



**Transport**  
Roads & Maritime  
Services

**Roads & Maritime Services**  
Western Sydney Infrastructure Plan  
The Northern Road Upgrade  
Jamison Road, Penrith to Mersey Road, Bringelly  
(Stages 3 and 4)  
State Significant Infrastructure  
Application report  
June 2015

# Executive summary

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## ***Introduction***

The Australian Government, in partnership with the NSW Government, has announced a ten-year road investment program worth over \$3 billion for Western Sydney, the Western Sydney Infrastructure Plan. This State Significant Infrastructure (SSI) application relates to the following key elements of the plan:

1. Upgrade of The Northern Road for up to eight lanes (six traffic lanes and two bus lanes) between Jamison Road, Penrith and Mersey Road, Bringelly
2. Improve the existing interchange at The Northern Road and M4 Motorway.

## ***Need***

The Northern Road Corridor Strategy (RTA 2009) forecast an increase in population and traffic (approximately 7% per year), which would exceed overall carrying capacity in peak periods, with almost all intersections providing inadequate service by 2026 and resulting in severe congestion.

Since that Strategy was prepared, further strategic and land use planning directions in the region have been advanced which will have a significant influence on future demand and functioning of The Northern Road. That includes: the proposed Western Sydney Airport at Badgerys Creek; the South West Growth Centre (SWGEC); and Broader Western Sydney Employment Area (BWSEA).

## ***The project***

The Northern Road upgrade project subject to this State Significant Infrastructure application will occur in two stages, as follows:

- **Stage 3** (from Jamison Road, Penrith to Littlefields Road, Luddenham) would include widening the existing two lane corridor for up to eight lanes. It would include new signalised intersections at some intersections, widening of the existing road and changed accesses to improve safety. The upgrade is expected to include a range of infrastructure such as bridges, retaining walls, drainage, safety barriers, shared paths and lighting.
- **Stage 4** (from Littlefields Road, Luddenham to Mersey Road, Bringelly) is principally required as the existing road runs through the site of the proposed western Sydney airport. The Australian Government has advised that the existing road will need to be realigned to avoid the proposed airport site and related facilities. The road upgrade would include similar works to the Stage 3 proposal.

Both project stages will also require supporting facilities during construction, such as compounds, stockpile sites, temporary accesses and sedimentation basins.

## ***Planning and assessment process***

Roads and Maritime, as the determining authority, has formed the opinion that the proposal would require an environmental impact statement (EIS) under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposal is, therefore, declared to be State Significant Infrastructure (SSI) under section 115U of the EP&A Act and clause 14 - Schedule 3, clause 1 of the *State Environmental Planning Policy (State and Regional Development) 2011*.

### ***Proposed scope of the environmental impact statement***

The purpose of this application report is to comply with section 115X of the EP&A Act and to assist the formulation of environmental assessment requirements by the Secretary under section 115Y of the EP&A Act, which would inform the preparation of the EIS.

This application:

- Describes the project
- Considers the potential environmental issues for the project
- Identifies key environmental issues for the project, including:
  - Traffic and transport
  - Hydrology and flooding
  - Ecology
  - Aboriginal heritage
  - Non-Aboriginal heritage
  - Noise and vibration
  - Socio-economic
  - Landscape and visual amenity
  - Land use
- Outlines other non-key environmental issues, including:
  - Soils, contamination and water quality
  - Air quality
  - Greenhouse gases and climate change
  - Resources and waste management.

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## Attachment

Attachment A: Requirements of the Environmental Planning and Assessment Regulation 2000

Attachment B: Database searches (NSW and Commonwealth)

## Abbreviations and Glossary

AHIMS	Aboriginal Heritage Information Management System
AM	Ante Meridian
ARI	Average Recurrence Interval
BS	British Standard
BWSEA	Broader Western Sydney Employment Area
cl	clause
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
CMA	Catchment Management Authority
CSSI	Critical State Significant Infrastructure
Cwth	Commonwealth of Australia
DECCW	Department of Environment, Climate Change & Water (NSW)
DIRD	Department of Infrastructure and Regional Development (Cwth)
DoP	Department of Planning (NSW)
DPI	Department of Primary Industries (NSW)
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Cwth)
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
kV	kilovolts
LEP	Local Environment Plan
LGA	Local Government Area
M	Motorway
NSW	New South Wales
OEH	Office of Environment and Heritage (NSW)
PACHCI	Procedure for Aboriginal cultural Heritage Consultation and Investigation
PAD	Potential Archaeological Deposit
PCL	Priority Conservation Land
PEI	Preliminary Environmental Investigation
PM	Post Meridien
<sup>PM</sup>	Particulate Matter
PVC	Polyvinyl Chloride
Roads and Maritime	Roads and Maritime Services (NSW)
RTA	Roads and Traffic Authority (former) (NSW)
s	section
SEPP	State Environmental Planning Policy
SEPP 14	State Environmental Planning Policy No.14 – Coastal Wetlands
SKM	Sinclair Knight Merz
SRD SEPP	State Environmental Planning Policy (State and Regional Development 2011
SSI	State Significant Infrastructure
TfNSW	Transport for New South Wales (NSW)
<sup>TM</sup>	Trade Mark
TSC Act	<i>Threatened Species Conservation Act 1995</i>
um	micrometre
UXO	Unexploded Ordinance
VRZ	Vegetated Riparian Zone
WARR Act	<i>Waste Avoidance and Resource Recovery Act 2001</i>
WSIP	Western Sydney Infrastructure Plan

# 1 Introduction

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Roads and Maritime is seeking approval for The Northern Road Upgrade Stages 3 and 4 (hereafter known as 'the project'). This chapter provides an overview of the project and the purpose of this report.

## 1.1 Overview of the project

The Northern Road is a key north-south road corridor between Narellan and Richmond, connecting the North West and South West Growth Centres. The Northern Road is approximately 51 kilometres from end-to-end and is generally a two-lane undivided road carrying up to 45,000 cars per day in some sections.

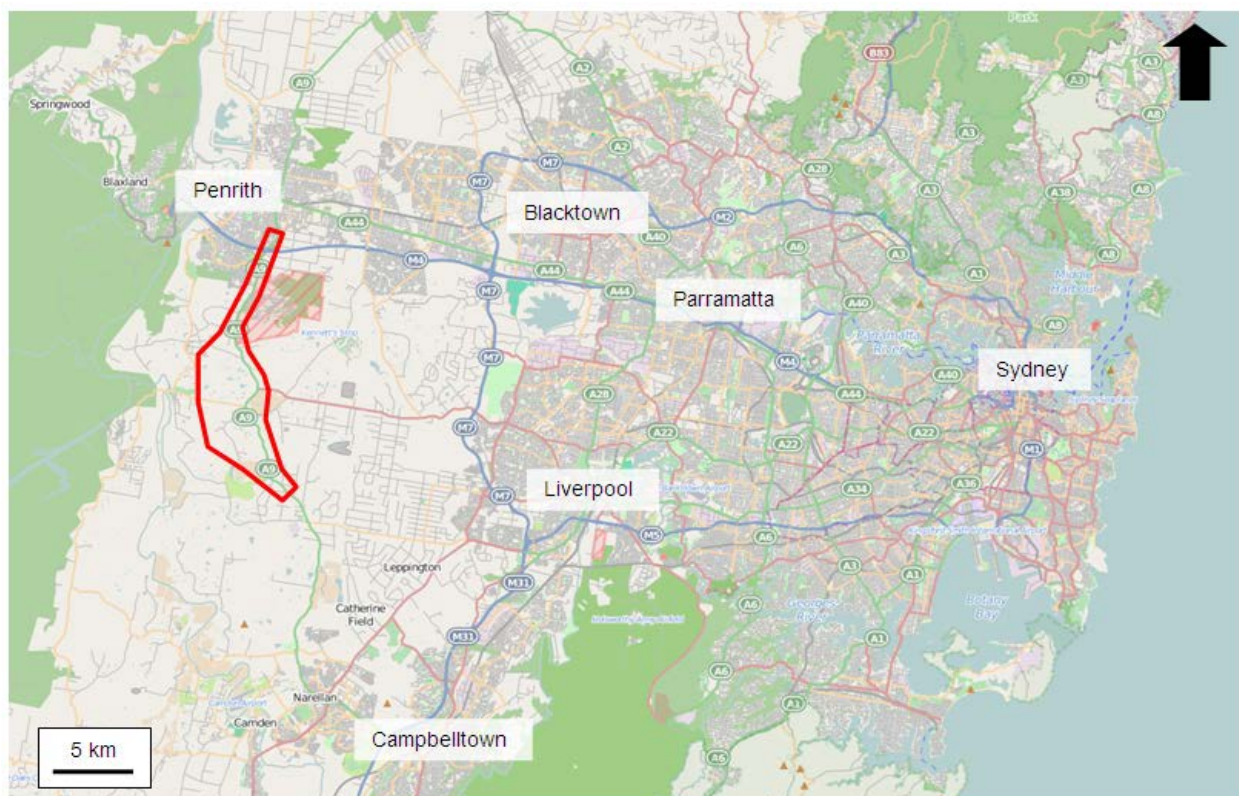
The upgrade of The Northern Road is divided into four stages between the southern extent at Camden Valley Way and Jamison Road, Penrith. Environmental assessments for Stage 1 and 2 have already been completed.

