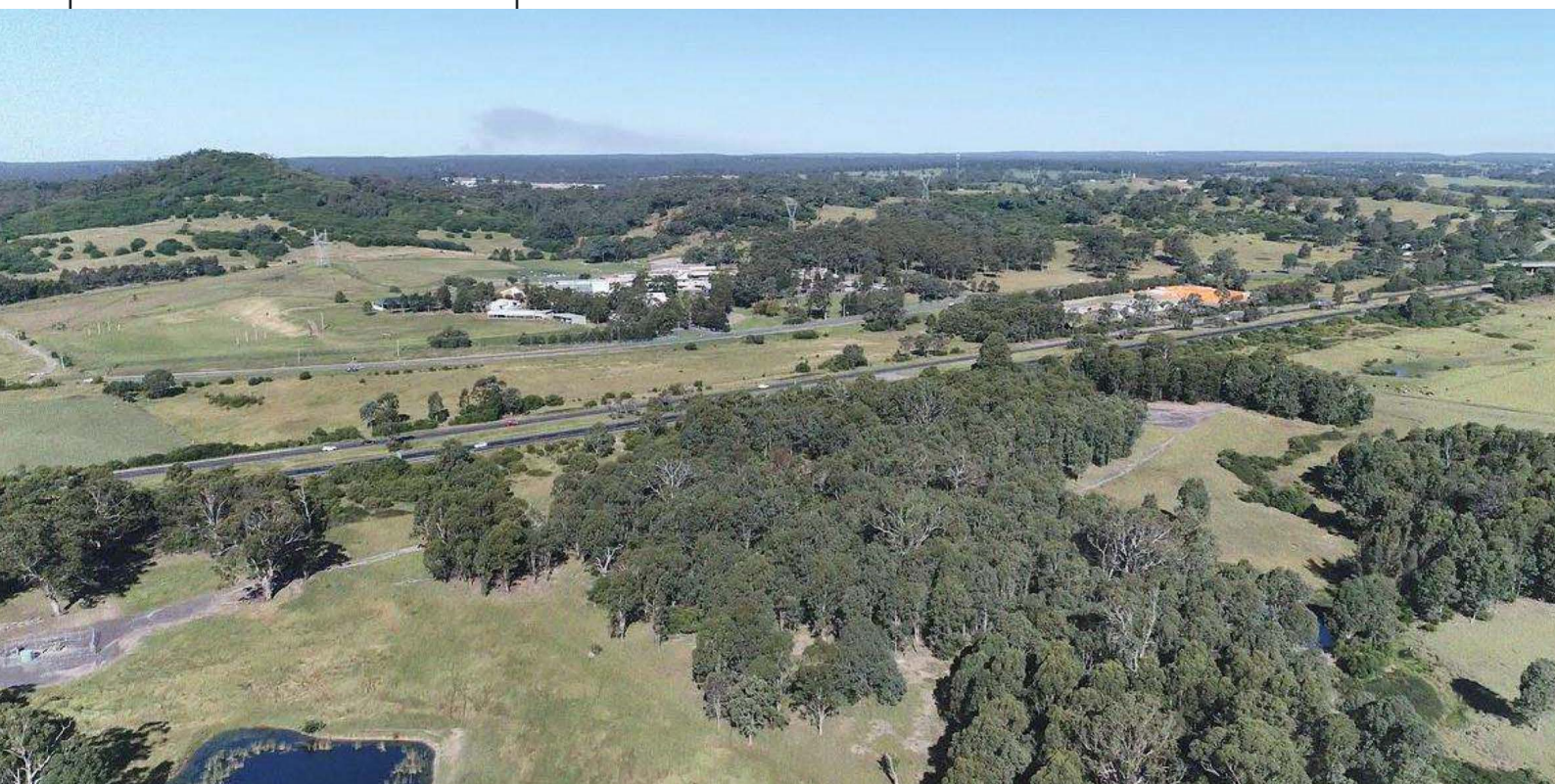


Transport  
for NSW

# Outer Sydney Orbital Stage 2 (OSO2) Corridor Options Report

November 2022



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### Acknowledgement

Transport for NSW acknowledges that the Tharawal, Gundungurra, and Dharug peoples are the traditional custodians of the land engaged by this project and wishes to pay respect to Elders past and present and recognises continuing connection to country.



# Introduction

Western Sydney is one of the fastest growing areas in NSW. Transport for NSW is investigating how future transport infrastructure, like the Outer Sydney Orbital, can support growing communities and businesses by providing connections to the Western Sydney Airport and surrounding employment lands. Identifying corridors now will ensure that land is available to deliver transport infrastructure in the future, when it is needed.

## Purpose of this report

The Outer Sydney Orbital (OSO) is proposed to be a north-south multi-modal transport corridor generally suitable for a motorway and freight rail route. It will connect Sydney's emerging Western Parkland City and its Aerotropolis with the Central Coast and Illawarra-Shoalhaven regions. The corridor investigation for this future project is comprised of three stages (Figure 1). This report considers the long-term transport connections between Western Sydney and the Illawarra-Shoalhaven region, referred to as **Outer Sydney Orbital Stage 2** (OSO2). This stage comprises three Sectors (Figure 2).

OSO2 has been subject to previous investigation<sup>1</sup> with a particular focus on Sector 1 – Greater Macarthur Growth Area and surrounds, including the Wilton Growth Area. For Sector 1, Transport for NSW published an *Outer Sydney Orbital Stage 2 - Greater Macarthur Growth Area Options Report*<sup>2</sup> in November 2020.

Following community and stakeholder engagement for two short listed corridor options that were exhibited between November 2020 and January 2021, a preferred corridor was announced in August 2021. To support this determination, Transport for NSW published an *Outer Sydney Orbital Stage 2 - Consultation Outcomes Report*<sup>3</sup> (August 2021) and *Outer Sydney Orbital Stage 2 - Final Appin Road Connection Options Report*<sup>4</sup> (August 2021). These reports identified a Recommended Corridor (known as the “Blue Option”).

Following confirmation of the “Blue Option” as the preferred, further work was undertaken by Heritage NSW into the Appin Aboriginal massacre site. This work has identified a much more extensive area associated with the Aboriginal massacre of 1816, including the role of the colonial properties in the area. NSW Heritage has now exhibited, and the Minister has endorsed a State Heritage Listing which conflicts with the Blue Option. Transport for NSW previously proposed to link the Blue Option with a crossing of Broughton Pass to provide a connection to Picton Road. Due to the Minister endorsing a State Heritage Listing, such a connection across Broughton Pass is no longer appropriate. A direct connection to Picton Road is now proposed, and as such, is envisaged to provide the main link to the Illawarra in the future.

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<sup>1</sup> [Outer Sydney Orbital Stage 2 | Transport for NSW](https://www.transport.nsw.gov.au/corridors/oso2) <https://www.transport.nsw.gov.au/corridors/oso2>

<sup>2</sup> *Outer Sydney Orbital Stage 2 - Greater Macarthur Growth Area Options Report*  
<https://www.transport.nsw.gov.au/system/files/media/documents/2021/Outer%20Sydney%20Orbital%20Stage%202%20Options%20Report.pdf>

<sup>3</sup> *Outer Sydney Orbital Stage 2 - Consultation Outcomes Report*  
<https://www.transport.nsw.gov.au/system/files/media/documents/2021/OSO%202%20Consultation%20Outcomes%20Report%20-%20Version%203.0%20-%20August%202021.pdf>

<sup>4</sup> *Outer Sydney Orbital Stage 2 - Final Appin Road Connection Options Report*  
[https://www.transport.nsw.gov.au/system/files/media/documents/2021/OSO2%20-%20Final%20Appin%20Road%20Connection%20Options%20Report%20August%202021\\_20210830.pdf](https://www.transport.nsw.gov.au/system/files/media/documents/2021/OSO2%20-%20Final%20Appin%20Road%20Connection%20Options%20Report%20August%202021_20210830.pdf)

**The purpose of this report** is to review the Sector 1 strategic options identified to date, consider opportunities to avoid impacts on the endorsed State Heritage Listing, and evaluate the broader connectivity considerations for a connection(s) to the Illawarra. Consideration is also given to the future connection between Appin and Wilton.

In response to this information, and through consultation with government agencies and relevant local councils, Transport for NSW identified a wider set of viable Sector 1 strategic options given the Recommended Corridor (the “Blue Option”) would have direct and significant impacts on the endorsed State Heritage Listing.

This report describes the new analysis of strategic options through a Strategic Merit Test. It then assesses alternative routes through a Multi-Criteria Analysis to identify the most appropriate corridor for a new OSO2 connection (Sector 1) from the M31 Hume Motorway through the Greater Macarthur Growth Area and Wilton Growth Area (Figure 3).

## Project definition

### The Outer Sydney Orbital

The *Future Transport Strategy*<sup>5</sup> sets the strategic direction for Transport for NSW to achieve world-leading mobility for customers, communities, and businesses. Making connections with people and places remains essential, whether it's to access jobs and services or visit family and friends. Connecting people and places is about providing the best ways for people to travel within their neighbourhoods, into cities or between towns and regions. The investigation of an Outer Sydney Orbital corridor to increase road and rail freight capacity to the Western Sydney Aerotropolis as well as providing a strategic route connecting the Western Parkland City with the Central Coast and the Illawarra remains critical to connect people and support efficient and reliable freight networks.

As shown in Figure 1 below, the OSO corridor is being investigated in three stages:

- **Stage 1** – From the M31 Hume Motorway at Menangle, across Western Sydney via the Aerotropolis to Richmond Road at Marsden Park.
  - Language Groups: Tharawal to Gandangara to Dharug
- **Stage 2** – From the M31 Hume Motorway at Menangle to the Illawarra-Shoalhaven region (i.e. the subject of this report).
  - Language Groups: Tharawal
- **Stage 3** – Between Western Sydney and the Central Coast.
  - Language Groups: Dharug to Darkinjung

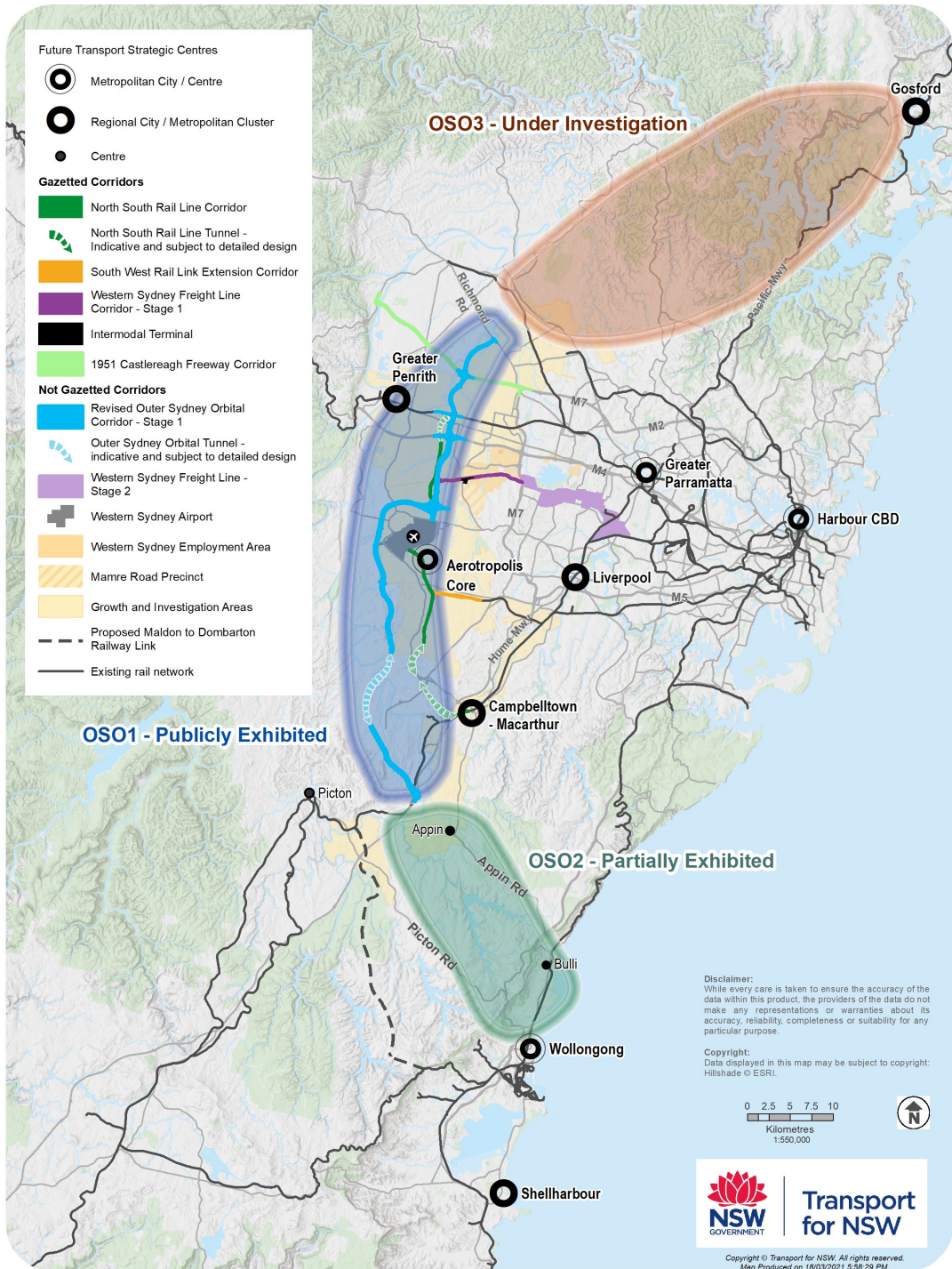
The proposed corridor for the first stage of the OSO (OSO1) was publicly exhibited in March 2018. Following consideration of public submissions, the Government announced in June 2018 that it would consider protecting a route between Richmond Road at Marsden Park and the M31 Hume Motorway at Menangle. The announcement also relocated the proposed interchange on the M31 Hume Motorway to Government owned land. It is envisaged that the OSO2 corridor would extend the connectivity offered by OSO1 to the Illawarra-Shoalhaven region. A corridor for a third stage of the OSO (OSO3), between Western Sydney and the Central Coast, is the subject of a separate investigation.<sup>6</sup>

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<sup>5</sup> Future Transport Strategy: Our vision for transport in NSW <https://future.transport.nsw.gov.au/>

<sup>6</sup> In 2018 the Government announced that it would relinquish the exhibited Outer Sydney Orbital corridor north of Richmond Road while continuing to work with stakeholders on options with a view to reducing impacts on homes.

**Figure 1: Outer Sydney Orbital Corridor Investigation**





## The Outer Sydney Orbital Stage 2 Study Area

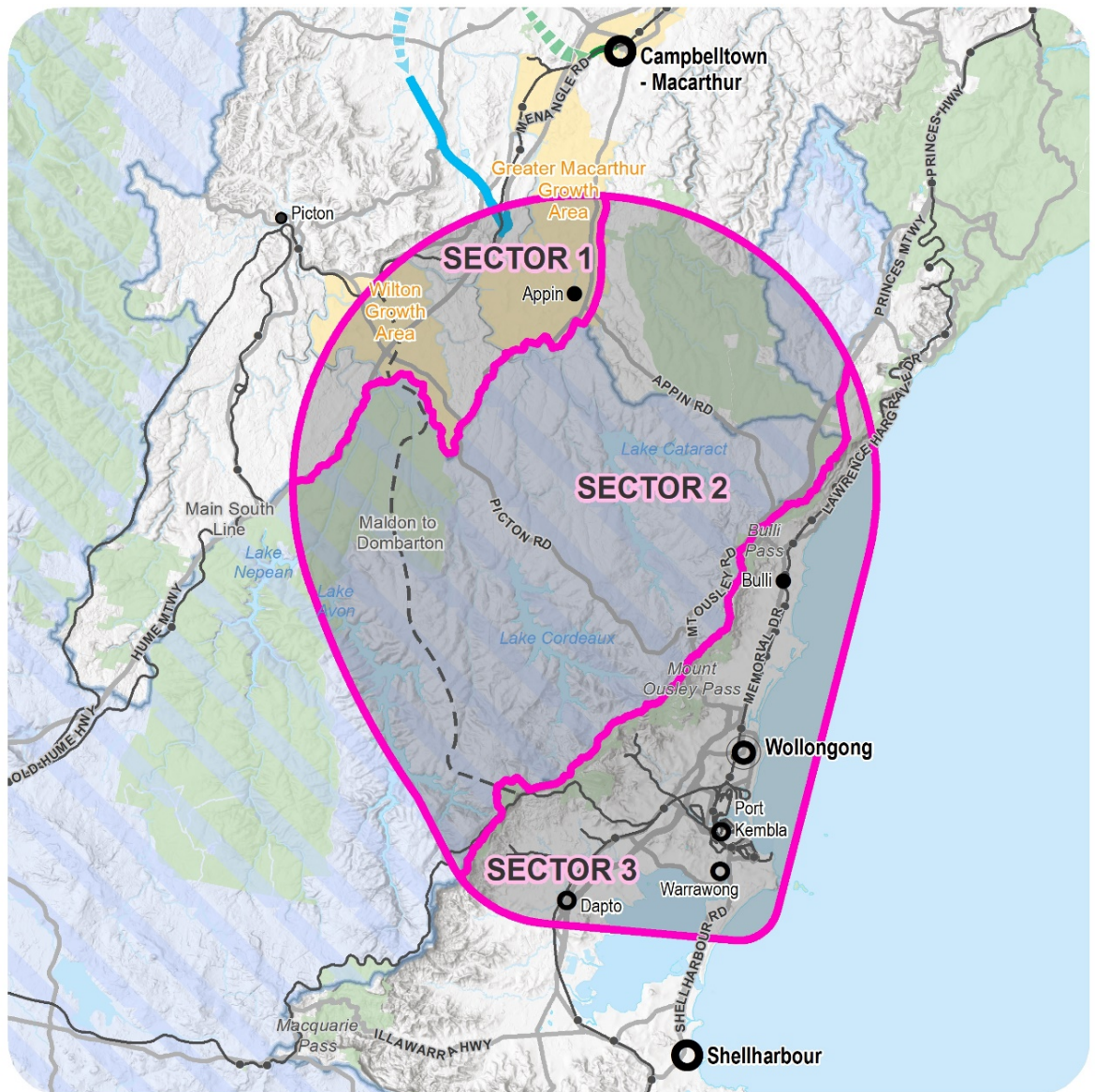
The OSO2 study area, as shown in Figure 2 below, is large with diverse planning issues and place values. Accordingly, the investigation has been divided into three 'sectors' based on land use and physical characteristics.

