Cobbitty to Camden Park

As shown in **Figure 29** and **Figure 30** this section of the recommended corridor traverses south from the University of Sydney's site at Greendale Road towards and across Cobbitty Road, east of the village of Cobbitty. The recommended corridor supports a future interchange with Cobbitty Road, and traverses west of the South West Growth Area through to the eastern portions of the University of Sydney's campuses. A full interchange is proposed at Burragorang Road at Mount Hunter, from which the alignment of the recommended corridor then traverses south east over the rural suburb of Bickley Vale towards Cawdor.

The recommended corridor provides the shortest distance between that in Section 2 and this section of the recommended corridor, minimising the number of rural properties affected. It avoids the village of Cobbitty, while still providing sufficient width to accommodate a potential future interchange with Cobbitty Road. It is also the preferred option of the University of Sydney as it avoids sensitive infrastructure within the Campus sites while providing a definite boundary between the urban areas of Ellis Lane and Grasmere and the rural campuses.

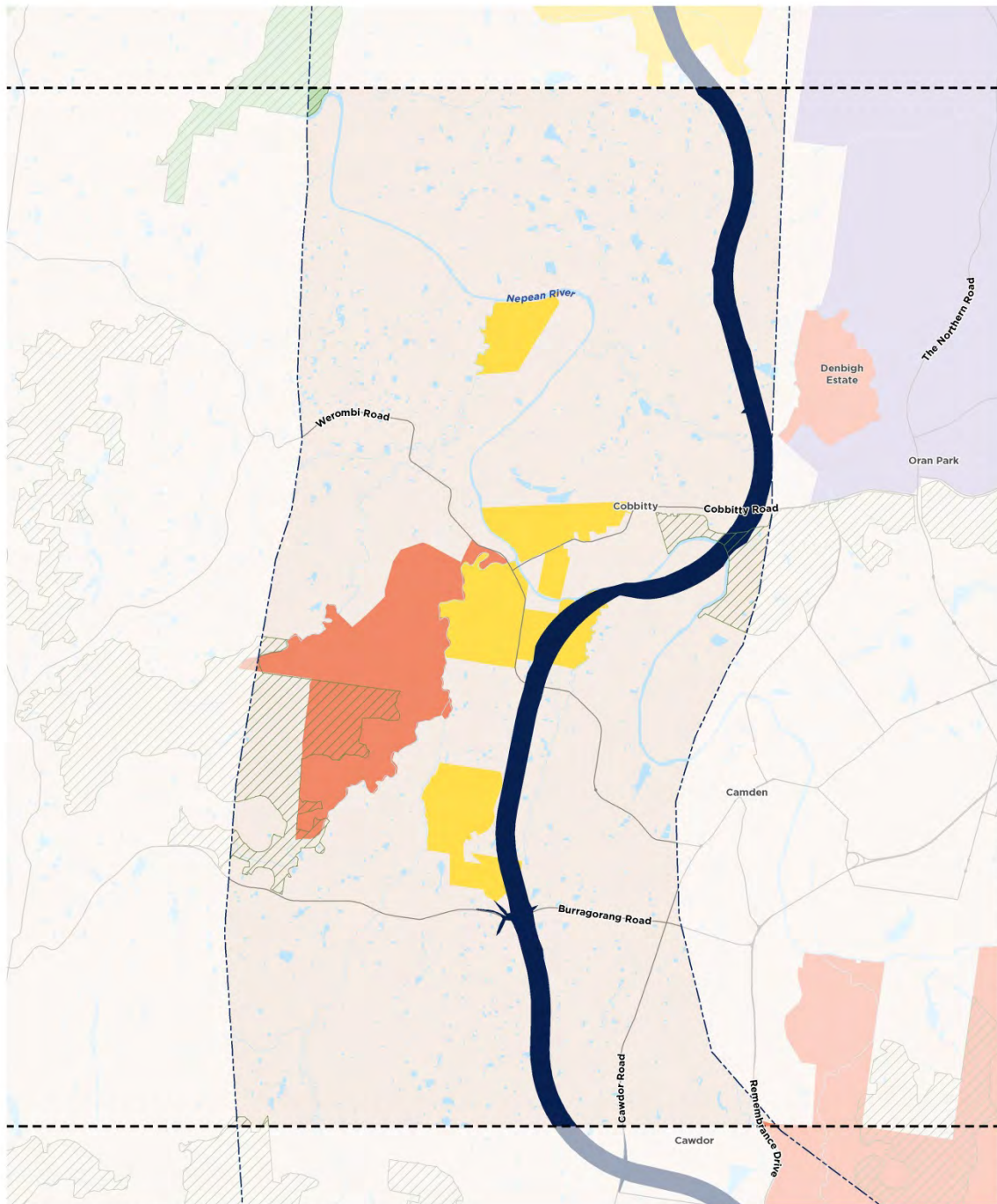
Avoiding the State Heritage listed site of Brownlow Hill Estate, the Cobbitty village and the core parts of the University sites compares with alternative alignment options through the village, the university and/or heritage sites that were considered too significant.

The recommended corridor affects the least amount of PCL in this locality when compared to options that were considered east and west of the recommended alignment

Although three sites zoned R5 Large Lot Residential are impacted by the recommended corridor alignment, one of these is vacant, flood prone and unlikely to be developed to later accommodate any dwellings; while the other two affected lots located along Cobbitty Road are at the edge of the village and are only partially impacted at their eastern edge.

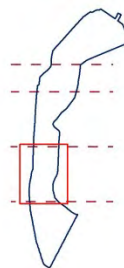
TfNSW has advised that an alternative alignment around the village of Cobbitty may be considered and that while an interchange with Cobbitty Road has been allowed for in the recommended corridor, a decision on the intersection would be subject to further detailed design and network planning in future years. This network planning would also consider an east-west connection north of Cobbitty Road as part of future planning for the South West and Western Sydney Airport Growth Areas.

DRAFT



SECTION 4 - COBBITTY TO CAMDEN PARK

- Study area
- Recommended corridor
- Priority Conservation Lands
- State Heritage
- South West Growth Area
- University of Sydney land
- NPWS Estate

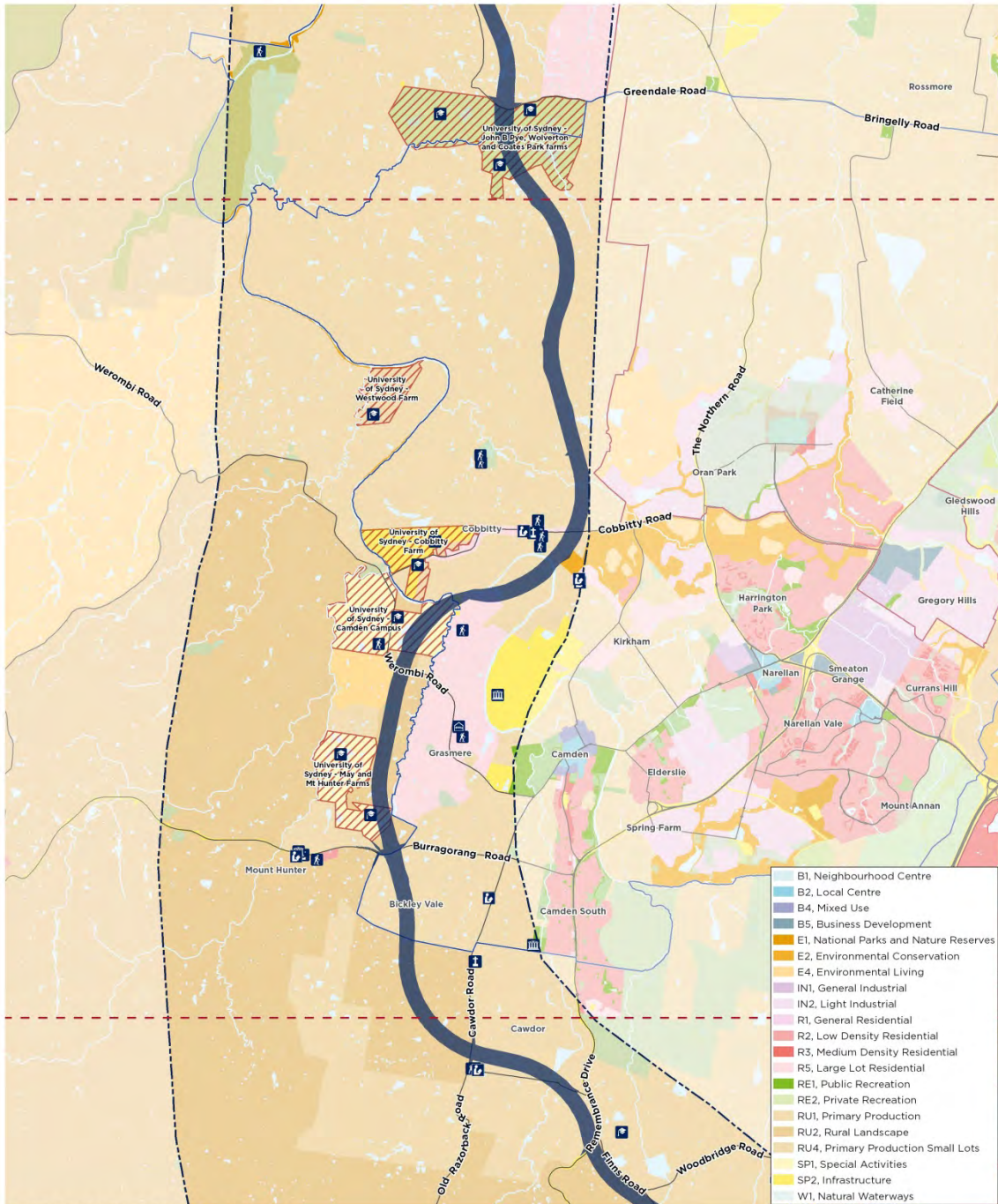


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

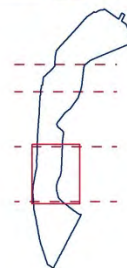
Figure 29 Key Land Uses – Section 4 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE
SECTION 4 COBBITTY TO CAMDEN PARK

- OSO Study Area
- Recommended corridor
- Section boundary
- Local Government Area
- Growth Area
- University of Sydney
- Aged care
- Community services
- Further education
- Park / sport / recreation
- Place of worship
- School



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 30 Land use zoning – Section 4 of Recommended Corridor

DRAFT

Section 5 Camden Park to Menangle

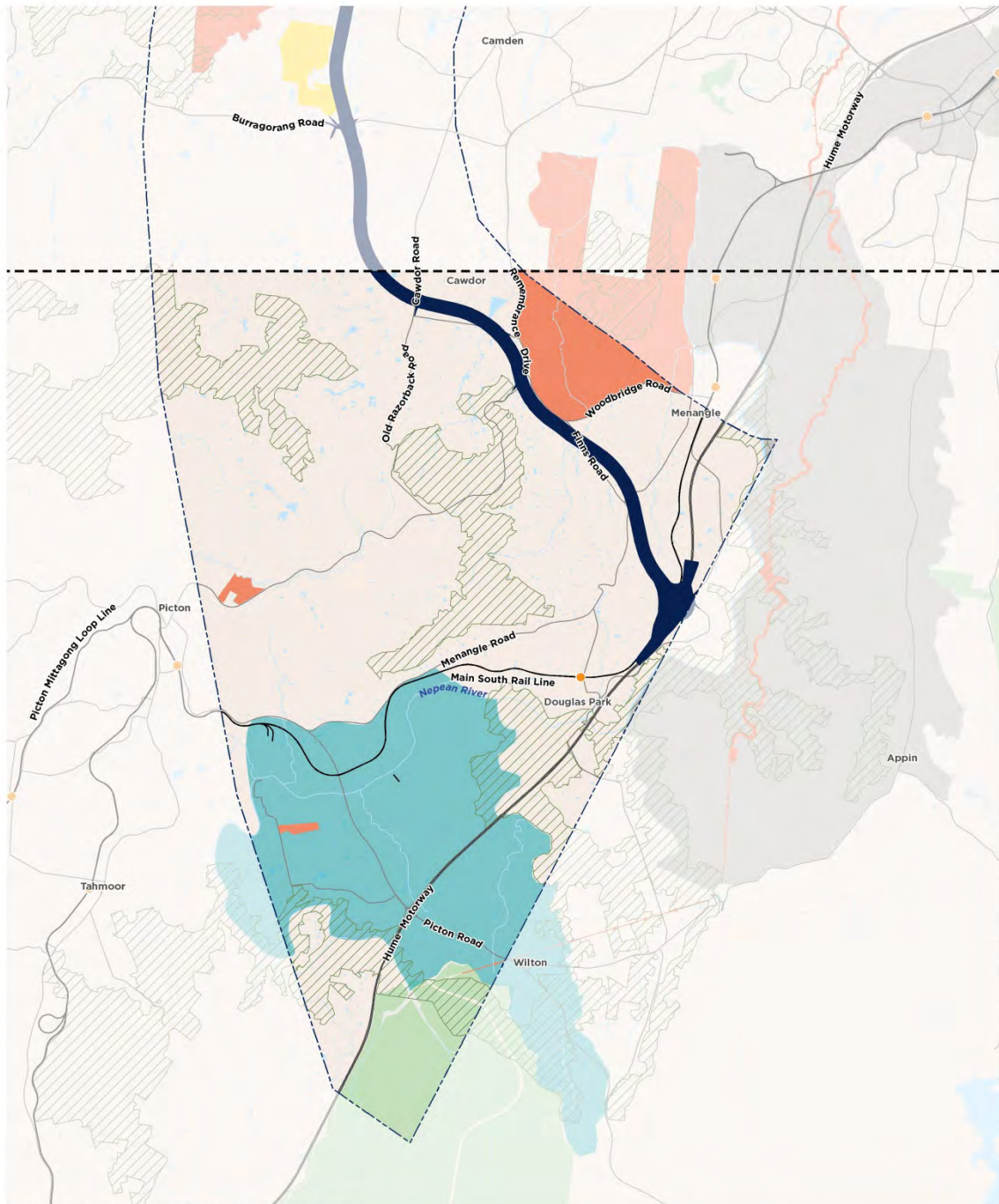
As shown in **Figure 31** and **Figure 32** this section of the recommended corridor passes through the southern portion of the potential urban release site of Cawdor, south west of the State Heritage listed site of Camden Park and connects to the Hume Highway south of Menangle Park. The recommended corridor avoids impacts on Camden Park and its curtilage, the Greater Macarthur and Wilton growth areas and potential urban development at Cawdor, although this impact is limited to the southernmost portion to allow for some remaining future development opportunity north of the recommended corridor.

While the recommended corridor impacts the 'Ruane Stud' site at 110 Finns Road, Menangle, along with a number of other rural sites along this section, the alignment has been shortened as much as possible to minimise impacts to a large number of sites further west of this alignment

The connections to both the Hume Highway and the freight rail line will provide the necessary interchanges with both road and rail to enable fuller access north to south along the corridor, as intended.

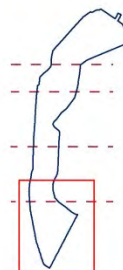
Although this section of the recommended corridor will impact the potential for rezoning and future urban development at Cawdor, and has impacts to rural residential development in this area, these impacts were considered necessary in order to avoid steep terrain further south of Cawdor through the Razorback Ridge, existing urban areas of Camden and Douglas Park and the State listed heritage items of Camden Park Estate and Belgenny Farm.

DRAFT



SECTION 5 - CAMDEN PARK TO MENANGLE

- Study area
- Recommended corridor
- Greater Macarthur Growth Area
- Wilton Growth Area
- Priority Conservation Lands
- State Heritage
- NPWS Estate

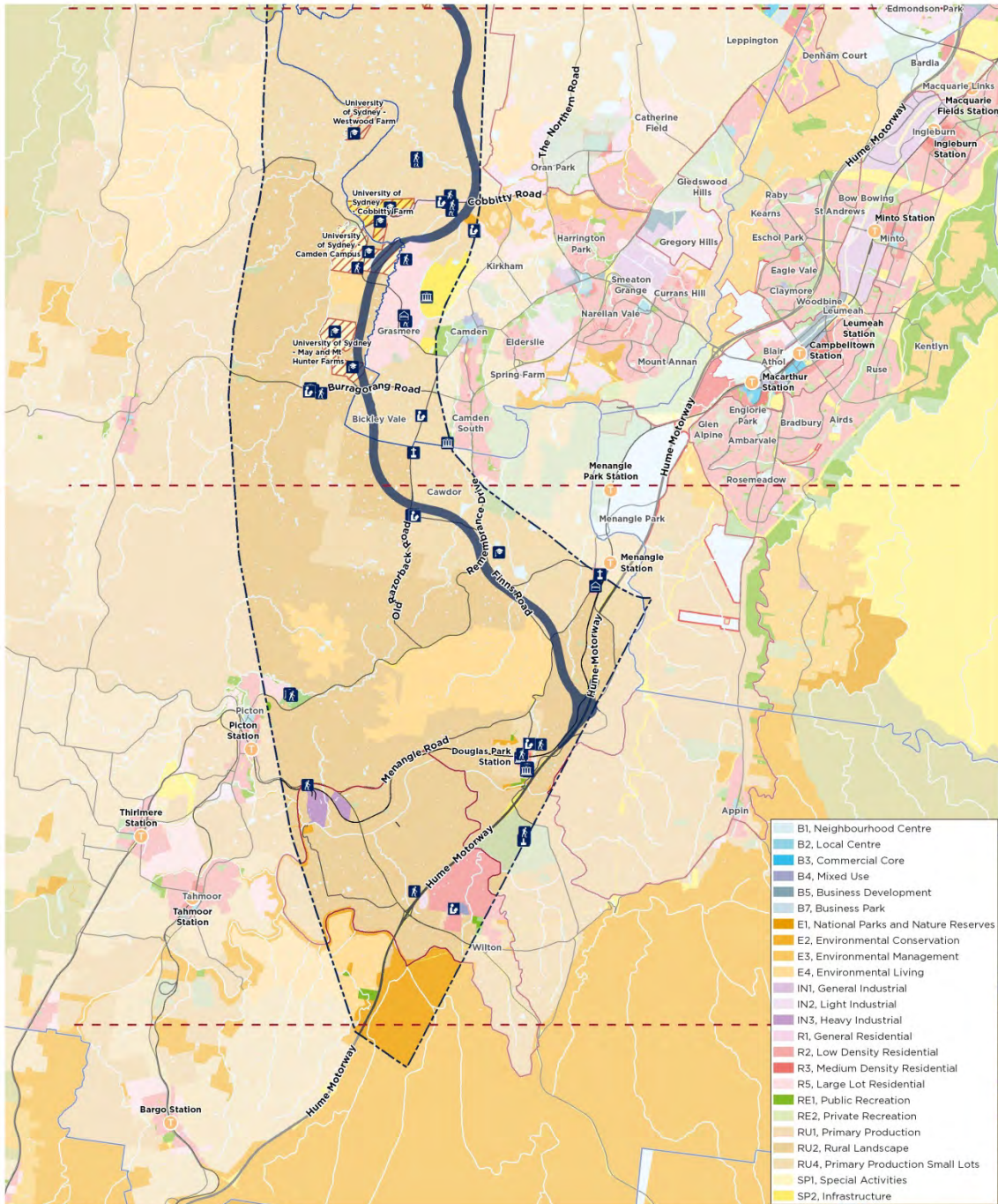


Data used has been provided by OEH and has not been verified for accuracy

AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

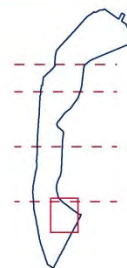
Figure 31 Key Land Uses – Section 5 of Recommended Corridor

DRAFT



OUTER SYDNEY ORBITAL - LAND USE
SECTION 5 CAMDEN PARK TO MENANGLE

- OSO Study Area
- Recommended corridor
- Section boundary
- Local Government Area
- Growth Area
- University of Sydney
- Aged care
- Community services
- Further education
- Park / sport / recreation
- Place of worship
- School



Data provided by OEH has not been verified for accuracy
AECOM makes no representations or warranties of any kind, about the accuracy, reliability, completeness, suitability or fitness for purpose in relation to the map content.

Figure 32 Land use zoning – Section 5 of Recommended Corridor

DRAFT

7.1.2 Management and mitigation considerations

Protection

The following recommended measures should be employed:

- Feedback from affected land owners should be incorporated into land use planning recommendations, where appropriate, including the provision of guidance on development within the corridor that may be physically affected or result in a loss of community facilities by the provision of project infrastructure in future or development adjacent to the corridor that may represent a concern for future sensitive receivers.
- Interim uses of the corridor until the infrastructure is built should consider benefits to the local communities, particularly in areas of residential growth, and could include providing for community facilities and open space and recreational benefits
- Consultation with affected land owners would occur during the consultation period to explain the consequences of rezoning land and landowner rights under the *Land Acquisition (Just Terms Compensation) Act 1991* (LAJTC Act)
- Continued consultation with government agencies and councils should be undertaken to ensure potential property and land use impacts are planned for, and managed appropriately.

Environmental impact assessment

A detailed land use impact assessment is required to support any future application for construction and operation of infrastructure within the corridor to meet the appropriate legislative and statutory provisions, guidelines relevant at the time, and requirements stipulated by the DPE.

As part of the design development and impact assessment process the following potential mitigation measures should be considered for the following sections of the recommended corridor to address and minimise impacts associated with the future OSO infrastructure:

- **Section 2** - Retaining access to the Dunheved Golf Course will need to be considered as part of any detailed design for the future OSO infrastructure. This could include direct links from Christie Street or Dunheved Road, or a northern extension of Werrington Road from Christie Street.
- **Section 2** - Reviewing alternative road access options to the Dunheved Estate once the rail loop is to be implemented. The purpose of this is to overcome the potential to land lock the northern portion of the estate. Consideration should be given to providing the Links Road extension which has been previously proposed by Penrith City Council to improve access to the northern part of the estate (see **Figure 33**).
- **Section 2** - Consideration of co-location of the future OSO infrastructure and maintaining and improving open spaces uses in this part of the corridor should be explored as part of and in support a future application for construction and operation of the future OSO infrastructure within the recommended corridor. The elevated infrastructure through this area could enable continued use and improved embellishment of the existing recreation areas.
- **Sections 1 and 2** - Consideration of ways to restore the biodiversity and water quality of the South Creek riparian corridor, thereby helping to support the delivery of the Green Grid through this part of Western Sydney.

DRAFT



Figure 33 Proposed Link Road extension in Dunheved Estate

7.2 Traffic and Transport

7.2.1 Corridor protection and potential future infrastructure

The protection of the recommended corridor would not result in tangible impacts to traffic other than to identify those roads that may, at some time in the future, require upgrading or augmentation. It is expected that a future OSO will improve the efficiency of freight transport through western Sydney and improve general access through the potential interchanges identified along the corridor for future network integrated planning.

Development of the OSO will depend on future road and rail traffic demand. It is intended that the OSO would be implemented at such a time to alleviate congestion on other north-south routes or when freight movements along the shared metropolitan rail network are affected due to capacity constraints. At a strategic level, transport impacts would be primarily beneficial.

Potential impacts requiring mitigation would include an increase in traffic on arterial roads connecting with the OSO. As such the OSO would necessitate a number of future local road treatments. These treatments would be required to maintain local access where possible and to avoid the severance of communities from their local road network. A list of local roads that would be affected based on the strategic concept design for the recommended corridor has been provided in **Appendix B** and includes potential treatment options that would need to be further developed and assessed in future design and delivery phases.

DRAFT

The provision of future public transport infrastructure including mass transit rail connections will have a beneficial impact on road congestion around the recommended corridor in concert with the future potential development of infrastructure for the OSO.

Section 1 – Box Hill to Dunheved

Potential future interchanges in Section 1 of the recommended corridor have been considered in terms of future benefits and impacts including:

- Full service interchanges at Windsor Road and Richmond Road, enabling connections to traffic in all directions. Access via Windsor Road would provide direct access to key centres such as Windsor to the north and Rouse Hill, Norwest, Castle Hill and Parramatta to the south. These interchanges would, however, result in increased flows on Windsor and Richmond Roads for traffic accessing the OSO.
- Access via Richmond Road, providing direct access to key centres such as Richmond to the north and Marsden Park and Blacktown to the south. The location of the service interchange at Richmond Road is further away from the urban areas of Marsden Park and Marsden Park Industrial and would provide some degree of separation between the intersections/accesses to these urban areas and regional traffic.
- System interchange connectivity provided with BLOR-CC at Llandilo within Shanes Park Precinct of the North West Priority Growth Area would not provide direct access to the regional road network at this location. It would however provide connection to the M7 Motorway and Richmond Road, Norwest Boulevard and Abbott Road via a future motorway within the BLOR-CC corridor.

When constructed, the OSO may increase traffic locally where each interchange is located. However, given OSO's functional hierarchy to provide regional connections, it would reduce the volume of regional through traffic in the arterial road network. Given the proximity of the interchanges at Windsor Road and Richmond Road, it may attract short trips within the North West Growth Area as an alternative route. Potential network solutions will need to be considered as part of future detailed design of infrastructure in the corridor and integrated network planning. Baulkham Hills Council has recommended that Bandon Road be considered as a parallel connection.

It is intended that freight rail will continue north of a connection to the Main North Rail Line and ultimately connect to the Central Coast. The benefits of this northern connection are beyond the current scope of the OSO corridor investigation. The future stages of the Outer Sydney Orbital corridor will include connections north to the Central Coast.

Section 2 – Dunheved to Orchard Hills

Key road interchanges in Section 2 of the OSO in the recommended corridor, and benefits and impacts of these include:

- Full service interchange at Great Western Highway, providing connections to traffic in all directions
- Access via the M4 Western Motorway and Great Western Highway from the OSO, providing access to key centres such as Penrith, Blacktown, Parramatta and Sydney CBD as well as employment areas in the Western Sydney Priority Growth Area and WSEA.

A key benefit for this section of the recommended corridor is that it will provide the opportunity for future regional connection functionality between Western Sydney (Penrith and the Western Sydney Priority Growth Area) with the North West Priority Growth Area.

Delivery of the OSO transport infrastructure may result in increased flows on the Great Western Highway and the M4 Western Motorway for traffic accessing the OSO. Future potential operation of the OSO may also increase traffic locally where the interchanges are located, including the connection to the Great Western Highway interchange. However, given the functional hierarchy of OSO to provide regional connections, this would potentially reduce the volume of regional through traffic on the arterial road network.

The impacts of the freight rail in Section 2 of the recommended corridor are predominantly positive and include:

DRAFT

- Decreased freight movements along the Main West Rail Line between Flemington Junction and St Marys
- Additional passenger capacity along the shared rail network east of St Marys
- Improved connectivity to Port Botany and Port Kembla, through existing and future upgraded rail connections.

Section 3 – Orchard Hills to Cobbitty

Key road interchanges in Section 3 of the OSO in the recommended corridor and benefits and impacts of these include:

- Connection to the proposed M12 Motorway includes allowance for a full system interchange which would in turn facilitate access to the proposed Western Sydney Airport in the future
- A full service interchange at Greendale Road would provide connections to traffic in all directions
- Interchanges at Greendale Road (Bringelly Road) and The Northern Road would enable access to the northern areas of the South West Growth Area and connection to the M7 Motorway could still be achieved via the Greendale Road interchange (Bringelly Road) and Elizabeth Drive
- The OSO would provide regional connection between the major centres such as Penrith and the western Sydney and the South West Priority Growth Areas
- Given the proximity of the potential interchanges at Cobbitty Road and Greendale Road (Bringelly Road), the OSO may attract short trips between the northern and southern parts of the South West Growth Area as an alternative route – this impact may be mitigated with the upgrades and widening to The Northern Road (which would provide a parallel un-tolled route)
- Other potential east-west connections north of Cobbitty Road may avoid a connection to Cobbitty Road and would need to be investigated as part of precinct planning for the Western Sydney Airport and South West Growth Areas.

The impacts of rail in Section 3 of the recommended corridor are predominantly positive and include:

- OSO will facilitate the opportunity for rail connectivity to the proposed Western Sydney Freight Line corridor and a potential future Western Sydney Intermodal Terminal
- OSO will provide improved connectivity to Port Botany and Port Kembla, through existing and future upgraded rail connections.

Section 4 – Cobbitty to Camden Park

Key road interchanges in Section 4 of the OSO in the recommended corridor and benefits and impacts of these include:

- The Cobbitty Road interchange may result in increased traffic locally, however given the functional hierarchy of the OSO to provide regional connections, this would relieve the amount of regional through traffic in the arterial road network
- A full service interchange would be provided at Burratorang Road, which would provide connections for traffic in all directions; with access from the Burratorang Road interchange also likely to improve connections to Camden via Camden Valley Way and Camden Bypass
- The OSO would provide regional connection functionality and additional capacity between the South West Priority Growth Area and the Macarthur/Wollondilly region and would not duplicate arterial roads
- Operation of OSO infrastructure may change local traffic patterns in the vicinity of the Burratorang Road and Hume Motorway interchanges; however, given its functional hierarchy to provide regional connections, this would reduce the amount of regional through traffic on the arterial road network.