The current project involves:

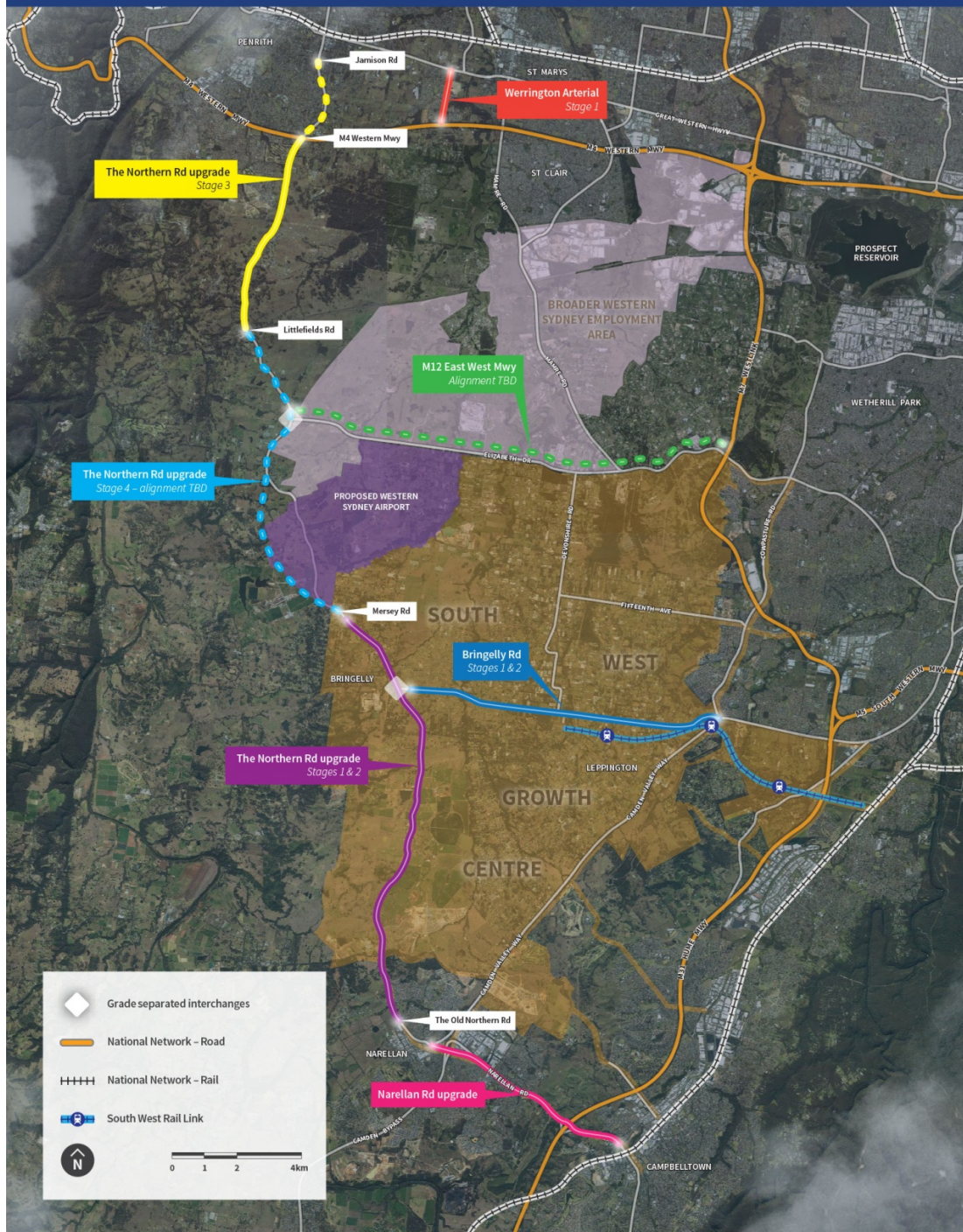
- Stage 3 - upgrade of the road corridor between Jamison Road, Penrith and Littlefields Road, Luddenham from a generally two lane road up to an eight lane (including two bus lanes) divided road with central median
- Stage 4 – realignment and upgrade of the road corridor between Littlefields Road, Luddenham and Mersey Road, Bringelly from a generally two lane road up to an eight lane (including two bus lanes) divided road with central median
- New bridge infrastructure, new signalised intersection controls and widening of the bridge over the M4 Motorway
- A shared pedestrian/cyclist path.

The entire length of Stages 3 and 4 will be designed for 90 kilometres per hour (km/h) south of the M4 Motorway and 80km/h to the north of the M4 Motorway.

The general location of the project is shown in Figure 1-1 while the specific locations of the project, represented by the yellow and dotted blue lines are presented in Figure 1-2.



**Figure 1-1: Regional context of the project**



**Figure 1-2: Project location**

## 1.2 Statutory process - NSW

The project is permissible without consent under clause 94 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), meaning it is an activity as defined in Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and that Roads and Maritime is the determining authority.

Roads and Maritime has formed the opinion that the project is likely to significantly affect the environment and requires the preparation of an environmental impact statement (EIS) under the EP&A Act.

By virtue of the operation of s 115U of the EP&A Act and Schedule 3, Clause 1 of *State Environmental Planning Policy (State and Regional Development) 2011*, the project is therefore declared to be State Significant Infrastructure (SSI). The assessment and approval pathway for SSI is set out in Figure 1-3.