- **Sector 1 – Greater Macarthur Growth Area and Surrounds:** In 2018, Department of Planning, Industry and Environment released an interim plan for the Greater Macarthur Growth Area – Greater Macarthur 2040<sup>7</sup>. This plan identifies a number of future transport connections linking the Greater Macarthur Growth Area with the M31 Hume Motorway. The Wilton Growth Area is also positioned at the junction of the M31 Hume Motorway and Picton Road in the Wollondilly Shire Local Government Area. Wilton will become a new town providing homes and jobs in the southwest of the Sydney basin. To provide certainty for planning and future development, there is an urgent need to identify corridor requirements for future inter-regional transport infrastructure (i.e. the subject of this report).
- **Sector 2 – Drinking Water Catchment:** This sector is predominantly covered by WaterNSW's Metropolitan Special Area, a major drinking water catchment for Sydney. It also includes the Appin and Picton Road corridors together with approved mining activities. Sector 2 investigations in the future will focus on potential upgrades to Appin and Picton Roads to avoid or minimise significant impact on the environment.
- **Sector 3 – Connecting to the Illawarra-Shoalhaven:** This sector encompasses the culturally and environmentally significant Illawarra Escarpment and the complex residential, commercial and industrial urban fabric of Wollongong. The investigation will commence with geotechnical assessment of potential locations for Escarpment crossings, having regard to previous and current mining activities and the geological conditions of the Escarpment.

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<sup>7</sup> [Greater Macarthur 2040 - \(nsw.gov.au\)](https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Greater-Macarthur-Growth-Area/Greater-Macarthur-2040) | <https://www.planning.nsw.gov.au/Plans-for-your-area/Priority-Growth-Areas-and-Precincts/Greater-Macarthur-Growth-Area/Greater-Macarthur-2040>

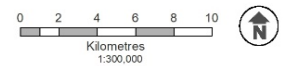
Figure 2: The OSO2 study area



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li> Metropolitan City / Centre</li> <li> Regional City / Metropolitan Cluster</li> <li> Strategic Centre</li> <li> Centre</li> <li> Drinking Water Catchment</li> <li> Growth Area</li> </ul> | <ul style="list-style-type: none"> <li> Outer Sydney Orbital Corridor - Under investigation</li> <li> Outer Sydney Orbital Tunnel - indicative and subject to detailed design</li> <li> North South Rail Line Corridor (Sydney Metro - Western Sydney Airport)</li> <li> North South Rail Line Tunnel - indicative and subject to detailed design</li> <li> Existing rail network</li> <li> Proposed Maldon to Dombarton railway line</li> </ul> |
|---|--|

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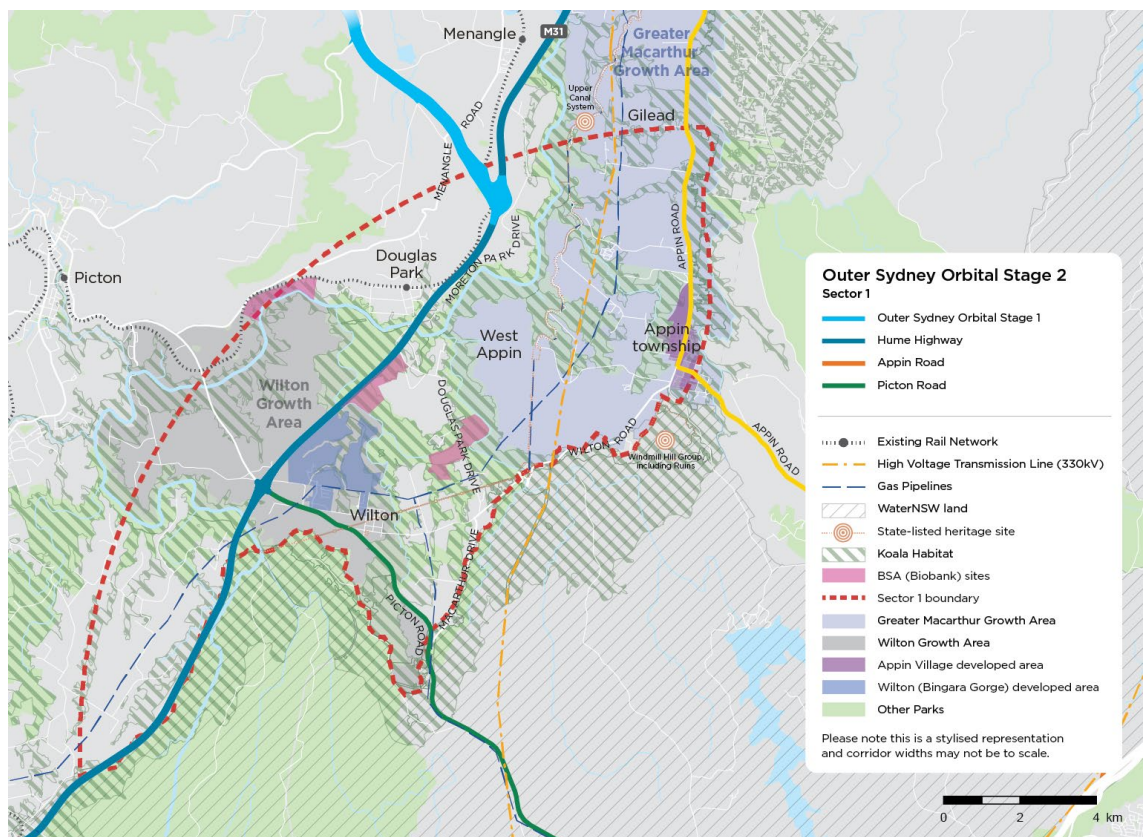
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Map Produced on 15/10/2020 10:05:08 PM.

## Sector 1

The study area for Sector 1 is shown in Figure 3 and incorporates parts of the Wollondilly and Campbelltown local government areas. Sector 1 is predominantly rural, but this is expected to change over time with urban development expected to occur across both the Greater Macarthur Growth Area and Wilton Growth Area.

A detailed description of existing and planned land uses in the area, along with its environmental characteristics can be found in Chapter 3. Community profiles developed for the existing townships of Appin, Wilton and Douglas Park are provided in the Constrains and Opportunities section below. These broadly suggest that these communities share common features with many other outer suburban places, with relatively high levels of socio-economic disadvantage, unemployment, and car use.

**Figure 3: OSO2 – Sector 1**



## Existing Road Network Context

The OSO2 study area includes two existing major vehicular routes, the M31 Hume Motorway and the M1 Princes Motorway. Picton Road and Appin Roads are the primary road connections between the Western Parkland City and the Illawarra-Shoalhaven region. These routes are identified in the context of the Illawarra – Shoalhaven Regional Transport Plan in Figure 4.

Picton Road is an important transport corridor linking the Illawarra Region with Sydney and the Greater Macarthur Growth Area and is one of two major east-west links between the M1 Princes Motorway and M31 Hume Motorway. The Australian and NSW governments are upgrading Picton Road to support growing communities and businesses across Western Sydney and the Illawarra-Shoalhaven by providing improved access to jobs, services, education and suppliers between the neighbouring regions<sup>8</sup>.

Appin Road provides a connection between Campbelltown and the M1 Princes Motorway at Bulli Tops.

Both Appin and Picton Roads have single lane and multi-lane sections, with varying speed zones that reflect changing road conditions. Heavy vehicles represent around 20 percent of traffic on Picton Road and 15 percent of traffic on Appin Road.

Travel between Wollongong and Sydney is constrained by the Illawarra Escarpment, which rises sharply around 400 metres above sea level and the Woronora Plateau. Currently, the two main Escarpment crossings are Mount Ousley Road (interfacing most directly with Picton Road) and Bulli Pass (interfacing most directly with Appin Road). While Mount Ousley Road is multi-lane (three lanes uphill, with two lane sections downhill), Bulli Pass is only single lane in either direction with limited overtaking opportunities. Both routes are not ideal for heavy vehicles - the maximum grade on Mount Ousley Road is 10.9 percent and the maximum grade on Bulli Pass is 14.6 percent<sup>9</sup>.

The Princes Highway between Appin Road and Picton Road junctions has several hills and curves, providing a poor standard for heavy vehicles. The majority of heavy vehicles from the Illawarra use Picton Road to access the Hume Motorway and south-west Sydney. However, over time the junction of Picton Road at Wilton will become more congested as Wilton township grows.

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<sup>8</sup> [Picton Road upgrade - Picton Road Projects - Projects - Roads and Waterways – Transport for NSW](https://roads-waterways.transport.nsw.gov.au/projects/picton-road-projects/picton-road-upgrade/index.html) <https://roads-waterways.transport.nsw.gov.au/projects/picton-road-projects/picton-road-upgrade/index.html>

<sup>9</sup> Australian road design standards suggest a maximum grade of 4 to 6 percent is preferable.

Figure 4: Existing road network in the contact of the Illawarra - Shoalhaven Regional Transport Plan.



## Strategic Context and Needs

The Government’s strategic transport plan for NSW – the *Future Transport Strategy*, as shown in Figure 5 below, identifies connections between Western Sydney and the Illawarra-Shoalhaven as an important element of the future Six Cities Region integrated transport network. The Illawarra-Shoalhaven Regional Transport Plan<sup>10</sup>, released in August 2021, also highlights the need for OSO2 in the longer term.

**Figure 5: Future Transport Strategy – Existing and future Six Cities Region integrated transport network.**



### KEY

Hubs	Existing Operational infrastructure and services	Future Non-operational infrastructure and services include committed, funded and visionary
Metropolitan centre	Ferry	Future Fast Rail routes
Metropolitan city	Light rail	Light rail
Metropolitan cluster	Rapid Bus	Rapid Bus
Regional city	Rail	Rail
Strategic centre	Rail freight (dedicated line)	Rail freight
International freight port	Road	Road
International airport		

<sup>10</sup> [Illawarra – Shoalhaven Regional Transport Plan | Future Transport \(nsw.gov.au\)](https://future.transport.nsw.gov.au/plans/illawarra-shoalhaven-regional-transport-plan)  
<https://future.transport.nsw.gov.au/plans/illawarra-shoalhaven-regional-transport-plan>

The *Future Transport Strategy* provides the basis for investigating the corridor that would be needed for a future OSO2 connection as part of the broader orbital connection between the Illawarra-Shoalhaven and the Central Coast via the Western Sydney Aerotropolis. The OSO2 connection also aligns with the following considerations:

- Strategic spatial planning for both Western Sydney and the Illawarra-Shoalhaven region.
- Other directions set in the *Future Transport Strategy* and its associated plans including for freight, ports, and road safety.
- Strategic transport modelling to understand the capacity of existing infrastructure and the possible implications of different infrastructure and service investments.
- Local governments' Local Strategic Planning Statements (LSPSs), Community Strategic Plans (CSPs) and other policy documents.
- Stakeholders' expressions of needs, including advocacy by the Illawarra-Shoalhaven Joint Organisation (ISJO) and others for improvements to transport services and infrastructure connecting Western Sydney and the Illawarra-Shoalhaven region to achieve better economic and social outcomes.

This initial assessment has found that high-quality arterial transport connections will be required in Sector 1 from the M31 Hume Motorway to both Appin Road and Picton Roads in the next 30 years. However, increasing pressure for development within the Greater Macarthur Growth Area, and in particular West Appin, requires urgent engagement with the community to identify and protect future transport corridor needs. This will provide the community and landholders with certainty regarding planned corridors and land use. Certainty for the Wilton Growth Area will also be required in the medium term.

The future OSO2 infrastructure is expected to bring the following benefits:

- enable reduced inter-regional travel times for journeys between the Western Parklands City and the Illawarra-Shoalhaven region for work, study and leisure;
- have important benefits for the movement of freight including reducing the cost of moving goods between the Port of Port Kembla, the Western Sydney Aerotropolis and other logistic hubs in Western Sydney and the Illawarra-Shoalhaven;
- increase the capacity of the transport network, potentially reduce delays, and offer an opportunity to improve road safety outcomes in line with the Government's Towards Zero vision;
- within and around the Greater Macarthur Growth Area, it will also have the crucial effects of diverting inter-regional through-traffic away from Appin Road north of Appin township and contribute toward reducing congestion in and around Campbelltown-Macarthur;
- within and around the Wilton Growth Area, divergence of inter-regional through-traffic will benefit the Wilton township and contribute toward reducing congestion on the upgraded Picton Road; and
- support a well-planned intra-regional network that will help to protect precincts of high place value like Appin and Wilton Town Centres from through traffic.

### **A connected Six Cities Region**

The Greater Cities Commission's discussion paper, *Delivering global competitiveness and local liveability*<sup>11</sup>, identifies a 20-year vision for a connected Six Cities Region that enhances the mobility of freight and people like never before, and enables jobs and housing to be distributed across the wider region. This will provide better access to domestic and international markets, jobs, education and services. It will enable our region to respond to new talent location preferences and remain competitive to a younger innovation workforce, by increasing the supply of housing to bring down the cost of living and providing improved transportation for commuters. It also enables more affordable homes through opening up new opportunities for settlement, and better lifestyles for our communities.

An integrated and efficient road, rail and freight system will be critical for our region's competitiveness. Improved connectivity within the broader region, as well as to our ports and airports, are required to improve access to global markets. These gateways also need to support the increasing volume of freight movements and address the vulnerabilities in global markets and changing customer expectations revealed by the pandemic.

## **Investigation Approach**

### **Project Team**

This investigation of OSO2 strategic options has been led by Transport for NSW and supported by several professional service providers: Mott MacDonald (engineering and strategic options), Ethos Urban (strategic land use planning), EcoPlanning (ecology), WolfPeak (Aboriginal and European heritage) and Arup (strategic transport planning). WolfPeak facilitated consultation with Aboriginal Land Councils and knowledge holders.

An Advisory Group made up of subject matter experts from across government and other bodies has also been integral to the investigation. The Advisory Group included representatives from:

- A range of Transport for NSW business units including from teams with responsibilities for road, rail, freight, and regional transport planning.
- A range of Department of Planning and Environment business units including from teams with responsibilities for land release, environmental planning, conservation and regulation and heritage. This includes Heritage NSW.
- The Greater Cities Commission (GCC) and the Department of Premier and Cabinet.
- WaterNSW.
- Campbelltown City Council, Wollondilly Shire Council, and Wollongong City Council.

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<sup>11</sup> Discussion Paper The Six Cities Region: Delivering global competitiveness and local liveability <https://greatercities.au/six-cities-region/connected-region>



## Project Objectives

The OSO2 Project Objectives in Figure 6 were adopted by the Advisory Group to guide the OSO2 investigation as a process. While tailored to the OSO2, these reflect Transport for NSW's general approach to corridor preservation investigations and are informed by the requirements of the Department of Planning and Environment's *Planning Guideline for Major Infrastructure Corridors* and the NSW Government's *Practitioner's Guide to Movement and Place*.

**Figure 6: OSO2 Project Objectives**



## Corridor Objectives

The Advisory Group also assisted the development of the initial OSO2 Corridor Objectives listed in Table 1, based on key issues identified during the assessment of the OSO2's strategic context and needs. These outline the matters that need to be considered when identifying and selecting corridor alignment options and ultimately recommending a corridor for protection.

**Table 1: Initial OSO2 Corridor Objectives**

Initial OSO2 Corridor Objectives	
1	Avoid impacts on communities and, where avoidance is not reasonably possible, minimise and mitigate those impacts.
2	Helps people to move efficiently and safely between Western Sydney and the Illawarra-Shoalhaven region.
3	Enables freight to move efficiently and safely between Western Sydney and the Illawarra-Shoalhaven region.
4	Supports the urban development of the Illawarra-Shoalhaven region and the Wilton and Greater Macarthur Growth Areas, facilitates great places, and provides certainty for investment.
5	Avoid impacts on important environments and habitats and, where avoidance is not reasonably possible, minimise and mitigate those impacts.
6	Ensures future infrastructure can be delivered sustainably and cost effectively.

Following the change in strategic context, these Corridor Objectives were expanded to include the following additional objectives shown in Table 2.

**Table 2: Additional OSO2 Corridor Objectives**

Additional OSO2 Corridor Objectives	
7	Impacts to existing and potential state-significant heritage areas and sensitive Cumberland Plain woodlands are avoided entirely, or where avoidance is not reasonably possible, minimise and mitigate those impacts.
8	Areas of historical and cultural significance to Aboriginal communities are avoided, allowing for them to be protected and preserved.
9	The needs of emerging and future transport technologies are accommodated through the provision of a resilient transport network.

## Business Requirements Statement

A Business Requirements Statement (BRS) developed for the OSO2 can be found in Appendix A. While it is not currently proposed to construct OSO2 infrastructure, the BRS sets out in technical terms what form future infrastructure might take to meet the OSO2 Corridor Objectives, and consequently the nature of the land that may be required for preservation. The BRS must also be flexible to align with environmental constraints, existing land uses, and planning for future urban development. The BRS has been developed with reference to subject matter experts on particular issues (e.g. road safety) and other sources of contemporary best practice.

### What type of road will the OSO2 be?

The OSO2 is expected to take different forms in different locations. In some sections it may be a limited-access motorway style road (similar to, for example, the M31 Hume Motorway). Within the Greater Macarthur Growth Area, it is expected to be a high quality arterial road similar to The Northern Road or Camden Valley Way with limited at-grade intersections.

### What other types of roads will be required?

To support the current and future land use developments in the area, new local (sub-arterial) roads will be critical to meet the needs of the community and businesses. This includes the provision of new routes and infrastructure for public transport that will be needed to meet demand for travel by 2056. Although Transport for NSW is currently planning for additional capacity on Picton Road, a new high quality arterial connection between the M31 Hume Highway and the Illawarra-Shoalhaven will still be required in the future to facilitate safe and efficient inter-city connectivity and to separate inter-regional demand from local demand generated by the new Growth Areas at Wilton and Greater Macarthur. Capacity improvements to Appin Road will be required to support local public transport, private vehicle trips, and the movement of goods.

## Investigation Process

Building from the elements above, a systematic approach was followed to develop and assess a long list of strategic options (or “swooshes”) presented in this report. The short-listed strategic options were then considered in more detail as corridors and subjected to a Multi-Criteria Analysis. The approach is consistent with the requirements of Department of Planning and Environment’s *Planning Guideline for Major Infrastructure Corridors*<sup>12</sup>, and the NSW Government’s *Practitioner’s Guide to Movement and Place*<sup>13</sup>. Both require engagement with relevant stakeholders regarding the potential environmental, economic, and social impacts of a proposed corridor. This process is summarised in Figure 7.

**Figure 7: OSO2 investigation and options analysis approach.**



<sup>12</sup> [planning-guideline-for-major-infrastructure-corridors-2016.pdf \(nsw.gov.au\)](https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/planning-guideline-for-major-infrastructure-corridors-2016.pdf) | <https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/planning-guideline-for-major-infrastructure-corridors-2016.pdf?la=en>

<sup>13</sup> [Practitioner’s Guide to Movement and Place \(nsw.gov.au\)](https://www.governmentarchitect.nsw.gov.au/resources/ga/media/files/ga/manuals-and-guides/practitioners-guide-to-movement-and-place-2020-06-04.pdf) | <https://www.governmentarchitect.nsw.gov.au/resources/ga/media/files/ga/manuals-and-guides/practitioners-guide-to-movement-and-place-2020-06-04.pdf>

# Constraints and opportunities

## Introduction

Before considering potential routes for corridor options, investigations across the OSO2 study area were undertaken to identify existing land use, environmental, heritage, and engineering constraints.