DRAFT

Section 5 – Camden Park to Menangle

Key road interchanges in Section 5 of the OSO in the recommended corridor and the benefits and impacts of these include:

- A full system interchange at the Hume Motorway would provide connections for traffic in all directions.
- The OSO will facilitate access to the Macarthur South and Macarthur areas locally as well as regional connections to Wollongong via Picton Road and the Southern Highlands/Canberra/Melbourne via Hume Motorway. It would also provide regional connection between Camden and Macarthur South, which does not duplicate arterial roads.
- There could be localised changes in traffic at the interchange however the regional connections provided by the interchange would reduce the amount of regional through traffic in the arterial road network.

The impacts of rail in Section 5 of the OSO corridor are predominantly positive and include:

- Provision of access to the Main South Rail Line via a southern direction grade separated junction
- On the Main South Rail Line there would be decreased freight movements north of Menangle
- Southbound freight re-routed along the OSO would provide additional capacity on the Southern Sydney Freight Line.

7.2.2 Management and mitigation considerations

Protection

The OSO will not be developed for some time. Corridor protection alone will not directly impact the local or regional road network or the freight rail network. The timing of the project will depend on traffic demand and land use developments, including other potential cumulative projects that are unknown at this stage. No specific mitigation and management measures are therefore recommended in relation to corridor protection.

Traffic modelling should be undertaken to inform the growth and change on the traffic network as the design develops. Once the traffic demand has increased and the need for the OSO is realised, further traffic investigations should be pursued.

At the stage of implementing parts of the OSO, analysis should be undertaken to assess the impacts on the local road and rail networks, and if required, network improvements should be identified and carried out. These might include increasing the capacity of some of the arterial roads connecting to the OSO. Transport for NSW and Roads and Maritime are continually monitoring the network and assessing forecast future demand.

Environmental impact assessment

A preliminary investigation of local roads that may require treatment as a result of the OSO has been identified. It is noted that while these proposed treatments are preliminary only and detailed design may propose alternative arrangements, the indicative local road treatments demonstrate that feasible mitigation and management measures can be implemented to maintain local road connectivity. It is recommended that future investigations are carried out to ensure treatments proposed maintain local road access in a similar manner.

A detailed traffic impact assessment will be undertaken at the time of delivery of the OSO project, to more accurately understand the potential traffic impacts that may occur, and to identify more specific management measures and treatments. The traffic impact assessment will inform the EIA that will be undertaken for the project in the future.

7.3 Socio-Economic

Social impacts are consequences due to changes or impacts to people's way of life, community, access to social infrastructure and facilities, health and wellbeing, and properties. These can arise as a result of physical or indirect impacts associated with infrastructure projects, such as amenity issues like noise, visual, air quality and other environmental impacts. This section addresses the key socio-

DRAFT

economic issues for the recommended corridor, with assessment of other specific issues (such as noise and visual) are addressed elsewhere in this draft SEA.

7.3.1 Corridor protection and potential future infrastructure

Impacts to community infrastructure have been avoided where possible through the options development process for the recommended corridor. Direct socio-economic impacts as a result of protection of the recommended corridor are linked to impacts associated with potential future property acquisition, which generally only occurs prior to a future infrastructure construction project.

In addition, once the land within the corridor is protected, investment for further expansion and development of services within the corridor may be reduced or limited (refer to **Section 8.0**). Consideration of commensurate land use planning will need to be considered to minimise impacts to the community and existing landowners.

Community impacts

The recommended corridor minimises direct impacts on established dwellings and community facilities to avoid displacing residents or communities. The corridor does have the risk of separating communities or individual ties to the community by creating a physical separation of residents from important elements of their community at a local or regional level.

While the OSO has the potential to provide greater accessibility to educational facilities, there is the potential for these educational facilities to be impacted by the potential loss of amenity associated with the future operation of a major transport corridor. In particular, the Kurrumbene School and Penrith Valley Learning Centre, which have been avoided by the recommended corridor, may experience a change in amenity as a result of future infrastructure within the corridor.

The recommended corridor has been located to reduce impacts on the existing and future operation of University of Sydney Campuses.

As there are no State health or aged care facilities located within the recommended corridor, the primary impact is related to access to these facilities. This is of particular importance for Nepean Hospital that is on the western side of the recommended corridor. The Great Western Highway and the M4 Western Motorway are key access roads to this major hospital. Rezoning around the recommended corridor and maintaining these key access points should ensure the hospital is not isolated from the communities to the east of the recommended corridor.

A small number of other community facilities were not avoided due to the need to balance other land use impacts. Section 1 of the recommended corridor passes through the Wianamatta Regional Park at Ropes Crossing; it has been refined in consultation with Office of Environment and Heritage, to avoid impacts to the main access to the Regional Park and minimise impacts on its associated facilities as well as cultural and biodiversity values.

Five recreational spaces are located within Section 2 of the recommended corridor. Direct and indirect impacts associated with future construction and operation of the OSO is the potential to reduce available open space for recreational activities in the area where this open space is directly included in the recommended corridor.

Employment and industry

Table 13 outlines each area and the considerations for the recommended corridor.

DRAFT

Table 13 Future Employment Areas

Future Employment Area	Description/location	Recommended corridor consideration
Western Sydney Employment Area	Located near the intersection of the M4 Western Motorway and M7 Motorway, the Western Sydney Employment Area is expected to eventually accommodate some 40,000 workers.	The corridor remains to the west of the area with a major intersection with the M4 Western Motorway at Claremont Meadows in the south creek catchment.
Western Sydney Airport Growth Area	Dedicated land for future residential development and employment lands that will connect new suburbs and employment areas with the planned Western Sydney Airport and the Metropolitan City Cluster of Penrith.	The corridor skirts around the western boundary of the Western Sydney Airport Growth Area. The Growth Area is in the early stages of planning.
North West Growth Area	Dedicated land for future residential and mixed use development on approximately 10,000 ha in the former Hills, Blacktown and Hawkesbury LGAs. The area is divided into 16 precincts to be progressively released. It will contain 70,000 new dwellings for around 200,000 new residents (DPE, 2016a).	The corridor intersects four of the precincts to the west. Windsor Road intersection will be a key link for the northern precincts. The Richmond Road intersection would be utilised by the central precincts of the area and the Palmyra Avenue intersection would be utilised by the southern precincts.
South West Growth Area	Dedicated land to future residential and mixed use development on approximately 17,000 ha in Liverpool, Camden, Campbelltown LGAs. The area is divided into 18 precincts to be progressively released. It will contain about 110,000 new dwellings for some 300,000 residents and capacity for 22,120 jobs (DPE, 2016b).	The corridor is located to the west of this area but provides future connectivity. The University of Sydney McGarvie Smith Farm intersection would be utilised by the northern portion of the release area. The Cobbitty Road intersection or alternative intersection to the north would be utilised by the southern portion.
Greater Macarthur and Wilton Growth Areas	Dedicated land for future residential and mixed use development at Menangle Park, Mount Gilead and Wilton.	The corridor sits between the two key areas for the Greater Macarthur Growth Area. The intersection with the Hume Highway would be integral in connecting the growth areas.

An important element of the current and future employment areas is the provision and/or facilitation of job opportunities close to places of residence. The OSO offers an opportunity to minimise future direct impacts on employment lands and will enable the efficient allocation of land, considering the potential future transport opportunities.

The prevalence of rural zoned land within the corridor indicates that this land may play an important role in generating income for owner occupiers as well as employment for persons in agricultural related industries. Therefore there is the potential for productive land used for agricultural purposes to be impacted by the provision of infrastructure within the recommended corridor in the longer term.

Transport infrastructure and travel behaviour

The social and economic opportunities to be provided by facilitating new transport corridors or improving the quality of existing transport connections in western Sydney are likely to be substantial. These opportunities will arise through improving accessibility for residents and businesses, increasing transport efficiency, changing land use and stimulating economic development.

DRAFT

Strategic transport planning for the OSO needs to locate road, freight rail and passenger rail corridors, and the connections between the corridors and the important land uses listed above, so as to provide efficient access for passenger and freight movements and to minimise future increases in car and heavy vehicle kilometres of travel, reducing congestion and increasing accessibility.

Section 1 – Box Hill to Dunheved

There is potential for negative impacts to rural lands, including established dwellings, in the vicinity of Oakville, Vineyard, Marsden Park and Berkshire Park, which could occur from the future OSO infrastructure through the introduction of increased noise and vibration, segmentation of existing rural land (primarily RU4), and visual/landscape impacts from the introduction of a new visual element.

Impacts on areas of Windsor Downs and Berkshire Park have been reduced by locating the recommended corridor in the South Creek corridor within close proximity to the existing 500kV electrical transmission line.

The cultural landscape and sense of place in the communities of Shanes Park and Llandilo could also change through the introduction of an infrastructure element into a primarily agricultural and low density area. Through the use of considered planning measures this change could present a future opportunity for the area.

The recommended corridor would result in direct impacts to the Wianamatta Regional Park through the establishment of an east-west barrier between visitor precincts (as identified in the Wianamatta Regional Park Master Plan). Presence of a transport corridor in this area would detract from the amenity value of this recreational space and may impact on connectivity of the recently upgraded walking and cycling tracks. This has potential to change the community sense of place and recreational value of the park and would require consideration of appropriate management and design measures as part of a future application for planning approval for the project. When assessed against conflicting impacts of surrounding areas, effecting Wianamatta Regional Park was considered the least impactful. The study team and TfNSW consulted with Office of Environment and Heritage in order to determine the least impactful route through the park. The future infrastructure would also be design to minimise impact on the park.

Section 2 – Dunheved to Orchard Hills This seems to repeat some of the above

Section 2 contains the highest density of population and associated community facilities along the recommended corridor and therefore impacts in some instances are largely unavoidable.

Impacts to residential land around St Marys and Werrington zoned as low (R2), medium (R3) and high (R4) are anticipated through the establishment of a barrier between these areas, as well as impacts to local amenity including increases in noise and visual intrusion. In order to minimise these impacts the corridor has been located in the South Creek corridor in close proximity to the existing 500kV electrical transmission line. Perceived changes to amenity could result through the introduction of a new infrastructure element in proximity to a number of educational and community facilities including the Kurrambee School and the Penrith Valley Learning Centre, both of which cater to students with intellectual or behavioural disabilities, Wollemi College, Western Sydney University, Cobham Remand Centre, Thorndale Foundation, Claremont Meadows Primary School, St Marys Village Shopping Centre and St Marys Senior High School.

The Dunheved Golf Club, Blair Oval at St Mary's, which is home to the Nepean Athletics Club, St Mary's Tennis Courts, The Kingsway playing fields and rugby fields, and the Samuel Marsden Reserve which includes the Colyton St Clair Chiefs Baseball Club, could all be impacted through the increase of noise and vibration, segmentation of the property and the introduction of a new landscape and visual element. The Dunheved Estate Reserve, Troy Adams Archery field and the Penrith BMX Club could also be impacted by proximity to new road and freight rail infrastructure.

Section 3 – Orchard Hills to Cobbitty

The recommended corridor transects the western extent of the Leppington Pastoral Co. land and, slightly further south, the University of Sydney John B Pye, Wolverton and Coates Park farms. Direct impacts on these properties would occur through increased noise and vibration and the introduction of a new visual element, however provision of new connections to the University would act as a benefit to these educational facilities.

DRAFT

Section 4 – Cobbitty to Camden Park

The recommended corridor may impact on local community connectivity, with the potential for perceived changes to accessibility of the Cobbitty township. The recommended corridor transects the east-west connection of Cobbitty Road as well as the Werombi Road connection to the south to the townships of Grasmere and Ellis Lane. Given the smaller size of the Cobbitty township and its rural residential character, changes to accessibility and connection to other neighbouring townships could represent a more significant concern compared with localities to the north, which are well serviced by community facilities in surrounding suburbs. The corridor has however been located at the eastern extent of Cobbitty village avoiding direct impact on the village and creating a barrier between the densely populated areas of Oran Park and the South West Growth Area.

The recommended corridor transects the University of Sydney Camden and Cobbitty Campus and the south east portion of the May and Mt Hunter Farms site. However, as described in Section 3, provision of new connections to the University would act as a benefit to these educational facilities.

Section 5 – Camden Park to Menangle

Given the predominantly rural and semi-rural composition of the communities within this section of the recommended corridor, localised changes to the cultural landscape and sense of place and the community character and values could be exacerbated via the operation of the corridor, although these potential impacts should be considered in the context of the existing presence of rail and arterial roads.

A paintball centre at Cawdor is located within Section 5 of the recommended corridor and may be directly impacted through increased noise and vibration and the introduction of a new visual element.

7.3.2 Management and mitigation considerations

The potential impact on property is also in part mitigated in those areas which are subject to future growth under the growth areas.

The future development of infrastructure in the corridor is potentially decades away and therefore people can continue to enjoy their properties within the recommended corridor. Future development of infrastructure has a number of major design and approval stages that will provide communities with ample opportunities to comment on the provision of potential future infrastructure and ultimately properties impacted by the corridor will be subject to acquisition under *the Land Acquisition (Just Terms Compensation) Act, 1991*.

The potential loss of open space will need to be addressed as part of a future detailed design stage and environmental approval process. Sections of the corridor through flood affected land will be elevated and the design of these structures can reduce impacts on open space and connectivity.

The development of future potential infrastructure including along South Creek can provide opportunities for riparian corridor management and new active transport connections. The M7 Motorway is one example of where infrastructure for road has provided cycle and walking connections.

The potential to locate future freight rail infrastructure between sections of motorway is likely to have a beneficial outcome from a noise and visual perspective and reduce complications at key road to road intersections.

Protection

Different communities and individuals will respond differently to the protection of the corridor. It is recommended that socio-economic considerations are incorporated into land use planning recommendations so as to prevent limitations to existing uses.

Pursuant to clause 5.1(3) of the *Standard Instrument – Principal Local Environmental Plan 2006* interim use of the corridor until the infrastructure is built may be considered to benefit local communities, particularly in areas of residential growth. This could include providing for community facilities and open space and recreational benefits. Early planning should also be undertaken for new community facilities that would be required to offset the loss of those within the corridor. In addition, existing use rights provisions under sections 106-109B of the EP&A Act will enable the continuation of current approved uses until such time as the future OSO infrastructure is built.

DRAFT

Environmental impact assessment

It is anticipated that a social impact assessment will be undertaken to support a future application for construction and operation of infrastructure within the corridor. This social impact assessment will need to meet the appropriate guidelines relevant at the time.

7.4 Non-Aboriginal Heritage

7.4.1 Corridor protection and potential future infrastructure

There would be no direct impacts to heritage structures as a result of corridor protection.

There is potential for indirect impacts to heritage items to arise as a result of changes in management, maintenance and ownership of those sites. However, it is not possible to ascertain or accurately predict these changes.

Protection of land may impact management plans for key heritage sites within the OSO corridor, including the Shale Woodland Llandilo (a Commonwealth Heritage item), the Clydesdale – Grand House, Barn and Cottage (a State Heritage Register Curtilage) and Wianamatta Regional Park. Further discussion with OEH, Heritage Council and relevant local councils would be required to determine existing maintenance requirements and responsibilities for key sites and management of those sites in the future, including changes to existing management plans for key sites.

Potential impacts on non-Aboriginal heritage may arise during construction and operation of a future transport corridor and these include:

- Direct impacts as a result the necessary removal of heritage items to accommodate the transport corridor and associated infrastructure
- Indirect impacts as a result of changes to important views and landscape context associated with heritage values of items and places.

Items listed on the Commonwealth Heritage List and State Heritage Register have national, regional and State significance (as described above) and level of legal protection under national and state legislation. One Commonwealth Heritage site and two State heritage sites may be impacted by the OSO infrastructure.

Section 1 – Box Hill to Dunheved

The following heritage listed sites within or adjacent to the recommended corridor in Section 1 would be impacted by the OSO infrastructure:

- The former ADI site at Llandilo, incorporating the International Radio Transmitter Station and Shale Woodlands, is listed on the Commonwealth Heritage List
- Clydesdale House – Grand House, Barn and Cottage listed on the SHR
- Two LEP listed items, St Phillips Cemetery and Rosemont, are located within or adjacent to this section of the recommended corridor.

Shale Woodland Llandilo

The Shale Woodland Llandilo, located off Stony Creek Road in Shanes Park, is listed on the Commonwealth Heritage List and the Register of the National Estate (now a non-statutory archive). The site is significant as it contains one of the largest remnants of the natural vegetation of the Cumberland Plain, including the nationally endangered Cumberland Plain Woodland, which highlights its significance in the western Sydney region. Furthermore, it is possible that cultural values, both indigenous and non-indigenous, of National Estate significance may exist in this place (Australian Government, 2015). It is approximately 400 ha in size, located around the former International Radio Transmitter Station near Llandilo.

A portion of Commonwealth Heritage Listed Shale Woodland Llandilo landscape area would be impacted by the recommended corridor. The area would be permanently fragmented from the larger site; however this would be a relatively small portion of the southwest corner of the site. Direct impacts would result from the loss of part of the property to the recommended corridor as well as indirect impacts on the heritage values of the site as a result of visual intrusion.

DRAFT

Clydesdale House

The Clydesdale property itself was listed under Schedule 2 of the Blacktown LEP (1988) as 'House and Farm Buildings—Clydesdale—Lot 2, DP 260476, Richmond Road'. This local listing still appears on the State Heritage Register as 'Clydesdale, Farmers Cottages and Barn', but has subsequently been removed from the Blacktown LEP 2015.

The National Trust of Australia register lists 'Clydesdale' as item 7063 on its suburban register as an item of historic heritage value. The State Heritage register (SHR) lists 'Clydesdale - House, Barn, Cottage and Farm Landscape' (Item 00674) as an item of State significance and defines its curtilage as including all historic items and structures, as well as the pastoral landscape that they are situated within, stating: "*its landscape features remain relatively intact, including significant remnant woodlands, Aboriginal relics, two cemeteries... The house retains its original relationship to its landscape setting and farm and is the only remaining example of the lowland model of homestead siting in the Blacktown area and one of three remaining examples intact on the Cumberland Plain*" (NSW Office of Environment and Heritage, 2016).

The recommended corridor would significantly impact on State Heritage Register item Clydesdale House, Barns and Cottage. Clydesdale House itself would be avoided by OSO infrastructure but the curtilage of the property would be directly impacted. It is expected that the OSO would be on viaduct through this area to be above the 1:100 flood level. The landscape and visual amenity of the Clydesdale property would be disrupted through the introduction of the OSO transport infrastructure. The property has been listed as significant and protected in part because of the associated views and landscapes. Additionally, the curtilage of the property would be fragmented and may lose some of the character that made it significant.

Local heritage items

Once a future transport corridor is constructed, the heritage items and their associated values have the potential to be lost. Two sites, St Phillips Cemetery (which is on the site of Clydesdale Estate) and Rosemont (house and pasture), could be directly impacted by the OSO infrastructure. The property/curtilage would be segmented and may result in loss to the character and values that made the items significant.

Section 2 – Dunheved to Orchard Hills

The following heritage listed sites within or adjacent to the recommended corridor in Section 2 would be impacted by OSO infrastructure:

- St Marys Railway Group - listed on the SHR and Penrith LEP
- Four LEP listed items are located within or adjacent to this section of the recommended corridor. These four items are Wool Pack Inn Ruin, Torquay house, Margaret Farm and Memorial Cairn.

St Marys Station Group

St Marys Station group is listed as having State significance on the SHR. The listing identifies that "*St Marys Station Group is of State significance as an early station opened in the 1860s when the Great Western Railway was extended from Parramatta and for the role it played in handling the increased traffic for the American ammunition and general store built at Ropes Creek during World War II...*

St Marys Station Group features a number of rare structures including the goods shed, the only brick example of its type in the state and the associated crane, one of a few remaining cranes in the Sydney area. The signal box is one of few remaining such structures using utilitarian materials in a non-standard style" (NSW Office of Environment & Heritage, website accessed 2016).

The rail junction the Main West Railway could result in impacts to the heritage context of the site resulting from direct physical impacts or from visual intrusion and vibration.

Local heritage items

Once a future transport corridor is constructed, the heritage items and their associated values have the potential to be lost. In particular, one local heritage item could be lost as it is located wholly within the recommended corridor.

DRAFT

Section 3 – Orchard Hills to Cobbitty

No Commonwealth or State listed heritage items would be impacted by the OSO infrastructure in Section 3 of the recommended corridor. Three local heritage items, partly located within the recommended corridor, could be impacted directly and/or indirectly and would require mitigation and management. These items are Luddenham Road Alignment, McGarvie-Smith Farm and The Fleurs Radio Telescope Site.

Section 4 – Cobbitty to Camden Park

No Commonwealth or State listed heritage items would be impacted by the OSO infrastructure in Section 4 of the recommended corridor. Two local heritage items are partly located within the corridor. These items are Pomare Grove Teen Ranch and Cobbitty Weir. Direct and/or indirect impacts are likely and would require mitigation and management.

Denbigh Estate

Denbigh Estate is a State listed heritage item located to the east of the recommended corridor. The SHR identifies that:

Denbigh is of State significance as an intact example of a continuously functioning early farm complex (1817-1820s) on its original 1812 land grant. It contains a rare and remarkable group of homestead, early farm buildings and associated plantings with characteristics of the Loudon model of homestead siting within an intact rural landscape setting fundamental to its interpretation. The large collection of early farm buildings is perhaps the most extensive and intact within the Cumberland/Camden region....It retains its historic views across the valley to Cobbitty in the west. (NSW Office of Environment & Heritage, website accessed 2017).

While the curtilage of the heritage site would not be directly impacted by the recommended corridor or associated OSO infrastructure, the site could potentially be impacted by the corridor through the introduction of a new visual and landscape element in the future. In particular there would be potential for impacts on historic views from the Estate towards Cobbitty across the valley to the escarpment in the west.

Section 5 – Camden Park to Menangle

The following heritage listed sites within or adjacent to the recommended corridor in Section 5 would be impacted by the OSO infrastructure:

- SHR listed Camden Park Estate and Belgenny Farm (located adjacent to the corridor)
- Two LEP listed items are located within or adjacent to this section of the recommended corridor (also within Section 4), being Cawdor Creamery Site and Cawdor Dairy, and one LEP listed item wholly within the corridor, being Wooden Mileposts.

Camden Park Estate and Belgenny Farm

Belgenny Farm was the working farm supporting the Camden Park homestead. Collectively they form the oldest, intact, rural landscape and group of farm buildings in Australia. Camden Park Estate and Belgenny Farm is a State heritage item located adjacent to the recommended corridor. Direct impacts are not anticipated however the site could potentially be impacted by the corridor through the introduction of a new visual and landscape element.

Local heritage items

Two local heritage items are partly located within the recommended corridor, the Cawdor Creamery Site and Cawdor Dairy. Direct and indirect impacts are likely and would require mitigation and management. The Wooden Milestones are unable to be avoided and would be directly impacted. The Camden Park Estate and Belgenny Farm are also listed as items of local significance. They are located outside of the recommended corridor but have the potential to be indirectly impacted as a result of visual intrusion into the landscape.

DRAFT

7.4.2 Management and mitigation considerations

Protection

Further discussion with OEH, the Heritage Council and relevant local councils is recommended to determine existing maintenance requirements and responsibilities for key heritage sites, including identifying and informing required changes to existing management plans for key heritage sites.

Environmental impact assessment

The currently available information pertaining to non-Aboriginal heritage along the recommended corridor is reliant on previous studies and recordings to draw its conclusions. Field inspections will be required to more accurately characterise the relationship between the recommended corridor and the listed heritage items. The following actions would be undertaken as part of the future delivery of the OSO:

- Field inspections to confirm listed item condition, curtilage and to assess the heritage impacts of the proposed infrastructure
- Assessment of areas of potential as well as aesthetic and landscape values during the field inspections
- Additional research with historical maps and aerials to determine if there are other as yet unidentified non-Aboriginal heritage values potentially impacted by the OSO.

The addition of targeted information from detailed survey and item validation would allow for a refinement of the criteria to provide an additional level of detail for the assessment and refinement of the corridor and proposed infrastructure where possible.

For Clydesdale, an item with State significance, a Statement of Heritage Impact (SoHI) assessment may be required, supported by fieldwork to identify the current condition, the impacts the proposed works may have to the heritage significance and appropriate mitigation measures to avoid or minimise impacts where applicable. The resulting SoHI could be used to support permit applications for the approval of the proposed works, as they are required for future development of the corridor.

A detailed heritage assessment will need to be prepared to support future environmental impact assessment for construction and operation of the OSO transport infrastructure in the future. This assessment would be subject to those guiding procedures and legislation active at the time of the application, and would include individual SOHIs (or equivalent) for each heritage item impacted, as required.

7.5 Aboriginal Heritage

7.5.1 Corridor protection and potential future infrastructure

There would be no direct impacts to known or potential heritage sites as a result of corridor protection.

Potential impacts on Aboriginal heritage may arise during construction and operation of a future motorway and these include:

- Destruction or damage to registered sites
- Disturbance of areas of archaeological sensitivity and discovery and damage to unknown sites
- Impact to cultural heritage of landscape values and areas of cultural significance.

Section 1 – Box Hill to Dunheved

The recommended corridor passes through areas identified as potentially sensitive for Aboriginal heritage, including land within 200 m of McKenzies Creek, Killarney Chain of Ponds, Eastern Creek and South Creek. Two recorded AHIMS sites were also identified in Section 1 and may be impacted directly by OSO infrastructure and associated vibration impacts.

Wianamatta Regional Park

One large area of known Aboriginal heritage sensitivity that has been identified as a constraint to the recommended corridor is the Wianamatta Regional Park. The Park's known Aboriginal heritage is

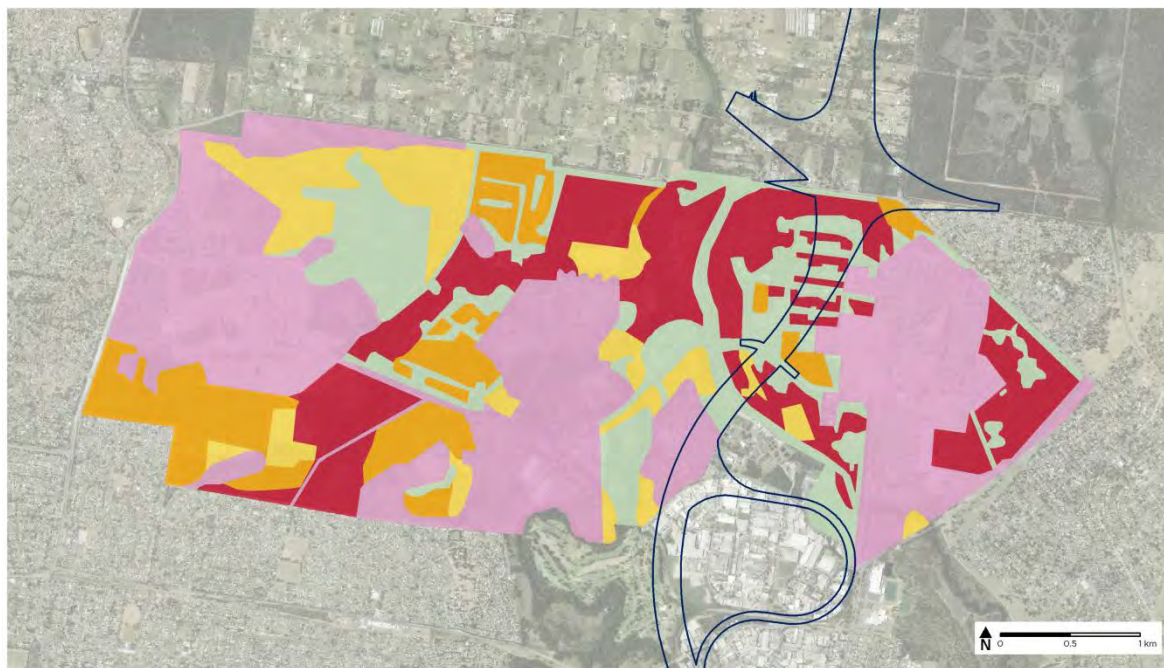
DRAFT

marked by the number of AHIMS registered sites, areas of PAD and identified cultural attachment, defined in consultation with the local Aboriginal community. Currently there are over 150 AHIMS sites within or immediately adjacent to the bounds of Wianamatta Regional Park. These sites comprise primarily of artefact scatters and isolated artefacts. Other site types recorded include five PADs, one quarry, one rock shelter and one modified tree.

Wianamatta Regional Park also has numerous waterways flowing through it and multiple confluences within its boundaries. The most significant waterway in the Wianamatta Regional Park is South Creek in the eastern section of the park. The portion of the park with known waterways was included in the channel buffer for sensitivity during Phase 1 of the OSO study. Levels of sensitivity have also previously been assessed for the park area and were mapped in the management plan (refer to **Figure 34**).