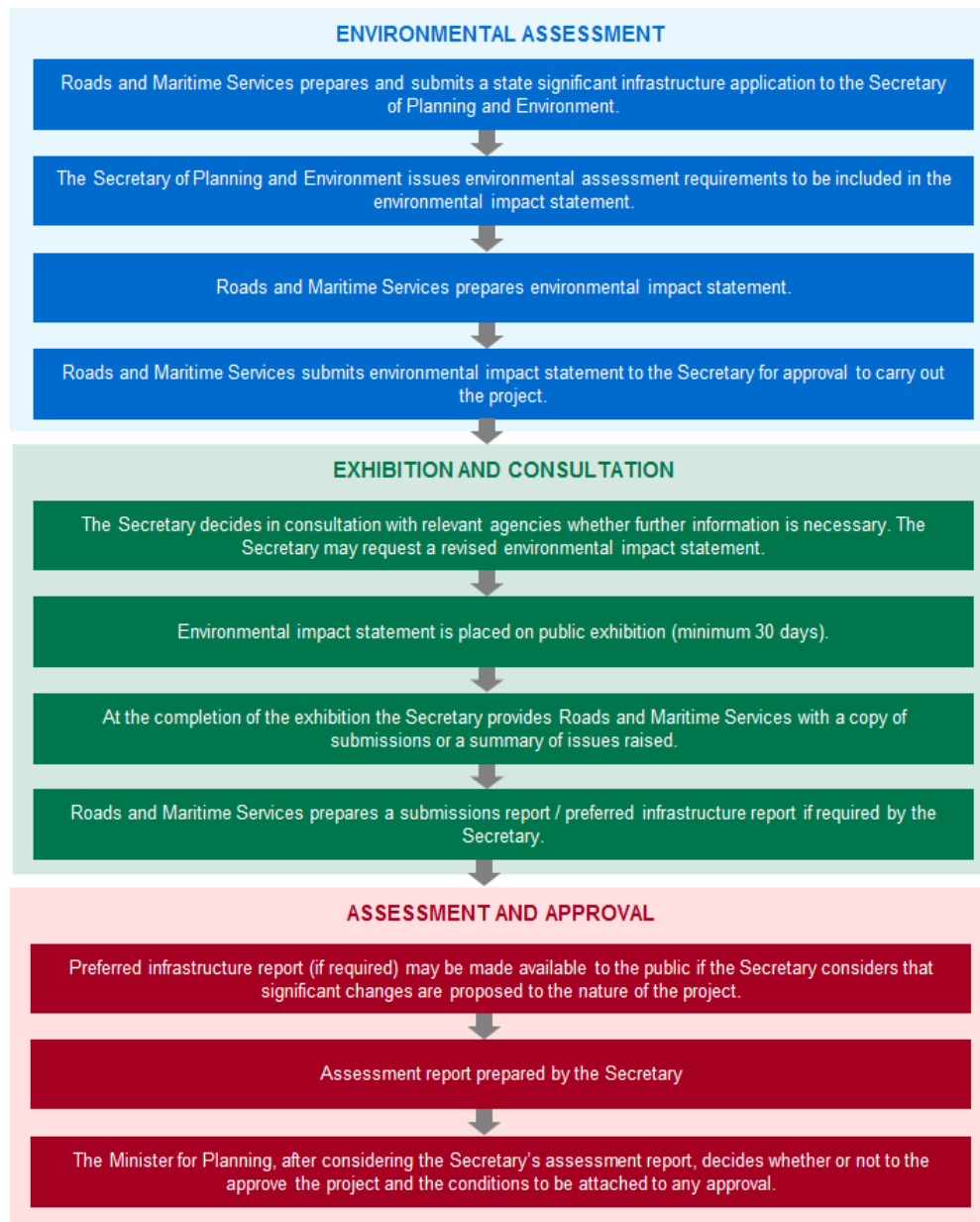
This report has been prepared to support the SSI application required under s.115X of the EP&A Act. It will inform the preparation of Secretary's environmental assessment requirements (SEARs) by the Department of Planning and Environment in accordance with s 115Y of the EP&A Act.

The requirements of clause 192 of the Environmental Planning and Assessment Regulation 2000 for applications seeking approval of the Minister for Planning to carry out SSI are addressed in attachment A to this report.

## 1.3 Statutory process – Commonwealth

At this stage, it has not been determined whether the project will have a significant impact on nationally listed biodiversity, or other matters of national environmental significance, under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This is discussed in section 4.4. This will be considered during the EIS process.

In particular, there are areas of Commonwealth land that may be affected by the proposal. That includes lands currently included as part of the future Western Sydney Airport site and along the western boundary of the Orchard Hills Defence site. Roads and Maritime is continuing consultation with the Australian Government on these aspects of the proposal to confirm applicable requirements of the EPBC Act. The relationship of the proposal to these lands will be confirmed during preparation of the EIS.



**Figure 1-3: State significant infrastructure approval process**

#### 1.4 Purpose of this report

The purpose of this report is to support the SSI application and assist the formulation of environmental assessment requirements by the Secretary under s 115Y of the EP&A Act. The application report does the following:

- Describes the project
- Considers the potential environmental issues for the project
- Identifies key environmental issues for the project.

This report and the SEARs would inform the preparation of an EIS for the project. The form and content of the EIS would be in accordance with clauses 6 and 7 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

## 2 Background

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This chapter describes why the project is needed, the project objectives, consistency with strategic planning, and the process of options assessment and short-listing route alignment options for The Northern Road Stages 3 and 4.

### 2.1 Project need

The Northern Road is one of the principal transport corridors in the south west region of Sydney. While the existing configuration of The Northern Road has generally provided adequate service to local and regional communities up to this point in time, there are a number of key current and emerging issues which will necessitate upgrading to meet the needs of existing and future road users.

The Northern Road Corridor Strategy (RTA 2009) forecast an increase in population and traffic (approximately 7% p.a.) that would exceed overall carrying capacity in peak periods, with almost all intersections providing inadequate service by 2026 resulting in severe congestion. Existing operational concerns within The Northern Road are increasingly evident with a number of intersections currently performing at low levels of service, with severe queuing and congestion occurring during both AM and PM peaks. The current two-lane nature of the road provides minimal overtaking opportunities and has a poor safety record.

Since the Strategy was completed a number of large scale planning initiatives have progressed that will also lead to significant increases in traffic demand. These include:

- Development of the South West Growth Centre – which is about 17,000 hectares in size, includes parts of the Liverpool, Camden and Campbelltown local government areas and will contain about 110,000 new dwellings for 300,000 residents
- Establishment of the Broader Western Sydney Employment Area (BWSEA) – which will provide an area of 6,300 hectares of new employment land, with employment predominantly in freight and logistics
- Planning for the proposed Western Sydney Airport at Badgerys Creek.

Upgrading The Northern Road would both address areas of emerging poor performance and its strategic long-term importance. Specifically, it would:

- Increase the road capacity of The Northern Road corridor. This would respond to traffic demand resulting from future planned development and land use change
- Improve accessibility to the proposed Western Sydney Airport, South West Growth Centre and BWSEA
- Provide economic benefits that are well in excess of the expected costs, as a result of increased efficiency of freight and reduced travel times
- Cater for population growth in the region
- Resolve a number of existing operational issues
- Improve safety, efficiency and amenity of the road network
- Promote sustainability through provision for public and active transport links.

## 2.2 Consistency with strategic planning

The project would be consistent with strategic planning directions, as documented in the following reports:

- *Western Sydney Infrastructure Plan*: The plan has been prepared to support the development of the proposed Western Sydney Airport, Broader Western Sydney Employment Area and the South West Growth Centre through road development including The Northern Road upgrade, Bringelly Road upgrade, a new motorway between the M7 and The Northern Road and the Werrington Arterial Road Stage 1 upgrade.
- *The NSW Long Term Transport Master Plan (TfNSW, 2012)*: The project supports the Plan's vision by providing infrastructure to sustain growth and improve accessibility in greater Sydney. The upgrade project is consistent with this plan as it would cater for predicted increases in traffic and provide accessibility into the South West Growth Centre.
- *NSW 2021: A Plan to Make NSW Number One (NSW Government, 2011)*: The project supports the Plan's transport goals to by improving traffic efficiency and road network functionality on The Northern Road. The proposal would improve the customer experience by improving safety, amenity and efficiency of the road network.
- *The State Infrastructure Strategy 2012-2032 (NSW Government, 2012a)*: The strategy recognises the importance of the South West Growth Centre in catering for future population growth in the Sydney region and identifies a number of projects to cater for this growth, including The Northern Road upgrade.
- *NSW Bike Plan*: The NSW Bike Plan is a comprehensive plan to encourage people to ride more often and more safely in NSW. Provision would be made for pedestrian and cycle facilities as part of The Northern Road Stages 3 and 4.
- *A Plan for Growing Sydney (DPE, 2014)* – the Plan provides the framework for strengthening Sydney's global competitiveness and delivering strong investment and jobs growth in Western Sydney. The Northern Road upgrade is identified as one of the major transport projects needed to support delivery of the Plan.
- *The Metropolitan Transport Plan – Connecting the City of Cities (DoP, 2007b)*: The plan aims to effectively link Sydney's land use planning with its transport network in the long term. The Northern Road upgrade aims to meet the demand of projected traffic growth associated with the development of the South West Growth Centre, Broader Western Sydney Employment Area and the proposed Western Sydney Airport. It would provide improved connectivity for road and freight routes while also improving facilities for pedestrians, cyclists and public transport.
- *Sydney South West Sub-Regional Strategy (NSW Government 2007)*: The Plan and associated strategy recognise the major arterial road networks require upgrades and extension to service the South West Growth Centre. The strategy sets out the vision for the management and development of the sub-region to 2031, by providing a framework for the long-term development of the area, guiding government investment and linking local and state planning issues.
- *The Northern Road Corridor Strategy (RTA, 2009)*: The project supports the implementation of effective and integrated regional transport systems, with a focus on road, bus and freight movement.