Constraint mapping is an important early step in the corridor planning process to understand the land and context. Overlaying the different constraints and opportunities within the study area allows for corridors options to be identified, with the aim of achieving a workable balance between different impacts of future transport infrastructure on property, land use, and the environment. Impacts on the most sensitive constraints should be avoided as far as possible. For unavoidable impacts, mitigations are considered that can reduce the severity of the impact.

## Land Use and Landscape

### Existing Land Uses and Landscapes

In general, Sector 1 of the study area has an undulating topography comprising a mixture of cleared farmland, remnant native vegetation along watercourses, and deeper gorges such as that of the Nepean River. The region has historical associations with early European farming in Australia and a large proportion of the sector remains zoned as Rural Landscape.

**Figure 8: Typical landscape in the study area. Source: Greater Macarthur 2040 Interim Plan (Greater Macarthur 2040: An Interim plan for the Greater Macarthur Growth Area | Planning Portal - Department of Planning and Environment).**



The largest existing settlement in the southern part of the Greater Macarthur Growth Area is Appin township. The first land grant in the Appin area was made in 1811 and a town plan was created in 1834. Appin township today has a population of around 2,600 people and the centre of township contains a retail and service centre for the surrounding community. Historic churches, community facilities, a public school and a sports ground are located either side of Appin Road. To the north of the Appin township lies a greyhound track and recreational motorcycle facilities (i.e. Macarthur Motorcycle Club).

Appin township is predominantly zoned Low Density Residential. There are two Medium Density Residential zones associated with land subdivisions located to the east, and west of the town centre including the Appin Valley estate site for over 300 homes. A Local Centre zone traverses both sides of Appin Road accommodating retail, and commercial uses to service the town. Light Industrial zoned land to the south of the town on Wilton Road accommodates a number of industrial uses including Baines Masonry.

Wilton lies to the west of the Greater Macarthur Growth Area and has grown considerably in recent times following the first sales of lots in the Bingara Gorge residential subdivision in 2007. It has a current population of just over 3,000. New shops, services and a primary school are located within the subdivision, and a golf course provides a buffer with the M31 Hume Motorway. The Wilton urban area is predominantly zoned Low Density Residential between the M31 Hume Motorway and Wilton Road.

Also, west of the Greater Macarthur Growth Area, Douglas Park has a population of 1,400 and is located to the north of the M31 Hume Motorway and Nepean River. The township features a small number of shops, a primary school along Camden Road and a railway station served by diesel passenger services on the Southern Highlands Railway Line. Large lot rural residential properties surround the township. To the south, the Douglas Park Drive area contains the historic St Mary's Towers Retreat Centre, the Appin West Colliery, and a cluster of dwellings along Douglas Park Drive intersecting with Wilton Road.

A number of rural residential properties are present between the townships along with agri-businesses and religious facilities. Broughton Pass, between Wilton and Appin, contains a weir along with other water infrastructure, and is not suitable for heavy vehicles.

There are also significant sub-surface mining operations in the area, and associated surface infrastructure including the Appin East Colliery to the south of Appin township. The mining industry provides a significant number of local jobs both directly and indirectly. This connection with mining was recently commemorated in the Appin Sportsground with a memorial to 14 miners killed during a 1979 mine explosion.

Existing urbanised areas within the Greater Macarthur Growth Area are considered to be a significant constraint and wherever possible to be avoided.

## **Expected Land Use and Landscape Change**

Much of the remainder of Sector 1 is expected to become urbanised in accordance with the Government's planning for the Greater Macarthur Growth Area and Wilton Growth Area, which is detailed in the *Greater Macarthur 2040* and *Wilton 2040* plans.

### **Greater Macarthur Growth Area**

*Greater Macarthur 2040* and the associated draft Special Infrastructure Contribution (SIC) for the growth area outline the large-scale rezoning of land, environmental areas to be protected, and various forms of infrastructure (and its staging) required to support growth. The vision set out in *Greater Macarthur 2040* includes:

- 'Engaging, well designed places'
- 'Sensitivity to koalas, biodiversity and heritage'
- 'Transport will form the spine of the Growth Area'

The OSO2 study area (Figure 2) interfaces primarily with the southernmost of new land release areas identified extending south of Campbelltown to Appin. Sydney's Greater Macarthur area will deliver up to 40,000 jobs and 58,000 new homes over the next 20 years.

*Greater Macarthur 2040*, as shown in Figure 9 below, identifies urban capable land<sup>14</sup>, the location of future centres, and environmentally sensitive land together with indicative future major transport connections. The latter includes:

- A north-south rapid public transport spine – the Greater Macarthur Transport Corridor (GMTC)
- Three indicative east-west arterial roads in the Greater Macarthur Growth Area with interchanges on the M31 Hume Motorway
- Upgrading of Appin Road as an arterial road between Campbelltown and Appin township.

The Growth Area was formally declared in 2019 through an amendment to the State Environmental Planning Policy (Sydney Region Growth Centres) (2006) (commonly referred to as the ‘Growth Centres SEPP’). Some applications have already been lodged seeking to rezone land to enable urban development and other proposals for land release are expected to be lodged in the coming years.

A feedback report was released by the NSW Department of Planning and Environment following the exhibition of *Greater Macarthur 2040* and draft Special Infrastructure Contribution. A number of transport related issues were raised and documented in the *Greater Macarthur What We Heard report*<sup>15</sup>, including:

- The need for alternate transport corridor alignments and potential for passenger and freight rail.
- The width of the GMTC and its potential to split neighbourhoods.
- The potential for transport corridors to negatively affect neighbourhood amenity.
- Avoiding unnecessary traffic through Campbelltown.
- The impact of the planned Outer Sydney Orbital.
- Uncertainty for affected landowners until corridors are finalised.
- Suitable crossings for koalas of Appin Road and other transport links.

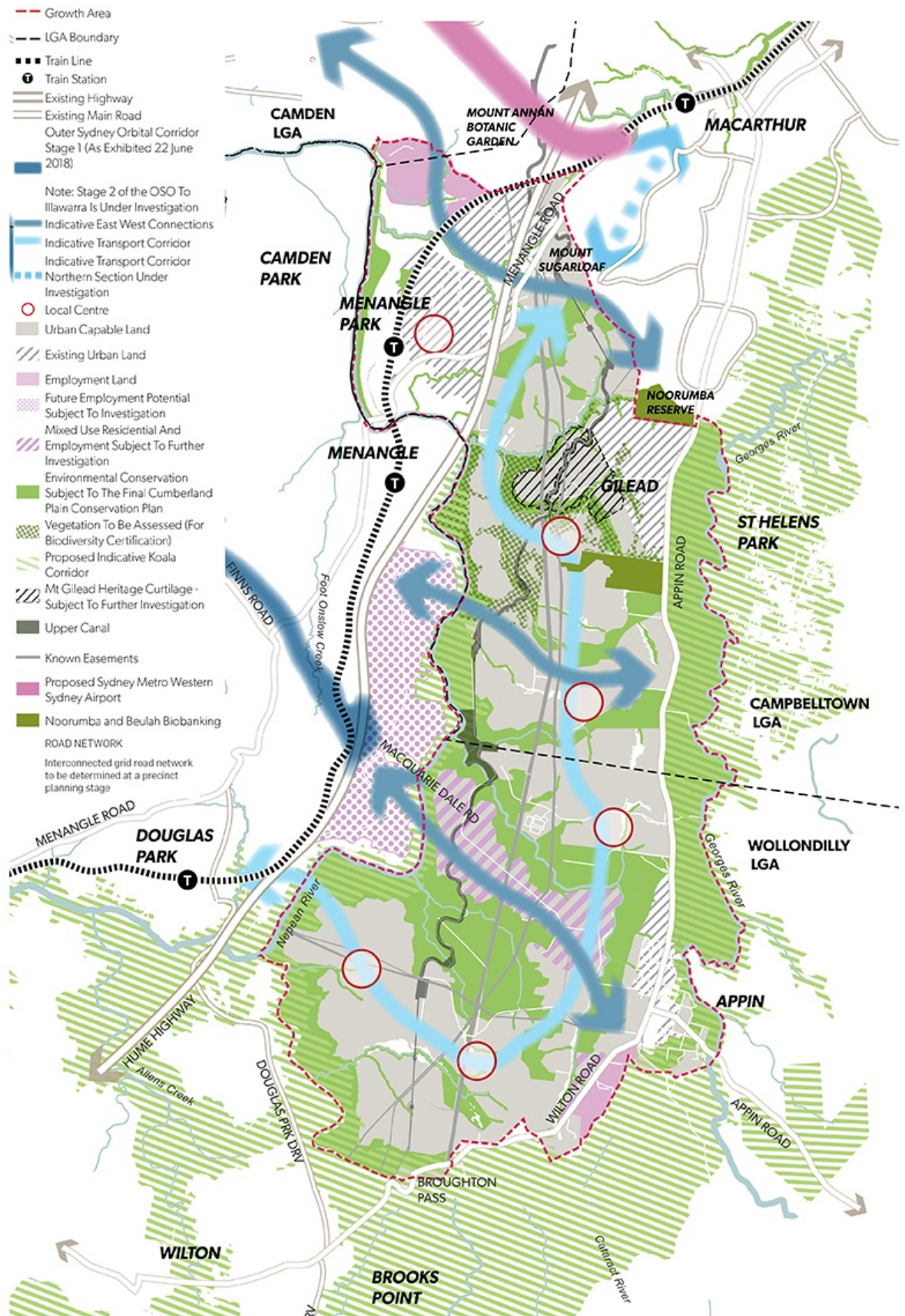
OSO2 corridor option development must therefore consider how options will relate to future land uses in the Greater Macarthur Growth Area, land to be protected for environmental reasons, and other infrastructure including other transport connections

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<sup>14</sup> Certified-urban capable land is defined by the NSW Department of Planning and Environment as land identified for future development that will seek biodiversity certification under the *Biodiversity Conservation Act 2016* (NSW) and where impacts from development will be strategically assessed under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). This category identifies where future urban development is likely to occur, subject to other approvals.

<sup>15</sup> [Greater Macarthur 2040: An Interim plan for the Greater Macarthur Growth Area | Planning Portal - Department of Planning and Environment \(nsw.gov.au\)](https://www.planningportal.nsw.gov.au/draftplans/under-consideration/greater-macarthur-2040-interim-plan-greater-macarthur-growth-area) | <https://www.planningportal.nsw.gov.au/draftplans/under-consideration/greater-macarthur-2040-interim-plan-greater-macarthur-growth-area>

**Figure 9: Greater Macarthur 2040 Structure Plan (Land Release Areas). Source: Greater Macarthur 2040.**





## Wilton Growth Area

The Wilton Growth Area is positioned at the junction of the Hume Motorway and Picton Road in the Wollondilly Shire Local Government Area. Wilton will become a new town providing homes and jobs in the southwest of the Sydney basin, with access to the beaches of the Illawarra region and National Parks. There are seven precincts within the Wilton Growth Area. Each precinct will create thriving local communities with new homes, jobs, public transport and community facilities.

Wilton will be known for its protection and conservation of the natural environment, particularly its koala corridor, enhancing the experience of living and working in Wilton. It will offer a key location for job opportunities that benefit from direct access to Greater Macarthur, Wollongong, and the new Western Sydney Airport.

The Wilton Town Centre Precinct will be the residential, retail, commercial and entertainment core of the Wilton Growth Area and the largest strategic centre in the Wollondilly Shire. The Precinct has been rezoned, with a commencement date of 30 September 2022.

The Wilton Growth Area will be a significant source of demand for travel in the immediately surrounding area and flows to and from it need to be considered. When fully developed, the Wilton Growth Area is expected to accommodate 15,000 new dwellings and 15,000 jobs across five precincts. Two have been rezoned for primarily residential development (North Wilton and South East Wilton). A new town centre with 50,000m<sup>2</sup> of floor space will be the commercial and social infrastructure focal point for the new community. The developing Bingara Gorge residential estate also forms part of the Growth Area. The NSW Department of Planning and Environment's structure plan for the Wilton Growth Area (from the *Wilton 2040* plan) is at Figure 10.

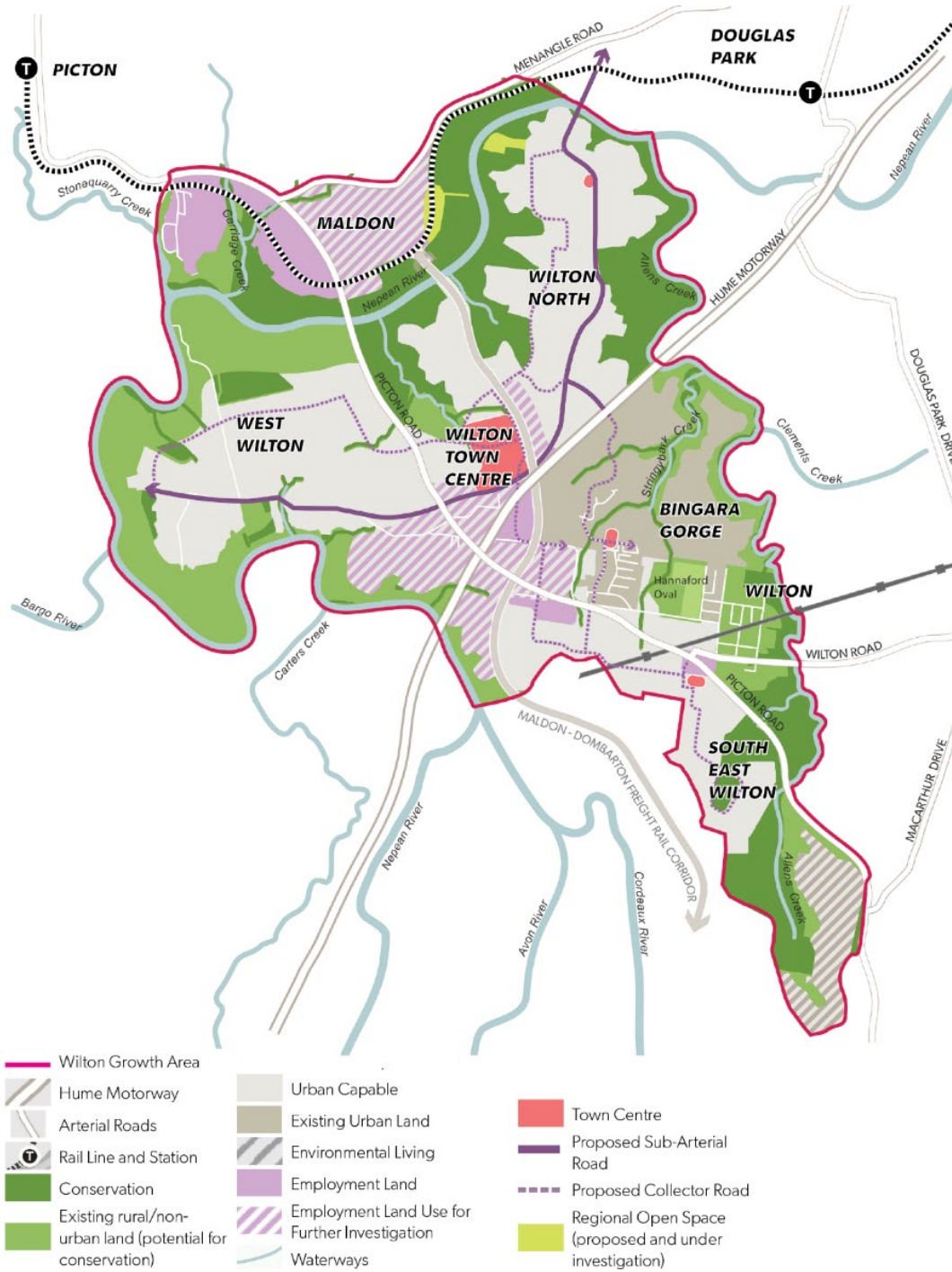
The plan's vision also includes the following elements:

- 'An employment hub for logistics'
- 'An accessible place'
- 'A protected and enhanced environment'

Transport planning for the Wilton Growth Area has identified needs for widening of the M31 Hume Motorway, new access ramps, and upgrading of Picton Road within the Growth Area. The need for a connection through the Greater Macarthur Growth Area to Picton Road is the subject of further analysis as part of this OSO2 investigation.

The OSO2 study area interfaces primarily with new land release areas, but also has potential implications on the Wilton Town Centre Precinct through direct impact on land or potential environmental impacts such as noise.

Figure 10: Wilton 2040 Structure Plan



## Biodiversity

Whilst much of Sector 1 has been impacted by agriculture post-European settlement, it nonetheless contains significant remnant native vegetation. Aquatic systems are also present including waterways such as the Nepean and Georges Rivers, wetlands, and farm dams.

A number of databases and reports were reviewed to gain an understanding of the sector's biodiversity values including the:

- BioNet Atlas of NSW Wildlife for *Biodiversity Conservation Act* (BC Act) listed threatened species and communities (i.e. State Government matters)
- Protected Matters Search Tool for *Environmental Protection and Biodiversity Conservation Act* (EPBC Act) matters of national environmental significance (i.e. matters regulated by the Commonwealth)
- SEED Environmental Database<sup>16</sup>
- Conserving Koalas in Wollondilly and Campbelltown LGAs (Office of Environment and Heritage report, January 2018)

It is important to note that corridor planning will not have any immediate impacts on land use and the environment. The land is just being safeguarded for potential use for future transport infrastructure, construction of which may be many decades away, and existing uses can continue in the meantime. Nonetheless, the matters outlined below have been identified as sensitive and attempts have been made during options development (as described later in this report) to avoid them as far as possible. Future infrastructure delivery within the corridor will need to undertake further detailed environmental assessment ahead of obtaining approval. A detailed environmental assessment would need to be undertaken in future before seeking approval to construct transport infrastructure in the corridor.

### Threatened Ecological Communities (TECs)

The concept of an 'ecological community' is an important way of understanding local biodiversity, and these are defined under the Biodiversity Conservation Act as 'an assemblage of species occupying a particular area'. Ecological communities are not limited to assemblages of plant species, although the majority of ecological communities listed under State (Biodiversity Conservation Act) and Commonwealth (EPBC Act) legislation are based around and defined by vegetation types.

State and Commonwealth legislation recognise different categories of Threatened Ecological Communities (TECs) of conservation significance: Vulnerable (V), Endangered (E), and Critically Endangered (CE). The listing of ecological communities as TECs takes into consideration the natural rarity of different ecological communities, current and historical reductions in their extent and threats to their continued existence. Table 3 below outlines the TECs identified in Sector 1 of the OSO2 study area. The location of TECs in Sector 1 is shown in Figure 11.