The management plan has also identified post-contact Aboriginal sites. The plan notes that disturbance activity has altered the natural and Aboriginal landscapes, but descendants of the Darug people maintain a cultural connection to the park area which also encapsulates contemporary activity, such as camping and fishing places. The four post-contact Aboriginal landscape sites include a garden, a cultural site, a fishing/camping spot and a bush tucker area. All four sites are avoided by the recommended corridor. The connection expressed by the contemporary Aboriginal community will need to be considered in more detail through consultation with Aboriginal stakeholders and the community prior to construction of the OSO.

In addition to the mapped zones of sensitivity noted in the Wianamatta Regional Park Plan of Management, there are a number of demarcated zones of sensitivity around water channels of various orders and types. Whether Aboriginal archaeological surface artefacts or subsurface deposits are present within these areas is dependent on whether past disturbance activities, both natural and manufactured, have partially or completely removed them from these areas.



OUTER SYDNEY ORBITAL - WIANAMATTA REGIONAL PARK CONSERVATION MANAGEMENT PLAN

- Recommended corridor
- Development Area
- Zone 1: Core conservation area
- Zone 2: High potential for archaeological sites
- Zone 3: Moderate potential for archaeological sites
- Zone 4: Least potential for archaeological sites



AECOM makes no representation or warranty of any kind about the accuracy, reliability, completeness, timeliness or fitness for purpose in relation to the map content.

Figure 34 Zones of Aboriginal archaeological potential within Wianamatta Regional Park (Source: Godden Mackay Logan Pty Ltd, 2011)

DRAFT

Section 2 – Dunheved to Orchard Hills

The recommended corridor passes through areas identified as potentially sensitive for Aboriginal heritage, including land within 200 m of South Creek, Werrington Creek, Claremont Creek, Byrnes Creek, and Blaxland Creek.

Five previously identified AHIMS sites (artefact scatters and isolated artefact) may be impacted directly by OSO infrastructure.

Section 3 – Orchard Hills to Cobbitty

The recommended corridor passes through areas identified as potentially sensitive for Aboriginal heritage, including land within 200m of Cosgrove Creek, Duncans Creek and Bringelly Creek.

Six previously identified AHIMS sites (artefact scatters and isolated artefact) may be impacted directly by the OSO infrastructure.

Section 4 – Cobbitty to Camden Park

The recommended corridor passes through areas identified as potentially sensitive for Aboriginal heritage, including land within 200m of Cobbitty Creek, the Nepean River, and Sickles Creek. Therefore there is the potential for as yet unidentified sites of Aboriginal heritage to be present within the corridor.

There are no previously identified AHIMS sites within Section 4. This does not, however, mean that no sites are present in this section, as a lack of previous surveys undertaken in this region can have the same result.

Section 5 – Camden Park to Menangle

The recommended corridor passes through areas identified as potentially sensitive for Aboriginal heritage, including land within 200 m of Matahil Creek, Navigation Creek and Foot Onslow Creek.

Fifteen previously identified AHIMS sites (artefact scatters, isolated artefacts and PADs) may be impacted directly by the OSO infrastructure.

7.5.2 Management and mitigation considerations

Protection

While no direct impacts would occur as a result of protection, further discussion with OEH and relevant LALCs is recommended to inform future interim management of the corridor.

Environmental impact assessment

The currently available information pertaining to Aboriginal heritage across the corridor is reliant on previous studies and recordings to draw its conclusions. While no direct impacts would occur as a result of protection, a better understanding of the existing environment is required to inform future assessments. Aboriginal consultation, field inspections and potentially test excavation would be required to more accurately characterise the corridor impacts. The following actions would be undertaken as part of a future environmental impact assessment:

- Consultation with the appropriate LALCs to determine if there are further cultural areas or landscape features
- Field inspections with site card comparison for registered AHIMS sites to confirm their location and determine their extent and appropriate curtilage. To ensure that this is the case, further ground-truthing for sites within the corridor would be undertaken and consideration given to whether direct or indirect impacts might occur
- Field survey with LALC representation to assess if further previously unidentified sites are likely to occur within the recommended corridor
- Targeted inspections of areas mapped as having archaeological sensitivity to determine their level of past disturbance and whether test excavation is required.

DRAFT

The above tasks would form part of an Aboriginal Cultural Heritage Impact Assessment that would assess the potential impacts that may occur as a result of future development and design of the OSO infrastructure.

Mitigation strategies for such areas could include a program of test excavation to determine either the presence or absence of Aboriginal cultural deposits, to be followed by further mitigation strategies like salvage if appropriate. All testing and salvage methodologies would need to be developed with input resulting from appropriate Aboriginal community consultation, with reference to the *Aboriginal cultural heritage consultation requirements for proponents* (DECCW, 2010) and the PACHCI process.

7.6 Biodiversity

Infrastructure projects have the potential to impact biodiversity in ways such as habitat loss, habitat degradation, fragmentation, the introduction of invasive species and other changes to the environment that can impact native flora and fauna. Infrastructure can, however, be designed in such a way to minimise impacts and conserve areas of biodiversity.

7.6.1 Corridor protection and potential future infrastructure

The recommended corridor will impact on land subject to an existing offset agreement at Shanes Park, which is in place to offset impacts resulting from the development of the North West Growth Area.

Although some existing offset areas will be rezoned, the corridor protection will not result in disrupting habitat or accelerated habitat loss or degradation. It is expected that future interim management works including weed and vegetation management would need to be undertaken within the protected OSO corridor prior to delivery of the OSO infrastructure. A strategic environmental management framework would be prepared to outline and manage the activities and impacts to biodiversity from corridor management works. Impacts to biodiversity including threatened species and habitats will be appropriately assessed and, where necessary, included in a biodiversity offset strategy.

Clearance and fragmentation of threatened vegetation communities

The major considerations with respect to biodiversity within the recommended corridor are the areas of threatened vegetation communities (EECs and CEECs) which provide important habitat for threatened flora and fauna species. The recommended corridor also crosses a number of watercourses which include riparian and fish habitat as well as regional habitat connectivity across the landscape. These riparian corridors act as major regional habitat connectivity linkages across the landscape and have been identified by OEH as key areas for investment in habitat enhancement across western Sydney.

The recommended corridor passes through the Cumberland Plain, where the vegetation is a fragmented fraction of what was originally present due to clearing for agriculture and subsequent clearing due to expanding urban development across the region. Consequently, the recommended corridor will contain threatened vegetation communities and threatened species listed under the EPBC Act or BC Act.

Impacts of shading from structures

Careful planning and design of bridges and viaduct structures can minimise the potential for physical impacts on terrestrial and aquatic habitats and hydrology of waterways. These structures can, however, introduce shading and potentially have an adverse impact on the composition of species and function of habitats, including macrophytes, terrestrial and riparian plants, macroinvertebrates and fish. Light attenuation is a key limiting factor of primary productivity (microalgae and emergent macrophytic vegetation) and can lead to a change in species composition of aquatic and terrestrial communities as they adapt to shading over the longer term. Appropriate design of the bridge and viaduct structures, including form and height, would minimise the impacts of shading on biodiversity.

Section 1 – Box Hill to Dunheved

A number of TECs occur throughout Section 1 of the recommended corridor in varying condition. Of this vegetation, a majority may meet Endangered or Critically Endangered criteria under the EPBC Act. The OSO infrastructure is expected to have physical and indirect impacts on these areas, in particular where the corridor crosses watercourses.

DRAFT

Future assessment will need to assess the potential impact on Freshwater Wetlands associated with Eastern Creek west of Vineyard, and River Flat Eucalypt Forest and Cumberland Plain Woodland northeast of Vineyard associated with Killarney Chain of Ponds and Mackenzie Creek. There is also the potential for shading impacts where the OSO crosses these watercourses on an elevated structure.

One of the identified PCLs includes the Wianamatta Regional Park. A Plan of Management and a Landscape Masterplan has been prepared for the park which includes the identification of core areas for heritage and biodiversity conservation. Generally regional parks are lands reserved to protect and conserve areas in natural or modified landscapes. They are also suitable for sustainable public recreation and offer open spaces for cultural and recreational activities which may not be permitted in national parks, state conservation areas or nature reserves.

Biodiversity values within Wianamatta Regional Park that may be impacted by the recommended corridor include a number of threatened ecological communities, such as Cumberland Plain Woodland, Cooks River/Castlereagh Ironbark Forest, Shale / Gravel Transition Forest and River Flat Eucalypt Forest. These vegetation communities provide important habitat for a number of threatened species that have been recorded within and in the vicinity of Wianamatta Regional Park as well as providing an important habitat link along the South and Ropes Creek corridor enhancing biodiversity and ecological viability in this part of western Sydney. The core area of the park identified for biodiversity conservation is based around the central and western parts of the park, where there has been the least disturbance. Areas to the east of the park have the greatest history of disturbance and have been identified as a visitor precinct.

The recommended corridor through the Wianamatta Regional Park was resolved with OEH to minimise and balance impacts to heritage and biodiversity values within the Regional Park. Consideration was also given to the Regional Park's main access, with the aim of minimising impacts beyond (west of) this entrance.

The land of the former Llandilo Radio Transmitter Station at Shanes Park contains substantial areas of Cumberland Plain Woodland and Shale-Gravel Transition Forest EECs. Approximately 400 ha of this 560 ha site is listed as a Commonwealth Heritage Place for its natural heritage values. A portion of the site could potentially be impacted by the interchange with the proposed BLOR-CC. The area will be permanently fragmented from the larger site; however this would be a relatively small portion of the southwest corner of the site.

Section 2 – Dunheved to Orchard Hills

The recommended corridor impacts land near the confluence of South Creek and Werrington Creek north of Dunheved Street, potentially impacting on River Flat Eucalypt Forest (BC Act) directly through vegetation clearance or shading by elevated structures. Similarly, the OSO interchange with the M4 Motorway would likely result in impacts to Cumberland Plain Woodland (BC and EPBC Acts) at Claremont Meadows to the north of the M4 Motorway and immediately to the south of the M4 Western Motorway and east of Kent Road.

There is the potential for impacts to fragmented River Flat Eucalypt Forest (BC Act) along Blaxland Creek at Orchard Hills. These impacts will need to be further assessed at the detailed design stage.

Section 3 – Orchard Hills to Cobbitty

A number of areas contain TECs listed under the BC Act and EPBC Act, including River Flat Eucalypt Forest (CC Act) southeast of the Defence Establishment Orchard Hills, River Flat Eucalypt Forest and Cumberland Plain Woodland between Luddenham and Greendale North, and River Flat Eucalypt Forest (BC Act) along Bringelly Creek, a tributary of Nepean River, within University of Sydney land. These would be direct impacts through vegetation clearance or shading by elevated structures.

Section 4 – Cobbitty to Camden Park

Future assessment will need to assess the potential impact on River Flat Eucalypt Forest and Cumberland Plain Woodland south of Greendale and River Flat Eucalypt Forest associated with Cobbitty Creek, north of Cobbitty Road. There is the potential for shading impacts on River Flat Eucalypt Forest riparian vegetation where the OSO crosses the Nepean River on an elevated structure south of Cobbitty.

DRAFT

An area of Cumberland Plain Woodland (EPBC Act) east of Mayfarm Road at Grasmere would be impacted by OSO infrastructure.

Section 5 – Camden Park to Menangle

Impacts to a stand of Cumberland Plain Woodland from the recommended corridor through the introduction of increased impervious coverage, air quality, and fragmentation could occur. It is anticipated that offsets would be required for impacts borne by the recommended corridor.

7.6.2 Management and mitigation considerations

Protection

Biodiversity Offset Strategy

Generally, impacts on existing biodiversity values have been avoided where possible. Impacts within the recommended corridor which cannot be avoided will need to deliver biodiversity offsets in other areas. Through the minimisation and avoidance of a number of the biodiversity values, the recommended corridor has reduced the impacts to biodiversity values and therefore the amount of ecological offset required. A biodiversity offset strategy will be prepared by Transport for NSW, which will guide the identification and acquisition of appropriate biodiversity offsets.

Field validation

The protection of the corridor would limit development such that biodiversity values have the potential to improve. However, given that future development of the corridor would require vegetation clearance and other ground disturbances, these values would ultimately be impacted. As such, it is important that interim management measures are identified and agreed, including a Biodiversity Offset Strategy.

The current vegetation mapping provides an indication of the vegetation community type and indicative condition; however, due to the scale and age of the mapping, this may vary to what is actually present. Refinement of the vegetation extent (as a desktop exercise using the latest available imagery) would be beneficial for a more accurate assessment of TECs impacted. However, should it be intended that offsets are secured immediately following protection of the corridor (recommended), then field survey of the corridor would be required to accurately determine the biodiversity values that may be impacted.

Further investigation of more detailed survey reporting, particularly in the Castlereagh area includes:

- Targeted investigation of existing detailed field surveys carried out in the Castlereagh area over the last 5 years, particularly within Wianamatta Regional Park.
- Field validation of identified TECs and their condition where information is still lacking – to refine areas of TECs for more detailed and accurate assessment as well as confirm consistency with TEC definition under the EPBC Act where relevant. This is particularly important where the corridor crosses areas of Priority Conservation Lands to assess the condition of the mapped vegetation and opportunities for enhancement of lands.
- Targeted survey for high priority species where information is still lacking – to determine suitability of species habitat in potentially impacted areas.

The addition of targeted information from either detailed survey or site validation will allow for a refinement of the design and to provide an additional level of detail for future impact assessment. As part of the assessment of biodiversity impacts, an identification of potential habitat offset requirements for the recommended corridor can be carried out to determine the type and quantity of offset required in line with the *Biodiversity Assessment Method* (OEH 2017).

Environmental impact assessment

Where possible, crossings of watercourses should avoid or minimise impacts to existing vegetation through spanning riparian or flood prone areas by a bridge or raised viaduct. The use of a raised viaduct, particularly over lands identified as having potential opportunities for regional habitat connectivity, such as along areas of South Creek in the northern part of the corridor, may provide opportunities for restoration or the enhancement of native vegetation in and around the corridor through design. This includes allowance for natural light to the area below and surrounding the constructed roadway decks through separation and provision of spacing between them.

DRAFT

It is anticipated that a biodiversity impact assessment would be undertaken to support a future application for construction and operation of infrastructure within the corridor. This impact assessment would need to meet the appropriate guidelines relevant at the time, such as the *NSW Biodiversity Assessment Framework*, or at a minimum Roads and Maritime's *Environmental Impact Assessment Practice Note: Biodiversity Assessment* (EIA-N06).

Where land protected under the NPW Act is impacted, consideration will be given to the provisions under this and the *Crown Lands Act 1989*.

7.7 Surface Water and Hydrology

7.7.1 Corridor protection and potential future infrastructure

Impacts to flooding and drainage are not anticipated as a result of corridor protection as no infrastructure or modification of existing hydraulic conditions are proposed as part of reserving the recommended corridor. Protection of the recommended corridor would maintain existing surface water and hydrological conditions.

Waterways

The addition of bridges and viaduct piers into the channels and floodplains would potentially introduce localised areas of increased velocity. These areas may be subject to scour around the bridge abutments and surrounding piers, which could mobilise sediment downstream and increase turbidity levels within waterways. Velocity impacts in waterways could lead to geomorphological impacts including changes in bed sediments and bank morphology. The magnitude of velocity impacts in and around bridges, piers and waterways would be assessed as the design continues to develop.

Flooding

The construction of OSO infrastructure would impact the corridor and adjacent land in a number of ways. In general terms, there is potential for flood levels and therefore flood extents to be impacted by the location of additional bridge structures and embankments in the floodplain. There is also potential for local increases in the flow rate and flow velocities, especially at bridge piers and embankments located in the floodplain. These impacts would occur both within and outside the corridor.

The key flooding considerations across the recommended corridor occur primarily around watercourses and associated areas of floodplain. Typically there is scope to design new infrastructure in such a way as to minimise flooding impacts or to incorporate suitable mitigation measures, which would require assessment of costs, environmental and social impacts.

Potential for flood impacts to surrounding property

- The crossing of the Nepean River with Sickles Creek near Camden which, while mostly outside the 100 year ARI flood extent, have some areas where encroachment of the corridor into the floodplain is present. Some flood impacts would be expected due to structures in the floodplain in larger storm events. The extent and severity of impacts are currently being assessed and will be considered in more detail in subsequent assessments for detailed design and planning approval prior to construction.
- The waterway and floodplain crossings in the South Creek catchment differ from the Nepean River catchment in that the crossings are primarily parallel with the direction of flow in South Creek. The structures generally comprise a greater length of viaduct with more piers than embankments and the relative impacts are anticipated to be less or reduced in magnitude but are likely to cover a greater extent in area. Similarly, road and rail interchanges add numerous piers to the floodplain with structures rarely being perpendicular to the direction of flow.

Future development within the catchments through which the recommended corridor passes has been considered with regard to potential for cumulative impacts between adjacent developments. These include:

- Ongoing residential development within the Growth Areas which has the potential to increase the volume of runoff generated within the catchments along the OSO corridor. The magnitude of the increase will be a function of the change in impervious area throughout the catchments as well as the nature of stormwater management regulations applied to new developments.

DRAFT

- Future development in addition to that being undertaken in the Growth Areas is likely to occur in the South Creek floodplain. Such development has the potential to change or reduce the available floodplain storage. Other road and rail infrastructure which may be upgraded prior to the construction of the infrastructure associated with the OSO (motorway and freight) could also change the hydraulic or flood characteristics of the floodplain and change the potential for impacts from the OSO.

Water Use

Similar to both flooding and water quality, impacts to significant existing water utilities and private water infrastructure can typically be avoided or mitigated by appropriate design. Alternatively, relocation and/or adjustment of utilities and infrastructure can be undertaken to avoid direct impacts.

Water quality

Without the implementation of appropriate water quality mitigation and management measures, the future motorway and rail operations within the recommended corridor would have the potential to impact the downstream receiving environments. Runoff generated by the road and rail would require some form of treatment to manage the potential sediment and nutrient loads discharged from the corridor. The potential method of treatment that has been considered as part of the strategic concept design is water quality bio-retention basins which are designed to treat the smaller low flows or first flush from storm events. Potential impacts relating to water quality include:

- The relatively large number of waterbodies located along the length of the overall corridor presents an increased risk of potential environmental or water quality issues to be addressed.
- Runoff generated from the road and rail will require treatment to manage the sediment and nutrient loads entering the receiving environment. The proposed method of treatment is bio-retention basins which are designed to treat smaller storm flows. The potential impacts at each basin would include both nutrient loads into receiving waterways and potentially increased flows from the additional impervious road area.
- Potential for impacts would occur in larger storm events, where runoff bypasses the treatment area of the basin and is discharged directly to the receiving environment.

Stormwater runoff discharge locations are constrained to certain locations (by local topography, receiving waterbody, etc), which may also correspond with a sensitive waterway or environment. Water quality treatment targets for the OSO would ultimately reflect the existing background water quality levels and the level of sensitivity of the receiving waterway to changes. The water quality targets would also influence the type of treatment device used and the treatment dimensions. The proposed treatments and water quality targets would be revisited as part of future assessment of the OSO infrastructure.

Climate change

Climate change is becoming one of the key challenges facing the greater Sydney region. In the coming years, the changing climate will likely result in an increase in average temperatures, increase in rainfall intensity and storm events and variability in annual rainfall.

The primary design criteria adopted for the recommended corridor is to achieve a minimum flood immunity of 100 year ARI (i.e. 1% AEP) for both the future road and rail infrastructure. Construction of the transport infrastructure within the recommended corridor may not occur for some time, and under such circumstances it is considered appropriate to consider the provision for potential future climate change impacts which would influence estimated design flood levels and hence, the design road level and overall embankment footprint. The OSO strategic concept design has considered a 10% increase to rainfall intensity and storm volumes in the 100 year ARI design event, as per guidance in *Practical Consideration of Climate Change* (DECC, 2007) and current practice,

Changes in flood levels and extents as a result of increased rainfall intensity and storm events are anticipated where the recommended corridor crosses the Nepean River floodplain. Flood levels in some reaches of the Nepean River are particularly sensitive to the 10% increase applied in modelling and could potentially impact residences and businesses in the vicinity. This sensitivity is driven by the two significant floodplain constrictions at Gulguer Reserve and just downstream of Wallacia. Further

DRAFT

detailed consideration of climate change impacts would be undertaken as the OSO design develops and as part of future environmental impact assessment.

Section 1 – Box Hill to Dunheved

Specific surface water and hydrology considerations relevant to Section 1 include:

- The potential for localised water level and velocity impacts at viaduct piers and bridges and at the Bells Line of Road – Castlereagh Connection interchange.
- Impacts to hydrology and flow are likely to occur to the main waterways in this section, including McKenzies Creek, Killarney Chain of Ponds, Eastern Creek, South Creek and Ropes Creek. The extent of impacts would depend on the location and quantity of pier and other footing structures, which would be optimised during detailed design to minimise hydrological impacts.
- Potential impacts on floodplain storage would be minimal as a result of OSO transport infrastructure, as most of this section would be on viaduct and therefore elevated out of the floodplain.

Section 2 – Dunheved to Orchard Hills

Specific surface water and hydrology considerations relevant to Section 2 include:

- Impacts to hydrology and flow could occur in the main waterways in this section, including South Creek, Claremont Creek and Blaxland Creek depending on the location and quantity of pier and other footing structures.
- The potential for impacts at two existing flood levee structures at St Marys and Werrington, which would require further assessment during design development.
- The potential water level and velocity impacts as a result of placement of piers in the floodplain associated with the OSO rail and road interchanges
- Impacts on floodplain storage in this section from the recommended corridor would be minimal as most of this section is likely to be on viaduct and therefore elevated out of the floodplain.

Section 3 – Orchard Hills to Cobbitty

Specific surface water and hydrology considerations relevant to Section 3 include:

- Operation of the corridor could impact on a number of streams associated with the South Creek Catchment including Cosgrove Creek, Badgerys Creek, Duncans Creek and Bringelly Creek
- There is the potential for water level and velocity impacts at bridge piers and abutments, the location of which would be optimised during detailed design to minimise hydrological impacts
- Potential for increased runoff volume and velocity due to the increased impervious coverage of the OSO road and rail surfaces to be introduced into a predominately rural area with minimal existing impervious cover.

Section 4 – Cobbitty to Camden Park

Specific surface water and hydrology considerations relevant to Section 4 include:

- A key area of potential impact exists where the recommended corridor crosses the Nepean River. Water level and velocity impacts would be expected at viaduct pier locations, with water level impacts anticipated to extend upstream and downstream of the viaduct.
- A number of other streams in this section including Cobbitty Creek, Sickles Creek, a Creek near Westbrook Road and a Creek near Cawdor Road could be impacted by the recommended corridor with potential for water level and velocity impacts at bridge piers and abutments.

Section 5 – Camden Park to Menangle

Specific surface water and hydrology considerations relevant to Section 5 include:

- Impacts to hydrology of Matahil Creek and Navigation Creek could arise as a result of the introduction of OSO bridge piers and abutment infrastructure

DRAFT

- There is the potential for hydraulic and water quality impacts as a result of decommissioning an online dam at Matahil Creek.

7.7.2 Management and mitigation considerations

Protection

Impacts to flooding and drainage are not anticipated as a result of corridor protection therefore no strategic mitigation measures associated with corridor protection are proposed.

Environmental impact assessment

Mitigation and management of the impacts of the protection and operation of the recommended corridor may take a number of forms. These are described below.

- Where practical, impacts to flood levels and extents can be mitigated through hard engineering measures such as the construction of new flood levees or the elevation of existing levees. Alternatively, compensatory floodplain storage could be made available to offset the increases in the flood level and manage the change in flood extent.
- Mitigation of water quality impacts could also be managed using engineering measures such as stormwater detention basins/tanks as well as augmentation of the subsurface stormwater network.
- Planning related controls could also be effective in identifying newly impacted properties and zone them with land uses appropriate for flood affected land.

A detailed surface water and hydrology impact assessment would be undertaken as part of future environmental impact assessment for the delivery of the OSO infrastructure.

7.8 Landscape and Visual

7.8.1 Corridor protection and potential future infrastructure

The protection of the recommended corridor is not anticipated to result in landscape and visual impacts.

Impact on heritage items

There are a number of heritage items along the recommended corridor that could be impacted given the proximity of the recommended corridor and potential for view disruption from the heritage item. Not only do the heritage items themselves have the potential to be impacted, given the recommended corridor travels through a large amount of rural and floodplain land, potential significant visual impacts due to the prominence of the corridor from the properties could occur.

The landscape settings of heritage places are important contextual elements which contribute to their significance. As such these heritage places could potentially be detrimentally impacted by a visually incongruent element such as the corridor within their visual curtilage.

Impact on floodplain

Landscape and visual impacts to a number of floodplains across the corridor could result from the OSO infrastructure, given the number of stretches where the recommended corridor runs right along much of the floodplain frontage. The South Creek and Nepean River floodplain landform elements could be detrimentally impacted as a result of the number of crossings which may visually dominate the landscape. The South Creek corridor can also present an opportunity, for example, where the recommended corridor could utilise existing well vegetated riparian corridor as a naturally screen from development and serve to visually tie the corridor into the landscape. Development along the edge of the floodplain would minimise the visual impacts associated with the recommended corridor.

Landscape character

The impact on landscape character for the corridor changes across the length, as it passes through a mosaic landscape of rural small holdings, floodplain/natural areas, variously sized stands of tree cover and urban areas of existing residential and commercial development. Where possible, co-location with the electricity transmission line easement would reduce the extent of new visually disruptive

DRAFT

infrastructure corridors across the landscape. The length of viaduct, however, creates a visually strong feature within the landscape.

Razorback Range presents a constraint that will be challenging to traverse in a manner sensitive to the landscape. Similarly the small scale rolling hill formations of the Southern Rural Lands could be challenging for the corridor to traverse. The generally north-south alignment of the recommended corridor would cut across the east-west formations with areas of cut and fill required. This has the potential to create a contrasting visual element in the landscape.

Impacts to visual receivers

The recommended corridor has the potential to be a catalyst for new urban development that will be established as a result of improved accessibility provided by the corridor. New urban development and the recommended corridor itself have the potential to impact on visually sensitive areas. As it is difficult to predict the location and type/form of future urban development that will be facilitated by the recommended corridor over the next 20 plus years it is not reasonable to assess these potential indirect landscape changes as part of this study. It would be more appropriate to assess such impacts at a later date as part of the environmental assessments for the development of the OSO project itself or for specific urban development projects facilitated by the OSO.

Impact of night lighting

A majority of the recommended corridor runs through a mix of open rural settings, as well as generally well-wooded rural small holdings landscape. In conjunction with project landscape integration planting, the existing landscape in the recommended corridor has the capacity to provide a substantial level of project screening to sensitive receivers. Notwithstanding these mitigating factors the project would comprise a distinctly new line of infrastructure running through the intrinsically dark night time, rural landscape, where little or no lighting was previously present. Additionally, the lighting will comprise both fixed elements (motorway lighting) and potentially visually more apparent moving elements (motor vehicles).

Summary of impacts

Generally, key impacts of the recommended corridor with regard to landscape and visual elements include:

- Landscape and visual conflict with Clydesdale Estate, Denbigh Estate, Camden Park Estate and other heritage sites. However, there is potential to provide screening while conserving the pastoral landscape character of the Estates.
- Major change in character of rural settings.
- Southern areas of the corridor have potential for larger cut and fills through the landscape and potentially greater visual prominence.
- Filling across the floodplain creates significant landscape impact (a viaduct is preferred for crossings).

Summary of opportunities

There are a number of opportunities that have been and will be considered for the recommended corridor to minimise visual impacts, including:

- Sections of the corridor cross gently rolling landform which provides relatively minor cut and fill and reduced disruption to landscape character.
- Significant opportunities to offset impacts with restoration of cleared flood prone land, potentially within the corridor as a first step, and then beyond the corridor
- Consideration of architectural design and screening to minimise visual impacts of viaduct throughout floodplain landscapes.

Section 1 – Box Hill to Dunheved

The recommended corridor in the vicinity of Clydesdale will be visually prominent and likely require an appropriate landscape and visual management strategy to minimise impacts.

DRAFT

There is potential for impacts to visual receptors associated with the introduction of viaduct structure where the recommended corridor passes through floodplains, in particular South Creek and the crossing of the Killarney Chain of Ponds floodplain landscape which provides elevated floodplain/district views and views to the Blue Mountains.

The OSO is likely to provide a visual intrusion to stands of Cumberland Plain Priority Conservation Lands and areas of substantial remnant bushland where the corridor passes alongside and through these areas, in particular through Wianamatta Regional Park.

Section 2 – Dunheved to Orchard Hills

There is potential for visual impacts to residential receivers at St Marys South and Claremont Meadows due to the introduction of views of both the OSO infrastructure and the interchange with the M4 Western Motorway. In addition, ongoing maintenance clearing of tree growth within riparian areas may be required to adequately maintain the infrastructure corridor, resulting in potential impacts to views.

Section 3 – Orchard Hills to Cobbitty

While the recommended corridor predominantly travels through the WSEA and forms a large visual element within the area, landscape / master planning of the WSEA will be able to take into account the recommended corridor.