- *Broader Western Sydney Employment Area Draft Structure Plan*: The Northern Road provides a key connection between Mersey Road and Elizabeth Drive to provide access to the BWSEA.
- *Broader Western Sydney Employment Area Draft Structure Plan – Transport Planning – Preliminary Analysis Report*: The Preliminary Transport Analysis identifies The Northern Road as providing a north-south link along the western boundary of the BWSEA which services connectivity into the region primarily from the M4 Motorway and to a lesser extent from Bringelly Road and the southern end of The Northern Road.

## 2.3 Project objectives

The project will deliver a combination of new, additional and renewed infrastructure. Primary project objectives have been developed to ensure the preferred option maximises the benefits of the project, while considering the broader strategic context. They also address the identified existing operational risks and strategic need for the project. Supporting project development criteria have been developed in conjunction with these objectives to inform the final preferred option.

The Northern Road **Stage 3** project objectives are to:

- Improve transport connections from the Penrith region and M4 Motorway to the proposed Western Sydney Airport and surrounding developments including the South West Growth Centre and Broader Western Sydney Employment Area
- Improve road safety
- Support freight movement to efficiently address the growing freight task
- Cater for future traffic demand to improve the flow of traffic to provide reliable journeys
- Improve facilities for public and active transport to promote sustainable and efficient journeys.

The supporting project development criteria are to:

- Minimise environmental impacts
- Deliver a cost effective proposal.

The Northern Road **Stage 4** project objectives are to:

- Realignment of The Northern Road around the proposed Western Sydney Airport site to allow construction and facilitation of the proposed airport. Hence, Stage 4 is likely to commence construction prior to Stage 3
- Improve transport connections to the proposed Western Sydney Airport and surrounding developments including the South West Growth Centre and Broader Western Sydney Employment Area
- Cater for future traffic demand to improve the flow of traffic to provide reliable journeys
- Improve facilities for public and active transport to promote sustainable and efficient journeys.

The supporting project development criteria are to:

- Minimise environmental impacts
- Deliver a cost effective proposal

- Improve road safety
- Maintain arterial road function.

## 2.4 Selection of the preferred route

### *Stage 3*

The Northern Road Upgrade Stage 3 will utilise the existing alignment, with widening to the east and/or west of the current road corridor. An options assessment was conducted through an Options and Scoping Value Management Workshop on the 23 March 2015.

The workshop, and subsequent investigations, determined:

- **South of the M4 Motorway** - the preference is to expand the road to the eastern side of the existing corridor for up to eight lanes
- **North of the M4 Motorway** - the road would be upgraded to an eight lane corridor from the M4 to Jamison Road.

### *Stage 4*

The existing alignment of The Northern Road Upgrade Stage 4 between Littlefields Road, Luddenham and Mersey Road, Bringelly crosses a substantial portion of the proposed Western Sydney Airport site at Badgerys Creek; therefore, Roads and Maritime have investigated alternative route options to bypass the proposed Western Sydney Airport site, while maintaining the north-south road corridor.

The strategic route option study identified twelve route alignment options (Figure 2-1). These were shortlisted to four route alignment options during a strategic route options short-listing workshop (Figure 2-2). The four options were:

- Town Centre
- Campbell Street
- West Luddenham
- East Luddenham.

It is envisaged that these options will be displayed to the community in July 2015. The objectives of this will be to:

- Raise awareness of the project
- Engage with key stakeholders and affected local communities early in the planning process, so issues raised can help inform the concept design
- Allow face to face dialogue between community members and the project team
- Engage early with property owners about the potential need for property acquisition for the construction and operation of the bypass.

Field investigations are planned to be undertaken from July to September 2015 and an economic analysis, further design work and costing will be undertaken from May to August 2015. A preferred option workshop will be conducted in September 2015 to select the preferred route alignment option. Feedback received from the option display will be collated into a community feedback report and used as input into the development of the concept design and in the preparation of the EIS.

Updates will be made available to the community as the project progresses. The EIS (covering the entire project –Stages 3 and 4) is expected to be placed on public exhibition in 2016 when the community will have another formal opportunity to provide feedback.