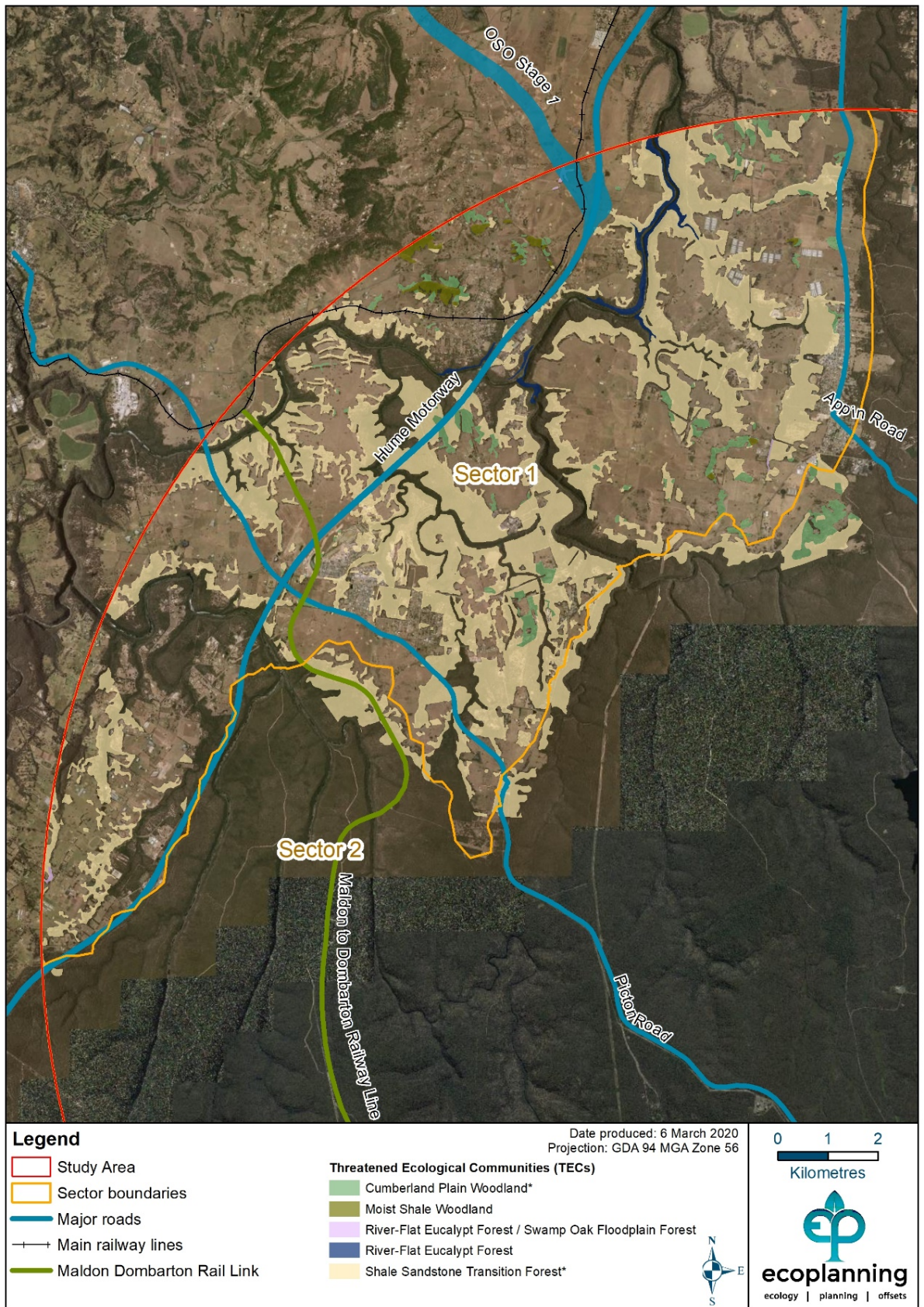
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<sup>16</sup> SEED is the NSW Government's central resource for Sharing and Enabling Environmental Data. | <https://www.seed.nsw.gov.au/>

**Table 3: TECs identified in the OSO2 study area – Sector 1**

<b>Threatened Ecological Communities</b>	<b>Status</b>
Western Sydney Dry Rainforest in the Sydney Basin Bioregion	NSW - Endangered Commonwealth – Critically Endangered
Moist Shale Woodland in the Sydney Basin Bioregion	NSW - Endangered Commonwealth – Critically Endangered
Cumberland Plain Woodland in the Sydney Basin Bioregion	NSW – Critically Endangered Commonwealth – Critically Endangered
Shale Sandstone Transition Forest in the Sydney Basin Bioregion	NSW – Critically Endangered Commonwealth – Critically Endangered
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregion	NSW –Endangered
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	NSW –Endangered Commonwealth –Endangered

Figure 11: TECs within the OSO2 study area – Sector 1



## Fauna and Flora

Individual flora and fauna species were also considered with the threatened species in Table 4 being identified as present in Sector 1:

**Table 4: Threatened flora and fauna species – OSO2 study area - Sector 1**

Common name	Scientific name	Conservation Status
<b>Fauna</b>		
Koala	<i>Phascolarctos cinereus</i>	State – Endangered C'wealth – Endangered
Macquarie Perch	<i>Macquaria australasica</i>	State – Endangered C'wealth – Endangered
<b>Flora</b>		
Hairy Geebung	<i>Persoonia hirsuta</i>	State – Vulnerable C'wealth - Vulnerable
Spiked Rice-flower	<i>Pimelea spicata</i>	State – Endangered C'wealth - Endangered
Sydney Plains Greenhood	<i>Pterostylis saxicola</i>	State – Endangered C'wealth - Endangered

While all of these species have biodiversity significance, koalas are known to be of particular community concern. Many in the community in south west Sydney feel strongly about the need to ensure sustainable development and a healthy local environment to protect koala numbers. Planning decisions have been made that endeavour to protect the species and maintain a viable population in the long term.

Within the OSO2 study area, koalas feed on a variety of eucalypts that include *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (Cabbage Gum), *E. moluccana* (Grey Box), *E. crebra* (Narrow-leaved Ironbark), *E. fibrosa* (Red Ironbark), *E. punctata* (Grey Gum), *E. globoidea* (White Stringybark), *E. piperita* (Sydney Peppermint), *E. longifolia* (Woollybutt), *E. pilularis* (Blackbutt) and *E. agglomerata* (Blue-leaved Stringybark). Based on mapping of these species, koala habitat and movement corridors have been identified by Department of Planning and Environment across the Wollondilly and Campbelltown local government areas, with a particular focus on *E. punctata* (Grey Gum) and *E. globoidea* (White Stringybark). Figure 12 below shows koala habitat and corridors, along with other threatened flora records, in Sector 1.

The Office of the Chief Scientist and Engineer has recently delivered a report<sup>17</sup> that provides clear and tangible pathways to increase koala numbers in the Greater Macarthur region. This will require:

- increasing and improving existing habitat
- constructing road underpasses and ongoing monitoring of their use by koalas
- separating koalas from key threats using exclusion fencing and appropriately wide buffer zones
- active predator management.

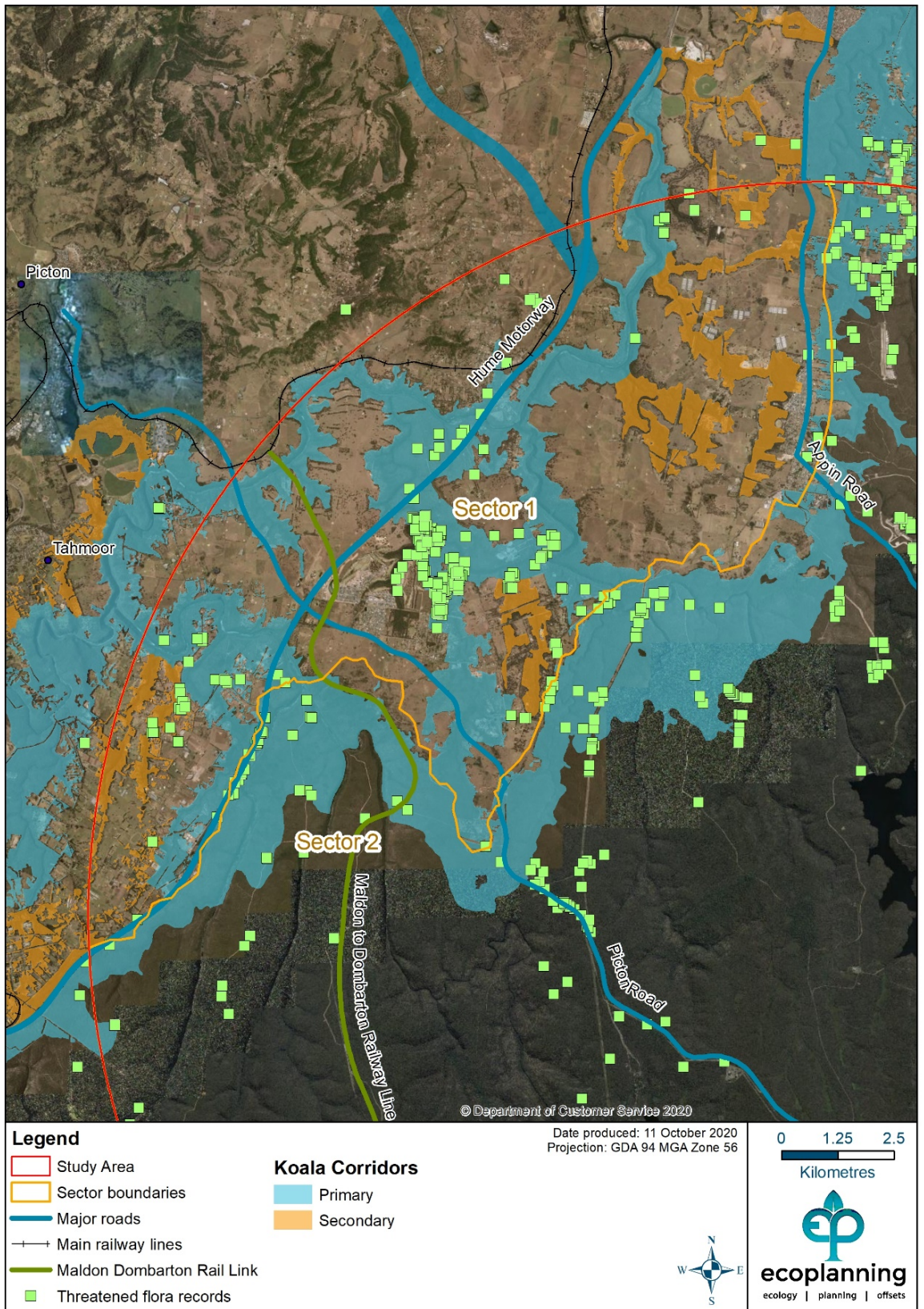
Consistent with *Greater Macarthur 2040*, the report also supports the protection of north–south koala movement corridors and recognises that further work is required to protect east–west corridors through the infrastructure and precinct planning process. Where koala habitat cannot be completely avoided it may be possible to mitigate impacts through elevating structures or using the other measures identified by the Office of the Chief Scientist and Engineer and currently in use such as fencing.

The development of corridor options for OSO2 had a strong focus on identifying those locations which had least impact on primary koala corridors and habitat. In this regard, the narrowest sections of the Nepean River were identified that would enable future bridging structures to give adequate clearance for koalas, and to minimise impacts to surrounding habitat. Avoiding vegetation along Ousedale Creek and providing a firm edge with infrastructure (to limit human access to koala habitat) was another consideration as part of the design of corridor options. Similarly, cleared land was seen as an opportunity for the OSO2 corridor to avoid and reduce impacts on habitat.

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<sup>17</sup> [Koala Report | Chief Scientist \(nsw.gov.au\)](https://www.chiefscientist.nsw.gov.au/independent-reports/koala-report) | <https://www.chiefscientist.nsw.gov.au/independent-reports/koala-report>

Figure 12: Koala habitat and corridors and threatened flora records – OSO2 study area – Sector 1





## The Cumberland Plain Conservation Plan

The NSW Government has been consulting on the *Cumberland Plain Conservation Plan* (CPCP) to protect and manage biodiversity across Western Sydney in association with the development of new urban areas, including the Greater Macarthur Growth Area.

The CPCP's strategic conservation planning assesses and conserves biodiversity upfront in the planning process for large scale development. In the Greater Macarthur Growth Area, it has sought to identify opportunities to protect the TECs discussed above, along with koalas, and other fauna and flora. This includes creating a new koala-focused National Park to the east of Appin Road as well as seeking to protect other locations. This may include new Biodiversity Stewardship Agreement (BSA) sites that are privately owned but legally protected in perpetuity to preserve their biodiversity values.

The OSO2 Project Team has worked closely with Department of Planning and Environment's CPCP team to ensure sites of interest to the CPCP are avoided as far as possible. Any offsets required for future OSO2 infrastructure would be identified prior to construction. Transport for NSW will continue working with Department of Planning and Environment to ensure that the future offsets are consistent with and enhance the strategic conservation planning of the CPCP.

## Aboriginal Heritage

Prior to European settlement, Sector 1 was an interface area between three tribal groups:

- the Tharawal people, who generally occupied the Illawarra coastal region southwards from the Georges River to the Shoalhaven River
- the Gundungurra people, who occupied the Southern Highlands and southern Blue Mountains area; and
- the Dharug people, who occupied Western Sydney and northern Blue Mountains up to the Hunter region.

Aboriginal heritage was previously examined in a 2017 report commissioned by the NSW Department of Planning and Environment as part of preliminary studies for the Greater Macarthur Growth Area. This report was considered by the OSO2 investigation together with the *Aboriginal Heritage Information Management System* (AHIMS) database, the *State Heritage Inventory* (SHI), the *Wollondilly Local Environmental Plan 2011*, and *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

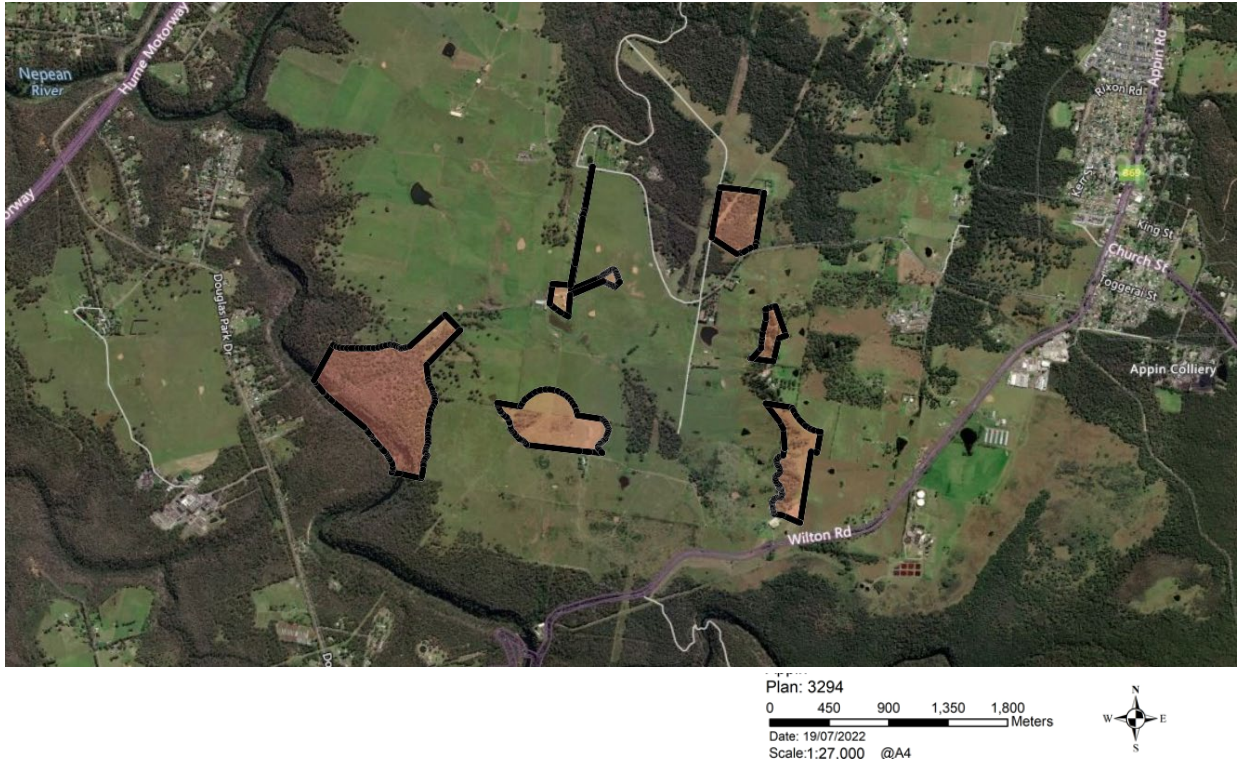
Twenty-one AHIMS sites were identified in a focus area between the M31 Hume Motorway and the northern boundary of the Metropolitan Special Area (broadly south of Appin township). These sites included rock shelters, artefact scatters, axe grinding grooves, and scarred trees. As would typically be expected, the AHIMS sites are concentrated around the key waterways within the study area. The highest potential for any further significant cultural material will most likely be found in areas along these waterway corridors with elevations and sandstone outcrops and a general absence of development.

An Aboriginal place is also listed under Schedule 5 of the Wollondilly Local Environmental Plan being the site of the 1816 Appin Massacre, where at least 14 Tharawal people were killed by British soldiers. It appears to be generally agreed that the massacre occurred in the vicinity of Broughton's Pass, although this site is presumed to contain no physical evidence of the event. A memorial has been established within the grounds of Cataract Dam and an annual memorial ceremony is held. The 2017 the NSW Department of Planning and Environment study also identified a massacre site and hanging tree in the West Appin area.

In parallel to the exhibition and consultation period for the preferred alignment for OSO2 Sector 1, both DPE and Heritage NSW engaged with Aboriginal knowledge-holders regarding the

identification of an area to be added to the NSW State Heritage register to mark the site of the Appin massacre. Given the significance of the site, the entire heritage curtilage represents a major constraint for any OSO2 option.

**Figure 13: NSW State Heritage endorsed curtilage for the Appin massacre site. Source: Heritage Council of New South Wales.**



## Non-Aboriginal Heritage

Government databases were searched to identify sites in Sector 1 that have been recognised for their non-Aboriginal heritage value, they include:

- Items of State Significance and listed under the Heritage Act 1977
- Items of Local Significance and listed within Schedule 5 of the Wollondilly Local Environmental Plan 2011 (excluding Aboriginal items)
- Items of Local Heritage Significance and listed within Schedule 5 of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 – Appendix 14 – South East Wilton Precinct Plan.

Two State significant sites and 21 locally significant sites have been identified in a focus area between the M31 Hume Motorway and the northern boundary of the Metropolitan Special Area.