OSO infrastructure within the recommended corridor could impact on the view shed of the Blue Mountains as the corridor passes south over The Northern Road.

Section 4 – Cobbitty to Camden Park

The recommended corridor in the northern part of Section 4 traverses along the side of a valley with moderate slopes and is located generally upslope of a well vegetated riparian corridor. This conserves the existing well-vegetated upper slopes and ridgeline which comprise the watershed and visual catchment boundary for the upper South Creek catchment. This high ground has high levels of endemic tree cover, particularly when seen from the east.

The recommended corridor descends towards the Cobbitty Creek floodplain, crossing a broad east-facing valley. This part of the recommended corridor has the potential to be visually prominent from the nearby State heritage listed Denbigh Estate, the western boundary of which is generally set some 600 m distant, but as close as 100 m to the recommended corridor at the southwest corner of the Denbigh Estate.

While there are generally a low number of sensitive visual receptors along this section of the recommended corridor, there are substantial views across upper floodplain areas that may be impacted by the presence of viaducts over the Nepean River and its tributaries as well as night time lighting. In particular, viaduct structures and lighting would be visible from parts of Cobbitty village and Ellis Lane. However, views could also potentially be moderately screened by existing trees.

The recommended corridor crossing close to Cobbitty Village would likely impact on the landscape character and entry experience to the village. However, there would be opportunities to minimise impacts on the landscape character of Cobbitty village through viaduct design.

The crossing of, and interchange with, Burragorang Road may have some visibility from the Mount Hunter community, whereas visibility from Grasmere would likely be screened by existing vegetation.

Major changes in character to the rural setting of the University of Sydney Brownlow Hill Campus would occur as the recommended corridor is seen at a relatively close distance, and appropriate design mitigation would need to be considered.

Section 5 – Camden Park to Menangle

The sequence of viaduct crossings and traversing through the landscape of Cawdor Dairy and Creamery site could impact on the mosaic remnant land cover stands of endemic trees in these areas.

There is potentially low visual prominence of the OSO from Camden Park Estate and Belgenny Farm due to substantial screen of trees along site boundary and wooded cover within the site. However, viaduct crossings near South Camden and Camden Park may be visible from these properties.

DRAFT

7.8.2 Management and mitigation considerations

Protection

The protection of the recommended corridor would not have a material visual impact on the existing environment. No mitigation or management measures are recommended.

Environmental impact assessment

Future phases (as part of project application for approval to construct the OSO) should prepare a Landscape and Visual Impact Assessment (LVIA) in accordance with RMS Guideline *EIA-N04 - Guidelines for landscape character and visual impact assessment (v.2 - 2013)*, to provide a clear summation of the likely landscape and visual impacts for a recommended design, and provide opportunities arising from this for a further more detailed level of refinement. It is anticipated this would require additional consideration of visual impacts on key view points.

Clydesdale Estate

It is anticipated visual analysis will be required of the Clydesdale House and associated views.

Other View Points

Additional visual photomontages will need to be prepared to demonstrate impacts on key view points along the corridor. It is anticipated this will require field visits and access to land under private ownership.

7.9 Soils and Geology (including Contaminated Land)

7.9.1 Corridor protection and potential future infrastructure

There would likely be minimal change to the existing soils and geology within the recommended corridor over the timeframe of the recommended corridor protection. The exception to this being effects from underground mining operations in the southern part of the corridor. Mining operations over the duration of the corridor protection have potential to cause land subsidence in the overlying terrain.

The key geotechnical issues and risks are identified below as well as opportunities for mitigation. Modifications to the existing soil and geology regime during construction and operation of the proposed infrastructure would include excavation of cuts, construction of embankments, drainage channels, culverts and bridges, and possibly minor structures such as noise mounds and landscaping.

Embankments and Bridges

Embankments constructed on soft ground could require ground improvements or treatment to limit post construction settlement. This could include pre-loading of the embankment footprint, which consolidates the soft soils, and could therefore reduce soil permeability. The reduction in permeability could affect groundwater flows and cause groundwater mounding/flooding or drawdown. Alternative ground improvement techniques could be adopted, such as controlled modulus columns, which would allow passage of groundwater beneath embankments if this is a significant issue.

Groundwater Drawdown at Cuttings

Drawdown of the existing groundwater table could occur around cuttings, depending on the depth of the cut and the depth to existing groundwater. Appropriate hydrogeological conceptual modelling to be undertaken as part of future environmental impact assessment would provide information to determine appropriate measures to assess and manage groundwater drawdown.

Disturbance of Acid Sulfate Soils

There is a low probability of acid sulfate soils being exposed as a result of the proposed infrastructure within the recommended corridor. Where necessary, management plans would be developed to manage acid sulfate soils during construction.

Soil Erosion

Embankment and cutting slopes would require vegetation cover or alternative treatment to limit soil erosion during operation of the infrastructure. Soil erosion and sedimentation would be managed through best practice environmental controls.

DRAFT

Mine Subsidence

Mine subsidence would pose a geotechnical risk where the recommended corridor passes through active mining areas of the Southern Coalfield. This is only applicable in Section 5 between Camden Park and Menangle. The level of risk would depend on the type of surface infrastructure, the depth of extraction and the extraction method. Mine subsidence in the recommended corridor could be appropriately managed through detailed design.

Contaminated Land

Following protection and a cessation of additional development/existing activities in the recommended corridor, it is considered unlikely that the contamination status of the future environment would be significantly different to that currently identified over the timeframe of the recommended corridor protection. Additionally, areas of contamination identified in this report are generally restricted to specific sites and locations and are not widespread across the corridor. Notwithstanding, it is possible that contamination arising as a result of future land use activities that cannot be anticipated herein may alter the contamination status of the recommended corridor in the future.

An environmental management plan incorporating an unexpected finds procedure for contaminated land would be developed and implemented at the delivery phase of the future infrastructure to manage potentially contaminated materials encountered in areas not identified/anticipated as part of this assessment. The procedure would outline the process for the identification and assessment of potentially contaminated material in the event that previously unidentified contamination is discovered during construction or excavation activities.

7.9.2 Management and mitigation considerations

Protection

Protection of the recommended corridor will not result in direct impacts to soils and geology, therefore no specific mitigation measures are proposed. Consultation with the Mine Subsidence Board (MSB) would need to be undertaken to inform the future infrastructure design in relation to managing mine subsidence risks.

Environmental impact assessment

All work carried out to date is based on desk top studies. Field investigations will need to be carried out to verify and expand on the information obtained to date. The quantum and prioritisation of this work will require planning and integration with other components of the study and should be done in stages as the design develops.

A mine subsidence management plan will be required, outlining appropriate mitigation measures along the southern part of the corridor within Mine Lease areas. The Mine Subsidence Board (MSB) may require compliance with particular conditions where infrastructure is to be constructed over existing or areas proposed for future mining. Agreement with the MSB may be required with regard to construction of infrastructure with some resilience to mining impacts where detailed plans for future mining have not yet been developed.

7.10 Noise and Vibration

Noise and vibration from infrastructure projects can impact sensitive receivers including residential, recreational and educational receivers. Research has indicated the most widespread response to environmental noise is annoyance. Annoyance is related to the effect of noise in disrupting conversation, activities requiring attention, rest and relaxation activities. Noise also affects people's ability to gain the appropriate amount and type of sleep needed to maintain good health and there are suggestions of disturbed sleep leading to more serious health problems. Environmental noise ingress can also interfere with the enjoyment of people's homes and amenity.

Consideration of the increase in noise and vibration resulting from an infrastructure project should be considered and where relevant, mitigation measures provided to offset negative increases. As a result, the key consideration is proximity to noise and vibration sensitive receivers.

To determine the potential impacts of the future infrastructure associated with the OSO, preliminary modelling of the noise from the operational road and rail has been undertaken and results assessed

DRAFT

against current applicable noise criteria. The objective of this assessment is to provide an indication of areas that are likely to be affected by noise as a result of the operation of future OSO infrastructure.

Ground-borne noise and vibration have not been considered in this assessment. It is expected that both ground-borne noise and vibration impacts would be contained to within the extent of the recommended corridor, thereby not impacting sensitive receivers outside the corridor and requiring no strategic mitigation. A detailed assessment of both ground-borne noise and vibration impacts should be undertaken during the future Environmental Impact Assessment and mitigation in the form of rail track form design will be considered at that time.

The future project would involve the development of new transport infrastructure within the recommended corridor in some previously undeveloped areas. For both the road noise assessment and rail noise assessment, the new infrastructure criteria would therefore be applicable for the main alignment. These criteria are not reliant on existing noise levels and as such existing noise levels were not modelled.

For surrounding intersections, the road transition criteria and existing road and rail criteria would likely need to be considered. For the purposes of this strategic noise and vibration assessment, criteria currently applicable (2016) have been used, however it is noted that these criteria may change in the future and therefore the OSO would need to be assessed against the applicable criteria at the time of the delivery of the OSO.

7.10.1 Road noise assessment criteria

Road noise assessment criteria in New South Wales are specified in the following guidelines:

- *NSW Road Noise Policy* (DECCW, 2011) – provides the underlying basis for all road noise assessment policy in New South Wales
- *Noise Criteria Guideline* (RMS, 2015) – provides further guidance on the application of the *NSW Road Policy* to projects proposed by Roads and Maritime Services
- *Noise Mitigation Guideline* (RMS, 2015) – provides further guidance on the evaluation of feasible and reasonable noise mitigation measures for projects proposed by Roads and Maritime Services.

The *NSW Road Noise Policy* establishes a series of criteria for assessment of road projects. Noise from a road project above one of these criteria triggers the need to consider feasible and reasonable noise mitigation measures. The *Noise Mitigation Guideline* provides further guidance on eligibility for, and evaluation of, noise mitigation measures and includes consideration of existing noise levels (cumulative limits and acutely affected receivers) and the extent to which noise is anticipated to increase above existing noise levels.

Relevant to consideration of the noise assessment approach for the OSO, the *NSW Road Noise Policy* includes the following:

- Noise assessment criteria for residential receivers during the day and the night periods for new roads and redeveloped roads
- Noise assessment criteria for non-residential sensitive receivers during the day and night periods, as relevant (irrespective of whether it is a new road or a redeveloped road)
- Relative increase criteria for residential and non-residential receivers (other than open space) during the day and night periods (irrespective of whether it is a new road or a redeveloped road). The relevant increase criteria are primarily intended to protect existing quiet areas from excessive changes in amenity due to noise from a road project.

The applicable road noise assessment criteria used in the strategic road noise assessment for the future OSO infrastructure are presented in **Appendix D**.

7.10.2 Rail noise assessment criteria

Rail noise assessment criteria in New South Wales are specified in the following guideline:

- *Rail Infrastructure Noise Guideline* (EPA, 2013) – provides rail noise assessment criteria for heavy and light rail infrastructure.

DRAFT

The *Rail Infrastructure Noise Guideline* establishes a series of trigger levels for assessment of rail projects. Noise from a rail project above one of the trigger levels results in the need to consider feasible and reasonable noise mitigation measures.

Relevant to consideration of the noise assessment approach for the future freight rail associated with the OSO, the *Rail Infrastructure Noise Guideline* includes the following:

- Noise trigger levels for residential receivers during the day and the night periods for new rail lines and redeveloped rail lines
- Noise assessment criteria for non-residential sensitive receivers when in use (day or night), and for new rail and redeveloped rail lines).

The rail noise assessment policy does not currently include a 'relative increase criterion' comparable to the criterion specified in the NSW Road Noise Policy. The applicable rail noise assessment criteria used in the strategic rail noise assessment for the future OSO infrastructure are presented in

Appendix D.

7.10.3 Corridor protection and potential future infrastructure

Corridor protection would not directly impact existing receivers as there would be no action that would result in an increase in noise or vibration. Development controls for noise could be developed and implemented through an environmental planning instrument for the protected corridor, to manage impacts for future adjacent land uses and sensitive receivers.

The preliminary noise modelling showed that some areas within the recommended corridor would exceed the applicable road and rail noise criteria; however exceedances of the criteria by more than 10 dB are generally contained within the corridor. Both the road and railway noise modelling show that existing sensitive receivers adjacent to the recommended corridor are likely to be impacted when the OSO infrastructure is operational in the future. Future developments that may be developed before the construction of the OSO infrastructure may also be impacted by the project. Noise controls in the form of physical mitigation and treatments or planning controls should be developed in future stages of the design.

Section 1 – Box Hill to Dunheved

Operation of the future OSO infrastructure is likely to impact residential receivers through the semi-residential areas of Oakville, Vineyard, Riverstone, Windsor Downs, Marsden Park, Berkshire Park and Shanes Park due to the increase in noise and vibration. Noise mitigation will likely need to be included in the design of the infrastructure as well as through development controls for adjacent development, particularly in areas such as the North West Growth Area.

Section 2 – Dunheved to Orchard Hills

Operation of the future OSO infrastructure will likely impact the denser urban and suburban developments within this section including the suburbs of St Marys and Werrington due to the increase in noise and vibration. Noise mitigation could be incorporated into the design of the infrastructure to minimise impacts on sensitive receivers present at the time of corridor reservation. This should be assessed as part of future project applications and the necessary approvals sought.

Section 3 – Orchard Hills to Cobbitty

Operation of the future OSO infrastructure will likely impact on residential receivers through the semi-residential area of Greendale. Noise mitigation measures could be incorporated into the design of the OSO infrastructure to minimise impacts on receivers present at the time of corridor protection. Impacts on future development should be managed by appropriate planning and development controls to be developed and implemented through environmental planning instruments.

Section 4 – Cobbitty to Camden Park

Residential receivers in the semi-rural areas of Cobbitty, Ellis Lane and Brownlow Hill could be impacted as a result of the operation of the OSO infrastructure. Noise mitigation measures could be incorporated into the design of the future OSO infrastructure to minimise impacts on receivers present at the time of corridor protection. Impacts on future development (such as in the South West Growth

DRAFT

Area) should be managed by appropriate planning and development controls to be implemented through environmental planning instruments.

Section 5 – Camden Park to Menangle

Operation of the future OSO infrastructure could impact residential receivers through the semi-rural areas of Cawdor, Menangle and Douglas Park. Noise mitigation measures could be incorporated into the design of the OSO infrastructure to minimise impacts on receivers present at the time of corridor protection. Impacts on future development should be managed by appropriate planning and development controls to be implemented through environmental planning instruments.

7.10.4 Noise and vibration mitigation

Protection

Protection of the recommended corridor would not have direct noise and vibration impacts on sensitive receivers, therefore no strategic mitigation or management measures are required.

For new projects the typical order of mitigation is to consider mitigating noise at the source, then the propagation path, and finally the receiver. However this project presents a somewhat unique opportunity for development controls to be considered and applied as part of the recommended corridor protection and ahead of the construction of the infrastructure. The order of noise mitigation suggested for this project is:

- Development planning controls / strategic land use planning – implementation of these controls would result in the location of less sensitive land uses near the infrastructure corridor, or require new sensitive receiver buildings adjacent to the corridor to incorporate appropriate design to minimise the impacts of noise and to potentially include noise mitigation.
- Source mitigation – reduction of noise where it is generated. This would include the OSO motorway surface and the wheel/rail interface and diesel exhausts for the freight rail.
- Path mitigation – reduction of noise on the propagation path involves the use of noise barriers, landscaped earth mounds to reduce the noise at receiver locations.
- Receiver mitigation – applying building treatment to existing buildings.

Environmental impact assessment

A detailed noise and vibration assessment will be undertaken as part of future environmental impact assessment for the OSO and would provide further definition of the likely noise and vibration impacts.

7.11 Air Quality

7.11.1 Corridor protection and potential future infrastructure

Protection of the recommended corridor would not result in impacts to air quality as no infrastructure would be constructed.

Given the generally good availability of meteorological and ambient pollution monitoring data (with the exception of PM_{2.5}) along the recommended corridor, there can be a reasonable understanding formed in relation to the general meteorological conditions, how these may influence the dispersion of pollutants from the future OSO infrastructure and the cumulative impacts of pollutants from that infrastructure and other pollutant sources on surrounding receptors. The following conclusions can be drawn from the analysis:

- Particulate levels are elevated during certain times of the year along the recommended corridor and generally across western Sydney, with six of the seven monitoring stations showing an exceedance of the regulatory PM₁₀ 24 hour limit over the last 12 months. The longer term (annual) PM₁₀ average concentrations show a better picture with the annual average data being approximately half the regulatory limit. This suggests that the particulate concentrations are driven by relatively short term elevated concentration occurrences such as bush fires rather than a generally high PM₁₀ environment. Vehicle and train emissions during the operation of the OSO would contribute to particulate levels along the corridor.

DRAFT

- The limited PM_{2.5} data along the corridor exhibited elevated concentrations of both short and long term average periods. Operation of the future OSO infrastructure would contribute PM_{2.5} to the air shed, which has existing concentrations at or above the annual mean criteria. The construction and operation of the proposed Western Sydney Airport would be expected to contribute particulate matter to the ambient environment. In combination with the future OSO infrastructure, there is a risk of cumulative impacts associated with PM_{2.5} concentration and to a lesser degree the PM₁₀ and NO₂ concentration.
- Existing NO₂ concentrations are generally low with no exceedances noted in the data examined. The peak concentrations are well below the regulatory limit. A greater risk of impact associated with NO₂ concentrations exists in the central section of the recommended corridor. This is due to the proposed construction of the Western Sydney Airport and associated upgrade and expansion of the major arterial and motorway network that is planned to occur prior to the future OSO infrastructure being constructed (M12 Motorway and upgrade of The Northern Road). There is a risk of cumulative impacts occurring in this area of the recommended corridor when the airport has been built and all infrastructure is operational.
- The influence of Sydney Basin sea breeze circulation patterns could result in increased cumulative pollution in the west where the future OSO infrastructure is located, resulting in potentially higher ambient concentrations when compared to other areas of the Basin.

Industrial Sources

Cumulative assessment of major projects such as the future OSO infrastructure need to consider their contribution of pollution to the air shed as well as whether other sources of pollution may be combined when in close proximity. This is because in combination, higher ground level pollutant concentrations may result than would otherwise be expected if the project were operating just within the regional pollutant concentrations. There are 10 industrial point sources of NO₂ and fine particulates along the recommended corridor that are listed on the NPI database. While there are relatively few sources, a detailed analysis of the cumulative impacts for NO₂ from the existing industrial sites would need to be included in the future quantification of air emissions associated with the recommended corridor.

Western Sydney Airport

Substantial air emissions (PM₁₀ and PM_{2.5}) are expected to be associated with the construction and operation of the proposed Western Sydney Airport. Pollution from the airport is expected to be primarily particulate matter during construction and NO₂ and particulate matter emissions once the airport becomes operational.

Cumulative air quality impacts from the proposed airport may substantially affect the corridor as it passes the north-western boundary of the proposed airport perimeter. A detailed analysis of the cumulative impacts for NO₂ and fine particulates from the proposed airport construction and operation would need to be included in the future quantification of air emissions associated with the operation of the future OSO infrastructure.

Freight Rail

A Screening Level Air Quality Impact Assessment (Screening Assessment) was undertaken for freight rail. The Screening Assessment focused on emissions from rail traffic. Concentrations of PM₁₀ and PM_{2.5} and the combustion gas NO₂ resulting from assumed OSO freight rail movements were predicted using a preliminary air dispersion model. The assessment considered the incremental impacts from the trains only with no background values applied.

The Screening Assessment showed that predicted incremental impacts from the corridor were below the NSW EPA assessment criteria for NO₂ and particulates; however as noted previously, short and long term average ambient PM_{2.5} concentrations are close to NSW EPA criteria, therefore further detailed modelling and assessment of air quality impacts would be needed during the future environmental impact assessment of the future OSO infrastructure to identify the relative contribution of the future OSO infrastructure and to demonstrate that no adverse effects to the health and amenity of surrounding communities are anticipated.

DRAFT

7.11.2 Air Quality mitigation

Protection

The protection of the corridor is unlikely to represent a potential impact from a regional or local air quality perspective. As such, mitigation measures are not identified at this early stage.

Environmental impact assessment

Regional air quality is anticipated to change over time, as is transport technology. More detailed consideration of air quality impacts and an associated Human Health Risk Assessment would be undertaken closer to the time of project application and detailed design of the future OSO infrastructure.

As previously acknowledged, PM₁₀, PM_{2.5} and NO₂ have been identified as the primary pollutants of concern and OEH currently has limited PM_{2.5} in the recommended corridor. Therefore in order to adequately assess the likely impacts of the operation of the OSO during future environmental impact assessment, a robust data set of baseline air quality concentrations for the pollutants of potential concern would need to be collected through a targeted air quality monitoring program undertaken closer to the time of project application and detailed design.

Consideration of potential cumulative impacts

Cumulative impacts refer to the effects of a given project on the environment when considered in the context of other human actions; past, present, and future. Direct and indirect human actions over time, while seemingly small, can combine to collectively impact the environment. Cumulative impacts for the recommended corridor includes consideration of a number of infrastructure and development projects including, but not limited to BLOR-CC, the proposed M12 Motorway, the proposed Western Sydney Freight Line, proposed North South Rail Line, Western Sydney Airport, the North West, South West, Western Sydney Airport, Western Sydney, and the Greater Macarthur Growth Areas. The discussion of cumulative impacts has assumed a 30 to 50 year assessment period as the likely timeframe for completion of the OSO.

Cumulative benefits for traffic and transport have been described in previous sections of this report and are a fundamental part of the justification and need for the future OSO infrastructure. Consideration of other specific cumulative impacts related to key environmental and social issues are discussed below.

7.12 Consideration of potential cumulative impacts

7.12.1 Land use and property

There are some significant challenges in defining and reserving a corridor for the future OSO infrastructure, and with the current rate of development in western Sydney, this will only become more difficult. Despite this, the predominant land use that will be impacted along the recommended corridor will be rural zoned land. This is reflective of the fact that much of the land in western Sydney is still zoned and used for rural purposes. Some of this rural land has however been set aside for urban development, both for employment and residential development. While these areas are as yet unzoned for these future purposes, protection of the recommended corridor now is opportune as it can be readily accommodated into the planning for these areas and compatible land use zones can be selected for land adjoining the recommended corridor.

7.12.2 Heritage

In the Greater Western Sydney area, areas of Aboriginal sensitivity and heritage have been identified along a number of waterways and other open space/natural lands. The recommended corridor has avoided areas of high potential for Aboriginal sensitivity and heritage as far as possible. This includes siting the corridor away from areas of known sensitivity. In addition, in areas where the recommended corridor connects with other major infrastructure (proposed M12 Motorway, BLOR-CC, the proposed Western Sydney Airport), it has been located in areas that are of lower potential for Aboriginal heritage values.

Likewise, areas of Commonwealth, National, State, and local heritage were identified throughout western Sydney. Connections to other infrastructure (proposed M12 Motorway, BLOR-CC, Western

DRAFT

Sydney Airport) have been situated in areas of no or low concern for non-Aboriginal Heritage items to the extent possible. In specific areas, including the Llandilo Shale Woodland at the interchange of the recommended corridor with BLOR-CC, consultation with DPE and OEH has been conducted to develop ways to minimise cumulative impacts.

It is expected that current management plans will be modified to accommodate the recommended corridor, while project and resource-specific mitigation measures should be provided for future phases, on a project-by-project basis.

7.12.3 Biodiversity

The recommended corridor traverses a number of TECs, PCLs, and other environmentally sensitive lands. Where possible, the design has minimised impacts to these areas including avoiding as a first response, then skirting along edges to avoid fragmentation. Interchange designs and connections to other major infrastructure in the region have been situated in areas of low environmental sensitivity. Regionally sensitive areas within or adjacent to the OSO study area such as the Blue Mountains, Scheyville National Park and Razorback Range, have been considered and direct and indirect (e.g. landscape and visual) impacts have been avoided where possible.

Based on the design and relative impacts of proposed projects, substantial cumulative impacts could occur to Cumberland Plain PCLs. It has been noted that there are relatively few stands remaining and of these lands, most are currently fragmented. In addition, given the reducing area of these habitats, it is becoming increasingly difficult to secure mitigation offsets in these areas.

It is anticipated the environmental management measures such as early offset strategies, bio-banking where possible and other project-specific mitigation measures will be provided as part of future phases and environmental assessments.

7.12.4 Air quality

Air quality along the project corridor and within the Greater Western Sydney basin has been classified as 'good' by international standards, with measured data reporting below the BOM standards across a range of pollutants. With increased sources of pollution resulting from additional industrial development, the proposed intermodal terminal in the vicinity of WSEA, and the implementation of at least three major motorways (proposed M12 Motorway, OSO, BLOR-CC), cumulative impacts on air pollution are possible, particularly with regard to PM_{2.5}. As data has shown several daily exceedances for PM_{2.5} in the past, it is likely that additional pollution resulting from this additional infrastructure could have a negative effect on air quality if not appropriately mitigated.

The projects are however, expected to deliver relief in the form of reduced congestion, reduced vehicle kilometres travelled, coupled with larger programs to increase automobile and truck emission standards and shift from truck freight to freight rail.

7.12.5 Flooding

Growth is anticipated within and adjacent to the recommended corridor in the South Creek and Nepean River catchment areas. These developments often encroach on fringes of the floodplain and reduce the available flood storage. Similarly, new road and rail infrastructure waterway crossings are likely to produce some localised impacts.

While the impacts of individual developments are already required to be assessed by developers, the cumulative impacts are not often assessed. This is particularly important for the future OSO infrastructure given the time between corridor protection and the potential construction date. The cumulative impact of developments that will take place prior to construction of the OSO combined with the development of the OSO increases the potential for impacts to surface water, hydrology and flooding.

DRAFT

8.0 Economic considerations

Well-connected and integrated transport infrastructure is fundamental to delivering a competitive economy. For Western Sydney, reserving the OSO corridor for future transportation investment has the ability to support significant employment and housing growth anticipated for this region as well as a reduction in congestion and improvements in freight connections for Sydney and NSW.

Previous sections in this draft SEA have presented the economic justification for reserving a corridor for the delivery of OSO transport infrastructure. This section presents the findings of a qualitative strategic economic assessment of the impacts on economic factors associated with reserving the OSO corridor and construction and operation of the OSO transport infrastructure in the future.

8.1 Existing and future environment

Australia is a highly urbanised country, with 75% of future population growth expected to occur in the eight capital cities by 2031 (Department of Infrastructure and Regional Development, 2015). States are becoming more city-centric; with the share of NSW population living in Sydney projected to increase from 64% in 2012 to 74% in 2061 (Australian Bureau of Statistics, 2013).

Western Sydney's population is projected to grow 50% between 2016 and 2036 (DPE, 2016), with the fastest growth projected to occur in Camden (178%) and Auburn (68%) (DPE 2014). The rise in population and urban density will put further strain on infrastructure as more people are using urban transport networks. The rise in population and ongoing prosperity will fuel consumption of goods and services resulting in an increase in freight movement. Consequently, increased demand for Sydney's road network will cause a rise in congestion with no corresponding increase in transportation capacity.

The cost of road congestion in the absence of any new transport network capacity or improvements in its efficiency is expected to increase by 165% for the Sydney/Newcastle/Wollongong area between 2011 and 2031; from \$5.6 million in 2011 to \$14.8 million by 2031 (2011 prices) (Infrastructure Australia, 2015).

The Greater Western Sydney area is made up of a diverse range of industries and services. Census data (2011) illustrates that the number of jobs in the manufacturing and agriculture, forestry and fishing sectors has been declining for more than a decade and this trend is expected to continue. Other industries including health care and social assistance, retail trade, transport, postal and warehousing have seen an increase in the number of persons employed for each industry. However, the number of high value-added professional services jobs is not growing at a sufficient pace to match the number of qualified western Sydney residents (University of Western Sydney, 2016). This means that many western Sydney residents are forced to travel outside of the region for employment.

This increases congestion across all transport modes while putting significant pressure on productivity and economic growth, creating negative impacts on family life and resident's health and living conditions across the metropolitan area. Good access to the proposed Western Sydney Airport, WSEA and other employment centres in the region will be important in providing local employment options for western Sydney residents and to help reduce congestion across the metropolitan area.

Reserving the recommended corridor and operating well-designed transport infrastructure has the ability to support a reduction in congestion, improve freight connections and provide more employment opportunities within the region.

8.2 Methodology

The methodology for undertaking this qualitative assessment involved establishing the current economic environment and assessing the potential economic impact of a future motorway and freight line within the recommended corridor at a strategic level. The analysis qualitatively discusses potential economic impacts and likely outcomes for the periods prior to building transportation infrastructure (corridor protection), during construction and once the OSO infrastructure is operational in the future (transportation impacts).

DRAFT

The economic assessment assumes that the protection of the corridor would commence in the short term; however, no timeframes are placed around the economic impacts during the construction and operational stages of the corridor, as the timeframe for these has not yet been established.

The potential economic impacts to the western Sydney and/or Greater Sydney region are presented qualitatively and are based on information from a range of sources, including:

- Australian Bureau of Statistics Census
- Department of Infrastructure and Regional Development
- Australia Bureau of Transport Statistics
- Infrastructure Australia
- UK Department of Transportation
- New Zealand Ministry of Transport.