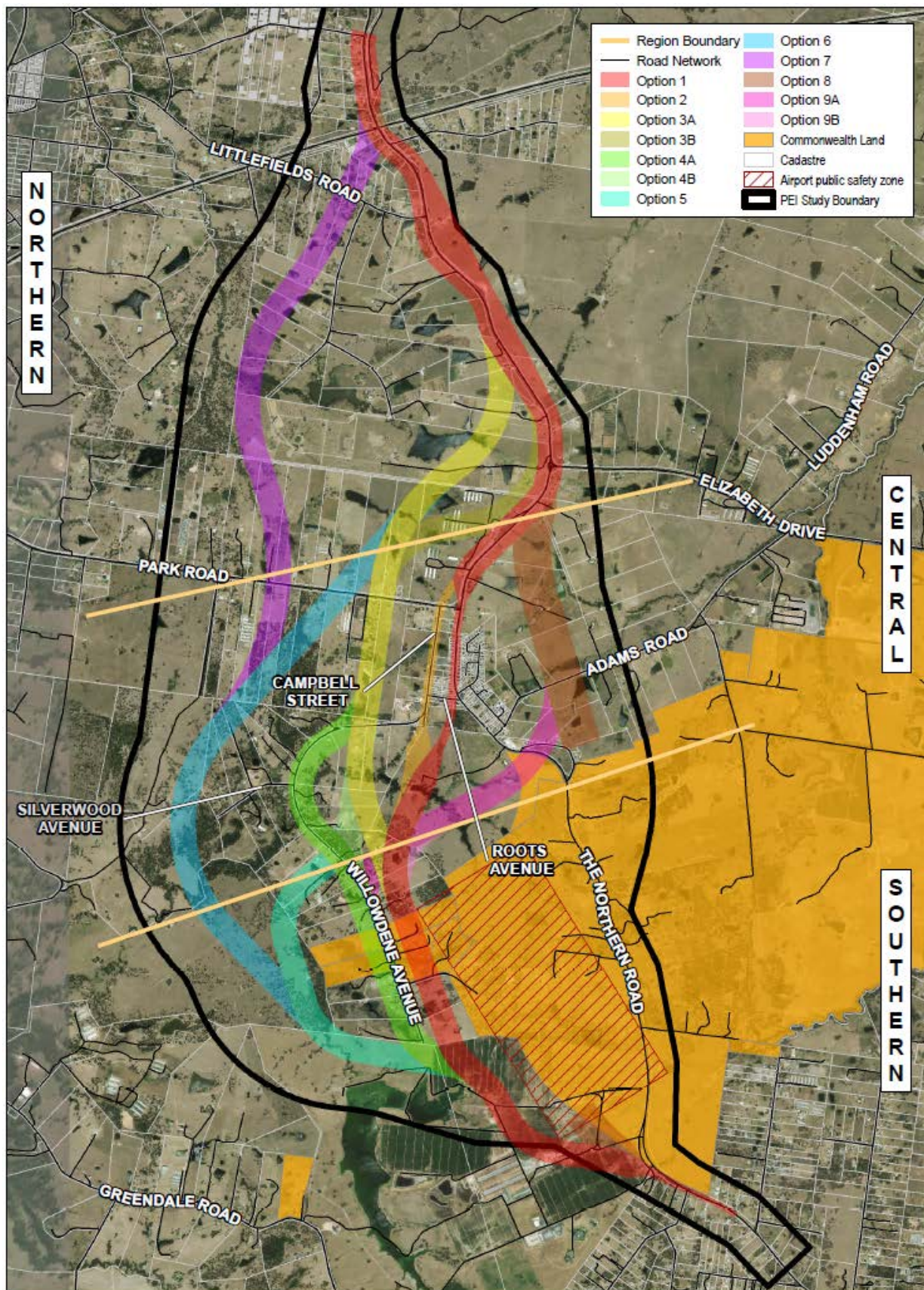
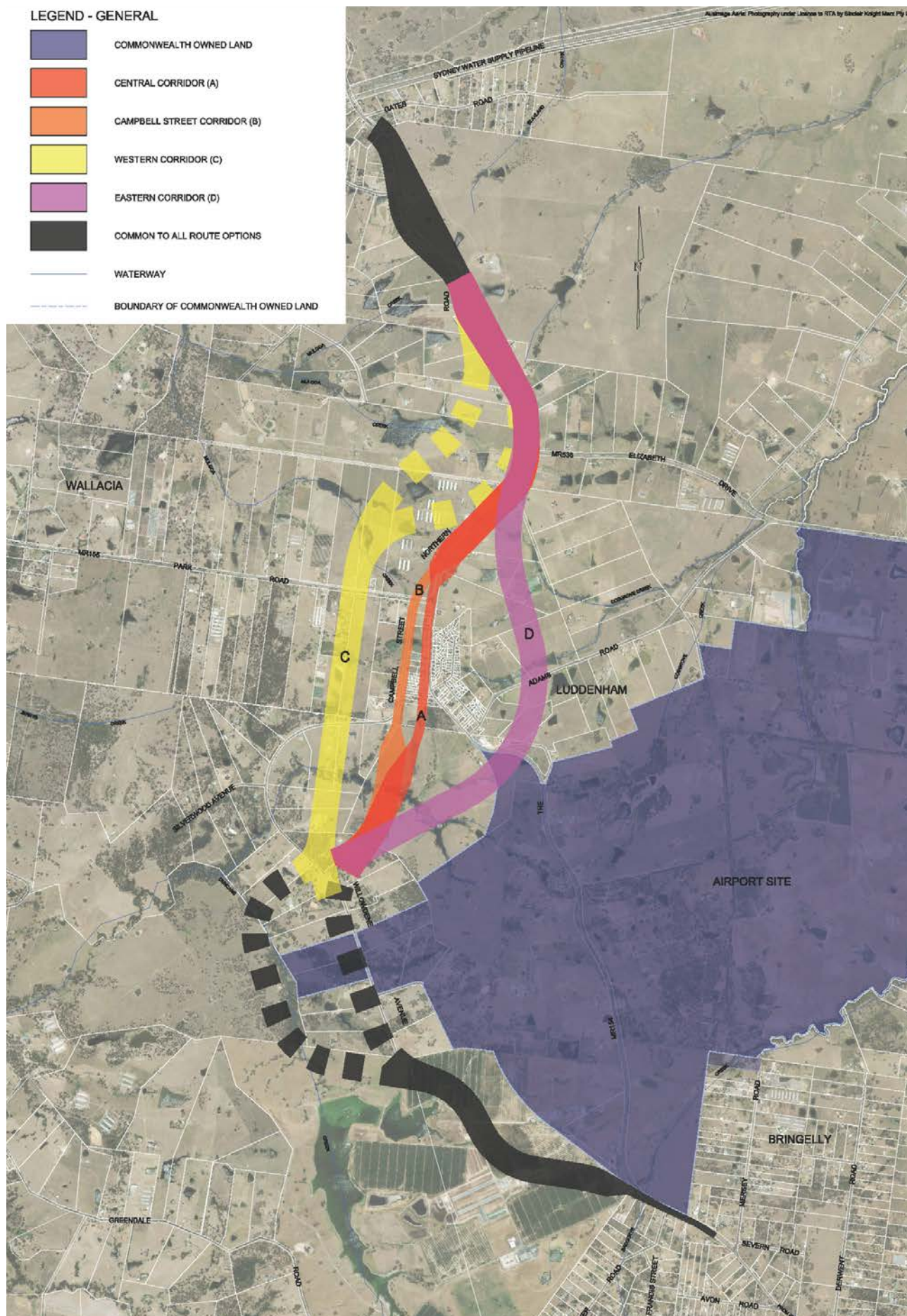


Figure 2-1: The Northern Road Stage 4 – Route Options



**Figure 2-2: The Northern Road Stage 4 – Shortlisted Route Options**

## 3 Project description

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Stages 3 and 4 of The Northern Road upgrade were announced as part of the Western Sydney Infrastructure Plan, following the Australian Government's decision to proceed with the Western Sydney Airport in April 2014. The Northern Road Stage 3 upgrade is 10 kilometres in length and will occur between Jamison Road, Penrith and Littlefields Road, Luddenham. The Northern Road Stage 4 upgrade is approximately 11 kilometres and will occur between Littlefields Road, Luddenham and Mersey Road, Bringelly.

The upgrade will provide for up to eight lanes between Jamison Road, Penrith and Mersey Road, Bringelly, including two bus lanes. The upgrade would be designed for 90km/h south of the M4 Motorway and 80km/h north of the M4 Motorway. The upgrade would include shared paths for pedestrians and cyclists.

The Northern Road Stage 3 upgrade would include new signalised intersections at some intersections, widening of existing intersections and changed accesses to improve safety and corridor capacity. The upgrade is expected to include a range of renewed and formalised infrastructure such as bridges, retaining walls, drainage, safety barriers and lighting. The existing heavy vehicle enforcement bays are proposed to be relocated along the corridor.

The Northern Road Stage 4 will involve realignment of the existing road corridor around the proposed Western Sydney airport site to facilitate the construction and ongoing operation of the airport.

The capital investment value of the project is \$1 billion.

### 3.1 Key project components

#### *3.1.1 Alignment*

The Northern Road will generally follow the existing alignment between Jamison Road, Penrith and Littlefields Road, Luddenham.

South of Littlefields Road, The Northern Road will be realigned. This is necessary as the current alignment crosses the proposed Western Sydney Airport site at Badgerys Creek.

#### *3.1.2 Intersections and Interchanges*

Intersections which were given consideration for design change are included in this section, as follows. These will be further investigated and refined during preparation of the EIS.

##### *Castle Road Intersection*

The proposed upgrade would close Castle Road. The impact to traffic entering Castle Road is considered minor with the availability of Aspen Street and Maxwell Street. The proposed roundabout on Frogmore Road would assist with northbound movements from Castle Road.

##### *Frogmore Road/Tukara Road Intersection*

The proposed upgrade would signalise the existing arrangement. There is no impact to existing arrangements. Tukara Road traffic would continue to access The Northern Road from other intersections.

#### *Homestead Road Intersection*

The proposed upgrade would close the Homestead Road intersection. The impact to traffic is considered minor with access available via Wentworth Road and Cross Road. Right turn out access is likewise impacted although serviced by the same route to the Wentworth Road intersection.