### State significant sites

The Upper Canal System has been assessed as meeting the threshold for historical, associative, research potential and rarity heritage significance at the State level. Constructed in the nineteenth century, the canal is still operational and an important part of Sydney’s bulk drinking water distribution network. It is 64km long between Broughton Weir at the south of the Greater Macarthur Growth Area and the Prospect Reservoir near Wetherill Park as it traverses through rural, suburban and urban areas across Western Sydney. There are numerous existing roads and other infrastructure crossings along its course and future development would need to comply with WaterNSW’s Guidelines for Development Adjacent to the Upper Canal and Warragamba Pipelines.

The Windmill Hill Group, south of Appin township (on land owned by WaterNSW), has been assessed and endorsed as meeting the threshold for historical, aesthetic, social, research potential, rarity and representative heritage significance at the State level. A photo of the Windmill Hill Group is shown in Figure 14. The State Heritage Inventory includes the following statement of its significance:

*'The Windmill Hill Group, including Ruins, has State heritage significance for its ability to demonstrate the pattern of middle level farming and settlement in the Cumberland Plain from the 1820s to the early twentieth century, through its cluster of ruined farm buildings, granary, plantings and archaeological remains within a relatively intact rural setting, including remnant native bushland. When viewed from below the western ridgeline, the few visible elements in the landscape create a strong sense of place and retain the historic setting of the group of farm buildings and their relationship to one another, which is increasingly rare as the Cumberland Plain is subjected to development pressure. The rural vernacular character of the various buildings and ruins contributes to the high aesthetic quality of the group. This significance is reinforced through the visual connections between each individual farm across the valley.'*

**Figure 14: Windmill Hill Group – North Farm Structures**



The Windmill Hill Group is an important State heritage item. The curtilage of the property extends along Wilton Drive and a conservation management plan has been previously prepared for the site.

### **Locally significant sites**

A range of predominately nineteenth century homes, commercial buildings, and religious facilities were identified from Schedule 5 of the Wollondilly Local Environmental Plan 2011 and Schedule 5 of the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 – Appendix 14 – South East Wilton Precinct Plan as sites of local heritage significance, including:

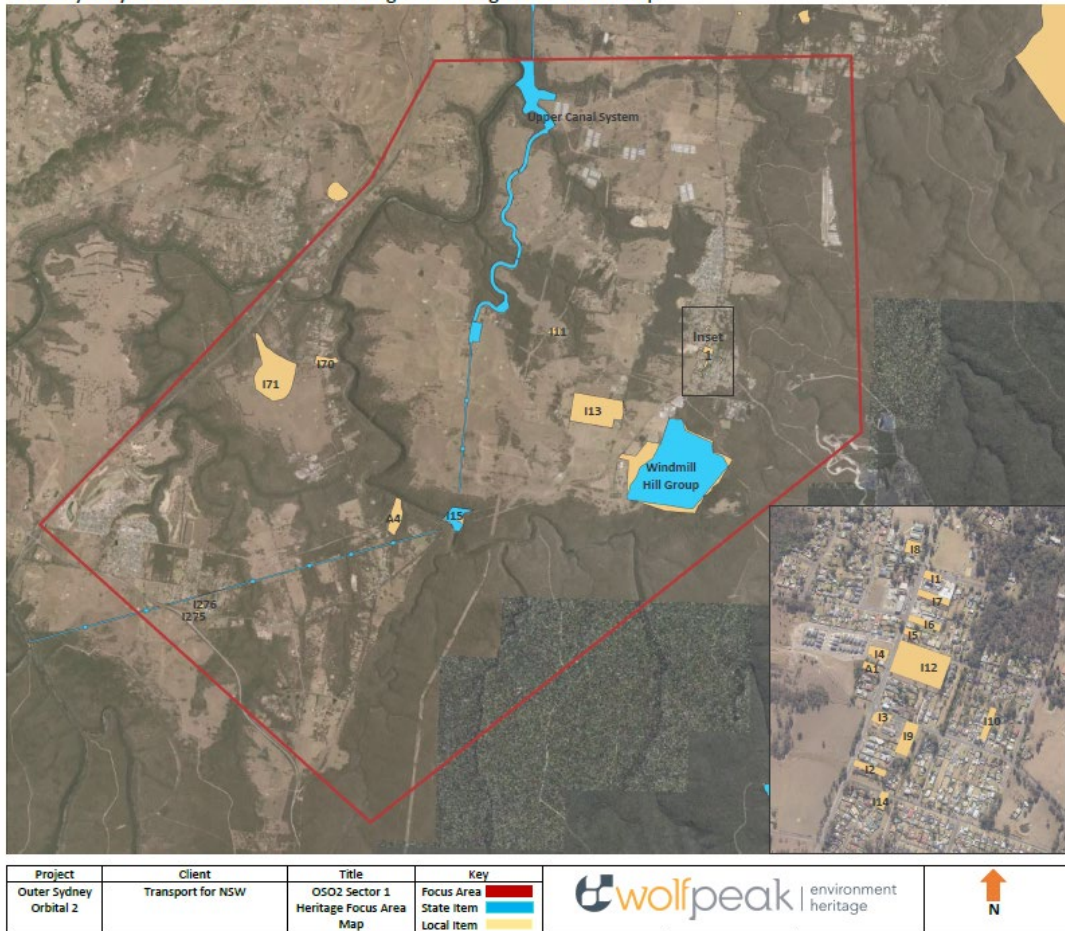
- Darcy's House Site (51 Appin Road, Appin)
- Stone Ruin (45 Whitticase Lane, Douglas Park)
- Appin Hotel (84 Appin Road, Appin)
- Former Courthouse and Gaol (22 Appin Road, Appin)

- Darcy's Corner (38 Appin Road, Appin) – NB: This structure was demolished in February 2020
- Appin Inn (61 Appin Road, Appin)
- Bungalow (66 Appin Road, Appin)
- Former Shop (70 Appin Road, Appin)
- Stone Cottage (78 Appin Road, Appin)
- Appin Public School and Schoolmaster's Residence (97 Appin Road, Appin)
- St Mark's Anglican Church and Graveyard (1–3 Church Street, Appin)
- Weatherboard Cottage (24 Church Street, Appin)
- Elladale (80 Elladale Road, Appin)
- St Bede's Catholic Church and Graveyard (60 Appin Road, Appin)
- Northhamptondale Group (60-80 Northhamptondale Road West, Appin)
- Former St Marks Rectory – (5 Toggerai Street, Appin)
- Stone Cottages (380 Douglas Park Drive, Douglas Park)
- St Mary's Towers (415 Douglas Park Road, Douglas Park)
- Cottage (1090 Argyle Street, Wilton)
- St Luke's Anglican Church (1095 Argyle Street, Wilton)
- Windmill Hill Group (NB: The local listing has slightly different boundaries to the State listing)

The locations of the State and locally significant non-Aboriginal heritage items are identified and outlined in Figure 15 below. The majority of locally listed heritage items are within Appin township, which is also a major land use constraint for corridor options.

**Figure 15: Locations of Non-Aboriginal Heritage Items**

Outer Sydney Orbital Sector 1 – Non-Aboriginal Heritage Focus Area Map



**KEY**

**Heritage Item SHR/LEP No. and Heritage Item**

01373 (SHR) Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)	13 Darcy's Corner (38 Appin Road, Appin)	19 St Mark's Anglican Church and Graveyard (1-3 Church Street, Appin)	114 St Marks Rectory - former (5 Toggerai Street, Appin)
115 Broughton Pass Weir	14 Appin Inn (61 Appin Road, Appin)	110 Weatherboard Cottage (24 Church Street, Appin)	170 Stone Cottages (380 Douglas Park Drive, Douglas Park)
01931 (SHR) Windmill Hill Group including ruins (Wilton Road, Appin)	15 Bungalow (66 Appin Road, Appin)	111 Elladale (80 Elladale Road, Appin)	171 St Mary's Towers (415 Douglas Park Road, Douglas Park)
A1 Darcy's House Site (51 Appin Road, Appin)	16 Shop - former (70 Appin Road, Appin)	112 St Bede's Catholic Church and Graveyard (60 Appin Road, Appin)	1275 Cottage (1090 Argyle Street, Wilton)
11 Appin Hotel (84 Appin Road, Appin)	17 Stone Cottage (78 Appin Road, Appin)	113 Northhamptondale Group (60-80 Northhamptondale Road West, Appin)	1276 St Luke's Anglican Church (1095 Argyle Street, Wilton)
12 Courthouse and Gaol former (22 Appin Road, Appin)	18 Appin Public School and Schoolmaster's Residence (97 Appin Road, Appin)		

## Geotechnical and mining

Geological databases and other sources of information were reviewed to build an understanding of the geological environment including acid sulfate soil risk potential, and mining activities. These characteristics are described below which, with the exception of certain aspects of mining, were not deemed to be significant constraints for future transport infrastructure. Ongoing liaison with Subsidence Advisory NSW will be required for future applications to support urban development and transport infrastructure.

## Geological environment

In a regional geological context, Sector 1 area is located within the Sydney Basin which occupies the current geography roughly from Nelson Bay in the north to Batemans Bay in the south and from

Lithgow in the west to the eastern coastline and beyond. The Sydney Basin – a bowl shaped regional landscape formed on the older basement rocks of the Lachlan Fold Belt is filled predominantly with near-horizontally bedded sequence of sedimentary rocks including sandstones, siltstones and claystones which were deposited during the Permo-Triassic periods some 250 – 300 million years ago. The proposed sector area lies in the southern part of the Basin where the stratigraphic subdivisions recognised in the sedimentary rock strata comprise (from older to younger) the Permian Shoalhaven Group and Illawarra Coal Measures, Late Permian to Middle Triassic Narrabeen Group, the Middle Triassic Hawkesbury Sandstone and Wianamatta Group Folding and lineaments.

With reference to the 1:100,000 geological map of Wollongong – Port Hacking, there are a number of geological structural lineaments including Narellan Lineament Syncline, South Coast Wrap, Coastal Lineament and Douglas Park Syncline that are mapped crossing the sector area.

Applications for infrastructure approval within an OSO2 corridor will require further geotechnical investigations together with other detailed environmental constraints analysis.

### **Acid sulfate soil**

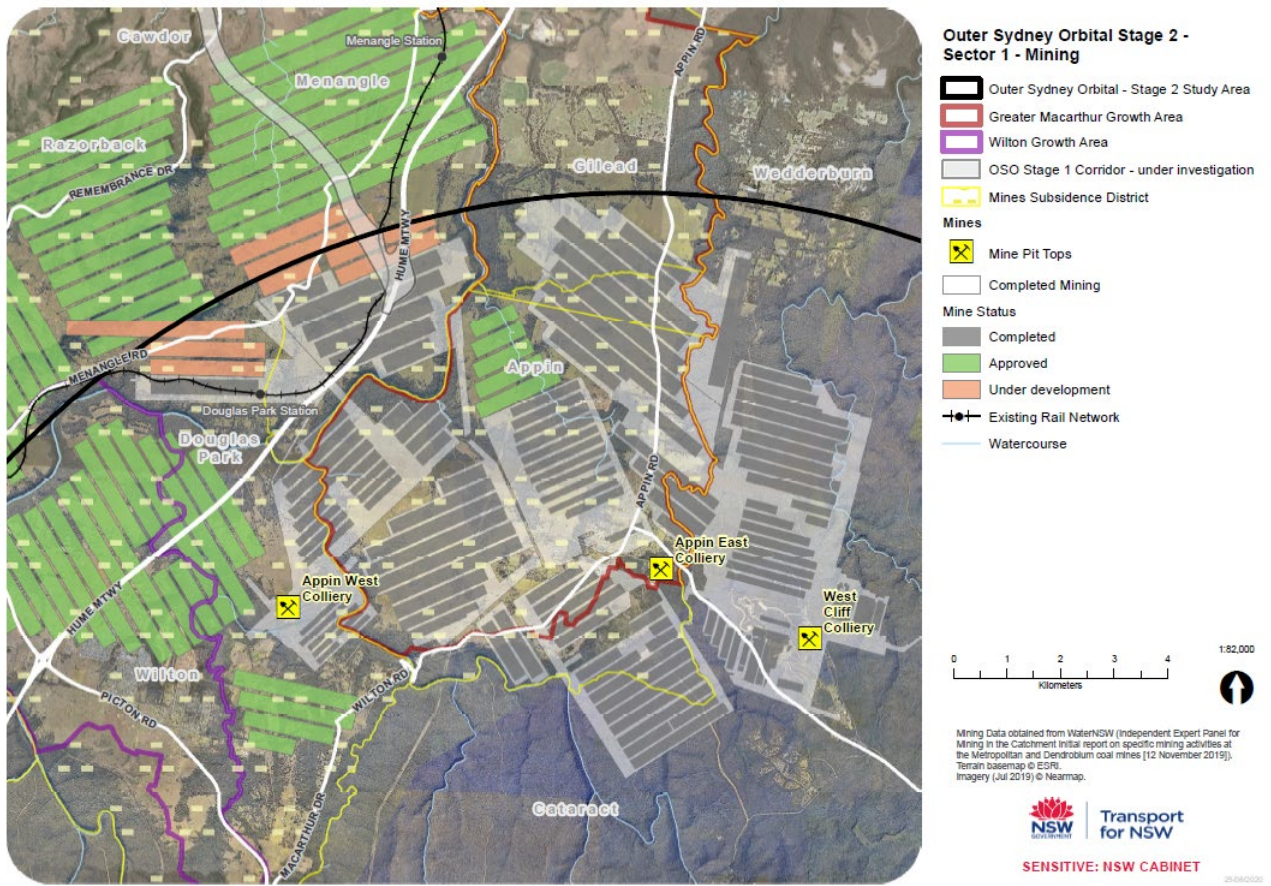
There are no known areas of potential acid sulfate soil within Sector 1.

### **Mining**

Mining activities have been carried out in the Macarthur region for many decades and are expected to continue for an extended period of time. South 32 operates extensive underground coal mining operations around Appin. These are accessed by three pit tops: Appin West (off Douglas Park Drive), Appin East (off Colliery Lane to the south of Appin township), and at West Cliff to the south east of Appin township.

The status of mining including the location of completed, approved, proposed and under development works in Sector 1 is illustrated in Figure 16.

**Figure 16: Historic and current mining activity in Sector 1**



A major consequence of underground mining is ground subsidence which may affect the stability of the built environment above it. This typically takes place within one to two years after the completion of mining. As mining has largely been completed within the boundary of the Greater Macarthur Growth Area, and the delivery of OSO2 infrastructure is not expected for many years, subsidence is not considered to be a significant constraint (i.e. future mining in the area of likely interest for OSO2 options such as in the vicinity of Macquariedale Road, is likely to be completed before infrastructure is built). However, the continuing functions of surface mining infrastructure, such as the Appin East Colliery and ventilation portals, have been recognised as part of the constraints analysis process.

## Flooding and hydrology

Sector 1 contains several major watercourses, of which the most significant are stretches of the Nepean, Cataract, and Georges Rivers. These flow through deep gorges that would require major spans to cross. Each of these rivers also have tributaries, such as Ousedale Creek, Elladale Creek, Mallaty Creek, and Simpsons Creek which flow into the Nepean. While Clements Creek, Allens Creek, and Stringybark Creek shape the area between Wilton and Douglas Park. Generally, the rolling nature of Sector 1 mitigates against widespread flooding, land in and around part of Appin township has been identified in Greater Macarthur 2040 as being at 1-in-100 year flood risk.

Sector 1 is also adjacent to (though downstream from) WaterNSW's Metropolitan Special Area, which together with other elements of the Upper Nepean catchment typically supplies between 20 to 40 percent of Sydney's water.

Overall, flooding has been assessed as a manageable constraint within the study area and can be appropriately addressed through the future design of structures. Further detailed flood assessment

will be completed as part of any future applications for infrastructure within the proposed OSO2 corridor prior to construction.

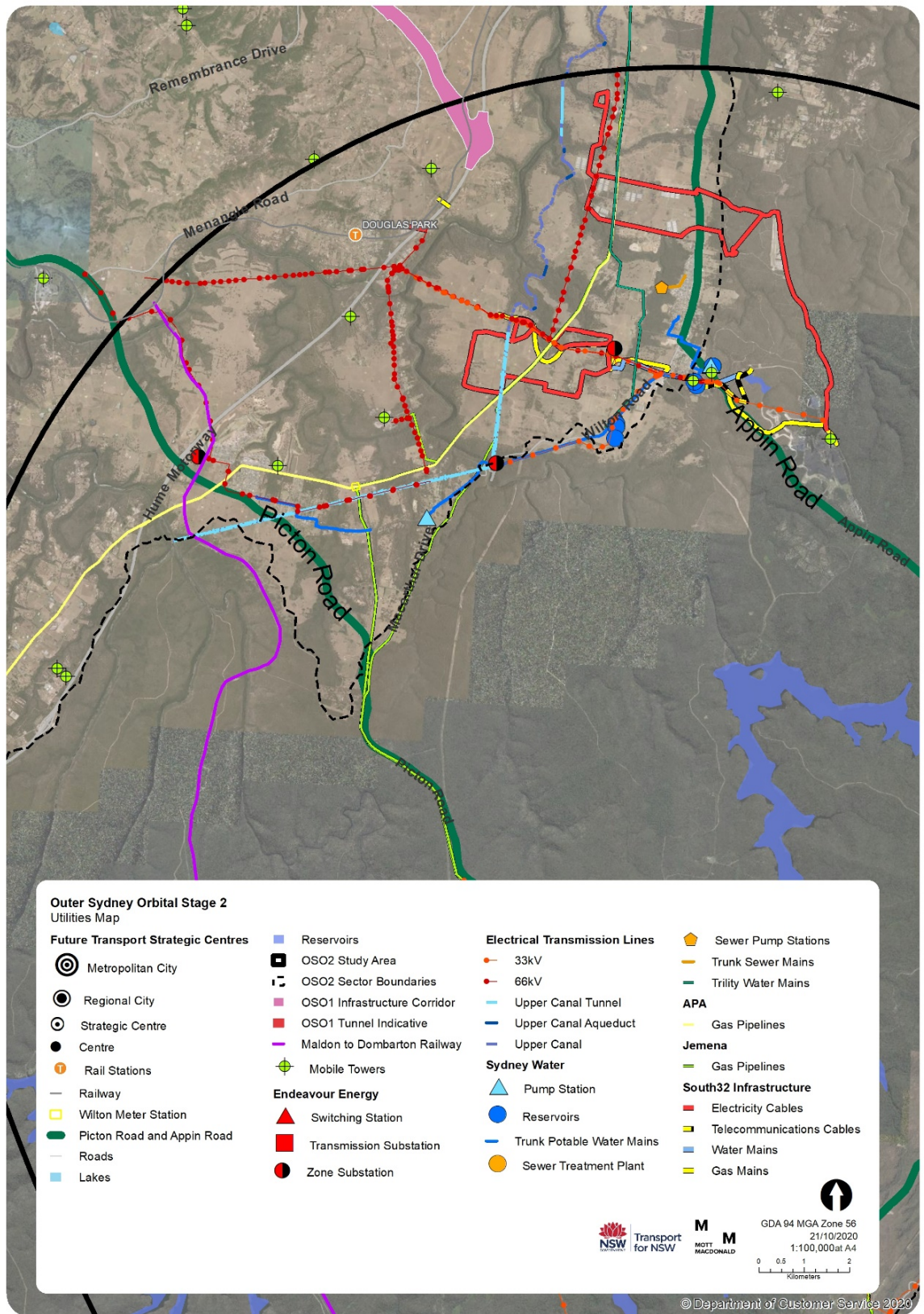
## Utilities

A utilities assessment was undertaken based on information collated from public sources as well as Geographic Information System (GIS) data provided by utility authorities. The assessment focused on larger trunk infrastructure, such as major power lines, that would be costly or difficult to relocate. Details regarding individual trunk utility services are provided below and locations are shown in Figure 17.