This economic assessment discusses impacts on value added, gross state product, agglomeration, and productivity. These terms are defined as follows:

- **Value added:** measures the increase in the value of a good at each stage of production less the value of intermediate consumption. This measures the contribution to GDP made by an individual producer, industry or sector.
- **Intermediate Consumption:** measures the value of goods and services consumed as inputs by a process or production.
- **Gross State Product:** measures the output for the state and equals the sum of value added for all industries and flows of goods, services, labour and capital within state.
- **Agglomeration:** the productive advantages that firms derive from being located in close proximity to other firms, such as access to suppliers and labour.
- **Productivity:** defined as a ratio of output volume to input volume and measures how efficiently production inputs are being used to produce a given level of output.

8.3 Consideration of potential economic impacts

This section provides commentary on the strategic impacts of reserving the recommended OSO corridor compared to the situation of not reserving the corridor. It is concerned with the macroeconomic issues of economic growth and productivity changes prior to transportation investment (OSO corridor protection), during construction and once the OSO transportation corridor is operational. Economic impacts have been broadly categorised as follows:

- **Economic growth:** The impacts to overall productivity within the region, as demonstrated through a change in the Gross State Product.
- **Land value prices:** The impacts to land values as a result of zoning changes, development controls, changes in density and access.
- **Employment:** The impacts to jobs and businesses, largely due to changing labour requirements and linkages to emerging employment areas.
- **Industry development:** The impacts to local industry patterns.

The following discussion does not *quantify* expected changes for each of the categories of impact. It presents a spectrum of potential impacts based on the changes to the existing economic conditions that could be driven by the protection of the recommended OSO corridor and the future construction and operation of the future OSO infrastructure.

The following ratings are used to describe the magnitude of change to each category of economic impact:

- **Low:** Indicates insignificant economic impacts

DRAFT

- **Medium:** Indicates moderate economic impacts
- **High:** Indicates substantial economic impacts.

These ratings are inherently relative, with no defined numerical boundaries between them. It is also important to note that these ratings do not describe the direction of change (i.e. positive or negative).

8.3.1 Corridor Protection

Impacts on economic growth

Significant economic opportunities exist in western Sydney, with many of these outlined in the Federal, State and local strategies discussed in **Section 2.0**. Protecting the recommended corridor will in its own right influence and potentially be a catalyst for other growth opportunities and economy activity. Corridor protection would signal to the market that transportation investment could occur within the corridor in the future. Protection of the recommended corridor for future transportation infrastructure could potentially drive how and where residential and commercial land is developed. For example, developers may choose to develop land based on its proximity and ability to access future transportation. The level of development that would occur along the corridor would depend on the availability of information regarding future infrastructure plans and the level of certainty surrounding future transportation investment.

Land within the protected corridor is likely to be zoned SP2 Infrastructure, with the proposed SEPP to determine the zone(s) for the corridor. However, it is intended that the land could continue to operate in a similar manner as it was immediately before the rezoning takes place, due to existing use rights provided under sections 106-109B of the EP&A Act. Businesses most likely would refrain from long-term investment in fixed capital within the recommended corridor given the potential for future infrastructure investment. This could lead to lower economic output in certain areas.

Not protecting the corridor means that the future OSO infrastructure could be suboptimal or not feasible to construct due to development that could occur within and directly adjoining the recommended corridor in the ensuing period from present to the future time when the OSO infrastructure is needed. If this were to be the case, higher congestion would lead to longer travel times and higher travel costs than would be expected under the scenario where the corridor is protected and OSO infrastructure built. This would result in a net reduction in productivity and subsequent reduction in economic growth for western Sydney and for the State given the lost potential for linkages that would have been provided by the OSO between key ports in Illawarra, Central Coast and Sydney if the corridor was not protected.

Considering the above, the overall magnitude of change in economic growth associated with protecting the recommended corridor would be **low**.

Impacts on land value

Some residents or business located in the corridor could choose to relocate following the announcement of protection of the corridor. This could occur if residents or businesses feel that it would be more beneficial for them to relocate prior to the construction of the future infrastructure. Conversely, some residents and businesses may choose not to relocate until their property is required for construction of the future infrastructure. More available land on the market could put downward pressure on property prices.

Protecting the recommended corridor would lead to changes in zoning and possibly development controls, particularly around proposed interchanges with other roads and in built-up areas.

Protecting the corridor in 2018 would reduce the risk of the corridor becoming compromised or compromising the ability of the Government to deliver the proposed OSO infrastructure in the future. Not protecting the corridor could have a greater impact on households and businesses if the infrastructure is eventually developed. This is because the protection phase provides important market signals and allows households and businesses to plan accordingly, contingent on the level of public information available.

Considering the above, the overall magnitude of change in land value associated with protecting the recommended corridor would be **medium**.

DRAFT

Impacts on employment

Protecting the recommended corridor could result in agglomeration economies for Western Sydney (the productive advantages that firms derive from being located in close proximity to other firms, such as access to suppliers and labour). New businesses and educational facilities may potentially relocate (or open) in the region prior to the commencement of the expected infrastructure investment if they expect to benefit from access to more diverse labour markets and proximity to businesses (clients and suppliers) as the area develops. However, this could increase congestion in the region in the short-term, meaning congestion impacts could offset the benefits of agglomeration economies.

Some businesses could choose not to invest in fixed capital and could even relocate because of protection² due to uncertainty regarding the timing of land acquisition for the delivery of transport infrastructure and construction of the future OSO transportation investment. If a business chooses to relocate, they could do so outside of the region if land that fits their requirements is prohibitively priced or unavailable within the immediate area. If this is the case, the affected workforce may need to relocate, travel outside of the region to get to work, find alternative employment within the same industry or re-train. This could lead to changes in labour supply and demand within the area and force some people to travel outside of the region for employment. More people traveling outside of the region for work would increase congestion within the metropolitan region.

The net impacts on employment are difficult to ascertain at this stage. The net inflow of businesses to the region would depend on many factors, the most important factors being the availability of information regarding future infrastructure investments, when it would become operational and the degree of certainty that this investment would occur. This information would allow businesses to better determine how they could benefit from future transportation investment.

Considering the above, the overall magnitude of change in employment associated with reserving the OSO corridor would be **low**.

Impacts on industry development

When compared to the scenario in which the recommended corridor is not protected, determining whether there would be a positive or negative impact on each industry, and the quantum of such impact, would largely depend on business decisions made in response to rezoning. Land protection would likely influence the type and pace of future development in the area. Some industries, such as freight logistics, stand to potentially benefit from the proposed infrastructure. However, further information is required to determine if any pre-investment by these industries will occur along the corridor during the protection phase.

Long-term fixed capital investments by businesses within the corridor could be deterred by the protection of the corridor. Businesses could reduce investment or even relocate if they perceive that the potential future construction of the OSO infrastructure would impact on the usable life of investments.

Value adding within the region could be slowed by reduced business investment and any relocation of business to outside the region. However, this could be offset by a shift towards the development of industries that are more mobile and choose to move into the area. Development for these business types is more likely to be completed and become operational for the period between land protection and the potential construction of the OSO.

Potential loss of economic growth and value in industries could be mitigated by restricting the limitation placed on development of the land that is most economically productive.

Considering the above, the overall magnitude of change in industry development associated with reserving the OSO corridor would be **low**.

² Even though land will be rezoned to SP2, it will allow existing uses to continue operating in the same manner as they did prior to reservation.

DRAFT

8.3.2 Future construction of OSO infrastructure

Impacts on economic growth

The future construction phase of the project could have both negative and positive effects on economic growth in the area. There could be a loss of productivity and output from businesses and services that are required to relocate or close down. Furthermore, businesses and services located adjacent or close to construction zones could be negatively impacted by noise, vibration and other amenity impacts. For example, customers may be less likely to shop in an area with heavy construction, given the availability of a suitable alternative. These factors could negatively impact productivity and economic growth in the area. Following the announcement of the corridor protection, the operational profile of businesses and services in the area may evolve to be more mobile and flexible to these changes.

The construction phase could positively impact output and economic growth in the area as a result of the labour, materials and equipment required for construction services (if the spending in the local construction industry and other associated industries would not have taken place without the project). This spending would have direct, indirect and induced effects on the local economy. These impacts are defined as follows:

- **Direct effects:** the change in output of the construction industry from undertaking the project.
- **Indirect effects:** Increase in output from suppliers in response to an increase in demand from the construction industry.
- **Induced effects:** As a result of the direct and indirect effects, the level of household income throughout the economy would increase as a result of increased employment. A proportion of this increased income would be re-spent on final goods and services (Scottish Government, 2016).

Economic output from the construction of infrastructure would only occur from funds that would otherwise not be spent in the recommended corridor. Additionally, funds spent on machinery and other supplies built outside the region would not be included in generating output in the region.

Considering the above, the overall magnitude of change in economic growth associated with the future construction of the OSO corridor would be **medium**.

Impacts on land value

Land required for the future OSO infrastructure would no longer be available for development as it would be used for the construction of transport infrastructure. Therefore, areas with the highest relative density within the corridor would be directly impacted to the greatest degree when land is acquired for construction of the future OSO infrastructure.

Market forces determine land values. If land values increase after the recommended corridor is protected and land acquisition does not take place until the construction phase, the cost of acquiring this land within the recommended corridor would be higher than if it was acquired during the protection phase. This is a consideration for government and is not considered further in this assessment.

The construction phase provides a significant signal to the market regarding the timing and certainty of future transport infrastructure. The impacts of construction and the greater certainty of future transport infrastructure both have the potential to impact land value. Land located close to major construction areas may be less desirable during the construction phase, due to noise, vibration and other amenity impacts. Conversely, land that will considerably benefit from improved access to employment, education and other businesses and services may be more desirable (in anticipation of the operational infrastructure). These factors will impact market demand, and in turn, land value.

Considering the above, the overall magnitude of change in land value associated with the future construction of the recommended corridor would be **medium**.

Impacts on employment

Future construction of the OSO transport infrastructure would create jobs for the duration of the construction phase. For the OSO study area, the true impact of the construction phase on employment depends on how the project funds would have otherwise been spent. In other words, if the same level of spending occurs for the construction industry and along the supply chain regardless of whether the

DRAFT

infrastructure is built, the difference in employment impacts is negligible. If, however, the level of spending in the study area is higher than what it would be without the project, the construction phase can create additional employment. Additionally, jobs would only be created for the associated machinery that is built within the region.

Businesses within the corridor on land rezoned as SP2 that did not relocate during the protection phase would be acquired prior to construction. Businesses that would relocate outside of the region would impact the regional labour markets. Workers would either have to travel outside the region for work, relocate, find other employment within the region, or re-train. This could lead to changes in labour supply.

Considering the above, the overall magnitude of change in employment associated with the future construction of the OSO corridor would be **medium**.

Impacts on industry development

Impacts to industry development would be most significant to the construction industry and its supply chain. This impact would be the result of new spending for local businesses and services that would not have taken place without the project, which could result in increased employment and output.

Some industries could begin to establish in the area to take advantage of the upcoming transportation investment. For example, manufacturing businesses which rely on freight connections for inputs and outputs could benefit from establishing operations near the future road and rail freight linkages.

However, acquisition of business land would negatively impact businesses that are not mobile or are dependent on specific land for operation. Included are primary industries, which could shrink as the land use changes from rural to special purpose road infrastructure.

Considering the above, the overall magnitude of change in industry development associated with the future construction of the OSO corridor would be **medium**.

8.3.3 Operational OSO Infrastructure Phase

When all three stages are complete, the full OSO infrastructure project would provide key road and rail freight north/south connections to the Illawarra Region and the Central Coast, and contribute to the easing of existing and future congestion across the city of Sydney. The *NSW Freight and Ports Strategy* found that 44% of the total NSW freight task was handled by NSW ports in 2010-11 (Transport for NSW, 2013). Efficient freight movements will be crucial to handling growing freight demand and minimising its congestion impacts on the wider road and rail network.

The *Outer Sydney Orbital Corridor: Preliminary Freight Needs Assessment* identifies the metropolitan rail freight network and Port Botany as two potential capacity drivers which may result in the need for the OSO (Transport for NSW, 2014b). The rail services component of the future OSO infrastructure would link with the existing rail freight network to relieve competition for track usage. Furthermore, the north/south connections would support improved utilisation of the Port of Newcastle and Port Kembla, reducing the strain on Port Botany and the adjacent transport network. The impact of the Western Sydney Airport on future freight demand also needs to be considered. The future OSO infrastructure has the capability to support the transfer of freight to and from the airport on road and rail.

The future OSO infrastructure has the potential to improve the efficiency of passenger movements across both road and rail. The proposed motorway provides an alternative travel route, which would yield travel time savings and other direct benefits to users. Users on the wider road network could also benefit from relieved congestion as passenger and freight vehicles switch to the OSO transport infrastructure. Improved rail freight infrastructure could also support a shift from road to rail freight, further reducing congestion on the road network. Rail passengers would benefit from improved service reliability as the future OSO infrastructure could support rail freight services which currently congest the shared passenger and freight rail network.

The Federal and State government policies in particular discussed in Section 2 demonstrate how important the future OSO infrastructure is considered for the future development of western Sydney. These included:

DRAFT

- The Western Sydney Airport EIS stating that future OSO infrastructure would support the Western Sydney Airport by supporting long term freight and passenger movements directly related to the airport
- The *National Land Freight Strategy* identifies that Australia's freight task is projected to nearly double over the next two decades
- The *Draft Greater Sydney Region Plan* identifies the future OSO corridor to support the growth project for the Western Sydney region, especially to support growth associated with the new Western Sydney Airport and Growth Areas.

In addition, the economic benefits of protecting the corridor identified in the Federal and State government strategies include:

- Infrastructure Australia's report on corridor protection found that the early acquisition of the corridor was estimated to potentially save around \$3.665 billion in acquisition costs and \$19.979 billion in construction costs, when compared to leaving the provision of this infrastructure to a later date and tunnelling to accommodate it
- The *Australian Infrastructure Audit* identified the protection of the OSO Stage 1 corridor for securing future connectivity between western Sydney and the Central Coast and Illawarra as a high priority initiative.
- The *National Urban Policy* sees the lack on planning for and protection of critical corridors and sites as a major impediment to new infrastructure.

Furthermore, the future OSO infrastructure could provide an additional north-south flood evacuation route. This is significant in minimising the economic impact of severe weather events in terms of potential net travel time savings, net safety benefits, net vehicle operating cost savings and net environmental benefits.

The following subsections describe the magnitude of economic change within the study region on economic growth, land value, employment and industry development as a result of operating the proposed transportation infrastructure.

Impacts on economic growth

In assessing the potential impact of the OSO infrastructure on the economic productivity and development of western Sydney, and the wider region, underlying economic factors, which exist in the region, have been considered. For example, inefficiencies in the spatial structure of western Sydney's transport network are likely to become more evident as demand grows. The OSO is well positioned now and in the future to provide a solution to this growing challenge, and contribute to the economic development of the region.

The economic impact of delivering the project compared to not delivering the project would be most evident in a change in productivity. The *Infrastructure Australia Audit (2015)* notes, "*Improvements in the efficiency of infrastructure services can lead to productivity gains for those businesses and individuals who utilise the services. This occurs because of lower costs for the infrastructure they use as an input to production, or because the improvements in infrastructure allow businesses to produce their output more efficiently*". As such, delivering the OSO infrastructure in the future could provide increased transport efficiencies attributable to the transport infrastructure and an overall increase in productivity. This is compared to the situation where the corridor is not protected, and the transport infrastructure is not delivered and operated as currently planned. A study completed for the New Zealand Ministry of Transport (2014) portrays the link between direct impacts on users, and their overall contribution to productivity as follows:

DRAFT

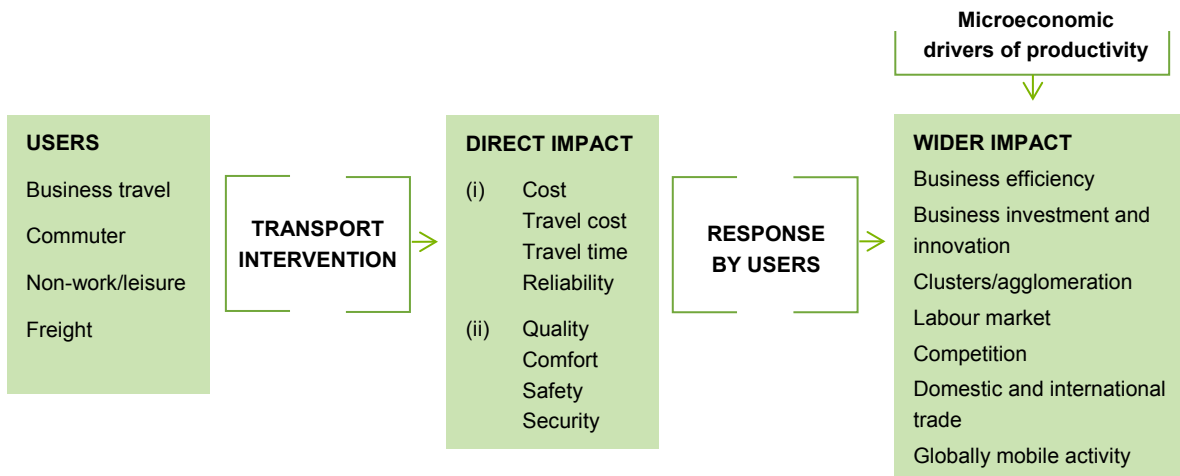


Figure 35 Direct and wider impacts of transport investment

A future detailed economic impact assessment should consider in detail changes in Gross State Product as a result of the net change in value added from productivity and agglomeration economics in emerging employment areas. At a strategic level, Gross State Product would likely be higher as a result of the operation of the future OSO infrastructure when compared to the scenario of not reserving the corridor and suboptimal transportation investment, because of the additional expected benefits of reductions in travel time, agglomeration economies and productivity gains that operation of the future OSO infrastructure could potentially deliver.

Considering the above, the overall magnitude of change in economic growth associated with the operational phase of the future OSO infrastructure would be **high**.

Impacts on land value

Once the infrastructure is constructed, land value could increase for parcels located around the interchanges. This is assuming that there are improvements in access to employment, education, businesses or other services (in comparison to the level of access prior to the infrastructure). The degree to which land values would change would depend on the ability to access key areas from those interchanges. In other words, land values may increase more if the interchanges provide quick and efficient access to other key areas/centres beyond solely providing access to the future OSO infrastructure. The magnitude of changes in land value could depend on land use, meaning the magnitude of change in the value of commercial land, residential land and other land uses could differ.

Other factors that would affect land values include, but are not limited to, environmental, urbanisation, zoning and land use. There is also an opportunity to encourage additional residential development beyond current targets if well-built infrastructure provides better access and faster travel times to desired locations. The pace at which residential development takes place will also impact land value.

Considering the above, the overall magnitude of change in land value associated with the operational phase of the future OSO infrastructure would be **high**.

Impacts on employment

The future OSO infrastructure would improve linkages to emerging employment areas (including the Western Sydney Employment Area and the proposed Western Sydney Airport) and existing employment areas (e.g. Norwest Business Park). In turn, these areas would become more accessible for residents of western Sydney. Additionally, the proposed Bells Line of Road - Castlereagh Connection would improve linkages to regional populations and potential labour markets. This improved accessibility increases the number of potential employees residing within the region (“effective employment density”). For employees, this means a potential growth in employment opportunities. Empirical research has shown that there are positive economies associated with increasing the effective density of employment, with the output and income of firms being a positive function of effective density (UK Department of Transport, 2006).

DRAFT

These positive economies are referred to as agglomeration economies and arise through the productive advantages that firms derive from being located in close proximity to other firms, such as access to suppliers and labour. These improvements to productivity and new employment opportunities may not occur without the protection of the recommended corridor and the subsequent future delivery of the future OSO infrastructure.

Considering the above, the overall magnitude of change in employment associated with the operational phase of the future OSO infrastructure would be **high**.

Impacts on industry development

The future OSO infrastructure is anticipated to provide valuable road links between growth centres such as the North West Growth Area, Western Sydney Airport Growth Area, South West Growth Area, Western Sydney Employment Area and the Illawarra and Central Coast regions. Reducing the cost of travel and transportation of goods between these areas could increase the productivity and competition offered by business and industries in these areas. The interchanges with other key roads and highways would support the flow of goods and services between the rest of Sydney and surrounding States and Territories, thus impacting key industries such as freight logistics. However, there is insufficient information to determine industry impacts at a granular level.

According to the Transport for NSW's *NSW Long Term Transport Master Plan* (2012), freight and logistics contributed approximately \$58 billion³ (13.8%) to NSW's Gross State Product. As previously noted, 44% of the total NSW freight task was handled by NSW ports in 2010-11 (Transport for NSW, 2013). The efficient movement of freight between air and sea ports will allow industries in NSW to remain competitive and continue to grow.

Considering the above, the overall magnitude of change in industry development associated with the operational phase of the future OSO infrastructure would be **high**.

8.4 Summary of findings

Protecting the recommended corridor would provide the necessary land required to construct and operate the proposed road and rail infrastructure when it is required in the future. Although protection could cause some businesses to relocate, the negative impacts incurred during protection would be outweighed by the benefits realised from building and operating the OSO infrastructure in the future. The reduction in congestion across the metropolitan region would lead to lower travel times and productivity gains when compared to the scenario in which the corridor is not protected and suboptimal infrastructure is constructed (or not constructed at all).

Better north/south freight links would increase the efficiency of freight transport, lowering costs and delays incurred by the shipper and customer. Lastly, better access to future employment centres within western Sydney could help spur job creation as well as reduce congestion on the metropolitan network as less people would have to leave the region for employment.

Table 14 summarises the findings of the strategic assessment of economic impacts. The table portrays the magnitude of potential economic change across the four economic impact categories considered, for the protection, construction and operational phases of the future OSO infrastructure.

Table 14 OSO Infrastructure Magnitude of Change Summary

Economic Impact Category	Corridor Protection	Construction	Operation
Economic growth	Low	Medium	High
Land value prices	Medium	Medium	High
Employment	Low	Medium	High
Industry development	Low	Medium	High

Note: "Low", "medium" and "high" have been used to describe the magnitude of change to each category of economic impact, and not the direction of change.

³ The dollar year of this statistic is not provided in the source.

DRAFT

Following the protection of the recommended corridor through the proposed SEPP, the magnitude of change is expected to be **low** for economic growth, employment and industry development and **medium** for land value prices. This is driven by the potential reaction from local residents and investors in response to the protection announcement, and any subsequent zoning or development control changes.

The construction phase is anticipated to have **medium** magnitude of change on all categories of economic impact considered in the assessment.

The highest magnitude of changes to economic growth, land value prices, employment and industry development are anticipated to occur during the operational phase of the future OSO infrastructure.

8.4.1 Alignment with broader government initiatives and projects

The NSW government is focused on supporting existing and future populations in key Growth Areas around Sydney. To do so, the government has implemented the following initiatives:

- Western Sydney Airport Growth Area
- North West Growth Area
- Greater Macarthur Growth Area
- South West Growth Area
- Western Sydney Employment Area

Without the protection of the recommended corridor and planned future transport investment, increasing congestion may hinder access to employment opportunities and efficient movement of freight to key air and sea ports. Thus, protecting the recommended corridor for planned future transport investment would support the NSW government in successfully achieving the goals of the above initiatives.

There are a number of infrastructure projects within or adjacent to the recommended corridor. These projects and the impact of the OSO on them have been considered, in accordance with the requirements of the SEA Guidelines, and are outlined in Table 15.

Table 15 Related infrastructure projects

Project	Description	OSO's impact on the project
Western Sydney Airport	Proposed airport at Badgerys Creek. On opening in the mid-2020s, the airport would operate from one runway and cater for approximately 5 million passengers per annum.	The airport is likely to be operational before the future OSO infrastructure. The future OSO infrastructure would provide additional north-south connectivity for the airport in the future. Traffic modelling and assessment would determine the need and staging of the future OSO infrastructure with regard to traffic demands generated by the airport in the future.
M12 Motorway	The proposed M12 Motorway would connect the M7 Motorway with The Northern Road and generally runs to the north and parallel with Elizabeth Drive. It would provide direct access to the proposed Western Sydney Airport from the M7 Motorway and from an upgraded The Northern Road.	The proposed M12 Motorway is expected to be operational before the future OSO infrastructure. The recommended corridor has been designed to enable connections with the proposed M12 Motorway west of the proposed Western Sydney Airport and share its interchange with the airport. Traffic modelling and assessment would determine the need and staging of the future OSO infrastructure with regard to traffic demands generated by the airport in the future.

DRAFT

Project	Description	OSO's impact on the project
Bells Line of Road – Castlereagh Connection	A study to determine the alignment of the future Bells Line of Road – Castlereagh Connection is being undertaken in parallel with the study undertaken to support the recommended corridor. A system interchange is proposed between the two motorways.	The studies undertaken for the recommended corridor, as well as the Bells Line of Road – Castlereagh Connection have been progressed in parallel. The two motorways interchange with each other and their alignments have been co-ordinated. At this stage, the relative timing of the two projects is unknown. The design would allow either project to progress first.

DRAFT

9.0 Strategic Planning Considerations

Much of western Sydney's development potential has yet to be realised; however the planned intentions for this region are far reaching and visionary. Hence the delivery of a major transport infrastructure project such as the future OSO infrastructure project complements and underpins this bold direction.

The exponential interest in western Sydney and the corresponding quantum and pace of change in the region, particular that associated with Western Sydney Airport – Badgerys Creek Aerotropolis (Badgerys Creek Aerotropolis), could see what are current opportunities transform into constraints as more development occurs. Therefore, the planning for the recommended corridor needs to not only complement land use decisions for western Sydney where possible, but also support current land use planning decisions and future strategic intentions.

Considering the scale of the recommended corridor and its geographic foot print, and in the context of the scale of expected development across western Sydney, robust and innovative strategic planning will reduce the risk of the recommended corridor becoming compromised or compromising the ability of the Government to deliver the future OSO infrastructure.

Not protecting the recommended corridor could have a significant economic cost, as well as an adverse impact on the urban form and efficiency of the cities and regions that the future OSO infrastructure would service. This not only includes Badgerys Creek Aerotropolis, but other regional connections as well. With numerous projects currently in early development and scheduled for delivery in the immediate term, well considered strategic planning is imperative to ensure beneficial outcomes for existing and future development, economies and populations of western Sydney (see **Section 2.4** for more detail).

The following discusses the strategic consequences of protecting the recommended corridor in this context of future expected development for western Sydney, and its integration with other key infrastructure commitments for region including the Badgerys Creek Aerotropolis.

9.1 Strategic implications of protecting the recommended corridor

In the context of the expected growth and development in western Sydney the strategic reasons to support the protection of the recommended corridor include:

- The need to secure the opportunity for the future OSO infrastructure as envisaged by the *Draft Greater Sydney Region Plan* and *Draft Future Transport Strategy 2056*, and to support other strategic land developments such as the development of the various Growth Areas, Badgerys Creek Aerotropolis and the Western Sydney Parkland City.
- To enable a holistic approach to facilitate the future delivery the OSO infrastructure.
- To integrate the current and future land use planning being undertaken in western Sydney with strategic infrastructure planning.
- It is consistent with regional and local planning directions to provide adequate infrastructure into the future that will support the development of western Sydney.
- It will facilitate the delivery of the future OSO infrastructure to bring about improvements to the road and freight rail network that will deliver local, metropolitan and regional benefits as sought by all levels of Government.
- It will provide for the freight rail connection between Port Botany and the regional rail network via joining up the Western Sydney Freight Line to the Main West Line
- Planning and design is integrated with other current and future key infrastructure projects in western Sydney such as the proposed M12, The Northern Road upgrade, Western Sydney Freight Line, South West Rail Link Extension, North Soth Rail Line and the proposed BLoR-CC.
- It will assist in decision making for land uses in and around the recommended corridor both at a local, regional and metropolitan level.

DRAFT

The recommended corridor also achieves the key directions and aims set by the various strategic plans at different levels of Government (refer to **Section 2.1**) and will influence strategic planning for the areas in the vicinity of the land to be protected in that it will:

- Separate the North West Growth Area from Windsor and its surrounding existing residential and employment areas, thereby providing a clear delineation of these two distinct areas and their corresponding land use functions as desired by the draft District Plans.

In this way the recommended corridor would act as an artificial boundary separating the metro rural and urban areas in this northwest sector. The exception to this would be where the Vineyard Precinct connects to the existing employment area of Mulgrave, which will take advantage of the co-located interchange of the future OSO infrastructure with Windsor Road.

- Satisfy a number of the strategic land use objectives of Blacktown City Council's *Blacktown City 2030 Strategy* in that it secures land needed for key infrastructure that would serve the growing population in Blacktown and enables the equitable provision of infrastructure as part of an integrated transport system within this part of the LGA.
- Pass through the north western portion of the Western Sydney Airport Growth Area which will provide the opportunity to integrate the protection of the recommended corridor into the planning and development of this important strategic employment area.
- Provide the opportunity to install a notional and strategic boundary to the western edges of the South West Growth Area and the Badgerys Creek Aerotropolis site, while providing more immediate connections between these two key development areas.