#### *Garswood Road Intersection*

The proposed upgrade would maintain the existing arrangement. There is no impact to existing arrangements. Garswood Road traffic would continue to access The Northern Road from other intersections.

#### *Glenmore Parkway/Wentworth Road Intersection*

The proposed upgrade would replace the existing roundabout with a signalised intersection. There are unavoidable impacts to property accesses associated with the loss of the roundabout and u-turn movements. Various surrounding treatments have been introduced to service surrounding property access requirements.

#### *Grover Crescent (north) Intersection*

The proposed upgrade would remove the existing right turn out. The right turn would remain as an uncontrolled movement from the median. The impact to properties in Grover Crescent is minor. A Chain-O-Ponds Road u-turn area would service southbound (right turn out) movements from affected properties.

#### *Grover Crescent (south) Intersection*

The proposed upgrade would remove the existing intersection. Grover Crescent access would be available from Grover Crescent (north) only. The impact to properties in Grover Crescent is minor. A Chain-O-Ponds Road u-turn area would service southbound (right turn out) movements from affected properties.

#### *Longview Road Intersection*

The proposed upgrade would close the existing intersection. The impact to traffic is considered minor with access available via a new road between Longview Road and Kings Hill Road. Right turn out access is likewise impacted although serviced by the same route to the Kings Hill Road intersection.

#### *Interchange at the M7 to The Northern Road Motorway*

The Northern Road corridor will need to allow an interchange with the proposed motorway from the M7, Cecil Park to The Northern Road, Luddenham.

#### *Interchange at the M4 Motorway*

The proposed upgrade would provide 3 lanes in each direction and a single signalised intersection for the M4 Motorway interchange. This will improve traffic capacity and remove existing congestion issues north of the M4 Motorway interchange.

### **3.1.3 Bridges**

A number of bridges would be required to cross physical constraints, including:

- Water courses (including Badgerys Creek, Duncans Creek, Mulgoa Creek and Cosgrove Creek)
- Floodways
- The M4 Motorway.

#### *3.1.4 Ancillary facilities*

Ancillary facilities would be required to enable the construction and operation of the project, including, but not limited to, the following:

- Construction site fences
- Temporary sediment and erosion control measures and other environmental controls
- Temporary signage
- Construction compounds
- Crane and hard stand area set up
- Stockpile sites (temporary and permanently incorporated into the finished works)
- Temporary site accesses
- Concrete batching plant
- Temporary road diversions
- Potential operational Incident Response Facility.

#### *3.1.5 Estimated project schedules & staging*

The following are estimated project schedules and staging:

Early / preliminary works - Stages 3 & 4	Mid 2017
Main works – Stage 4	Late 2017
Operation – Stage 4	End 2019
Main works – Stage 3	Mid 2018
Operation – Stage 3	End 2020

## 4 Key environmental issues

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### 4.1 Overview

Roads and Maritime prepared a Preliminary Environmental Investigation (PEI) for the project in March 2015, with the study area being from Mersey Road in the south to Bringelly Road/Caddens Road, about 19 kilometres to the north. The width of the study area varied as follows:

- **North of Elizabeth Drive** – about 250 metres either side of The Northern Road. This width was considered appropriate as the project follows the existing alignment in this area.
- **South of Elizabeth Drive** – about 1500 metres wide. This broader area was considered as options for the new alignment are still under consideration (refer section 2.4).

The outcomes of this PEI indicate the following key environmental issues will require further detailed assessment, via the EIS, and may require project specific impact mitigation measures. Issues associated with these key environmental issues are elaborated further in this chapter, as follows:

- Traffic and transport
- Flooding and hydrology
- Ecology
- Aboriginal heritage
- Non-Aboriginal heritage
- Noise and vibration
- Socio-economic
- Landscape and visual amenity
- Land use.

A number of other environmental issues have also been identified. These issues are outlined in Chapter 5 and are considered to be of lesser consequence taking into consideration the project scope, the existing environment and the implementation of standard management and safeguard measures. The potential impact of these other environmental issues will be assessed further in the EIS for the project.

### 4.2 Traffic and Transport

#### 4.2.1 Overview

The Northern Road is a north-south arterial road in western Sydney connecting the South West Growth Centre to the M4 Motorway and to Penrith. The Northern Road in the study area is generally a two-lane road with a speed limit of 80 kilometres per hour. The Northern Road forms an overpass over the M4 Motorway and there are signalised junctions at the motorway entry and exit ramps for northbound and southbound traffic.

#### *Intersections*

There are numerous intersections along The Northern Road in the study, including:

- Mersey Road
- Dwyer Road
- Eaton Road (south)
- Eaton Road (north)
- Adams Road
- Roots Avenue
- Blaxland Avenue
- Park Road
- Elizabeth Drive
- Littlefields road
- Gates Road
- Longview Road
- Kings Hill Road
- Grover Crescent (south)
- Grover Crescent (north)
- Chain-O-Ponds Road
- Bradley Street
- Wentworth Road
- Glenmore Parkway
- Garswood Road
- Homestead Road
- M4 Western Motorway
- Tukara Road
- Frogmore Road
- Aspen Street
- Castle Road
- Maxwell Street
- Bringelly Road
- M4 Motorway – signalised entry/exit ramps for eastbound and westbound traffic.

#### *Access*

These roads as well as a number of unnamed roads connected directly to The Northern Road provide access to a number of facilities including:

- Private residences
- Businesses
- Penrith Golf and Recreation Club
- Orchard Hills Golf Club
- Orchard Hills Defence Establishment
- Luddenham Showground

- Sales Park
- Freeburn Park
- Willmington Reserve.

The following intersections are signalised:

- The Northern Road and the M4 Motorway eastbound and westbound exit ramps
- The Northern Road and Maxwell Street/Bringelly Road.

None of the intersections south of the M4 motorway are signalised. The intersections at Elizabeth Drive as well as at Glenmore Parkway/Wentworth Road are roundabouts.

A section of the proposed Western Sydney Airport site is located in the study area to the south east.

#### *Heavy Vehicles & Public Transport*

The Northern Road is a designated heavy vehicle route and can carry the following:

- 4.6 metre high vehicles
- 19 metre B-double vehicles
- 23 metre B-double vehicles
- 25/26 metre B-double vehicles.

Three existing bus services pass through the study area:

- 789 – on The Northern Road for the length of the study area, operated by Busways
- 794 – on The Northern Road from the M7 Motorway to Wentworth Road, operated by Busways
- 781 – crosses The Northern Road at Glenmore Parkway, operated by Busways.

#### *Traffic Volumes*

The average daily traffic on The Northern Road was recorded in 2011 to the south of the study area, about 50 metres north of Dwyer Road (Roads and Maritime 2012).

The recorded volumes are provided in Table 4-1.

**Table 4-1: Average daily traffic**

Location	Average daily traffic (vehicles/day)	Average weekday traffic (vehicles/day)
The Northern Road, 50 metres north of Dwyer Road	10,467	11,075

#### *Other Planned Projects*

Construction works on other potential projects in the area could provide opportunities and constraints, including:

- Future construction of the M12 Motorway between the M7 and The Northern Road. It is expected the M12 Motorway would be generally parallel to and in the

vicinity of Elizabeth Drive.

- Construction of the proposed Western Sydney Airport – The Northern Road would be a key transport route to the airport during both construction and operation.
- Development of the South West Growth Centre – Construction works are generally to the east of the southern section of The Northern Road. The Austral and Leppington North precincts, in the north of the growth centre, were rezoned in 2013. The timing of construction in these precincts depends on the availability of services and the demand for housing.

The Outer Sydney Orbital (M9) is identified in a number of strategic plans (refer to section 2.2). A route has not been identified but the route would be likely to run north – south in the general area to the west of The Northern Road.

The Broader Western Sydney Employment Area Draft Structure Plan – Preliminary Transport Analysis (DPI 2013c) structure plan identifies one possible rail line that would cross and/or run along The Northern Road, being a freight line connection to the western line to the north and possibly to the Southern Sydney Freight Line to the south.