Wherever possible, corridor options should avoid major utilities and provide buffers to avoid impacts on existing structures. If required, the design of crossing points will be considered prior to construction, as part of future infrastructure development applications within the proposed OSO2 corridor.



Figure 17: OSO2 – Sector 1 Utilities



## **Potable and sewer water infrastructure**

Sydney Water, WaterNSW, and TRILITY own and operate several major water infrastructure items in Sector 1 including potable and sewer mains, the Upper Canal, reservoirs, and pump stations.

Local potable water supply is provided by Sydney Water and TRILITY infrastructure. The Macarthur Water Filtration Plant on Wilton Road extracts raw water from Broughton Pass weir. Treated water is then transferred to the surrounding area via a 1200mm trunk main located within an easement. It would be preferable for this trunk main to remain in its existing location due to its size and the resulting difficulties and costs associated with relocation. Other smaller trunk mains are also present. A single submersible wastewater pump station and adjoining pipe 300mm in diameter are believed to be the only large trunk sewer infrastructure.

Pump stations and reservoirs should be avoided, and interfaces with other water infrastructure will be considered at the time of construction of any infrastructure within the proposed OSO2 corridor. WaterNSW's guidelines for development adjacent to the Upper Canal (noted earlier in relation to this item's heritage value) also address design requirements for this item's function as a utility supplying Sydney.

## **Electrical infrastructure**

From the Dapto bulk supply point (BSP), a 330kV a TransGrid transmission line passes north through the Illawarra Escarpment and Lake Cordeaux on the western side. The transmission line enters Sector 1 near Broughton Pass and then continues northwards to the Macarthur BSP. Relocating this line would be relatively difficult.

Endeavour Energy (EE) maintains a number of infrastructure items, including three zone substations located at Wilton, Broughton Pass and Appin. These substations are connected via a series of overhead 33kV and 66kV transmission lines.

The Appin and Broughton Pass substations are connected via 66kV transmission lines which generally follow the alignment of Wilton and Brooks Point Road. These transmission lines also extend to the Appin and West Cliff Collieries, located on Appin Road.

33kV transmission lines originate from the Douglas Park switching station, located on Prices Road. These transmission lines exit the switching station to the south and generally follow the alignment of Douglas Park Drive. The Appin West Colliery is supplied by these transmission lines. The Wilton substation is supplied by the 33kV network via transmission lines which traverse the Bingara Gorge development site boundary and connects Douglas Park Drive.

EDL has developed a large Waste Coal Mine Gas (WCMG) power station at Appin that captures WCMG from South 32 mines and generates a significant amount of electricity used in mine operations.

Where possible electrical easements and structures should be avoided. However, future crossing points will require future detailed design prior to construction of infrastructure within the proposed OSO2 corridor.

## **Gas infrastructure**

Two bulk gas providers - Jemena and APA - operate several significant infrastructure items in Sector 1. These include:

- A section of Jemena's Eastern Gas Pipeline (EGP), an 800km major natural gas asset that runs between Longford, Victoria and Horsley Park, Sydney via Wollongong and which supplies more than half of the gas consumed in NSW.

- Several smaller Jemena trunk lines, including a connection to the Appin West Colliery
- A stretch of APA's Moomba-Sydney Pipeline
- Jemena (trunk receiving and metering stations) and APA (metering station) facilities on Ashwood Rd between Douglas Park and Wilton.

All of these items would be difficult and costly to relocate. Gas providers have specific design requirements for other linear infrastructure such as roads which need to cross their easements. These requirements are well understood by Transport for NSW and will be addressed as part of any future applications for infrastructure development within the proposed OSO2 corridor.

### **Telecommunications infrastructure**

Telecommunications infrastructure was reviewed but due to its nature (e.g. mobile towers) was considered to not be a significant constraint as items could be relatively easily relocated or otherwise addressed if needed.

## **Contaminated Land**

NSW Department of Planning, Industry and Environment databases were searched to identify sites registered as contaminated land in accordance with NSW environmental protection legislation. No sites were identified as significant constraints. Further detailed investigations into contamination will be conducted prior to construction of any infrastructure within the proposed OSO2 corridor.

## **Constraints Summary**

The issues mapped and discussed above were considered by the project team and Advisory Group during corridor options development. Some of the items were considered as being more sensitive than other constraints, and these are outlined below.

### **Land Use and Landscape**

- The existing townships of Appin, Douglas Park, Wilton and adjacent subdivisions
- The industrial estate to the south of Appin township
- Potential future Greater Macarthur Growth Area centres and major infrastructure corridors

### **Biodiversity**

- Threatened ecological communities
- Primary and secondary koala corridors
- Biodiversity Stewardship Agreement sites
- Land identified as being of interest for future protection as part of the Cumberland Plain Conservation Plan

### **Cultural Heritage**

- Aboriginal heritage sites (AHIMS sites)
- State significant heritage items
- Local heritage items

### **Geotechnical and Mining**

- Surface mining infrastructure and supporting utilities

### **Flooding and Hydrology**

- Major watercourses (i.e. the Nepean, Georges and Cataract Rivers)

### **Utilities**

- Major water, electrical, and gas infrastructure

### **Mitigations**

The initial identification of constraints above does not reflect that there may be opportunities to implement mitigation strategies for some negative impacts, such as noise, when future infrastructure is designed in detail. Depending on where and how infrastructure is designed and built, mitigations may substantially reduce impacts. Common mitigations for linear transport infrastructure include, for example, barriers to address visual or noise impacts, and underpasses or overpasses to help people or animals to cross it. Biodiversity offsets may be used where appropriate to address residual impacts.

# Corridor Option Development and Assessment

## Initial options identification

The Project Team and the Advisory Group used a range of studies to identify potential options for inter-regional connections through the Greater Macarthur Growth Area and Wilton Growth Area from the M31 Hume Motorway connecting to either Appin Road or Picton Road. The constraints mapping discussed in the previous chapter informed the development of alignments along with the OSO2 Corridor Objectives, in accordance with the following guiding design principles:

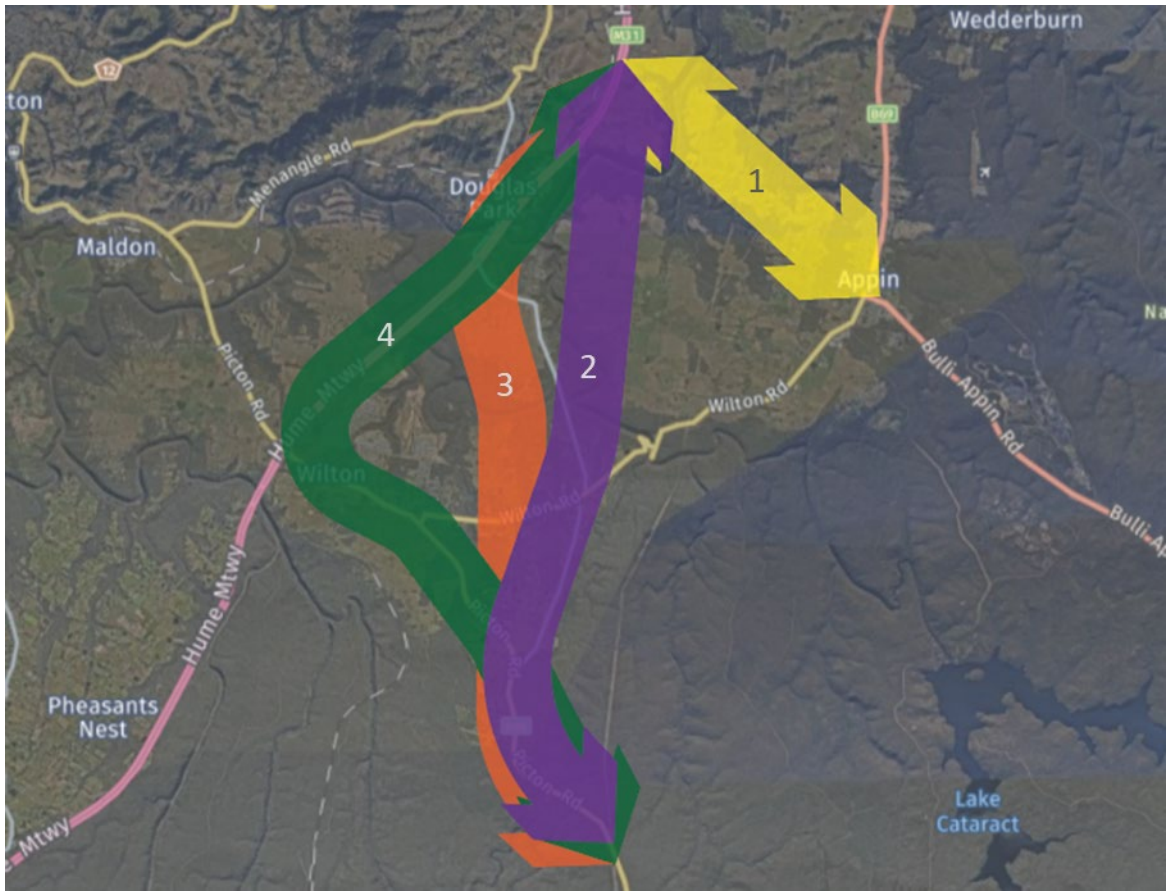
- **M31 Hume Motorway connection point:** It was assumed that OSO2 options should connect with the M31 Hume Motorway at the planned Outer Sydney Orbital Stage 1 interchange on NSW government-owned land announced in 2018 (see Figure 3).
- **Provide attractive routes for transport customers:** Strategic corridor options should offer a logical (e.g. relatively direct route) between the Hume interchange and intra-regional routes to the Illawarra-Shoalhaven (via either Appin Road east of Appin township or Picton Road south of the Wilton township) in the context of the identified constraints.
- **Test different approaches to avoiding or otherwise addressing major constraints:** Given that major constraints could be found across the study area, it was determined that no strategic option could reasonably avoid all significant constraints. Accordingly, a range of strategic options were developed that offered greater or lesser impacts on different forms of constraint discussed earlier. Strategic options east of the Appin township were discounted due to unacceptable impact on koala habitat and a new National Park proposed by the Government. Land previously identified for a potential Appin Bypass was also avoided due to the potential for unacceptable social and environmental impacts.
- **Avoid the most sensitive constraints:** Notwithstanding the above, strategic options should, as far as reasonably practicable, avoid items identified as sensitive during the constraint mapping process, particularly where effective impact mitigations would be difficult to achieve.

The design of the corridor options also considered the Business Requirements Statement (BRS) at Appendix A.

Based on the above, four strategic options (or “swooshes”) were identified linking the southern terminus of OSO1 to key intra-regional connections across the study area. These strategic options are:

- Strategic Option 1: OSO1 to Appin Road (yellow)
- Strategic Option 2: OSO1 to Picton Road via Broughton Pass and Macarthur Drive (purple)
- Strategic Option 3: OSO1 to Picton Road via Ashwood Road (orange)
- Strategic Option 4: OSO1 to Picton Road via M31 Hume Motorway (green)

**Figure 18: Four OSO2 strategic options (“swooshes”) linking the southern terminus of OSO1 to key strategic connections across the study area. Key: 1: yellow; 2: purple; 3: orange; 4: green.**



## Strategic Merit Test

A Strategic Merit Test (SMT) was undertaken to reduce the number of swoosh options based on the updated strategic context of the project. The strategic criteria and indicators used are shown in Table 5.

**Table 5: Criteria used for Strategic Merit Test.**

Criteria	Strategic indicator(s)
1 Community Impacts	Alignment should be unlikely to impact place outcomes in existing communities.
2 Movement of people and goods	Does the swoosh allow for the distribution of local traffic, regional traffic and freight appropriately to avoid local communities and not overload the road network?
3 Supporting Urban Development and Growth	Indication of alignment with urban development priorities from DPE, major landholders, and developers about preferred areas to develop.
4 Environmental Impacts	Does not encroach on sensitive koala habitat and Cumberland Plain forest areas. Consideration of threatened species and ecological communities. Consideration of Sydney Drinking Water Catchment.
5 Constructability and Cost	Does not require relocation or reconstruction of existing major infrastructure. Avoids unreasonable construction impacts and capital cost.
6 Supporting creation of resilient communities	Provides alternative or upgraded higher order access/egress routes for communities in bushfires, floods and other natural disasters.
7 Connecting with country and respecting First Nations heritage and cultural values	Does not impact recognised areas of historical or cultural value to First Nations communities.

The SMT assessed whether each strategic option would pass or fail when considered against each of these strategic indicators. Where appropriate, a “conditional” pass was applied to demonstrate that specific design decisions for the detailed alignment would allow these criteria to pass.

Applying these to the four strategic options (“swooshes”), Option 1 and Option 4 fail to meet some of the strategic criteria and as such will be excluded from further consideration in the multi-criteria analysis. A summary of SMT is shown in Table 6.

**Table 6: Application of SMT to strategic options.**

Criteria	Option 1 (yellow)	Option 2 (purple)	Option 3 (orange)	Option 4 (green)
1 Community Impacts	■ Pass	■ Pass	■ Pass	■ Fail
2 Movement of people and goods	■ Fail	■ Pass	■ Conditional	■ Fail
3 Supporting Urban Development and Growth	■ Conditional	■ Pass	■ Pass	■ Fail
4 Environmental Impacts	■ Pass	■ Conditional	■ Conditional	■ Pass
5 Constructability and Cost	■ Pass	■ Conditional	■ Conditional	■ Fail
6 Supporting creation of resilient communities	■ Fail	■ Pass	■ Pass	■ Fail
7 Connecting with country and respecting First Nations heritage and cultural values	■ Conditional	■ Conditional	■ Conditional	■ Pass
<b>Overall assessment:</b>	<b>■ Fail</b>	<b>■ Pass</b>	<b>■ Pass</b>	<b>■ Fail</b>

### Discussion of SMT application

Strategic option 1: OSO1 to Appin Road (yellow):

1. Avoids existing Appin village, including locating road infrastructure to avoid potential noise issues.
2. Unacceptable risk to future congestion on the road network around the Illawarra Escarpment (see breakout box below). There is also the potential for intra-regional traffic to bypass through the new urban development areas of Greater Macarthur Growth Area and Wilton Growth Area.
3. Reduced place-making outcomes in the new West Appin and Appin urban areas, which could be mitigated through the provision of a lower speed regional-level road aligned with future structure planning.
4. Minimises environmental impacts.
5. A relatively shorter route with only one complex river crossing.
6. Fails to provide the desired and necessary route redundancy for detours during natural disasters (see breakout box below).
7. Can avoid significant impacts on heritage during future phases of design investigation.

Strategic option 2: OSO1 to Picton Road via Broughton Pass and Macarthur Drive (purple)

1. Avoids existing Appin village and Wilton village, including locating road infrastructure to avoid potential noise issues.
2. Provides an optimal intra-regional route to the Illawarra-Shoalhaven and supports a resilient network.
3. Well-aligned with development outcomes for both Greater Macarthur Growth Area and Wilton Growth Area.



4. Avoids significant Koala habitat, but requires infrastructure across Cataract River and through areas of important habitat for endangered species. Further design investigations are required to avoid or minimise potential impacts.
5. Additional river crossings (compared to other options) that add complexity and cost.
6. Transport for NSW is currently planning for additional capacity on Picton Road. This strategic option would further improve resilience of the transport network by utilising Picton Road as a viable and secure connection to the Illawarra.
7. Can avoid significant impacts on heritage during future phases of design investigation.

#### Strategic option 3: OSO1 to Picton Road via Ashwood Road (orange)

1. Avoids existing Appin village and Wilton village, including locating road infrastructure to avoid potential noise issues.
2. Provides an optimal intra-regional route to the Illawarra-Shoalhaven and supports a resilient network. Has the potential to introduce traffic congestion on the M31 Hume Motorway.
3. Well-aligned with development outcomes for both Greater Macarthur Growth Area and Wilton Growth Area.
4. Avoids significant Koala habitat and avoids infrastructure across Cataract River. However, the route does pass through areas of important habitat for endangered species. Further design investigations are required to avoid or minimise potential impacts.
5. Would require considerable upgrades to the M31 Hume Motorway, including duplication of the crossing over the Nepean River (in the vicinity of Douglas Park Bridge).
6. Improves resilience of the transport network by utilising Picton Road where a new Illawarra Escarpment crossing is considered less complex and costly to construct.
7. Can avoid significant impacts on heritage during future phases of design investigation.

#### Strategic option 4: OSO1 to Picton Road via M31 (green)

1. Avoids existing Appin village, but significant impacts on the existing and future Wilton township as any alignment would need to be located in close proximity to urban areas.
2. Results in longer journey times for intra-regional traffic from Western Sydney to the Illawarra.
3. Reduced place-making outcomes in the Wilton Growth Area with few alternatives available for the OSO2 route. Difficult to align with future structure planning.
4. Avoids major environmental constraints and minimises environmental impacts.
5. Would require considerable upgrades to the M31 Hume Motorway, including duplication of the crossing over the Nepean River (in the vicinity of Douglas Park Bridge) and complex adjustments to the M31 Hume Motorway interchange at Picton Road. Would be inconsistent with current upgrades to Picton Road.
6. Does provide desirable route redundancy for detours during natural disasters (see breakout box below), but via a longer route and resulting in more pressure on the M31 Hume Motorway during any incident.
7. Avoids major heritage constraints.