The recommended corridor will also delineate and separate important rural uses and the southern growth areas, which align with the expectations by the Greater Sydney Commission to define the Rural Metropolitan Areas in this part of western Sydney.

- Support and provide further opportunities to incorporate additional road and railway planning for the Badgerys Creek Aerotropolis, which in turn supports the proposed growth in trade, logistics, advanced manufacturing, health, education and science economy in western Sydney.
- Serve as a western-most boundary to the urbanised areas of southwestern Sydney, which may help to separate and protect the rural character of the villages of Mulgoa, Wallacia and Cobbitty.
- Serve as a physical divider and buffer between the University of Sydney's Camden Campus and the existing urban residential communities of Ellis Lane and Grasmere, both of which are located west of Camden Town Centre. This could assist in demarcation between land uses and protect the university's agricultural uses from encroachment by other developments as desired by University of Sydney.
- Provide the opportunity to directly link southern regional areas of Canberra and Southern Highlands to western Sydney, as well as directly link freight rail connections to these regions and to the regions west of the Blue Mountains.
- Provide regional access from Melbourne and southern NSW via the Main South Line to western Sydney to service the growing interstate logistic businesses.
- Provide a key portion of the fuller recommended OSO corridor, which is intended to later extend and connect to the Central Coast and Illawarra Regions.

Separate and additional approval will still need to be sought under the EP&A Act to construct part or all of the future OSO infrastructure, such that a more detailed environmental impact assessment will need to be undertaken for the delivery of the future OSO infrastructure at that time.

The following sections describe the strategic planning considerations for each section of the recommended OSO corridor.

9.1.1 Section 1 Box Hill to Dunheved

Strategically this section of the recommended corridor has been located to minimise the overall impact on existing urban development and protection of the natural environment, while utilising existing infrastructure and riparian corridors where possible. In addition to the benefits described in Section

DRAFT

9.1, strategically the protection of the recommended corridor and the delivery of the future OSO infrastructure in this section:

- Largely avoids areas identified and/or rezoned for urban residential development within the North West Growth Area to reduce the need to acquire and demolish homes for the construction of the future OSO infrastructure.
- Utilises existing corridors used for high voltage power lines, which limit land uses.
- Will align with the strategic land use objectives of Blacktown City Council's *Blacktown City 2030 Strategy* in that:
 - The NSW Government will be able to meet its obligations to provide future key infrastructure in a cost-efficient and timely manner that will serve the needs of a growing population in Blacktown.
 - The recommended corridor will enable the provision of infrastructure within this part of the LGA that will connect to key land growth areas and centres in western Sydney.
 - The recommended corridor will facilitate the provision of an integrated transport system that can improve access to and within the City of Blacktown.
 - It will help to contribute to the ongoing expansion of transport networks that will meet the needs of a major growth centre such as the North West Growth Area.
- Provides the opportunity to reconsider the land use planning for the North West Growth Area Precinct of Shanes Park, which is currently identified to have the ability to deliver approximately 500 dwellings once rezoned and developed. However, once the land for the recommended corridor is protected the ability to re-plan this precinct will be compromised given that only a small section of land between the recommended corridor and Stony Creek Road would remain.
- Consideration of other and more compatible land uses than residential development should be considered for remaining and unaffected areas of the precinct.
- Provides for full access interchanges with Richmond Road and Windsor Road, enabling connections for traffic in all directions, further improving transport connectivity in the region.
- Will provide a future connection from Box Hill towards the Central Coast to connect with the M1 Pacific Motorway and the Main North Rail Line.

9.1.2 Section 2 Dunheved to Orchard Hills

Strategically this section of the recommended corridor has been located to minimise, as much as possible, impacts on existing and dense urban development in this area, while utilising optimal interchanges with existing key transport infrastructure. In addition to the benefits described in Section 9.1, the protection of the recommended corridor and the delivery of the future OSO infrastructure in this section:

- Passes through land with limited development potential, including flood prone land, parts of the Dunheved industrial precinct, and part of the Dunheved Golf Course, while safeguarding key open space areas along this recommended corridor and providing the opportunity for restoration to the South Creek corridor in alignment with the Greater Sydney Commission's goals to deliver and improve the Green Grid.
- Avoids existing urban areas especially residential development at Ropes Crossing, Werrington, and Claremont Meadows, including school sites. It also avoids direct impacts on the St Marys local centre including the St Marys Village Shopping Centre, and St Marys Leisure Centre, which enables development and renewal of these areas as anticipated by the draft *Western City District Plan*.
- It is acknowledged that it is not possible to avoid all impacts in the Dunheved area due to the established built form and land use activities in this area. Strategically this provides the opportunity to revise the master planning for this estate and to consider how best to leverage new business and industrial opportunities that may be associated with the freight connections that would be provided by the future OSO infrastructure.

DRAFT

- The location of the recommended corridor impacts on some parks and sports fields, however there are opportunities to restore existing remaining parks and provide embellishment to parks nominated but not currently used as parks at the moment, such as the Gipps Street Park.

9.1.3 Section 3 Orchard Hills to Cobbitty

Strategically this section of the recommended corridor has been located to best serve and connect with the future OSO infrastructure with the Western Sydney Airport, Badgerys Creek Aerotropolis, the Western Sydney Airport Growth Area, the proposed M12, The Northern Road and Bringelly Road as the key northern connection for the South Western Growth Area.

In addition to the benefits described in **Section 9.1** the protection of the recommended corridor and the future OSO infrastructure in this section:

- Would serve to facilitate future interchanges with the proposed M12 and The Northern Road that would provide direct and key road connections to the Western Sydney Airport, Western Sydney Airport Growth Area and Badgerys Creek Aerotropolis from other regions both within Western Sydney and regional NSW.

It also creates the opportunity to integrate the future OSO infrastructure into the planning and development of the Western Sydney Airport Growth Area where the recommended corridor will later be an integral route and connection for future employment related businesses in this area.

- Will support business investment in the Western Sydney Airport Growth Area and Badgerys Creek Aerotropolis, similar to the provision of other supporting road networks and infrastructure to which both Commonwealth and NSW Governments have already committed.
- Will protect the land needed to connect with and serve the proposed Western Sydney Freight Line and associated intermodal terminal, thereby ensuring strategic and integrated freight connection opportunities are protected.
- Affords an opportunity to integrate part of the northerly extension of the North South Rail line from the Badgerys Creek Aerotropolis to the T1 Main West Rail Line.
- Provides another opportunity for a key north-south connector road that would (once developed) be expected to alleviate the traffic pressures on the M7, which currently serves this north-south route function, albeit further east.
- Avoids the Commonwealth Defence land (with high ecological values), and established residential communities in Orchard Hills, residences in the Twin Creeks Golf Course Estate and Luddenham village. It also avoids all land within the South West Growth Area, including the recently announced South Creek West land release. These outcomes therefore protect the ability for these lands to be developed for urban purposes as intended by the *Draft Greater Sydney Region Plan* and the *Draft Western City District Plan*.

9.1.4 Section 4 Cobbitty to Camden Park

Strategically this section of the recommended corridor has been located to avoid Cobbitty Village, the State Heritage listed site of Brownlow Hill Estate and to minimise impacts to the Priority Conservation Area located in Cobbitty. In addition to the benefits described in **Section 9.1** the protection of the recommended corridor and the future OSO infrastructure in this section:

- Could serve to provide a notional boundary to the western edge of the South West Growth Area.
- Could provide direct links at both the northern and southern portions of the South West Growth Area through the specific provision of interchanges at both Greendale Road (which connects to Bringelly Road) and Cobbitty Road (or an alternative new interchange north of Cobbitty), thereby facilitating the opportunity to provide connections from this growth area to other regions in Western Sydney and more broadly to regional NSW areas. This portion of the recommended corridor once developed could be expected to support the main road network for the South West Growth Area.
- Avoids the core part of the Cobbitty Village centre that is threaded along Cobbitty Road and navigates between the spaces of the existing community of Ellis Lane. Although the recommended corridor traverses the eastern edge of the University of Sydney's campus in this

DRAFT

area, significant buildings and other infrastructure would be avoided. The result is that the recommended corridor will provide a defacto boundary between the residential urban fringes of Camden (including Grasmere) and the University's campus.

- Will, with the inclusion of the delivery of an interchange with Burragorang Road at Mount Hunter, be expected to provide direct road access between Camden and the future OSO infrastructure.
- Avoids a number of conservation areas and minimises the extent of crossing of the Nepean River.

9.1.5 Section 5 Camden Park to Menangle

Strategically this section of the recommended corridor has been located to avoid Cobbitty Village, the State Heritage listed site of Brownlow Hill Estate and to minimise impacts to the Priority Conservation Area located in Cobbitty. In addition to the benefits described in Section 9.1 the protection of the recommended corridor and the future OSO infrastructure in this section:

- Will provide for a road and freight rail connection from Victoria and southern NSW to the Western Sydney Airport and the emerging major logistics businesses in western Sydney.
- Will enable the northern portion of the Cawdor site to be developed, if deemed suitable for future urban development as currently sought for the site. This would also maintain direct connections and integration of the Cawdor site with the existing residential area of Camden Park.
- Protects the ability for the extension of the recommended corridor to the Illawarra Region.
- Provides a new link to the Hume Motorway that may alleviate the pressure of the current main interchanges at Narellan Road and the Hume Highway.
- Provides a key connection to the Hume Motorway, which will be a major link for regions south of Sydney to gain access to Western Sydney and to regions west of the Sydney metropolitan area.
- Supports the detailed planning and development of the Greater Macarthur and Wilton Growth Areas that include the future urban areas of Menangle, Mount Gilead and Wilton, and future expansion of Bingara Gorge.

9.2 Future Land Use Opportunities

Planning for, and providing, large scale transport infrastructure can be a catalyst for land uses in the vicinity of the recommended corridor. With this brings opportunities to identify options for urban growth and development of business and residential land uses that would benefit from the improved accessibility provided by the future OSO infrastructure connections with other motorways and arterial roads in western Sydney. The future provision of intermodal terminals connected to the future OSO infrastructure freight rail would support industries that would benefit from access to the freight rail opportunities. Inter-regional long-term benefits could be realised as a result of future land use changes, including improvements in accessibility and connectivity to Illawarra, Canberra and the Central Coast.

The Department of Planning and Environment's *Planning Guideline for Major Infrastructure Corridors*, contemplates potential implications for future land use and development in the vicinity of the recommended corridor both in the immediate and longer term. Specifically the guidelines recommend that the draft SEA:

- Provides commentary on the housing and job growth potential as a result of the project, including identifying likely areas of change and how this aligns with regional and district planning
- Provides commentary on potential opportunities to effectively integrate new infrastructure with surrounding land uses (either economic, environmental or residential land uses), and how this aligns with regional and district planning
- Identifies key locations including potential key interchanges and connections with other major future infrastructure projects.

The following sections provide a strategic assessment of urban development opportunities likely to result from future OSO infrastructure and its integration with the other transport infrastructure in the region, both existing and planned.

DRAFT

9.2.1 Housing and Job Growth

The *Draft Greater Sydney Region Plan* and *Draft Future Transport Strategy 2056* have already contemplated and included the recommended OSO corridor as part of the longer term infrastructure and city shaping outcomes for western Sydney. It is coordinated with the long-term land uses considered in the region, including the Badgerys Creek Aerotropolis. Consequently, it is expected that the protection of the recommended corridor will support projected housing and job growth in this region.

Although the broad strategic benefits of the protection of the recommended corridor are far reaching, particularly when its future stages are extended to Illawarra and the Central Coast and taking into account the scale and reach of the fuller recommended corridor, the key development areas to immediately benefit from this are related to the Growth Areas in western Sydney that are currently being planned and developed. The key benefit is safeguarding the land for the future OSO infrastructure, through protection of the recommended corridor, is to reduce the risk of land within the recommended corridor being considered for other land uses associated with these growth areas. It also responds to the identified benefits of the protection of this recommended corridor as detailed in Infrastructure Australia's *Corridor Protection* report.

Notwithstanding this, in selecting the location of the recommended corridor for the future OSO infrastructure, careful consideration of the relevant strategic land use plans for these growth areas has been undertaken. The *Draft Greater Sydney Region Plan* clearly identifies the need to protect future transport corridors for key infrastructure (such as the future OSO infrastructure) in recognition of projected freight task, population, housing and employment growth in these areas. As such the investment in new transport infrastructure that is as wide ranging as the future OSO infrastructure, stretching almost the entire north south extent of western Sydney, is of significant importance in improving the prospects for supporting economic development. It is expected to enable more job opportunities to be created closer to where people live, and helping to achieve the goal of '30 minute cities'.

The proposal at this stage as outlined in this draft SEA is only to protect the recommended corridor. The construction of the future OSO infrastructure will be undertaken as a separate process when it is needed. Hence, the Government's commitment to the construction of part or all of the future OSO infrastructure will likely be a larger catalyst to supporting continued or accelerated development growth in these and other regions of western Sydney and beyond.

Just as the future OSO infrastructure will support employment and housing growth in western Sydney, the speed and trends in the development of these growth areas will likely help dictate when this (or sections of the future OSO infrastructure) may be required to underpin projected housing and employment growth. This will assist Government to prioritise investment in the delivery of this future infrastructure, and help avoid underinvestment.

The recommended corridor avoids existing and proposed future urbanised areas and could be expected to form the notional limit for urban development. This could help preclude urban development from extending west of the recommended corridor in the regions of Section 1 of the recommended OSO corridor north of the BLOR-CC interchange and west of the Western Sydney Airport Growth Area extending to Greater Macarthur Growth Area. This supports the notional location of the recommended OSO corridor shown in the *Draft Greater Sydney Region Plan* and *Draft Future Transport Strategy 2056*, an in principle expectation of the recommended corridor could be to define a boundary between the Metropolitan Rural Area and areas identified for urban land in some sections of the recommended corridor. This may assist in reducing the risk of intensification of urban development in these rural landscapes and protecting the storage capacity of the floodplains to the west of the recommended corridor. These outcomes are likely to be an important balance to the opportunities provided by the future OSO infrastructure in supporting urban and employment growth in western Sydney and maintaining a rural frame around the Sydney Region.

9.2.2 Potential opportunities to effectively integrate new infrastructure with surrounding land uses

While the future OSO infrastructure will broadly support future employment and housing growth, its integration with the land in the vicinity of the recommended corridor is also of importance. Detailed and careful consideration has been given to the location and incorporation of the recommended corridor

DRAFT

with existing land uses, to both minimise impacts to existing development and to look for opportunities for existing land uses to benefit from this future infrastructure.

An assessment of the land use impacts of the recommended corridor are discussed in other sections of this report; however there are a number of localised areas in the vicinity of the recommended corridor that may be impacted by the proposed change in land use to accommodate the recommended corridor.

These areas may require and/or benefit from a considered review of changes to the strategic land use planning for these areas. The extent of land use changes for these areas cannot be fully determined by this assessment, but rather it highlights that the recommended OSO corridor protection may lead to the evaluation of land use changes in these areas. This review should focus on ensuring optimum integration of the recommended OSO corridor into the land use framework and the identification of ways to leverage the benefits of the future OSO infrastructure through potential changes to land use, the local road network and infrastructure planning.

The key areas that have been identified for review in relation to the recommended corridor include:

1. Vineyard Precinct between Boundary Road and Windsor Road.
2. Shanes Park Precinct in the North West Growth Area.

The following provides an assessment of opportunities that may exist to effectively integrate the recommended corridor and its future delivery with the surrounding land use in these key areas.

Vineyard Precinct

Part of this precinct in the area east of Windsor Road and north of Boundary Road has been rezoned for urban purposes. However, the remaining and northern portion of this precinct area has yet to be rezoned to accord with the North West Growth Area LUIIP, which has nominated this area for employment generating development. In contemplating the future land uses in this area, consideration should be given to both the location of the recommended corridor and what benefits may be gained from the future interchange with the future OSO infrastructure on Windsor Road.

Shanes Park Precinct

This precinct has not been rezoned for urban purposes to date and most of the precinct is flood affected. Any residual and flood free unzoned portions of this precinct are reduced in area by the interchange of the recommended corridor and the BLOR-CC. This impact reduces the development potential for this residual land. Consideration should be given to the fact that this remaining land is situated between the former International Radio Transmitter Station (Air Services Australia) site, with limited opportunity to integrate with the Marsden Park Precinct to the north. Additionally, this land's future interface with the future OSO infrastructure and BLOR-CC interchange suggests that land uses other than residential may be better suited to this land. Suggested uses could be light industrial, warehousing/distribution centre or trade businesses that would benefit from convenient access to either or both motorways (future OSO infrastructure and BLOR-CC).

9.2.3 Key Interchanges and Infrastructure Connections

As is often experienced with other infrastructure projects of this nature, it is expected that the protection of the recommended corridor will likely generate speculation from landowners and/or developers seeking to benefit from the future OSO infrastructure planning and later its delivery. These parties are likely to seek to deviate from or intensify the land use strategies outlined in the *Draft Greater Sydney Region Plan*.

These pressures will be different in different regions of the recommended corridor and will be influenced by various factors such as current land uses, levels of land ownership fragmentation (or not), current property market conditions and the introduction or commitments for other infrastructure.

The timing for a review of these opportunities should be considered when there may be more certainty regarding the delivery of the future OSO infrastructure itself, rather than just the protection of land for the recommended corridor. However, in the same way, the associated land use changes may help support the case to deliver the future OSO infrastructure sooner, either in part or in whole.

DRAFT

The road component of the future OSO infrastructure would be motorway class and accordingly, access would be restricted to interchange locations. The purpose of the future OSO infrastructure would not be to facilitate direct access to adjoining land, except where it may interchange with direct links to regional and local connections; therefore it does not provide a direct accessible benefit to all of the land adjoining the recommended corridor.

The key interchanges planned to provide connections to the local and regional road network, and which may provide opportunities for reconsideration of the land uses in the vicinity of these, include:

- **Windsor Road** – provides an opportunity to be one of two key road interchanges within the North West Growth Area. The area surrounding this interchange has yet to be rezoned and presents an opportunity to extend and leverage from the existing employment generating development north of Windsor Road in Mulgrave. This would be expected to provide collective benefits for this part of the North West Growth Area and the Windsor region. The development of employment related land uses at this interchange would also be compatible.
- **Richmond Road** – is not considered suitable for potential land use changes in the vicinity of the interchange given that there is a desire for the existing community west of this interchange to retain the current rural character of this area. Additionally, the land directly north is flood prone and land to the south is constrained by heritage sites and/or is the subject of the newly constructed residential development in the Marsden Park Precinct.
- **Bells Line of Road – Castlereagh Connection** – does not provide immediate connections to regional and/or local road networks close to this interchange, so it doesn't provide significant opportunities for land use changes in the vicinity of the interchange. Land use in this vicinity is constrained by areas of high heritage, and high environmental values of the land to the east (former Llandilo International Radio Transmitter Station site) and south of the interchange (Wianamatta Regional Park).
- **The Great Western Highway** – land to the north west of this interchange is still undergoing transformation and could benefit from direct access to the OSO. There is a conglomeration of assimilated institutional land uses in this area. Long term land use in this area could be reviewed in conjunction with potential changes for the University of Western Sydney's Werrington campus.
- **M4 Motorway** – land south of this future interchange at Orchard Hills is currently zoned rural and will benefit in the interim from the Werrington Arterial Road interchange and later the future OSO infrastructure interchange, by making this land highly accessible to key road networks. Much of this land south west of this future interchanges is also relatively unaffected by flooding. This accessibility and interface with existing residential development north of the M4 Motorway and west of The Northern Road may make this area suitable for other urban development. Alternatively, and similar to the employment related development that occurred around the M7 and M4 interchange, employment related uses for this area may be suitable given the opportunity for logistics and other similar types of businesses that may also benefit from the high levels of accessibility. This land is also identified by the *Draft Western City District Plan* as part of a large investigation area for another Growth Area to support additional employment and housing opportunities.
- **Future M12 Motorway and The Northern Road** – both interchanges will serve the local and regional networks that support the proposed Badgerys Creek Aerotropolis and the Western Sydney Airport Growth Area. Given the Western Sydney Airport Growth Area does not extend to The Northern Road interchange, it would be expected that pressure for land in the vicinity of these interchanges would develop following this significant improvement in accessibility to the key road networks. It is noted that these opportunities are being considered as part of DPE's work to prepare a new structure plan for the Western Sydney Airport Growth Area.
- **Greendale Road** – will provide a key connection for both the southern end of the Western Sydney Airport Growth Area and the northern portion of the South West Growth Area. However, this nominated intersection does not sit within either Growth Area. It is located west of both areas. Despite this the University of Sydney's campus site may present an opportunity to extend the edge of the South West Growth Area to include this land.

DRAFT

- **Cobbitty Road** – given the rural village character of Cobbitty (located west of this interchange) it would be expected that this community would prefer this to be retained in the longer term. Therefore, the potential opportunity for land use change in the vicinity of this interchange may only be on the east side of the interchange. Consideration should be given to transitioning from the urban areas of the South West Growth Area in Oran Park to the rural village character of Cobbitty and ensuring that road upgrades are provided along Cobbitty Road to better connect to the South West Growth Area. This opportunity is not as significant as others mentioned above and may be focused on reinforcing the rural residential character of the land in the vicinity. TfNSW has advised that this Cobbitty Road interchange is also subject to further investigation
- **Burratorang Road** – the terrain in the vicinity of this interchange is steep and the surrounds to this intersection are generally rural in character. In consultation with the community, this area will need to be reviewed to determine if this location does provide opportunities for land use changes, while ensuring that suitable local and regional road upgrades connecting to Burratorang Road ensure good connections to Camden.
- **Hume Motorway** – this is located close to the Wilton Junction development and the southern part of the Greater Macarthur Growth Area. This, the interchange could provide opportunities for significant logistics and other related employment businesses if additional access to land from either the Hume Highway and/or the future OSO infrastructure could be made possible.

9.3 Consideration of potential cumulative impacts

Cumulative effects refer to the effects of a given project on the environment when considered in the context of other human actions; past, present, and future. Direct and indirect human actions over time, while seemingly small, can combine to collectively impact the environment. Cumulative impacts for the recommended OSO corridor include consideration of a number of infrastructure and development projects including, but not limited to Western Sydney Airport, BLoR-CC, the proposed M12, Badgerys Creek Aerotropolis and the Growth Areas. The discussion of cumulative impacts below has assumed a 15 to 30 year assessment period as the likely timeframe for completion of the future OSO infrastructure.

There are some significant challenges in defining and protecting a recommended corridor for the future OSO infrastructure and with the current rate of development in western Sydney, this will only get more difficult. Perhaps the most complex section of the recommended corridor is between the suburbs of Llandilo and Orchard Hills. This is a built up area with existing and proposed developments but also requires key connections between the future OSO infrastructure and BLoR-CC, the Great Western Highway, the M4 Motorway and the Main West Rail Line. As a consequence more land use impacts are expected in this section of the recommended corridor when compared to the rest of the recommended corridor.

Despite this, the predominant land use that will be impacted along the recommended corridor will be rural zoned land. This is reflective of the fact that much of the land in western Sydney is still zoned and used for rural purposes. Some of this rural land has however been set aside for urban development, both for employment and residential development. While these areas are as yet unzoned for these future purposes, protection of the recommended corridor now is opportune as it can be readily accommodated into the planning for these areas and compatible land use zones can be selected for land adjoining the recommended corridor.

DRAFT

10.0 Statutory planning implications

To safeguard the opportunity to later deliver State significant infrastructure in the form of the future OSO infrastructure, the land required for the recommended corridor should be incorporated into the existing planning framework to both signal the future intentions and to protect it from other incompatible uses and development.

10.1 Introduction

The overall and key objective for this draft SEA is to justify and support the proposed protection of suitable land for Stage 1 of the future OSO infrastructure, which will be an essential transport link through western Sydney. When all three stages are constructed, the future OSO infrastructure will improve connectivity and transport efficiency between western Sydney and the Central Coast and Illawarra regions within a growing Greater Sydney Region.

To facilitate this outcome it is anticipated that Transport for NSW will request that a new State Environmental Planning Policies (SEPP) be prepared to rezone land to protect the recommended corridor for Stage 1 of the future OSO infrastructure. This would:

- Safeguard land for the purpose of delivering the various components of the future OSO infrastructure.
- Demonstrate the Government's commitment to protecting the recommended corridor and informing planning of land uses within and surrounding the recommended corridor.
- Inform current and future planning in western Sydney and the broader Sydney Metropolitan Area.
- Affirm the Government's commitment to delivering this key piece of multimodal infrastructure.
- Provide greater certainty to the community regarding the recommended corridor.
- Inform investment decisions which may in turn support and stimulate urban development and employment growth in western Sydney.
- Prevent the sterilisation (i.e. limitation of ongoing use) of land use within the recommended corridor and adjacent lands prior to delivery of the future OSO infrastructure.

10.2 Objectives for Protection of the Recommended OSO Corridor

Based on the need for the future OSO infrastructure and the need to protect a corridor of land for it, as outlined in Section 2.0 of this report, the benefits and motives for protecting the recommended corridor under an environmental planning instrument pertaining to affected land include:

- Providing certainty for the planning and development of adjoining land and key centres which may later benefit from connections to the future OSO infrastructure.
- Clearly outlining the Government's long-term plans and intentions for affected land, which provides certainty for landowners and investors.
- Informing and influencing Government and commercial investment decisions in land use planning and planning for other modes of transport.
- Providing greater certainty for the delivery of freight transport planning in the region, including supporting the location of future intermodal terminals in western Sydney.
- Allowing for long-term strategic planning to maximise the benefit of the future OSO infrastructure.
- Guiding and informing the delivery of other transport networks and other associated infrastructure.
- Enabling Federal, State and local Governments to program other infrastructure, which may in turn reduce overall costs for the later delivery of that transport infrastructure.

DRAFT

Notwithstanding these intended outcomes, land protected for the recommended corridor needs to be adequately sized to ensure that sufficient land is set aside ready for the opportune and timely provision of this future OSO infrastructure.

Therefore, and with the exception of interchanges to key transport nodes and/or where cut or fill is expected to be required to accommodate the future OSO infrastructure, the overall recommended corridor of land sought to be protected is generally 200 m wide, with some areas up to 300 m wide to allow sufficient space for the detailed design elements during the delivery of the future OSO infrastructure as discussed in **Section 4.3**.

10.3 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act is the current planning legislation that applies to all development and environmental assessment within NSW. Part 3 of the Act provides for the making of environmental planning instruments (EPIs) which establish the framework for land use planning and development.

The EP&A Act provides for two types of EPIs:

- SEPPs - which deal with matters of State or regional environmental planning significance
- Local environmental plans (LEPs) - which are made by councils to guide local planning decisions for LGAs through zoning and development controls to manage the ways in which land is used. Implementation of LEPs is supported by Development Control Plans (DCPs), which provide detailed planning and design guidelines. A DCP typically identifies additional development controls and standards for addressing development issues at a local level and can be applied more flexibly than a LEP.

Given the strategic importance of the future OSO infrastructure, it is anticipated that protection of the recommended corridor would be provided through a new SEPP that would subsequently rezone the land within the corridor. This process would be led by the Department of Planning and Environment (DPE) in consultation with the local community.

10.4 Other relevant NSW legislation

Table 16 identifies other relevant NSW statutes and their applicability to the recommended corridor protection.

Table 16 Relevant NSW statutes for recommended corridor protection

NSW Statute	Objectives and Relevant Sections
Roads Act 1993	The <i>Roads Act 1993</i> establishes the regulatory framework for various matters related to the provision of public roads in NSW including the procedures for the opening and closing of public roads; the classification of roads; the declaration of Roads and Maritime Services and other public authorities as roads authorities for classified and unclassified roads, and to confer certain functions on these roads authorities and regulating the carrying out of various activities on public roads. Part 12 of the <i>Roads Act 1993</i> provides for the acquisition of land for the purposes of the Act.
Land Acquisition (Just Terms Compensation) Act 1991	The <i>Land Acquisition (Just Terms Compensation) Act 1991</i> (LAJTC Act) provides a framework for the acquisition of land by a public authority where that land is not publicly available (i.e. for sale). It establishes a process for the equitable compensation of landowners whose land is acquired and for the amount of compensation to be not less than the market value of the land (unaffected by a proposal) at the date of acquisition.