#### *4.2.2 Summary of issues*

Considering extensive developments being planned in the region, the upgrade of The Northern Road is likely to improve traffic flow in the region.

Construction work around the M4 Motorway intersection would be a substantial constraint. Any widening over the overpass would also be a substantial constraint. Property access would be a constraint during widening works on The Northern Road. Along with numerous residential and businesses, The Northern Road provides direct access to the following:

- Orchard Hills Defence Establishment – The Northern Road, Orchard Hills
- Orchard Hills Golf Club – The Northern Road, Orchard Hills
- Penrith Golf and Recreation Club - The Northern Road, Glenmore Park.

#### *Construction*

Construction of the project would require the use of heavy vehicles to deliver construction plant, equipment and materials as well as remove waste from the project site. The construction period would also result in increased use of light vehicles on the surrounding road network associated with the construction workforce. The introduction of additional heavy and light vehicles may result in deterioration of intersection and traffic performance on the surrounding road network.

In addition, the construction of the project would be likely to have the following impacts:

- Road traffic, pedestrians and cyclists would be likely to be temporarily disrupted due to the increased traffic volumes from construction vehicles. There would be the potential for safety impacts due to temporary road arrangements or the proximity of construction activities to normal traffic
- Temporary disruptions and delays to traffic due to the narrowing of lanes, speed restrictions, additional truck movements and temporary road closures
- The potential for a temporary shift of traffic movements from roads within the project area to alternative routes during peak periods as motorists try to avoid

congestion caused by road works

- Temporary impacts on pedestrian and cycle access
- Increased bus travel times with consequent delays for commuters
- Vehicle access to some properties close to construction sites would potentially be impacted.

#### *Operation*

Once the project is operating, it would have the following potential impacts:

- Permanent changes to existing traffic movements and permanent road modifications
- Alterations to pedestrian movements at existing intersections
- Alterations to existing property accesses.

The project would have the following benefits:

- The ability to separate longer distance/through traffic and local trips
- Reduction in overall travel times for longer distance business and freight trips
- Improvement in travel time reliability for public transport, freight, businesses and commuters
- Improved resilience to the traffic network capacity requirements during wet weather and flooding
- Improved resilience to the traffic network capacity requirements during peak periods
- An improved level of safety and a likely significantly reduced crash rate
- A possible Incident Response Facility.

#### **4.2.3** *Proposed further assessments*

Roads and Maritime will carry out a more detailed assessment of the traffic, access and safety impacts of the project. The assessment will use traffic modelling to assess traffic impacts associated with the construction and operation of the project. The assessment will identify traffic impacts and undertake an assessment of existing local and regional traffic volumes and traffic patterns against forecast volumes and potential changes to traffic patterns associated with the project. The assessment will include:

- An assessment of interchange, intersection, road link and network capacity options to provide clear recommendations for input into the design
- Assessment of the traffic related impacts arising from construction vehicles as well as any changes in the road network as a result of construction activities
- Assessment of the traffic related impacts generally arising from completion of the project (the 'do something') as well as those that could be expected from the 'do nothing' scenario, including assessment of impacts of the project on road users such as motorists, public transport, pedestrians and cyclists
- Analysis of historical crash data to ascertain the safety of the road network as well as outline the improvement in crash safety that would be likely to result from construction of the project
- The future development of the Outer Sydney Orbital (M9) and potential access to the route should be considered during the development of options and concept designs

- The future development of freight and passenger rail lines should be considered during the elaboration of options and concept designs.

### 4.3 Hydrology

#### 4.3.1 Overview

Based on preliminary research, the waterways within the study area are deemed Class 2 or 3 waterways in accordance with Fairfull and Witheridge (2003) (see Table 4-2). Field surveys would be required to confirm these findings.

**Table 4-2: Assessment of waterways within the study area**

Feature					
Waterway	Mulgoa Creek	Cosgroves Creek	Badgerys Creek	Jerrys Creek	Duncans Creek
Class*1	Class 2-3	Class 2-3	Class 2-3	Class 2-3	Class 2-3
	Further investigation	Further investigation	Further investigation	Further investigation	Further investigation
Order*2	1st Order	1st Order	1st Order	1st Order	1 <sup>st</sup> Order
Key Fish Habitat*3	Yes	Yes	Yes	Yes	Yes

\*1 According to Fairfull and Witheridge (2003)

\*2 According to Strahler (1952)

\*3 According to DPI Fisheries mapping

#### 4.3.2 Summary of issues

##### *Construction*

The construction of the project would need to consider the following issues:

- A large flood during construction may have the potential to impact construction works
- Temporary waterway crossings may likely be required, which would have potential impacts on flow regimes
- Watercourses may be required to be realigned/relocated during construction, potentially altering the point of discharge
- A major rainfall event would have the potential to impact on construction and may cause surface and groundwater contamination
- Construction stockpiles, structures and equipment may have an impact on flood characteristics, including height of flood water, flood water velocity, flow paths, timing and flood storage.

##### *Operation*

A preliminary review indicates that there are up to four creek crossings along the proposed project where watercourses would require passage through the project, including Mulgoa Creek, Cosgroves Creek, Badgerys Creek, Jerrys Creek and Duncans Creek.

Once the project is operating, this may have the following potential impacts:

- Bridges/culverts and batters may change the velocity, location and flooding characteristics, including the time of inundation, depths, rates of recession and could cause scour (scour is the removal of soil material by river flow)
- Potential impact on water passages may occur through the various watercourses,

including changes to peak flows and floodplain storage

- Improved traffic network resilience during flooding.

#### 4.3.3 *Proposed further assessments*

Roads and Maritime will carry out an assessment of the flooding impacts of the project. The assessment will:

- Describe the existing flood and drainage conditions in catchments relevant to the project
- Establish existing scenario flood levels and velocities for a range of design storm events
- Identify minimum road elevations and sizing of bridges and culverts to address flood risks
- Identify impacts to flooding for a range of design storm events, and the probable maximum flood
- Consider the potential impacts of climate change and future development on flooding and the concept design
- Identify potential impacts from changes in flooding characteristics on properties and structures
- Provide input into the concept design to ensure the design meets required flood management objectives the project objective of providing minimum 20 year average recurrence interval flood immunity, and identify feasible and reasonable mitigation measures to minimise impacts to flooding.

## 4.4 Ecology

### 4.4.1 *Overview*

A search of the OEH BioNet Wildlife Atlas revealed 62 threatened species listed on the *Threatened Species Conservation Act 1995* (NSW) (TSC Act) Act recorded within 10 kilometres of The Northern Road section of the study area. They include 1 reptile, 3 amphibian, 24 bird, 2 invertebrate, 14 mammal, and 18 flora species. Also, 26 endangered ecological communities (EECs) have the potential to occur within the locality. Of these threatened species and communities 1 bird, 1 invertebrate and 2 flora species have been recorded within the study area, as well as 1 EEC (Attachment B).

A search of the EPBC Act Protected Matters Search tool revealed 48 nationally listed threatened species listed on the EPBC Act within 10 kilometres of the study area. They include 5 amphibian, 6 bird, 2 fish, 6 mammal, 1 reptile, and 28 flora species. Furthermore, 12 migratory birds were included. In addition, 6 EECs have the potential to occur within 10 kilometres of The Northern Road study area. Of these species and communities, 1 bird, 2 flora and 1 community have been recorded within the study area (Attachment B).

A search on the DPI Records Viewer revealed 4 threatened species for the Hawkesbury – Nepean Catchment. Further research revealed these species are unlikely to be occurring within the waterways of the study area.

A search of the Atlas of Living Australia revealed 38 threatened species previously recorded within a 10 kilometre radius of the study area. These records include records from the OEH BioNet Wildlife Atlas.