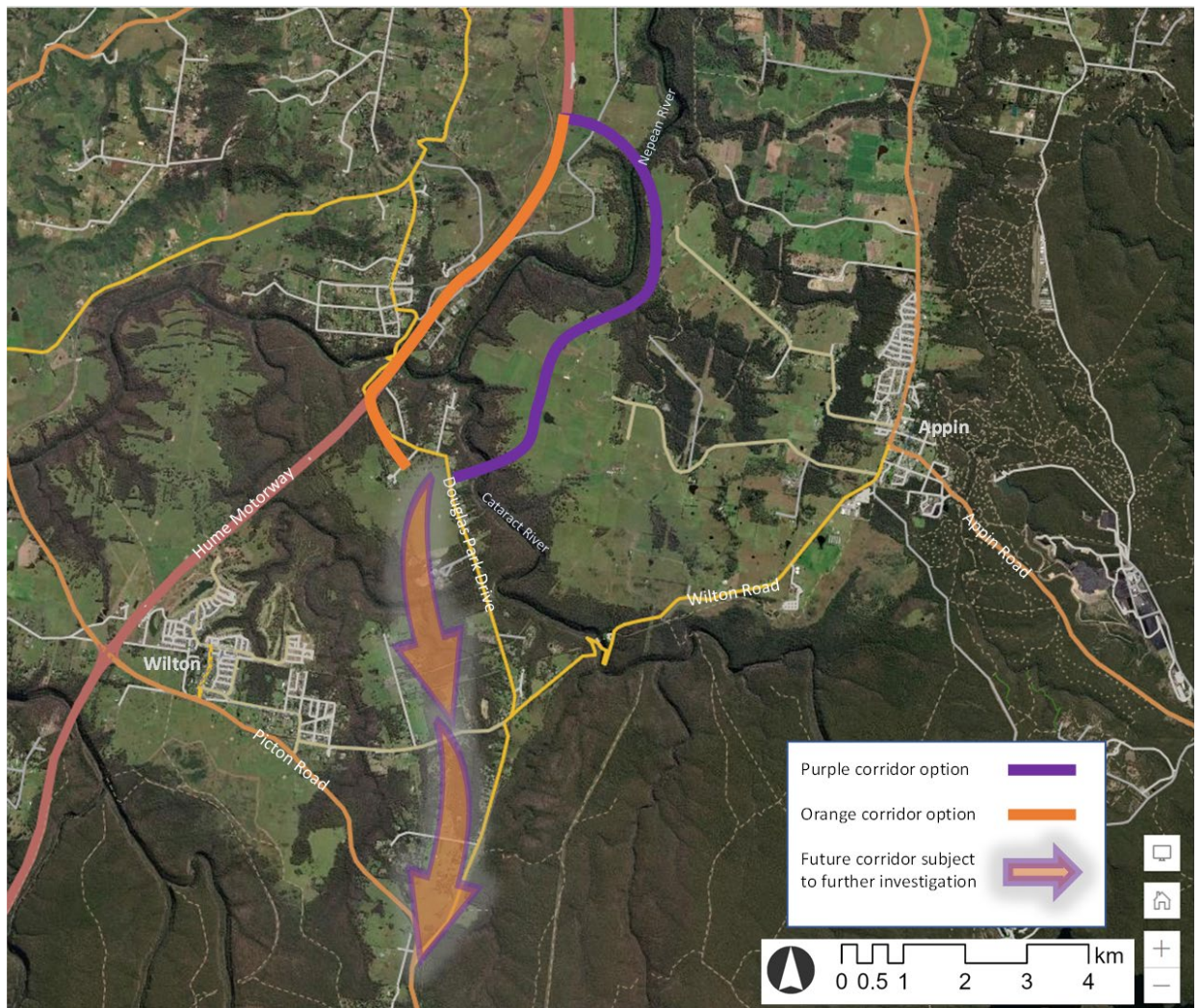
## Identification of corridor options

Two key corridor options were brought forward from the strategic merit test and developed to be considered as part of the multi-criteria analysis:

- Purple Option: Connecting OSO1 southern terminus to Picton Road via a bridge over the Nepean River near Elladale Creek, a bridge over the Cataract River approximately 1.5km upstream of the Nepean River, and a new OSO2 Motorway route in the vicinity of Douglas Park Drive and MacArthur Drive between Dredge Avenue and Picton Road.
- Orange Option: Connecting OSO1 southern terminus to Picton Road via the M31 Hume Motorway, with a new motorway junction at or near Douglas Park Drive, and a new OSO2 Motorway route in the vicinity of Douglas Park Drive and MacArthur Drive between the M31 Hume Motorway and Picton Road.

These are both shown in Figure 19.

**Figure 19: Short list of corridor options considered for revised MCA.**



## Multi Criteria Analysis (MCA)

An MCA provides a structured and efficient way to compare a range of options against stated objectives, with the flexibility to incorporate qualitative and quantitative evidence in a consistent manner. MCAs also allow an assessment of options at the strategic planning phase where monetised costs are not available, and similarly allow for the incorporation of the social and strategic benefits of pursuing certain options.

It is more detailed than the SMT and is most effective when project objectives are expanded into more detailed sub-criteria that address the key issues of the objective, with specific indicators and agreed measurements of these indicators to be used to assess how well a particular option performs. These indicators can be either qualitative or quantitative in nature.

This MCA will assess the two corridors developed for each swoosh that passed the SMT. The assessment criteria were expanded to reflect the changed context of the OSO2 and incorporate the additional corridor objectives. No weightings were applied to the supporting criteria.

Corridors were scored against each sub-criterion, using the scoring system presented below. The outcome from the MCA is presented below this.

### MCA sub-criteria

#### Criteria 1: Community impacts

Sub-criteria	Indicator	Measure
1.1 Impacts on existing residential properties	Quantitative assessment of the number of private residential properties impacted	Higher score for alignments which impact fewer properties, and lower score for alignments which impact a greater number of properties.
1.2 Noise, vibration and pollution impacts from new motorway alignment is minimised on existing and future communities	Qualitative assessment of distance the proposed alignment is from existing and future communities.	Higher score for alignments which are further away from or avoid existing and future communities, lower score for alignments which impact existing and future communities.
1.3 Alignment minimises severance of existing and planned future communities	Qualitative assessment of the barriers created by options between existing and planned communities	Higher score for movement corridors which avoid an alignment through urban areas and do not sever walking, cycling and driving routes for local journeys. Lower scores for movement corridors which potentially sever walking, cycling and driving routes for local journeys.

## Criteria 2: Movement of people and goods

Sub-criteria	Indicator	Measure
2.1 Provides long-term capacity on the higher order road network	Option does not result in any road reaching capacity in modelled future year scenarios	Higher score for options which maintain favourable capacity conditions across wider higher-order road network, lower score for options which result in reduced spare capacity or over-capacity roads across the wider higher-order road network.
2.2 Removes freight off local roads in new growth areas such as Wilton and Appin	Option does not increase regional trips on local roads in modelled future year scenarios	Higher score for alignments which reduce the number of regional freight trips on local roads, lower score for alignments which maintain or increase the number of regional freight trips on local roads in future year scenarios.
2.3 Minimises travel times	Quantitative assessment of the expected travel associated with the proposed alignments	Higher score for shorter travel times along key roads and lower scores for longer travel times along key roads modelled in future year scenarios.

## Criteria 3: Supporting urban development and growth

Sub-criteria	Indicator	Measure
3.1 Minimal impact on delivery of planned new housing supply	Qualitative assessment of how the corridor would affect the development yield of the growth area	Higher score for alignments which enable release of larger tracts of housing over the short term, and lower scores for alignments which would not enable this.
3.2 Supports movement and place functions in the development area	Qualitative assessment based on alignment with Greater Macarthur 2040 transport network planning, opportunity to improve future community connections, opportunity for collocation of utilities within corridors	Higher score for alignment options which align with the structure plan for Greater Macarthur Growth Area 2040. Lower score for alignment options which contradict the intended outcomes of Greater Macarthur Growth Area 2040.
3.3 Supports amenity and liveability in the development area	Qualitative assessment based on the intensity of sensitive land uses near the corridor.	Higher score for alignment options which avoid areas of greater intensity or sensitive land use, and lower scores for alignment options which do not.

#### Criteria 4: Environmental impacts

Sub-criteria	Indicator	Measure
4.1 Minimised or no impact on koala habitat	Option minimises the potential impacts in terms of area of koala habitat lost	Higher score for no or fewer hectares of koala habitat impacted, lower score for greater number of hectares of koala habitat impacted.
4.2 Impact on Cumberland Plain Conservation Plan	Option minimises the potential impacts to Cumberland Plain woodlands.	Higher score for no or fewer hectares of Cumberland Plain woodland impacted, lower score for greater number of hectares of Cumberland Plain woodland impacted.
4.3 Impacts to Hydrology and Riparian Corridors	Option minimises the potential impact on waterways.	Higher score for no or fewer key water crossings and lower score for more key water crossings that result in impacts to waterways and riparian zones.

#### Criteria 5: Constructability and cost

Sub-criteria	Indicator	Measure
5.1 Potential for delivery of road infrastructure along corridor by private developers	The option/part of the option is likely to be delivered by private developers	Higher score for alignment options where part of the delivery or the cost of the route can be delivered by private organisations, lower score for alignment options where the route is delivered entirely by government.
5.2 Minimises duplication of existing infrastructure	The option minimises the number of kilometres of road constructed	Higher score for shorter alignments or sections of road that duplicate existing roads without improving capacity or connectivity, lower score for longer alignments.
5.3 Major and complex constructions along alignment are minimised or avoided	The alignment option minimises the number of major infrastructure components such as tunnels or bridges	Higher score for alignments with fewer major bridge constructions and tunnels, lower score for alignments

## Criteria 6: Resilient communities and transport networks

Sub-criteria	Indicator	Measure
6.1 Enabling rapid land releases in locations that are of low risk during natural disasters	Qualitative assessment based on potential property impacts and the significance of the impacts, as well as connection to locations that are low risk during natural disasters.	Higher score for greater number of hectares of land in low-risk locations able to be released, lower score if alignment does not support land release in lower risk areas.
6.2 Support resilience and provides additional access routes during natural disasters	Provides alternative or upgraded higher order access/egress routes for communities in bushfires, floods and other natural disasters.	Higher score for options that provide redundant or additional routes across the Greater Macarthur Growth Area. Lower score for routes that provide no additional connections or redundant routes to support emergency access or egress in new development areas.

## Criteria 7: Connecting with Country and respecting First Nations heritage and cultural values

Sub-criteria	Indicator	Measure
7.1 Sensitive heritage sites of significance to Aboriginal communities are protected.	Assessment of the proposed option's impact on the Appin Massacre Heritage Site.	Higher or lower score to be informed by level of impact and proximity to Appin Massacre heritage site. Consideration of places and items of cultural significance.
7.2 Supported by LALC	Relevant Heritage NSW or Local Aboriginal Land Council (LALC) support design decisions to preserve sensitive locations.	Higher score to reflect the level of support by the relevant stakeholder.

## Updated MCA of the Options

A revised MCA was held on 20 May (first workshop) and 27 May 2022 (second workshop), with the following stakeholders taking part:

- Department of Planning and Environment
  - Strategic Land Use Planning
  - Resilience and Urban Sustainability Division
  - Biodiversity and Conservation Division
- NSW Heritage
- Wollondilly Shire Council
- Campbelltown City Council (27th May only)
- Transport for NSW
  - Regional and Outer Metropolitan Division
  - Customer Strategy & Technology Division, Planning for Places – Western Parkland City
  - Greater Sydney Division
  - Technical Advisors for Corridor Preservation Team.

The outputs of this MCA and how they apply to the two preferred swoosh options are presented below.

## Outputs of MCA

The MCA determined the following outputs for each using a traffic light assessment:

- Aligned or supports assessment criteria and avoid potential impacts
- Some alignment with assessment criteria with potential impacts that can be reasonably mitigated
- Poor alignment with assessment criteria and/or significant impacts that are challenging to mitigate

Criteria	Purple Option	Orange Option
Community Impacts	■	■
Movement of people and goods	■	■
Supporting Urban Development and Growth	■	■
Environmental Impacts	■	■
Constructability and Cost	■	■
Resilient communities and transport networks	■	■
Connecting with country and respecting First Nations heritage and cultural values	■	■

### Considerations for each criterion

#### Community Impacts

For the Community Impacts criterion, both options performed comparatively well. However, it was noted that the upgrade of the M31 Hume Motorway as part of the Orange Option would generate more traffic, which would result in more noise and vibration impacts along key roads such as Picton Road near the rezoned Wilton Town Precinct. Similarly, both options would likely result in some impacts to existing small communities along their alignment, particularly south of the Cataract River, resulting in increased traffic noise and poorer air quality along the alignment.

The alignment of either option in the vicinity of Douglas Park Drive would impact and potentially sever communities along this road in order to protect sensitive environmental areas to the west of Douglas Park Drive. Similarly, the Purple Option would likely separate parts of future communities in the West Appin area. However, as these are yet to be developed, future design mitigations could address this sensitively.

## **Movement of people and goods**

The Purple Option scored better than the Orange Option when considering the movement of people and goods. This was primarily due to its role in supporting the movement of people and goods across the study area along an alternative route to Wilton Road and the highly constrained Broughton Pass.

It was also noted that for both options, Picton Road is the key connection to the Illawarra and that upgrading the M1 Princes Motorway between Bulli Tops and Mount Ousley along the Illawarra Escarpment would be complex and expensive, supporting either option strongly over an alternative connection via Appin Road.

The Orange Option was noted as creating an additional intersection on M31 Hume Motorway, and which would increase the number of local trips using this motorway, impacting the flow of regional traffic on M31 Hume Motorway. The Orange Option would also result in ramps connecting between the M31 Hume Motorway and OSO2 that are north facing only, which would result in poor connectivity outcomes. The feasibility of upgrading this intersection is challenged by surrounding urban development.

## **Supporting Urban Development and Growth**

The Purple Option scored higher compared to the Orange Option for this criterion. This primarily is driven by the ability to then use other corridor options through the Greater Macarthur Growth Area that were considered in the SMT stage as sub-arterial and transit corridors with lower speeds and more frequent intersections, which would produce a better place outcome for new communities and deliver greater amenity outcomes for local residents.

However, both alignment options responded to the potential to open new areas for development sooner in the Greater Macarthur and Wilton growth areas.

## **Environmental Impacts**

The Orange Option scored better for this criterion. This was largely driven by the reduced impacts that it would have on koala habitat and koala movement corridors, with approximately 39ha and 30ha impacted in the Purple and Orange Options respectively. Similarly, the Orange Option also had reduced impact on Cumberland Plain woodlands, with 12ha and 5ha impacted in the Purple and Orange Options respectively.

Both options had other negative ecological impacts on non CPCP land which will need to be avoided or offset. This included significant impacts on EECs, threatened species (flora and fauna) and the potential impact of constructing river and creek crossings.

Clements Creek is noted as a particularly sensitive area for threatened fauna and should be avoided. Similarly, Elladale Creek contains threatened vegetation, but project mitigation is likely to achieve an acceptable outcome.

The high number of creeks and riparian corridors in the study area mean that both options had similar scale of impact on these types of environments.

It was noted during the MCA workshop that where the alignment options act as a barrier, there may be an option to restore koala habitat on former farmland. This could be a good use of the CPCP funding for revegetation.



### **Constructability and Cost**

The Purple Option scored higher compared to the Orange Option for this criterion. This was mainly driven by the complexity and cost of utilising the M31 Hume Motorway, including the expansion or duplication of the Douglas Park Bridge over the Cataract River, the need for construction of a second interchange on the M31 Hume Motorway and the complexity and significance in staging this, and the cost and complexity in constructing a motorway widening under live traffic conditions along the M31 Hume Motorway. Conversely, the Purple Option provided simpler staging and easier construction interfaces by aligning with the OSO1 interchange on the M31 Hume Motorway, with planning for eastern connectivity to Appin Road likely to be facilitated by an upgraded local road network through the West Appin release area.

### **Resilient communities and transport networks**

The Purple Option scored higher compared to the Orange Option for this criterion. This was related to the opportunity to create an additional, high-quality cross-regional link to complement or replace Wilton Road and Broughton Pass. Conversely, the Orange Option, which would utilise the M31 Hume Motorway corridor, would not improve network redundancy or resilience, and would use surplus space within the existing corridor, limiting future expansion or alterations to the transport network to support potential future transport technologies.

However, both options were noted as providing better access to Wilton Town Centre, particularly the Bingara Gorge area, diverting traffic away from the Wilton Interchange at the intersection of Picton Road and M31 Hume Motorway.

It was also noted that connections from OSO1 to both Picton Road and Appin Road would support future network resilience and should be pursued if possible. Following the Black Summer bushfires and the floods of summer 2020-2021 and 2021-2022, it was acknowledged of the urgent need to improve resilience to resist and recover from natural disasters in urban, semi-urban and rural communities. Both Picton Road and Appin Road are approved network routes for heavy vehicles (as defined by eligible Performance Based Standards (PBS) vehicles operating in NSW under an access permit issued by the National Heavy Vehicle Regulator (NHVR) or a National PBS Notice). However, Appin Road has a number of constraints as noted earlier. Picton Road remains a more viable choice for disaster detours, particularly given the ability to better access the southern areas of the Illawarra.

### **Connecting with Country and respecting First Nations heritage and cultural values**

Both options scored comparatively well for this criterion as they avoided the proposed curtilage of the Appin Massacre Site.

It was noted during the MCA that both options have further flexibility with their alignments to respond to heritage sites and to community needs, and they would avoid having a major impact on identified cultural heritage landscapes which are well valued by the local community.

## Preferred corridor option

Whilst a full assessment of the potential connection through to Picton Road has not been undertaken, a decision on the alignment or otherwise of the corridor through the west Appin area is urgently needed to provide direction to the Department of Planning and Environment in their consideration of releasing the west Appin area for housing development. The key considerations when comparing the Purple and the Orange options were:

- The engineering and land use feasibility of a suitable interchange between the Orange alignment and the Hume Highway at Douglas Park
- The long term plans and feasibility of an upgrade of the Hume Motorway
- Potential impacts on ecological values
- The suitability as a connection between Appin and Wilton

Based on the MCA, the preferred option to proceed as the Recommended Corridor for the Sector 1 of OSO2 is the **Purple Option**. This was underpinned by several key strengths of this option, as well as key weaknesses of the alternative Orange Option. This included:

- The Purple Option provided network redundancy and resilience across the Wilton and Greater Macarthur growth areas compared to the Orange Option. This included providing a more resilient alternative connection to Wilton Road and Broughton Pass.
- The Orange Option presented several construction challenges, including the expansion or duplication of the Douglas Park Bridge, the widening and expansion of the M31 Hume Motorway under live traffic conditions, and the construction of additional interchanges along the M31 Hume Motorway.
- The Purple Option provided an opportunity to act as a higher-order road through the West Appin area, allowing for other planned roads to function at reduced speeds with more frequent intersections, providing better place outcomes for future communities.
- The Orange Option would likely cause congestion on the shared section of the M31 Hume Motorway and require further road widening or upgrades in the future, including additional bridges over the Nepean River.