DRAFT

NSW Statute	Objectives and Relevant Sections
Biodiversity Conservation Act 2016	<p><i>The Biodiversity Conservation Act 2016</i> replaces the <i>Threatened Species Conservation Act 1995</i>, and provides for the conservation of threatened species, populations and ecological communities of animals and plants. The Act sets out a number of specific objects relating to the conservation of biological diversity and the promotion of ecologically sustainable development. The Cumberland Plain Recovery Plan has been prepared under the <i>Environment Protection Biodiversity Conservation Act 1999</i> (EPBC Act) and the <i>Biodiversity Conservation Act</i> to promote the recovery of threatened species, populations and ecological communities on the Cumberland Plain. While not a statutory protection, given the high ecological significance under the <i>Biodiversity Conservation Act</i> and EPBC Acts, these areas are to be considered as highly sensitive and any proposal to protect a future road corridor over these areas would trigger further statutory notifications and assessments.</p>
National Parks and Wildlife Act 1974	<p>The <i>National Parks and Wildlife Act 1974</i> (NPW Act) sets out the requirements for the conservation of nature, ecosystems, biological diversity, landscapes and landforms and for objects, places or features of cultural value (particularly Aboriginal heritage) within the landscape. The Act also sets out the responsibilities for the management of national parks, nature reserves and regional parks. Revocation of any or a portion of land dedicated as a regional park (s47ZB) requires an Act of Parliament to revoke a dedication or protection.</p>
Crown Lands Act 1989	<p>The <i>Crown Lands Act 1989</i> is intended to ensure that Crown land is managed for the benefit of the people of NSW. The Act sets out the conditions under which Crown land is permitted to be occupied, used, sold, leased, licensed or otherwise dealt with. Crown land can be either 'reserved' or 'dedicated' for public purpose, and therefore unavailable for private uses. Dedication can only be revoked with the agreement of both Houses of the NSW Parliament (s84), whereas Crown land that has been reserved can be revoked by the Minister (s90) without the matter being considered by Parliament.</p>
Heritage Act 1977	<p>The <i>Heritage Act 1977</i> sets out the legislative framework for the management of environmental heritage (natural and cultural) in NSW. Under the Act, 'items of environmental heritage' include places, buildings, works, relics, moveable objects and precincts identified as significant based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. State significant items are listed on the NSW State Heritage Register and are given automatic protection under the Act against any activities that may damage an item or affect its heritage significance.</p>

10.5 EPIs to be amended by the proposed SEPP

DPE has advised that it is intending that a new SEPP be made to rezone corridors, and that it is likely to be a SP2 Infrastructure to protect land within recommended corridors for future acquisition by a nominated NSW Government authority. Once the SEPP is made, each affected LEP would need to be updated to reflect the zoning prescribed in the SEPP.

This process would enable existing and future landowners to identify whether all or part of their land is located within the recommended corridor. Notwithstanding the future rezoning of the recommended corridor, the existing use rights provisions under sections 106 - 109B of the EP&A Act will enable the continuation of current approved uses until such time as the future infrastructure is built. The consultation that would be undertaken for the proposed SEPP would include more detail about this issue.

DRAFT

Table 17 outlines SEPPs and LEPs that are relevant to land use planning within the recommended OSO corridor that will need to be considered as part of the process for rezoning land for the future OSO infrastructure. The table also identifies whether development controls within these and other EPIs may apply to land within the recommended OSO corridor. Consultation on proposed planning changes will be conducted once the recommended corridor is finalised.

Table 17 LEPs and SEPPs proposed to be amended to support the recommended OSO corridor

State Planning Policy or Local Environmental Plan	Land Use Planning (rezoning)	Potential Development Controls
SEPP (Sydney Growth Centres) 2006 (Growth Centres SEPP)	✓	✓
SEPP (Western Sydney Employment Area) 2009**	-	✓
Sydney Regional Environmental Plan No 30—St Marys*	✓	✓
Hawkesbury Local Environmental Plan 2012	✓	✓
Blacktown Local Environmental Plan 2015	✓	✓
Penrith Local Environmental Plan 1991 ** (Environmental Heritage Conservation)	-	✓
Penrith Local Environmental Plan 1998 (Urban Land)**	-	✓
Penrith Local Environmental Plan 2010	✓	✓
Penrith Local Environmental Plan No.201 (Rural Lands)**	-	✓
Penrith Local Environmental Plan No 255—Exempt and Complying Development ***	-	✓
Liverpool Local Environmental Plan 2008	✓	✓
Wollondilly Local Environmental Plan 2011	✓	✓
Camden Local Environmental Plan 2010	✓	✓

* Regional Environmental Plans are now 'deemed SEPPs' for the purposes of the EP&A Act.

** Zoning amendments to these EPIs are not required as Penrith LEP 2010 zones the relevant area to which this SEPP applies to the recommended OSO corridor. However, these EPIs may need to include provisions to support the rezoning and protection of the recommended OSO corridor.

10.6 Property acquisition

The DPE Planning Guideline contains some guidance on land acquisition for major infrastructure corridors. In particular it recognises how land within a corridor may be acquired over time and at any phase of the corridor planning process. It is understood that relevant NSW government agencies will consult with affected landowners about this process as part of the consultation that will be undertaken for the proposed SEPP. Further information on the acquisition process can be found on NSW government web resources.

DRAFT

11.0 Environmental risk analysis

This chapter outlines the environmental risk analysis process and identifies the key environmental issues for future infrastructure planning for the OSO.

11.1 Strategic environmental risk analysis process

An environmental risk analysis has been carried out to identify and confirm key strategic environmental issues for the recommended corridor. This commenced with an environmental attributes and constraints analysis in the initial phase of the OSO study, which identified the environmental constraints of importance to the OSO study. The DPE SEA Guidelines also identified a range of key issues for the project. Environmental risks have been considered iteratively throughout subsequent phases of the OSO study, in accordance with the DPE SEA Guidelines.

Key issues are those that may have major impacts (actual or perceived) and require detailed assessment to determine the level or severity of potential effects and to identify appropriate mitigation and management measures.

The environmental risk analysis included:

- Identification of environmental constraints to future infrastructure, including key issues in the SEA guidelines, and other issues
- Strategic assessment of potential impacts and proposed 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 strategic mitigation measures.

Based on the environmental risk analysis, an environmental risk category of either “Key Risk” or “Other Issue” was assigned to each potential impact (refer to **Table 18**). The identification of environmental issues provided the basis for assessment of these key issues in this SEA.

11.2 Strategic environmental risk analysis

A strategic environmental risk analysis was undertaken for the recommended corridor. The residual risk rating reflects the risk after the application of strategic mitigation measures (including need for future assessment) identified in this SEA (refer to **Section 7.0**). A summary of the environmental risk analysis is included in **Table 18**, and identifies the stage at which key issues would be addressed.

DRAFT**Table 18 Environmental risk analysis**

Issue	Potential Adverse Impacts	Key Issue in SEA Guideline	Proposed Mitigation Measures	Residual Risk Category	Stage issue is to be addressed	SEA Reference
Land use and property	<p>Impacts on land zoned for residential, employment and industrial development and other areas currently under consideration for rezoning for these land uses.</p> <p>Impacts on land zoned for rural uses where residential dwellings and structure may be affected.</p> <p>In particular, impacts on residential zoned land in Cobbitty.</p>	Yes	<p>Development of guidelines for land uses within and adjacent to the corridor.</p> <p>Allow for interim uses of the corridor until the infrastructure is built.</p> <p>Consultation with affected land owners regarding consequences of rezoning the land and landowner rights</p>	Key issue	Corridor protection	Section 7.1
Traffic and transport	Localised impacts on arterial roads in the vicinity of interchanges. Generally beneficial impacts for future transport network.	Yes	Consideration of existing and future traffic volumes when developing road and rail designs.	Key issue	Project planning and assessment	Section 7.2
Socio-economic	Impacts to amenity and social and community infrastructure.	Yes	<p>Consultation with affected sensitive receivers</p> <p>Provision of temporary or replacement facilities where appropriate</p>	Key issue	Project planning and assessment	Section 7.3
Non-aboriginal heritage	Disturbance of non-Aboriginal heritage sites and the associated vistas, including Clydesdale state heritage listed site.	Yes	Prior to construction, field inspections will be required to more accurately characterise the relationship ultimately between the recommended option and the listed heritage items. A Statement of Heritage Impact (SoHI) assessment will be prepared to assess the impact on Clydesdale, an item with State significance.	Key issue	Project planning and assessment	Section 7.4

DRAFT

Issue	Potential Adverse Impacts	Key Issue in SEA Guideline	Proposed Mitigation Measures	Residual Risk Category	Stage issue is to be addressed	SEA Reference
Aboriginal heritage	Disturbance of valid AHIMS sites.	Yes	Aboriginal consultation, field inspections and potentially test excavation will be required to confirm sites and more accurately characterise the corridor impacts. Mitigation strategies to be developed including test excavation and salvage if appropriate.	Key issue	Design and construction	Section 7.5
Biodiversity	Disturbance of areas of threatened vegetation communities (EECs and CEECs) which provide important habitat for threatened flora and fauna species. Disturbance of watercourses which include riparian and fish habitat as well as regional habitat connectivity across the landscape.	Yes	Field validation of identified TECs and habitat for threatened species. Unavoidable impacts would be offset as required and in accordance with relevant offsetting guidelines and documented in a Biodiversity Offset Strategy. Avoid or minimise impacts to riparian vegetation by sensitive design of waterway crossings. Incorporate measures to provide opportunities for regional habitat connectivity.	Key issue	Project planning and assessment Design and construction	Section 7.6
Water Quality and Hydrology	Alteration of flood characteristics of the floodplains of the Nepean River and South Creek. Adverse impacts to water quality and flows from storm water runoff.	Yes	Construction of new flood protection mechanisms or the augmentation of existing protection infrastructure. Stormwater detention basins/tanks as well as augmentation of the subsurface stormwater network.	Key issue	Design and construction Design and construction	Section 7.7

DRAFT

Issue	Potential Adverse Impacts	Key Issue in SEA Guideline	Proposed Mitigation Measures	Residual Risk Category	Stage issue is to be addressed	SEA Reference
Landscape and Visual	Impacts to floodplain landform elements as a result of the number of crossings, cut and fill requirements, new urban development and a distinct new line of infrastructure running through the intrinsically dark night time, rural landscape which may visually dominate the landscape.	Yes	Potential to provide screening while conserving the pastoral landscape character. Incorporation of architectural and directional lighting design and screening to minimise visual impacts of viaduct throughout floodplain landscapes. Integration of planting into the existing landscape to screen the project from receivers, where feasible.	Key issue	Project planning and assessment	Section 7.8
Soils and Geology	Risks presented to engineering design by geological and soil conditions. Potential deep cuts and cliff line stability issues in the Razorback Range.	Yes	Detailed geotechnical assessment to define risks and incorporate mitigation in the design. Prepare appropriate plans for managing erosion and sedimentation and slope stability impacts during construction.	Other issue	Design and construction	Section 7.9
Noise and vibration	Impacts to sensitive receivers in proximity to the future operational infrastructure	Yes	Incorporate appropriate mitigation and treatment (where required) in the design. Implement appropriate planning controls to minimise impacts to future sensitive receivers.	Key issue	Project planning and assessment	Section 7.10
Air quality	Increased pollutants including oxides of nitrogen and particulates, specifically PM _{2.5}	Yes	Incorporate appropriate mitigation during construction and reduce emissions during operation by maintain low grades along the alignment.	Key issue	Design and construction	Section 7.11
Economic impacts	Impacts generally beneficial in the long term and supporting the growth and development of western Sydney and regional areas.	Yes	None proposed	Key issue	Project planning and assessment	Section 8.0

DRAFT

12.0 Corridor justification

Future OSO infrastructure will be one of the most significant pieces of road and rail infrastructure in NSW. It will serve as the key north-south transport spine. It will support western Sydney's housing and employment growth, and it will provide certainty in land use planning for western Sydney, particularly in the vicinity of the proposed corridor. The future infrastructure will provide key links between western Sydney, Illawarra and the Central Coast. While timing of the construction of future OSO infrastructure may be uncertain at this stage, the protection of land for future delivery is critical step to avoid conflicting development.

This recommended corridor requires the largest protection of land for an infrastructure project within the Sydney Metropolitan area in recent years. This forward planning and safeguarding land for future OSO infrastructure delivery should be conducted at the earliest possible time, to ensure no compromise by the current rapid development occurring in western Sydney. It will allow structured land use planning in the vicinity of the recommended corridor, creating certainty and opportunities for surrounding communities.

The *Planning Guideline for Major Infrastructure Corridors* (DPE, 2016) recognises that statutory planning controls should be implemented to protect an identified recommended alignment for a Major Infrastructure Corridor such as the future OSO infrastructure. This is particularly important where delivery options would become more constrained or delivery costs may become unfeasible due to future urban expansion or demand.

As outlined in **Section 2.0**, protection of land for future OSO infrastructure will help meet objectives under various current Australian and NSW Government strategic planning policies and documents that prioritise the protection of transport corridors and support future anticipated development growth associated with future urban and employment priority growth areas and the new Western Sydney Airport.

Additionally, and as also outlined in **Section 2.0**, the growth of western Sydney, especially driven and stimulated by the new Western Sydney Airport, requires supporting infrastructure, in particular improved arterial road network and freight rail connections.

The proposed approach to protect a corridor for the future OSO infrastructure that is appropriately located and of appropriate capacity will deliver the following benefits:

- Certainty for the planning and development of adjoining land and key centres, which may later benefit from future OSO infrastructure connections.
- Clear outline of the Government's long term plans and intentions for affected land, minimising the need for reactive or ad-hoc infrastructure provision.
- Informing and influencing Government and commercial investment decisions in land use planning and planning for other transport modes.
- Provision of greater certainty for delivery of freight transport planning in the region, including supporting the location of future intermodal terminals in western Sydney.
- Allowing for strategic planning and project appraisal to ensure identification of the most suitable corridor and allowance of sufficient time to conduct a cost-benefit analysis for the future OSO infrastructure delivery.
- Guiding and informing the delivery of other transport networks and associated infrastructure.

Additionally, protection of the recommended corridor will facilitate development of future OSO infrastructure, which will address key challenges outlined in many transport and land use strategies relating to western Sydney and Sydney more broadly by:

- Providing a dedicated future freight rail line for increased rail freight movements and reducing conflicts between passenger services and freight, with freight rail volumes expected to double by 2031

DRAFT

- Enhancing connectivity to strategic centres in western Sydney as it grows, and therefore supporting Sydney's ongoing contribution to the Australian and global economy
- Encouraging the relocation of essential CBD businesses and activities seeking more cost-effective locations, particularly in western Sydney
- Enabling direct intra-city and inter/intra-regional connections between western Sydney and the Illawarra and Central Coast regions.

Western Sydney has significant development potential both in terms of new homes and jobs. In the medium term, future OSO infrastructure could provide a vital north-south corridor providing intra-city and inter-regional connectivity. In the short term, protection of the corridor will allow it to be delivered cost-effectively in the future, at ground level or elevated on viaducts as needed, supporting continuing broader development.

Previously, freight and vehicle transport infrastructure in western Sydney have focused on improving east-west connections. By contrast, future OSO infrastructure will connect the sub-regions of western Sydney by providing a direct north-south connection. These sub-regions include the North West, South West and Western Sydney Airport Growth Areas, the Greater Macarthur Growth Area, Penrith, St Marys and the Windsor area. Ultimately, the Government will investigate further corridor protection to the north and south, extending north to the Central Coast and south to the Illawarra region, also improving access to Canberra. These connections would facilitate future development and economic growth by improving major infrastructure connections between these regions.

The preparation of this SEA enables appraisal of the land use consequences of protecting the corridor and justification of the proposal at a strategic level. This is achieved through the use of evidence-based assessments to forecast what likely implications the future OSO infrastructure will have once it is constructed. This SEA is based on an understanding and consideration of likely impacts to then enable prediction of the likely impacts prior to delivery.

The key benefits of this SEA approach include:

- Stage 1 of the future OSO infrastructure can be constructed in sections (i.e. not entirely end to end) as the SEA provides a holistic assessment of the overall development, including the cumulative environmental, social and economic impacts of the entire future OSO infrastructure.
- Enabling evaluation of infrastructure impacts before the preparation of construction phase designs and before any investment decisions. A strategic evaluation of the corridor will support thorough consideration and emphasis on the need for the corridor and its appropriate location.
- A proactive approach to transport and infrastructure planning aligns with international good practice and community expectations.
- Consideration of measures required to protect the corridor while additionally considering other policy and management frameworks to support the later delivery of the future OSO corridor (such as biodiversity offsets).
- Supporting the consultation process for the proposed SEPP and facilitating the revision of a final recommended corridor following receipt of feedback.

This SEA does not remove the need for a future Environment Impact Assessment (EIA) required when planning approval is sought for construction of future OSO infrastructure. Further and more comprehensive investigations would be undertaken as part of that EIA stage.

In preparing this SEA, investigations and stakeholder involvement have identified wide ranging social, land use, built form, infrastructure, economic and environmental constraints and opportunities.

Section 3.0 details key constraints and opportunities that have directly informed the proposed location of the recommended corridor. These include:

- Existing land uses and built form development
- Future intended land use and built forms
- Existing and planned infrastructure
- Indigenous and non-Indigenous heritage

DRAFT

- Biodiversity
- River catchments and flooding
- National parks and key reserves
- Cumberland Plain Priority Conservation Lands
- Defence land holdings
- Topography
- Hydrology and flooding
- Utilities.

Given the large size of the OSO study area, there were numerous constraints and opportunities affecting the orientation and placement of the recommended corridor (refer to **Section 3.1.5**). The approach taken to identifying an appropriate corridor alignment was based on specific local and regional factors that relate to each area while considering the application of engineering design standards.

The primary need to minimise negative impacts was balanced with ensuring the future infrastructure would serve its core purpose in supporting the development of current and future western Sydney and in providing links to regional areas.

The location balances a number of key factors:

- Functionality and technical feasibility of the future infrastructure
- Foreseeable potential impacts on existing/future land uses and development
- Impacts on the natural and cultural environment
- Future functionality that supports strategic housing and employment growth for the region.

The recommended corridor takes these constraints into consideration as well as the requirement for Stage 1 of the future OSO infrastructure to provide key connections through western Sydney. In summary, the corridor:

- Avoids all but a few parcels of existing residential zoned land along the full length of the 80km corridor
- Does not impact upon regional hospitals
- Avoids rural villages and townships
- Does not directly impact upon existing schools
- Avoids bio-banked sites within the OSO study area
- Interchanges with required key arterial roads along the OSO study area
- Avoids existing development at Windsor Downs
- Avoids existing and planned development in the North West Growth Area
- Will not detrimentally impact the development potential of each of the Growth Areas, but rather will enable the OSO to support and stimulate development of these significant growth precincts
- Is able to interchange with the recommended corridor alignment for the Bells Line of Road extension at Shanes Park
- Is able to provide a full rail interchange at St Marys without impacting upon residential development or the St Marys Town Centre
- Avoids all existing residential development and properties in the densely developed areas of St Marys, Werrington and Claremont Meadows
- Avoids the Orchard Hills Defence land that is also bio-certified

DRAFT

- Provides the opportunity for part of the recommended North South Rail Line corridor to use the recommended corridor from the Western Sydney Airport to Orchard Hills
- Provides the opportunity for part of the recommended Western Sydney Freight Rail Line corridor to use the recommended corridor from the Western Sydney Airport Growth Area to meet and interchange with the Main West Rail Line
- Avoids the existing Twin Creeks residential development
- Provides the opportunity for an interchange with the proposed M12 Motorway, which will link to the M7 Motorway
- Enables direct transport infrastructure access to the planned Western Sydney Airport
- Avoids the entire South West Growth Area
- Avoids the entire Greater Macarthur Growth Area
- Avoids the major Macarthur heritage lands and the steep Razorback Range
- Could allow for a future rail freight connection, to the proposed Maldon to Dombarton Rail Line
- Avoids the need to relocate key existing infrastructure such as the 500kV power lines through western Sydney to later accommodate future OSO infrastructure
- Sets up the key road and freight rail networks through the Western Sydney Airport Growth Area, which will help inform current land use and fine grain road networks for this area, supporting investment and development of this key employment area.

However, the recommended corridor for the future OSO infrastructure may create some unavoidable negative impacts. These have been weighed against potential and often more detrimental impacts of alternative regional alignments. These potential impacts, and their mitigating factors, are summarised below:

- Impact on future development in Stage 2 of the North West Growth Area Precinct of Vineyard. This land is nominated for future employment-generating land uses, which are thought likely to benefit from the eventual interchange at Windsor Road.
- The recommended corridor traverses the State heritage-listed Clydesdale Estate at Marsden Park.

The corridor has been positioned in order to avoid:

- Planned and existing development either side of the estate
- The significant homestead building on this site, allowing future management of the site's heritage significance
- The interchange with the BLOR-CC corridor at Shanes Park will have impact on the former Llandilo International Radio Transmitter Station (Air Services Australia) site, which is designated as the bio-certification offset for the North West Growth Area. This in turn will affect the development potential of the North West Precinct of Shanes Park.

This is considered acceptable in that:

- Impacts to the bio-certified areas will be offset
- The affected bio-certified area accounts for a small fraction of the overall area of land certified
- The future detailed design for this interchange can review additional opportunities to avoid impacts to the bio-certified area
- Most of the land in the Shanes Park Precinct is largely flood prone, removing the risk of compromise to future development capacity

DRAFT

- Crossing and dividing the Wianamatta National Park and part of the South Creek corridor. The recommended corridor alignment avoids heavily developed and populated areas within the Penrith LGA.
- Crossing the Sydney University sites at Greendale and the Camden Campus.
This alignment has been discussed with Sydney University as being the most suitable in aligning with its future strategies. It allows for Sydney University's planned future development and avoids key infrastructure and investments without compromise to operations or future educational opportunities. The alignment in the Camden area also supports a separation of rural and urban land uses in the area, with the University considered as part of the metropolitan rural land.
- Crossing over properties at Cobbitty and Ellis Lane.
The recommended corridor alignment avoids the rural village of Cobbitty, avoids the bio-certified area east of Cobbitty, and does not dissect or impact upon key infrastructure within the Sydney University campuses in that locality.

In summary, the proposed corridor has been identified as providing the most suitable and balanced outcome based on the initial study area, extensive public exhibition and consultation, multi-criteria and multi-party assessment addressing engineering principles, environmental concerns and community and stakeholder feedback.

DRAFT

13.0 References

- Department of Infrastructure and Regional Development, 2015, *Western Sydney Airport Draft Environmental Impact Statement* (EIS)
- Australian Bureau of Statistics, 2013, *Table 3222.0 - Population Projections, Australia, 2012 (base) to 2101*, retrieved from:
[http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3222.02012%20\(base\)%20to%202101](http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3222.02012%20(base)%20to%202101)
- Australian Bureau of Statistics, 2011, *Census of Population and Housing*, retrieved from:
<http://www.abs.gov.au/census>
- ABS 2010, Statistical Area Level 2 (SA2), Australia Bureau of Statistics, available at:
<http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/88F6A0EDEB8879C0CA257801000C64D9>
- AECOM, 2016, *South Creek TUFLOW model*, developed for assessment of the OSO corridor
- Australian Rail Track Corporation, 2015, *2015-2024 Sydney Metropolitan Freight Strategy*
- Australian Government, 2015, *National Urban Policy*
- Australian Government. (2015). Australian Heritage Database. Retrieved from
http://www.environment.gov.au/cgi-bin/ahdb/search.pl?mode=search_form;list_code=RNE
- Australian Government, 2015, *State of Australian Cities 2014-2015*
- Bewsher, 2012, *Hawkesbury Floodplain Risk Management Study and Plan, Volumes 1-3*
- Cardno, 2006, *Penrith Overland Flow Flood Overview Study*, Flood Analysis for Central Urban (Zone 1), Northern Rural (Zone 2), Southern Rural (Zone 3), flood extent database.
- Department of Infrastructure and Regional Development, 2015, *State of Australian Cities 2014-2015*, retrieved from https://infrastructure.gov.au/infrastructure/pab/soac/files/2015_SoAC_full_report.pdf
- Godden Mackay Logan, 2011, *Wianamatta Regional Park Plan of Management*
- Greater Sydney Commission, 2017, *Our Greater Sydney 2056 – A Metropolis of Three Cities (Draft Greater Sydney Region Plan)*
- Greater Sydney Commission, 2017, *Draft Western City District Plan*
- Greater Sydney Commission, 2017 *Draft Central City District Plan*
- Infrastructure Australia and National Transport Commission, 2011, *National Ports Strategy*.
- Infrastructure New South Wales, 2015, *Probabilistic Drawdown Flood Surfaces*
- Infrastructure Australia, 2015, *Australian Infrastructure Audit – Volume 1*, retrieved from
<http://infrastructureaustralia.gov.au/policy-publications/publications/files/Australian-Infrastructure-Audit-Volume-1.pdf>
- Land and Property Information (2016), *Rose Cottage and Early Slab Hut*, retrieved from:
http://www.baseline.nsw.gov.au/heritage/heritageProperty/40;jsessionid=5B7607F364148828D1742E8F4F30E00D?ref=d-5912750-p%3D6%26heritagePropertyName%3D*
- Australian Curriculum, Assessment and Reporting Authority (My School), 2016a, Kurrambee School Werrington NSW School Profile, available at:
<https://www.myschool.edu.au/SchoolProfile/Index/94563/KurrambeeSchool/41795/2015>
- Australian Curriculum, Assessment and Reporting Authority (My School), 2016b, Penrith Valley Learning Centre Werrington NSW School Profile, available at:
<https://www.myschool.edu.au/SchoolProfile/Index/94569/PenrithValleyLearningCentre/41801/2015>
- NSW Department of Environment and Climate Change, 2007, *Practical Consideration of Climate Change*
- NSW Department of Environment, Climate Change and Water, 2010, *Aboriginal cultural heritage consultation requirements for proponents*

DRAFT

- NSW Department of Environment and Climate Change, 2010, *Cumberland Plain Recovery Plan*
- NSW Department of Environment, Climate Change and Water, 2011, *NSW Road Noise Policy*
- NSW Department of Planning and Environment, 2013, draft *Metropolitan Strategy for Sydney*
- NSW Department of Planning and Environment, 2014, *Centre for Demography and Research*, July 2014
- NSW Department of Planning and Environment, 2014, *New South Wales State and Local Government Area Population, Household and Dwelling Projections: 2014 Final*
- NSW Department of Planning and Environment, 2015, *A Plan for Growing Sydney*
- NSW Department of Planning and Environment, 2015, *Employment Lands Development Program*
- NSW Department of Planning and Environment, 2015, *Greater Macarthur Land Release Investigations Area – 20-year Preliminary Strategy and Action Plan*
- NSW Department of Planning and Environment, 2016a, North West Priority Growth Area, retrieved from:
<http://growthcentres.planning.nsw.gov.au/PriorityGrowthAreas/NorthWestPriorityGrowthArea.aspx>.
- NSW Department of Planning and Environment, 2016b, South West Priority Growth Area, retrieved from:
<http://growthcentres.planning.nsw.gov.au/PriorityGrowthAreas/SouthWestPriorityGrowthArea.aspx>
- NSW Department of Planning and Environment, 2016c, *Planning Guideline for Major Infrastructure Corridors*
- NSW Environment Protection Authority, 2013, *Rail Infrastructure Noise Guideline*
- NSW Environment Protection Authority, 2015, *State of the Environment 2015*
- NSW Government, 2014, *Rebuilding NSW: State Infrastructure Strategy 2014*
- NSW Heritage Branch, 2009, *Assessing Significance for Historical Archaeological Sites and 'Relics'*
- NSW Heritage Office, 2001, *Assessing Heritage Significance*
- NSW Office of Environment & Heritage. (2016). NSW State Heritage Register. Retrieved from <http://www.environment.nsw.gov.au/heritage/listings/stateheritageregister.htm>
- NSW Roads and Maritime Services. (2011). Procedure for Aboriginal Cultural Heritage Consultation and Investigation. RMS.
- NSW Roads and Maritime Services, 2015a, *Noise Criteria Guideline*
- NSW Roads and Maritime Services, 2015b, *Noise Mitigation Guideline*
- NSW Roads and Maritime Services, 2015c, *Western Sydney Infrastructure Plan*
- New Zealand Ministry of Transport, 2014, *Contribution of transport to economic development: International literature review with New Zealand perspectives*, retrieved from:
<http://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/edt-contribution-of-transport-lit-review.pdf>
- Profile.id, 2016, *Community Profile*, (based on 2016 Census Data)
- Standing Council on Transport and Infrastructure, 2013, *National Land Freight Strategy*
- Transport for NSW, 2017, *Draft Future Transport Strategy 2056*
- Transport for NSW, 2012, *NSW Long Term Transport Master Plan*, retrieved from:
<http://www.transport.nsw.gov.au/sites/default/files/b2b/publications/nsw-transport-masterplan-final.pdf>
- Transport for NSW, 2013, *NSW Freight and Ports Strategy*, retrieved from:
<http://freight.transport.nsw.gov.au/documents/tfnsw-freight-and-ports-strategy-low-res.pdf>

DRAFT

Transport for NSW (Bureau of Transport Statistics), 2014a, *Population and Dwelling Forecasts by Regions and Years*, retrieved from: <http://www.bts.nsw.gov.au/Statistics/Population-Forecasts/default.aspx>

Transport for NSW, 2014b, *Outer Sydney Orbital Corridor: Preliminary Freight Needs Assessment – Draft Final Report*, prepared by George Stanley Consulting for Transport for NSW, 2014

Transport for NSW, 2016, *Outer Sydney Orbital Corridor: Updated Freight Needs Assessment – Draft Report*, prepared by George Stanley Consulting for Transport for NSW, May 2016

WMA, 2014, *Rouse Hill Flood Study*

Worley Parsons, 2014, *Nepean River Flood Study*, Draft Issue No. 2

Worley Parsons, 2015, *Updated South Creek Flood Study*

United Kingdom Department of Transport, 2006, *Wider Economic Benefits of Transport Improvement: Link between Agglomeration and Productivity*, prepared by D.J. Graham, 2006

University of Sydney, 2015, *Submission to Outer Sydney Orbital Corridor Protection Study*, August 2015.