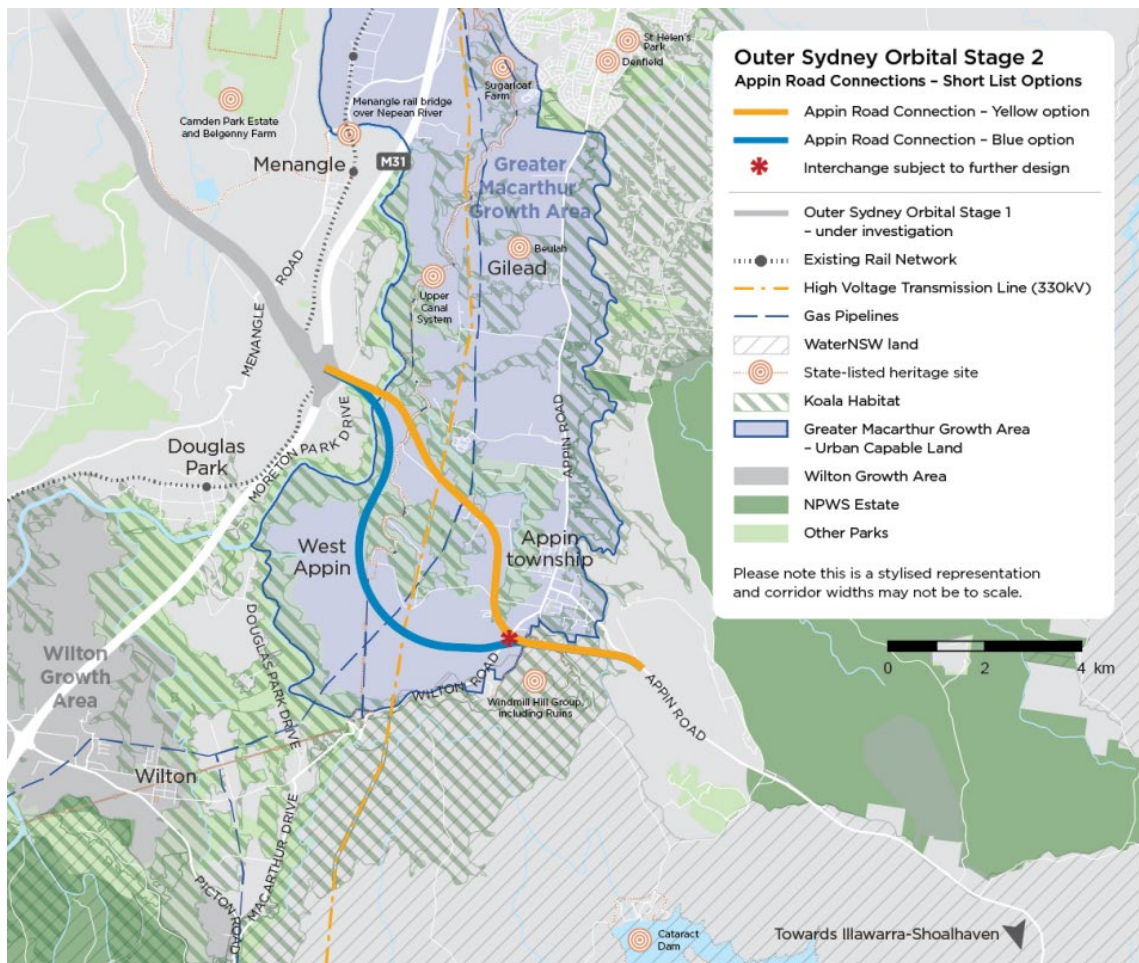
# Identification of a Recommended Corridor

## Final Design Review of the Options

### Updates to the Exhibited Options

Previously, Transport for NSW exhibited sub-options within the Swoosh 1, OSO1 to Appin Road (yellow option), that included “northern yellow sub-option” and a “preferred blue sub-option”, which are shown in Figure 20, below.

**Figure 20: Previously exhibited options for the Appin Road connection.**

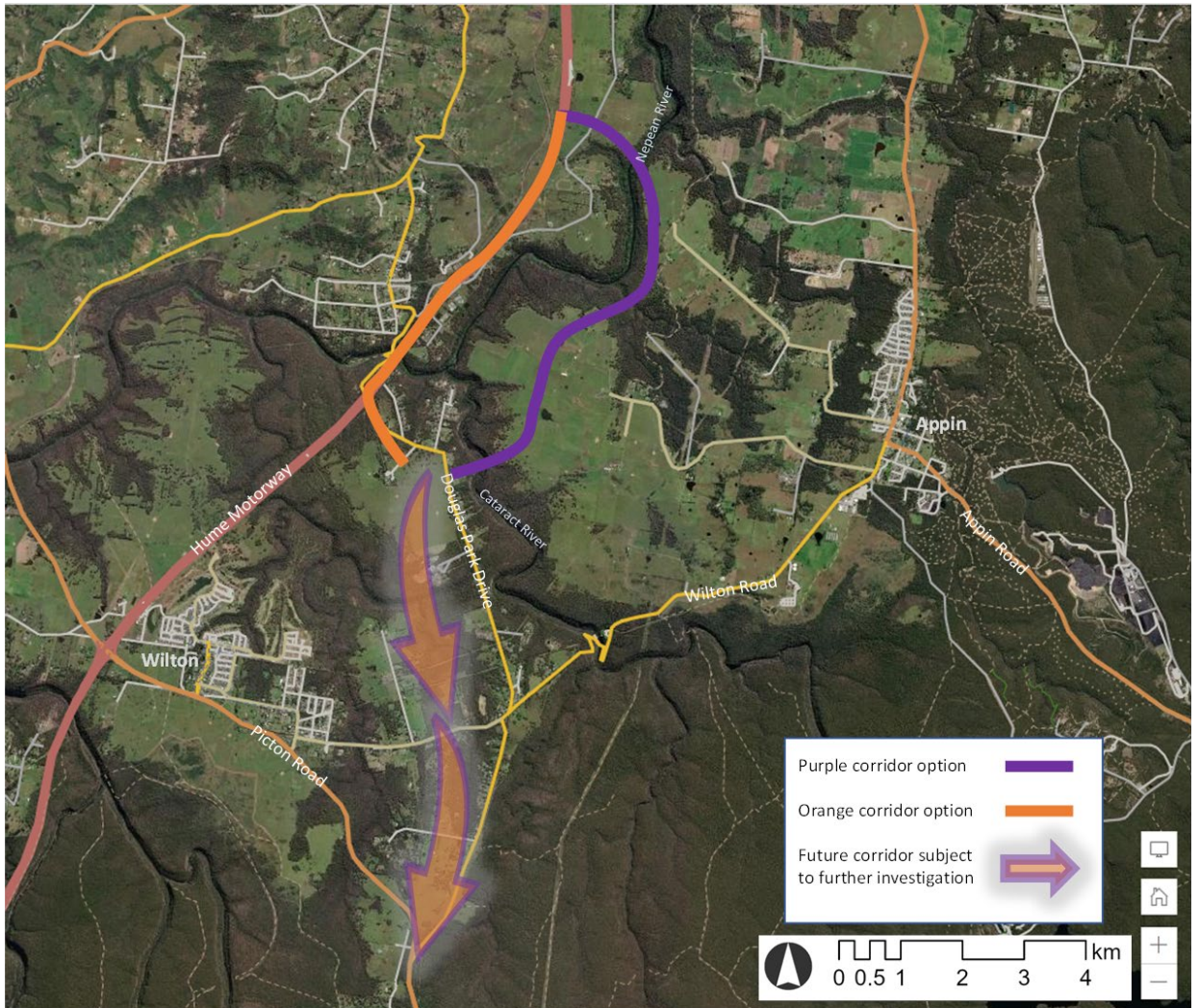


This revised options assessment has identified that the preferred blue sub-option should not proceed due to its unacceptable impacts on the endorsed NSW State Heritage listed curtilage for the Appin massacre site.

The northern yellow sub-option remains an important local connection to Appin Road from OSO1 and should therefore be further considered as a lower-order road.

A new higher-order, high-speed corridor connecting OSO1 to the Illawarra-Shoalhaven is recommended to connect the intersection of the M31 Hume Motorway and OSO1 with Picton Road via a new route through West Appin and in the vicinity of Douglas Park Drive and MacArthur Drive, as shown in Figure 21. This route uses the preferred blue sub-option in part but maintains a north-south orientation before crossing Cataract River.

**Figure 21: Recommended preferred corridor for OS02 Sector 1 Picton Road connection (Purple Option).**



## Final consideration of the preferred alignment (Purple Option)

### Community Impacts

Overall, the preferred option provides for design flexibility to respond to local community needs, which include minimising heritage and environmental impacts. Potential noise and air quality issues within residential/urban areas will need to be considered in the future. This may involve design solutions (such as noise walls) or planning responses (such as the use of green space or land use zoning).

### Movement of people and goods

Key movement considerations for the preferred option that should be noted for further analysis include:

- Intra-regional modelling to validate that traffic volumes on the preferred option are well balanced with traffic on the M31 Hume Motorway.
- Traffic analysis on both regional and local connectivity to the Wilton Town Centre, including performance of Wilton Road.

- Intersection arrangements for the preferred option at the northern extent of the West Appin and Appin urban areas to facilitate a local connection to Appin Road.
- Design of the preferred option and the local road network to safeguard grade-separated connections across the OSO route.

### **Supporting Urban Development and Growth**

The OSO2 connection is critical for both intra-regional connectivity and providing access to support the Government's commitment to urban development and growth. The preferred option will need to complement the existing and future local road network. Key considerations for further design development include:

- Design of the sub-arterial road/transit corridor within the West Appin and Appin urban areas, including how these lower speed roads respond to cultural and heritage considerations.
- The staging of urban development in the Greater Macarthur Growth Area and timing of the preferred option.

### **Environmental Impacts**

Key environmental considerations for the preferred option that should be noted for further design development include:

- The preferred option has moderate impacts on critical habitat, which would require biodiversity offsets
- This option engages a substantial area of land identified under the CPCP as having conservation value, including koala habitat.
- There are potential impacts on State heritage (Upper Canal and Windmill Hill Group), which would be addressed through design

### **Constructability and Cost**

There are several construction considerations for the preferred option that should be noted for further design development:

- Appropriate solutions, including grade separated intersections, will need to be considered for local road connections to the upgraded sections of Macarthur Drive and Douglas Park Drive.
- The crossing of Wilton Road would need to be grade separated to maintain a high-quality arterial connection.
- The central section of the preferred option will be isolated from each end until the bridges over Clements Creek and Cataract River are constructed, this will require construction access to be along Douglas Park Drive and will require careful management of earthworks prior to the bridge construction.
- Access into several locations, including Clements Creek Gorge and Cataract River Gorge to enable bridge construction is likely to be difficult and require significant vegetation clearing and earthworks.
- It is noted that the bridge crossing of the Cataract River appears to be at the widest point of the gorge. This should be revisited as it will increase the bridge span and will have a significant impact on the project cost.
- The farm access at the end of Brooks Point Road is being cut by the alignment which is in fill in this location. The farm access road will need to be relocated to the cut fill line with the associated road works or an under pass provided.
- The Elladale Creek crossing is in a heavily vegetated area which will likely require significant environmental safeguards to enable construction of the bridge.
- Large bridge span over Nepean River, will require flood studies and environmental protection.

- The connection with the M31 Hume Motorway appears to be on a hillside, which could make the construction of the interchange more complex than necessary.

### Considerations of bridge location and types

The large number of large span bridges will increase the likely the cost of the preferred option. In addition to this, the large bridge structures will require a considerable amount of temporary works including temporary access roads, access road upgrades to support significant plant and machinery, and the construction of piling and crane platforms.

It is expected that the following bridge structures will be used:

- (If required) **Lisa Road:** Likely to be a standard super T style bridge over Lisa Road
- **Wilton Road:** Likely to be a standard super T style bridge over Wilton Road
- **Clements Creek:** Likely to be an incrementally launched steel box girder or steel truss considering the span of the creek across a deep gully, with at least one side being quite steep. Should a piling rig be able to be established on the northern side of the gully and a back span constructed, there is a potential for the main span to be craned in as an alternative.
- **Cataract Creek:** The location of this crossing should be optimised to reduce the overall span. Access to the gully appears to be difficult, so an incrementally launched steel box girder or steel truss will likely be required. If the gully is accessible, back spans could be constructed to allow the main span to be craned in as an alternative.
- **Elladale Creek:** Access to the gully appears to be difficult, so an incrementally launched steel box girder or steel truss could be used. If the gully is accessible, back spans could be constructed to allow the main span to be craned in as an alternative.
- **Nepean River:** Access to the bridge location appears more feasible for this crossing, either from the river itself or from the northern bank this would allow back spans to be built and then a shorter main span to be either launched or craned into place. Any impact on the waterway clear width would require a flood study to be undertaken and would likely require additional works. Environmental safeguards would need to be strict to protect the waterway.

### Resilient communities and transport networks

The preferred option is considered the best performing option in terms of resilience. This second high-speed connection improves overall network performance, particularly as the Picton Road connection creates a more viable choice for disaster detours given the ability to better access the southern areas of the Illawarra. Local connections to Appin Road would also support future network resilience. The connection offers a safe and effective route for heavy vehicles and the movement of goods.

### Connecting with Country and respecting First Nations heritage and cultural values

There are potential impacts on Aboriginal heritage and cultural values across the study area. However, it is expected that any impacts can be avoided or mitigated during future stages of investigation and design. Based on the current boundary of the Appin Massacre Site, there are not expected to be impacts from the proposed preferred OSO2 corridor. If the curtilage is amended, Transport for NSW would work with NSW Heritage and the LALC on developing a revised alignment to accommodate this.

## Next steps

The preferred OSO2 corridor reflects the contemporary context of urban development, heritage conservation, and resilience of the transport network to disasters and uncertainty. The investigations and analysis that supports the recommended corridor reflects the best balance between the different opportunities and constraints in the study area in seeking to achieve the OSO2 Corridor Objectives.

The corridor between the M31 Hume Motorway and Cataract River will be considered for protection to enable it to be used for future transport infrastructure. This will be undertaken in consultation with the Department of Planning and Environment to update the *Greater Macarthur 2040* plan and associated strategic conservation planning. Transport for NSW will continue to work with landowners to identify ways to reduce impacts where possible.

The corridor south of the Cataract River to the connection to Picton Road requires further analysis and strategic design. There is less urgency to protect the corridor outside the Greater Macarthur and Wilton growth areas. However, there remains a need to provide certainty for the community and stakeholders. Transport for NSW will investigate alignments that avoid or minimise community and environmental impacts.

The construction of infrastructure within any protected OSO2 corridor is likely within the next 20 years, subject to demand and available funding. The future detailed design of infrastructure will further refine how impacts will be dealt with including noise, local connectivity, and measures to protect flora and fauna (including koalas), as well as visual amenity. Future planning approvals will also confirm arrangements for offsetting any residual environmental impacts.

The corridor planning process does not change current uses of the land and once the corridor is finalised there will be no need to immediately acquire land or property. However, should the corridor be formally protected then there would be an opportunity for property owners to consider owner-initiated early acquisition under the Land Acquisition (Just Terms Compensation) Act 1991 before the land is needed by the Government. Landowners can contact the project team on the free-call information line 1800 837 511 or via email [corridors@transport.nsw.gov.au](mailto:corridors@transport.nsw.gov.au) to discuss their individual circumstances.

# Appendix A

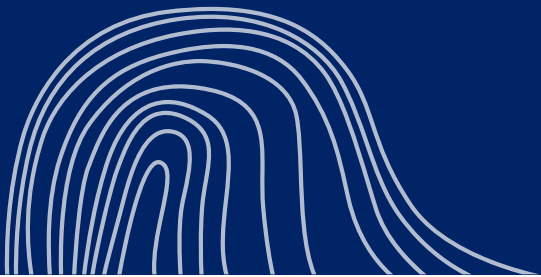
## Business Requirements Statement

NB: This BRS was developed for the whole of the OSO2 between Western Sydney and the Illawarra-Shoalhaven region. Departures from certain provisions may be considered in particular locations where appropriate (e.g. reduced speeds or corridor widths in urbanised or tunneled sections).

Item	Design Parameter	Setting/Measure	Compliance
01	General standards	Design should be based on relevant Austroads and NSW Government standards relating to motorways and other high capacity roads	Required
02	Corridor width	Indicative width of 80 metres is considered best practice, with reductions to be considered where place constraints exist. In highly constrained areas a width of up to 60 metres or less can be considered.	Desirable
03	Road formation width on straight horizontal alignment, excluding median and excluding active transport	<u>Two carriageways</u> , each comprising <u>three lanes</u> – each 3.5m wide, outer shoulder -3m wide Fewer lanes may be considered.	Desirable
04	Road median	Optimal width – 7m, with a central barrier (i.e. 3.5 m either side of the barrier, assuming 2.5m of grass and 1m of shoulder  Minimum width – 2m, with a central barrier	Desirable
05	Road vertical clearance	5.4m minimum clear height (i.e. pavement surface to any overhead structural element, internal surface, fitting or item of equipment)	Required
06	Preferred maximum road speed (excepting tunnels)	Design speed – 110km/h  Posted speed - 110 km/h The posted speed will be the subject of future considerations in terms of what is appropriate for particular places.	Desirable
07	Minimum maximum road speed (excepting tunnels)	Design speed – 90 km/h  Posted speed - 80 km/h	Required
08	Road tunnel maximum speed	Design speed – 90km/h  Posted speed - 80km/h	Required
09	Tunnels	None preferred outside of Sector 3 (Escarpment crossings)  Fire and life safety access / egress	Desirable  Mandatory
10	Connections with other roads	The future design of intersections will be subject to detailed design. Where appropriate intersections will be at grade.	Required
11	Gradient	Avoid prolonged grades in excess of 4%  Maximum 6% - Excluding tunnels  Maximum 4% - Tunnels	Required



Item	Design Parameter	Setting/Measure	Compliance
12	Road crossfall / Superelevation	Minimum crossfall: -3% Maximum superelevation: +3%	Desirable
13	Road curvature	Minimum radius -810m Preferred radius -900m	Desirable
14	Design life	100 years	Required
15	Design flood level	100 year ARI (Average Recurrence Interval)	Required
16	Operational noise & vibration	Design should be consistent with EPA road noise guidelines	Required
17	Road checking and design vehicle	Design vehicle - 30m PBS 2B heavy vehicles Checking vehicle - 36.5m B-triple	Required
18	Passenger rail	Not excluding dual track electrified passenger heavy rail (40 metre sub-corridor) Track vertical grades should be less than 1.5 % where practical	Desirable
19	Rail level crossings	No level crossings	Required
20	Water catchment	Avoid WaterNSW catchment if possible Where the alignment must pass through catchment design should be consistent with WaterNSW's 'Neutral or Beneficial Effects' water impact assessment guidelines	Required
21	Fauna management	Design should be consistent with relevant NSW Government guidelines or subject matter expert advice relating to safe fauna management (e.g. the use of koala movement barriers and/or crossings)	Required
22	Road safety	Design should be consistent with NSW's 'Safe System' approach and Centre for Road Safety subject matter expert advice	Required
23	Smart motorway technology	Design should be consistent with relevant NSW Government guidelines or subject matter expert advice in relation to the provision of smart motorway technologies	Required
24	Active transport	Design should provide for walking and cycling routes physically separated from motorised traffic Safe crossings to be provided for intersecting walking and cycling routes	Desirable



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