University of Western Sydney, 2016, *Addressing Western Sydney's Job Slide*, retrieved from: http://www.uws.edu.au/_data/assets/pdf_file/0019/1064701/JTW_report_complete_7April.pdf

Scottish Government, 2016, *Economy Input-Output Multipliers*, retrieved from: <http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Multipliers>

DRAFT

Appendix A

SEA Requirements

Strategic Environmental Assessment

Informing the preparation of statutory controls to secure a long term infrastructure corridor

Project:	Outer Sydney Orbital Transport Corridor Study
Location	The study area includes land in outer western Sydney in the Penrith, Blacktown, Liverpool and Camden local government areas, further detailed in the plan at Attachment A.
Lead agency	Transport for NSW
General Requirements:	A Strategic Environmental Assessment is to be prepared as the evidence base to inform the creation of statutory planning controls that secure land for the purpose of a long term infrastructure corridor.
Content of the Strategic Environmental Assessment:	<p>The Strategic Environmental Assessment should address:</p> <ol style="list-style-type: none"> 1. The strategic justification: <ul style="list-style-type: none"> • an outline of the objectives the corridor, including a description of the strategic need for infrastructure; and justification, objectives and long term outcomes for the proposed future infrastructure. This should take account of existing and proposed transport infrastructure and services within the adjoining subregions and regions, and as relevant the outcomes and objectives of relevant strategic planning and transport policies and other major Government announcements. • a strategic analysis of alternative options to the carrying out of the future project and corridor objectives. This should include an assessment of the strategic costs and benefits of preserving the corridor relative to alternatives and the consequences of not preserving the corridor. 2. The infrastructure components <ul style="list-style-type: none"> • a description of the potential future infrastructure components that may potentially be built in the corridor and therefore affect the design of the corridor alignment, including location and width. This includes all potential transport modes, such as road, rail, cycleway, and key interchanges/connections needed and intermodal terminals. 3. Corridor alignment options <ul style="list-style-type: none"> • Strategic study area scoping and analysis of: <ul style="list-style-type: none"> ○ environmental opportunities and constraints within the study area; and ○ existing land uses within study area <i>(This should include consideration of the key issues identified</i>

	<p style="text-align: center;"><i>below).</i></p> <ul style="list-style-type: none"> • Identification and assessment of corridor alignment options. <p>4. Preferred corridor alignment</p> <ul style="list-style-type: none"> • a description of the preferred corridor alignment, including: <ul style="list-style-type: none"> ○ proposed corridor (or corridor options if preferred alignment is not known); ○ location of likely interchanges, stations and intermodal terminals; ○ the relationship and/or interaction with other transport network, including existing public and freight transport services (including rail, bus and water-based traffic, and rail and bus stops); and ○ the implications of the preferred corridor alignment (in relation to the key issues outlined below). • detail how the preferred corridor alignment integrates with the relevant strategic plan, including supporting identified growth objectives and other objectives with the relevant strategic land use plans. <p>Notwithstanding the key issues specified below, the strategic environmental assessment must include an environmental risk analysis to identify the potential environmental impacts associated with the identified alignment of the corridor.</p> <p>Where relevant, the assessment of key issues below, and any other significant issues identified in the risk assessment, must include:</p> <ul style="list-style-type: none"> ○ adequate baseline data; ○ consideration of the potential cumulative impacts on the land within the corridor due to other development in the vicinity of the corridor; and ○ strategic measure to avoid, minimise and if necessary, offset the predicted impacts or any significant risks to the environment posed by the identified corridor alignment.
<p>Key issues</p>	<p>The Strategic Environmental Assessment must also address the following specific matters:</p> <p>Landuse and property impacts within the corridor and adjacent to the corridor - including but not limited to:</p> <ul style="list-style-type: none"> • current land use controls in the study area; • Estimated potential residential and industrial lands to be affected by the alignment, and impacts to Crown land; • potential impacts to open space, reservations, national parks; • potential impacts to major utility infrastructure; and • potential impacts on Sydney’s Growth Centres and Western Sydney Employment Area;

Future land use opportunities surrounding the corridor:

- Commentary on the housing and job growth potential as a result of the project, including identifying likely areas of change and how this aligns with regional and subregional planning;
- Commentary on potential opportunities to effectively integrate new infrastructure with surrounding land uses (either economic, environmental or residential land uses), and how this aligns with regional and subregional planning; and
- Identification of key locations including potential key interchanges and connections with other major future infrastructure projects.

Economic impacts of potential future infrastructure as well as potential impacts of limiting current land uses within and around the corridor – including but not limited to:

- Commentary on the expected economic growth potential created from the project;
- Potential impact on economic growth of failing to deliver the project as planned; and
- Impact on related infrastructure projects, such as international gateways, such as the second airport at Badgery’s Creek and major employment zones such as WSEA.

Traffic and transport — including but not limited to:

- Details of how the alignment will meet the traffic and transport objectives of the corridor taking into account adjacent sensitive land uses and future growth areas, as identified in existing and proposed strategic plans;
- An assessment and strategic traffic and transport impacts on the regional, State and National road network and local roads (where known), including identifying any future possible extensions to the network made possible by this project.

Noise and Vibration — including but not limited to:

- any lands or future land uses that may be sensitive to noise or vibration and may be affected by the infrastructure within the corridor.

Visual Amenity, Built Form and Urban Design — including but not limited to:

- Any strategic visual or built form impacts of the proposed corridor and how these can be mitigated or minimised.

Soils and Water— including but not limited to:

- strategic water quality issues to be considered or known impacts including an assessment of:

- Potential impact on bulk water supply including water storage locations and major pipelines;
- Identification of areas of acid sulfate soils.

- Hydrological impacts, including the identification and a strategic assessment of the following:
 - location and nature of flood regimes affecting the corridor;
 - any known contaminated land within the corridor.

Biodiversity — including but not limited to:

- A strategic assessment of potential ecological impacts of the project, with specific reference to vegetation and habitat clearing, connectivity, edge effects, riparian and aquatic habitat impacts and soil and water quality impacts; and
- the circumstances where a future detailed assessments would be required are to be outlined.
- the impacts to adjoining waterways, riparian vegetation and aquatic habitats, including consideration of water quality, marine vegetation, fish passage and habitat, soil types (including salinity), erosion and sedimentation, and ongoing water management;
- avoidance, mitigation and management measures, including details of alternative options considered, and proposed arrangements for long term management.
- details of any offset of ecological impacts and native vegetation clearing, taking into account the Principles for the use of biodiversity offsets in NSW (Department of Environment, Climate Change and Water 2008).

The assessment should also take into account

- Draft Guidelines for Threatened Species Assessment (Department of Environment and Conservation/Department of Primary Industries 2005);
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities (Department of Environment and Conservation 2004);
- Draft Policy and Guidelines for Fish Habitat Conservation and Management – Update 2013 (Department of Primary Industries 2013); and
- Guidelines for Aquatic Habitat Management and Fish Conservation (Department of Primary Industries 1999), and

Note - A detailed assessment of the ecological impacts should only be undertaken only if the corridor (irrespective of the final alignment) has a known impact.

Heritage – including but not limited to:

- Potential impacts to State and local heritage (including heritage items,

	<p>conservation areas, and archaeology)</p> <ul style="list-style-type: none"> • circumstances where a future detailed assessments would be required are to be outlined; <p>Air quality — including but not limited to:</p> <ul style="list-style-type: none"> • Potential for impacts on local and regional air quality, including sensitive receivers. <p>Social and economic — including, but not limited to:</p> <ul style="list-style-type: none"> • Social and economic potential impacts on the community and community facilities directly impacted by the project. <p>Environmental Risk Analysis — notwithstanding the above key assessment requirement, the Strategic Environmental Assessment must include an environmental risk analysis to identify potential environmental impacts associated with the future infrastructure planning and the proposed strategic mitigation measures and potentially significant residual environmental impacts after the application of proposed mitigation measures. Where additional key environmental impacts are identified through this environmental risk analysis, an identification of the stage in which issues will be addressed should be identified.</p>
Consultation	<p>During the preparation of the Strategic Environmental Assessment, there is an expectation that the agency will consult with the relevant local, State 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 DP&E about the preparation of the Subregional Plans • Relevant utilities and Environmental Assessment service providers; and • The public, including community groups and adjoining and affected landowners. <p><i>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.</i></p>

<p>Statutory planning considerations</p>	<p>Current planning framework - The Strategic Environmental Assessment should identify the existing Environmental Planning Instruments that need to be taken account of in the preparation of a draft instrument. This includes identifying all:</p> <ul style="list-style-type: none"> - existing Local Environmental Plans within the corridor - existing State Environmental Planning Policies and structure plans - other relevant policies and development control plans <p>The Strategic Environmental Assessment should identify all the current Environmental Planning Instruments that apply to the land and relevant sections that will be affected by potential statutory planning controls.</p> <p>Future planning framework –</p> <ul style="list-style-type: none"> • Statutory: The Strategic Environmental Assessment may make recommendations on potential draft clauses or instructions for the preservation* and reservation* of the corridor. This includes identifying if and where preservation controls should differ along the corridor. Where land is being reserved, the Strategic Environmental Assessment may also identify what appropriate interim uses should be considered. • Other: The SEA may make recommendations about appropriate land uses surrounding the corridor for considerations within other planning documents (such as subregional plans, structure plans or master plans) that are or will be prepared within the study area. <p>*Note the term ‘preservation’ of a corridor means the identification of planning controls that; require potential concurrences for future development over a certain dollar amount or scale, limit further intensification of development over and above what is already permissible, as well as identify potential limitation on design and/or further fragmentation of land parcels.</p> <p>It may also identify if and where sites are recommended to be ‘reserved’ for the purposes prescribed in section 26 (1)(c) and 27 of the <i>Environmental Planning and Assessment Act 1979</i>.</p>
<p>Other considerations</p>	<p>The Strategic Environmental Assessment may want to identify if there is a proposal in place for:</p> <ul style="list-style-type: none"> • Voluntary owner-initiated land acquisition for the corridor; • A possible buy back scheme for land for the corridor; • Any current holding arrangements for those sites; and • Any plans for potential interim uses that could be appropriate for purchased sites within the corridor.

DRAFT

Appendix B

Local government policy
summary

DRAFT

Appendix B Local government policy summary

There are a range of key local government strategies, commitments and policies affecting growth and development in the western Sydney region and which may influence the OSO. Note that a number of councils in the greater Sydney area are undergoing a process of amalgamation; including the consolidation of a number of strategic, local and environmental plans. The plans below are assumed to be relevant until such a time that updated policies are released. It is notable that there were no strategies relevant to the OSO corridor for The Hills Shire Council LGA.

Hawkesbury LGA

The Hawkesbury Community Strategic Plan 2013-2032

The *Hawkesbury Community Strategic Plan 2013 – 2032* recognises the theme of 'Linking the Hawkesbury' and the following objectives relevant to the OSO corridor:

- Linking people and products across the Hawkesbury and with surrounding regions
- Facilitating accessible, viable public transport to the major growth, administrative, commercial and service centres within and beyond the Hawkesbury
- Providing a comprehensive system of well-maintained local and regional roads
- Planning for physical infrastructure for the benefit of residents, visitors and businesses.

Hawkesbury Residential Land Strategy 2011

The Hawkesbury Residential Land Strategy states that future urban development is to be located in proximity to areas that are linked to the existing train network and that future urban development should be serviced by adequate road networks with links to key centres. The strategy identifies the south-eastern part of the LGA as having good potential for future urban development with some areas of 'high opportunity.' However, these areas of the LGA do not fall within the OSO corridor.

Hawkesbury Employment Lands Strategy 2008

The Hawkesbury Employment Lands Strategy identified constraints impacting employment generating development in the LGA, including industrial areas often having poor access to key transport routes. It recommends investigating additional industrial land supply to address future employment growth in Mulgrave, South Windsor and North Richmond. However these areas are outside the OSO corridor.

Penrith LGA

Penrith Community Plan (2013)

The *Penrith Community Plan* sets out seven Outcomes, with Outcome 3 – We Can Get Around the City being most relevant to the OSO. Outcome 3 focuses on effective transport options for passengers and freight, whereas both currently compete for the rail network. It specifically identifies the OSO as a priority, and recognises that future rail corridors connecting Penrith to the north and south must be protected before the opportunity is lost. Improving critical cross regional transport connections is also considered important, with Penrith Council's advocacy program lobbying other levels of government to improve key transport connections such as the OSO.

St Marys Town Centre Strategy

The St Marys Town Centre Strategy is focused on revitalising the town centre, and considers increasing the density and variety of land uses and activities planned within the town centre. The OSO corridor adjoins the suburb of St Marys.

Liverpool LGA

Growing Liverpool 2023

Growing Liverpool 2023 outlines key strategies, the most relevant to the OSO being Direction 6: Accessible Connected City which aims to encourage sustainable and alternative transport options. However, specific infrastructure projects are not referred to.

DRAFT

Liverpool Rural Lands Study 2012

The Liverpool Rural Lands Study focuses on protecting agricultural lands and maintaining the rural landscape character of the LGA by balancing land uses. It emphasises that future planning should restrict subdivision and increased development from areas adjacent to significant agricultural pursuits and on land that is Class 1 or Class 2 agricultural capability. However the Liverpool Rural Lands Study precedes more recent plans for Western Sydney Airport, and as such, its recommendations may be superseded.

The following actions were recommended by the Liverpool Rural Lands Study:

- Bringelly – area identified by the Liverpool Rural Lands Study has been rezoned RU4 with a permitted 10 ha lot size. The OSO corridor adjoins this suburb, and traverses it for a small section. However the area is located in a precinct currently referred to as Future Industrial directly south of the proposed Western Sydney Airport. Under the Structure Plan for the South West Priority Growth Area it is likely to be rezoned and developed for employment purposes.
- Luddenham – Liverpool Rural Lands Study recommends the area not expand beyond current R2 zoning limits. No zoning changes have been made so far. The OSO corridor traverses this suburb.
- Wallacia – Liverpool Rural Lands Study recommends the area retain the agricultural potential of land along the Nepean River by continued RU1 Primary Production zoning. Current RU4 zones should also be retained. No zoning changes have been made so far. The OSO corridor adjoins this suburb, and traverses it for a small section.
- Greendale - Liverpool Rural Lands Study recommends limiting development potential of the area by retaining current zonings (to protect equine, agricultural, extractive industry potential) and minimising subdivision lot size controls. The OSO corridor traverses this suburb.

Camden LGA

Camden 2040

Camden 2040 identifies rapid development of residential areas such as Oran Park and Gregory Hills as having significant transport implications, and that planning and securing the necessary commitment and resources prior to development is therefore required. The most relevant objective in Camden 2040 is Key Direction 4: Effective and Sustainable Transport, which identifies that without additional adequate infrastructure the area cannot sustain the urban growth that was forecasted in *A Plan for Growing Sydney* (which is being superseded by the Draft Greater Sydney Region Plan).

Strategies identified in Camden 2040 include:

- Developing a well-connected, well-designed and free flowing road network supported by appropriate infrastructure that provides effective movement of people and goods within the local and broader areas
- Prioritising delivery of roads and transport infrastructure early in new urban and industrial developments
- Building and improving regional transport linkages through effective planning, partnerships and joint action
- Improving public transport options, access, innovation and integration to ensure that public transport becomes a viable, affordable, and well utilised alternative to private vehicles
- Actively planning new urban and commercial areas to effectively connect people with significant places, centres, employment, and recreation and social opportunities throughout the local area.

Wollondilly LGA

Wollondilly Community Strategic Plan 2033

The *Wollondilly Community Strategic Plan 2033* contains the following themes relevant to the OSO corridor:

DRAFT

- *Building a Strong Local Economy* – identifying the need to plan and coordinate development and infrastructure with consideration of the unique towns, villages and rural setting, as well as the need for housing and local jobs to meet population growth. Council is considering options such as having new significant centres for growth e.g. Wilton Junction
- *Management and Provision of Infrastructure* – identifying key outcomes like safe, maintained and effective infrastructure and access to a range of transport options.

Blacktown LGA

Blacktown City 2030

Blacktown City 2030 contains the Strategic Direction of A Growing City Supported by Infrastructure. While Blacktown City 2030 does not refer to the OSO corridor or the need for additional road/rail infrastructure, actions in this Strategic Direction which are relevant to the OSO corridor include:

- Build strong partnerships with NSW Government to secure funding of existing infrastructure and timely provision of new infrastructure accommodating the City of Blacktown's changing needs
- Provide quality transport infrastructure and services supporting the City of Blacktown's major employment centres
- Manage infrastructure sustainably, based on long term strategic and financial planning
- Engage NSW Government to ensure community's best interests are considered in developing safe, reliable, sustainable and accessible public transport
- Providing transport networks connecting the City of Blacktown which are functional, accessible, and acceptable to the community, supporting vehicle and non-vehicle users.

DRAFT

Appendix C

Interchanges and road
and waterway crossings

DRAFT

Appendix C Interchanges and road and waterway crossings

Proposed road interchanges and rail junctions

Interchange / Junction location	Interchange / Junction type
Windsor Road	Service interchange
Richmond Road	Service interchange
Bells Line of Road to Castlereagh Connection	System interchange - with the Bells Line of Road to Castlereagh Connection going over the OSO.
Main West Rail Line	Grade separated rail junction - with the Main West Rail Line achieved using a loop around Dunheved industrial area.
Great Western Highway	Service interchange – with collector roads between the Great Western Highway and the M4 Western Motorway to manage potential weave issues.
M4 Western Motorway	System interchange – the interchange sits over the top of the Werrington Arterial's interchange and maintains its functionality (similar to the Light Horse interchange).
Proposed Western Sydney Freight Line	At grade 'Y' junction with the Western Sydney Freight line and the OSO motorway over the junction.
Proposed M12 Motorway	System interchange – similar to the system interchange between the Westlink M7 Motorway and the M5 South West Motorway.
The Northern Road	Service interchange
Greendale Road	Service interchange
Burraborang Road	Service interchange
Cobbitty Road	Service interchange
Hume Motorway	System interchange
Main South Rail Line	Rail junction

DRAFT

Existing watercourses crossed by the OSO Recommended Corridor

Crossing	Description
Section 1	
McKenzies Creek	Bridge over creek
Killarney Chain of Ponds	Bridge over creek
Eastern Creek	Viaduct over floodplain
South Creek (and tributaries)	Viaduct over floodplain
Ropes Creek	Viaduct over floodplain
Section 2	
South Creek	Viaduct over floodplain
Claremont Creek	Viaduct over floodplain
Blaxland Creek	Bridge over creek
Section 3	
Creek near Patons Lane, Luddenham	Bridge over creek
Cosgrove Creek	Bridge over creek (two separate crossings)
Badgerys Creek	Bridge over creek
Duncans Creek	Bridge over creek (two separate crossings)
Bringelly Creek	Bridge over creek
Section 4	
Cobbitty Creek	Bridge over creek
Nepean River	Bridge over river and viaduct over floodplain
Sickles Creek	Bridge over creek
Creek near Westbrook Road, Bickley Vale	Bridge over creek
Creek near Cawdor Road, Cawdor	Bridge over creek
Section 5	
Matahil Creek	Bridge over creek
Navigation Creek	Bridge over creek

DRAFT

Treatment of local roads

Local road	Treatment
Section 1	
Hession Road	Cul-de-sac
Old Pitt Town Road	Local road on bridge over the OSO
Hanckel Road	Cul-de-sac
Stahls Road	Local road on bridge over the OSO
Commercial Road	Local road on bridge over the OSO
Old Hawkesbury Road	Cul-de-sac
Windsor Road	OSO on bridge over local road, interchange included
Wallace Road	OSO on bridge over local road
Richmond Road	OSO on bridge over local road, interchange included
Stony Creek Road	OSO on bridge over local road
Stanley Street	OSO on bridge over local road
Shanes Park Road	OSO on bridge over local road
Palmyra Avenue	Cul-de-sac
Mainwaring St, Ropes Crossing	Cul-de-sac
Seymour Road, Ropes Crossing	OSO on bridge over local road
Links Road, St Marys	Cul-de-sac
Dunheved Circuit, St Marys	Local road realigned and connection to Links Road removed
Charles Street, St Marys	Cul-de-sac
Vallance Street, St Marys	Cul-de-sac
Niemar Road, St Marys	Connected to Ropes Crossing Boulevard
Section 2	
Links Road (between Dunheved Circuit and Forrester Road), St Marys	Local road in underpass under the rail loop
Dunheved Circuit, St Marys	Cul-de-sac to northern portion's connection with Link Road
Werrington Road, Werrington	Werrington Road realigned on western side of OSO
Parkes Road, Werrington	Parkes Road remains connected to the realigned Werrington Road (refer above)
Princess Street, Werrington	Cul-de-sac
Rosewood Way, Werrington	Local road no longer required
Bellwood Close, Werrington	Local road no longer required
Albert Street, Werrington	Cul-de-sac
Victoria Street, Werrington	Cul-de-sac
Railway Street, Werrington	Cul-de-sac
Rance Road, Werrington	Cul-de-sac
Walker Street, Werrington	Cul-de-sac
The Kingsway, Werrington	Realigned

DRAFT

Local road	Treatment
Tennant Road, Werrington	Realigned
Water Street, Werrington	Cul-de-sac
Great Western Highway, Werrington	OSO on bridge over local road, interchange included
Putland Street, Claremont Meadows	Cul-de-sac
Reserve Road, Claremont Meadows	Local road no longer required
Fowler Street, Claremont Meadows	Cul-de-sac
Equestrian Circuit, Claremont Meadows	Local road no longer required
Caulfield Road, Claremont Meadows	Cul-de-sac
Kindlebark Close, Claremont Meadows	New connection to Caddens Road and cul-de-sac
Caddens Road, Claremont Meadows	OSO on bridge over local road
Central Park Drive, Claremont Meadows	Cul-de-sac
Brushwood Street, Claremont Meadows	Local road no longer required
Springdale Street, Claremont Meadows	Local road no longer required
Burlington Street, Claremont Meadows	Local road no longer required
Doncaster Avenue, Claremont Meadows	Cul-de-sac
M4 Western Motorway	Bridge over motorway, interchange included
Werrington Arterial	Interchange over Werrington Arterial and its ramps
Kent Road, Orchard Hills	OSO on bridge over local road
Lansdowne Road, Orchard Hills	OSO on bridge over local road
Section 3	
Patons Lane, Luddenham	OSO on bridge over local road
Luddenham Road, Luddenham	Northern crossing - local road on bridge over OSO Southern crossing – OSO on bridge over local road
The Northern Road, Badgerys Creek	Local road on bridge over the OSO, interchange included
Park Road, Luddenham	Local road on bridge over the OSO
Willowdene Avenue, Luddenham	Northern crossing - local road on bridge over OSO Southern crossing – OSO on bridge over local road
Greendale Road, Greendale	Local road on bridge over OSO, interchange included
Section 4	
Chittick Lane, Cobbitty	Local road diverted under OSO bridge
Cobbitty Road, Cobbitty	OSO on bridge over local road, interchange included
Ellis Lane, Ellis Lane	OSO on bridge over local road
Sunnyside Drive, Ellis Lane	Cul-de-sac
Tarcoola Place, Ellis Lane	Cul-de-sac
Werombi Road, Ellis Lane	Local road on bridge over the OSO
Smalls Road, Ellis Lane	Local road on bridge over the OSO

DRAFT

Local road	Treatment
Burratorang Road, Mount Hunter	OSO on bridge over local road, interchange included
Dowles Lane, Bickley Vale	Cul-de-sac
Westbrook Road, Bickley Vale	Cul-de-sac
Cawdor Road, Cawdor	OSO on bridge over local road
Doncaster Avenue, Cawdor	Local road realigned
Section 5	
Cawdor Road, Cawdor	Local road realigned and on bridge over the OSO
Remembrance Drive, Cawdor	OSO on bridge over re-aligned local road
Dawsons Road, Menangle	Local road realigned and on bridge over the OSO
Finns Road, Menangle	OSO on bridge over re-aligned local road
Menangle Road, Menangle	OSO on bridge over local road
Hume Motorway	OSO on bridge over Hume Motorway, interchange included

Interaction with existing rail infrastructure

Railway	Treatment
Richmond Line	OSO on bridge over railway, no connection
Main South Rail Line	OSO on bridge over railway, rail junction provided with connection to the south only

DRAFT

Appendix D

Noise assessment
criteria

DRAFT

Appendix D Noise assessment criteria

Road noise assessment criteria

Road Airborne Noise Assessment Criteria – Residential Receivers

Type of Development	Noise Assessment Criteria (External)	
	Day (7am to 10pm)	Night (10pm to 7am)
Existing residences affected by noise from a new freeway/ arterial/ sub-arterial road corridor	55 dB(A) ($L_{Aeq(15\text{-hour})}$) (external)	50 dB(A) ($L_{Aeq(9\text{-hour})}$) (external)
Existing residences affected by noise from a redeveloped freeway/ arterial/ sub-arterial road corridor	60 dB(A) ($L_{Aeq(15\text{-hour})}$) (external)	55 dB(A) ($L_{Aeq(9\text{-hour})}$) (external)

Road Airborne Noise Assessment Criteria – Non-residential Receivers

Non-residential Sensitive Land Use	Noise Assessment Criteria	
	Day (7am to 10pm)	Night (10pm to 7am)
School classrooms	40 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal, when in use)	N/A
Hospital wards	35 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)	35 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)
Places of worship	40 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)	40dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)
Open space (active use)	60 dB(A) ($L_{Aeq(15\text{-hour})}$) (external, when in use)	N/A
Open space (passive use)	55 dB(A) ($L_{Aeq(15\text{-hour})}$) (external, when in use)	N/A
Childcare facilities – sleeping rooms	35 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)	N/A
Childcare facilities – indoor play areas	40 dB(A) ($L_{Aeq(1\text{-hour})}$) (internal)	N/A
Childcare facilities – outdoor play areas	55 dB(A) ($L_{Aeq(1\text{-hour})}$) (external)	N/A
Aged care facilities	As per residential receivers	

Road Airborne Noise Relative Increase Criteria

Type of Development	Noise Assessment Criteria (External)	
	Day (7am to 10pm)	Night (10pm to 7am)
Existing residences affected by noise from a new or redeveloped freeway/ arterial/ sub-arterial road corridor	Existing traffic noise (as $L_{Aeq(15\text{-hour})}$) + 12 dB(A) (external)	Existing traffic noise (as $L_{Aeq(9\text{-hour})}$) + 12 dB(A) (external)

DRAFT

Rail noise assessment criteria

Heavy Rail Airborne Noise Trigger Levels - Residential Receivers

Type of Development	Noise Trigger Levels (External)	
	Day (7am to 10pm)	Night (10pm to 8am)
New rail line development	60 dB(A) ($L_{Aeq(15-hour)}$) or 80 L_{AFmax}	55 dB(A) ($L_{Aeq(9-hour)}$) or 80 L_{AFmax}
Redeveloped rail line	Increases $L_{Aeq(period)}$ rail noise by ≥ 2 dB(A) or L_{Amax} rail noise by ≥ 3 dB(A) and	
	65 dB(A) ($L_{Aeq(15-hour)}$) or 85 L_{AFmax}	60 dB(A) ($L_{Aeq(9-hour)}$) or 85 L_{AFmax}

Rail Airborne Noise Assessment Criteria – Non-residential Receivers

Non-residential Sensitive Land Use	Noise Trigger Levels (When in Use)	
	New Rail Line	Redeveloped Rail Line
	Resulting rail noise levels exceed:	Increases $L_{Aeq(period)}$ rail noise by ≥ 2 dB(A) and resulting rail noise levels exceed:
Schools and educational institutions	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)
Hospital wards	35 dB(A) ($L_{Aeq(1-hour)}$) (internal)	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)
Hospitals – other uses	60 dB(A) ($L_{Aeq(1-hour)}$) (internal)	65 dB(A) ($L_{Aeq(1-hour)}$) (internal)
Places of worship	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)	45dB(A) ($L_{Aeq(1-hour)}$) (internal)
Open space (active use)	65 dB(A) ($L_{Aeq(15-hour)}$) (external)	65 dB(A) ($L_{Aeq(15-hour)}$) (external)
Open space (passive use)	60 dB(A) ($L_{Aeq(15-hour)}$) (external)	65 dB(A) ($L_{Aeq(15-hour)}$) (external)
Childcare facilities	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)	40 dB(A) ($L_{Aeq(1-hour)}$) (internal)