A search on the BOM Atlas of Ground Water Dependent Ecosystems found no groundwater dependent ecosystems occurring within The Northern Road section of

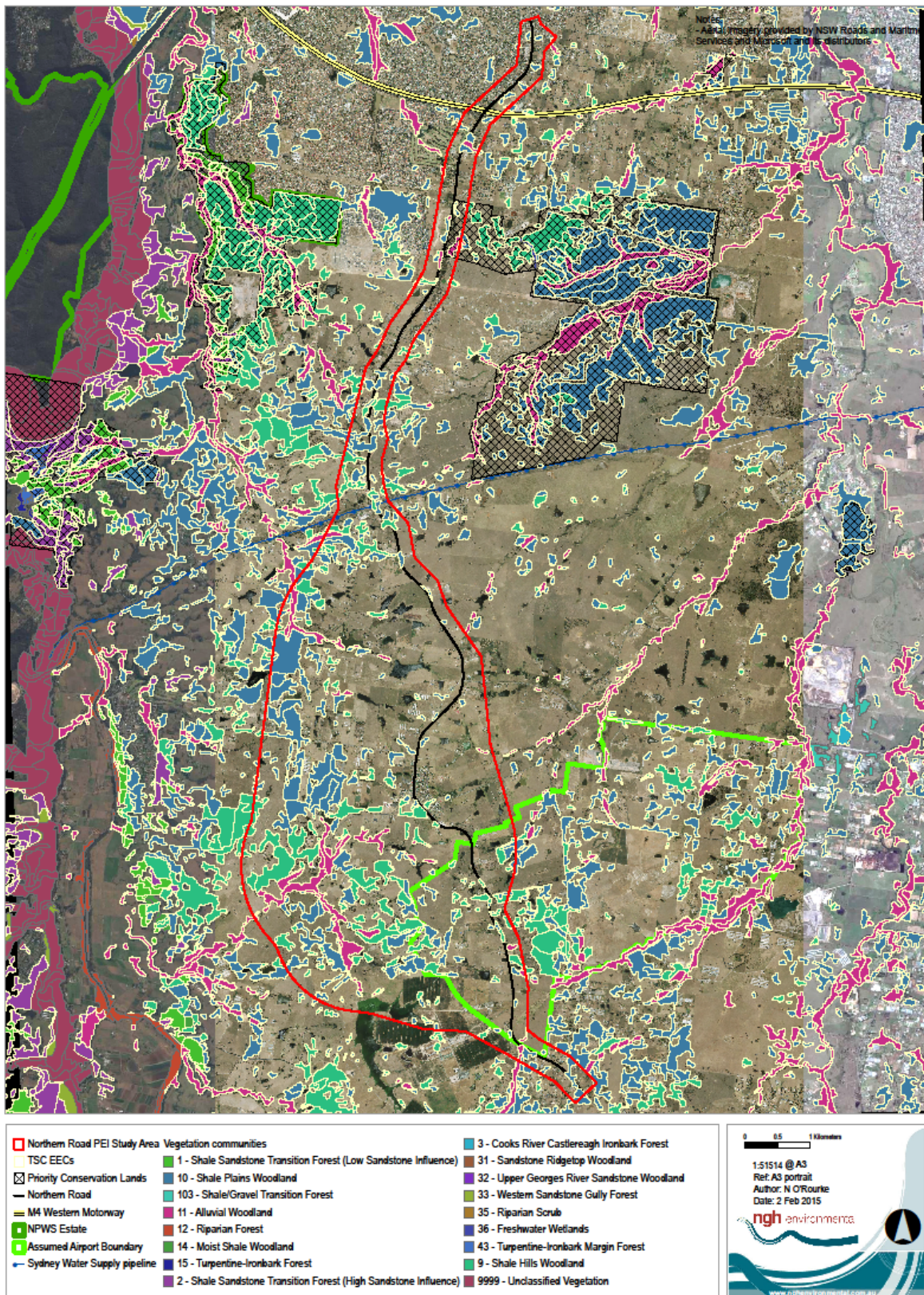
the study area.

Furthermore, a review of published reports was undertaken, including:

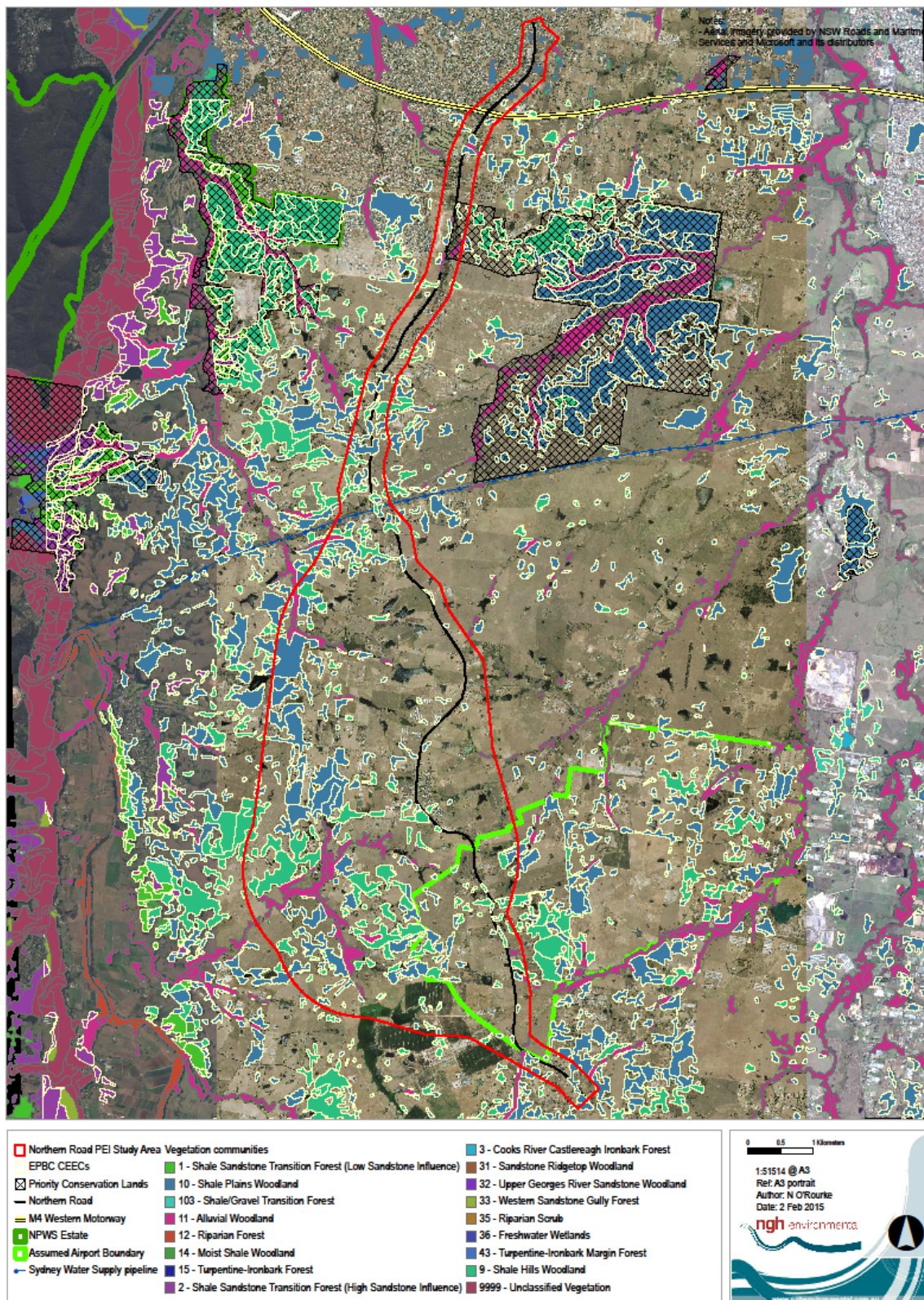
- The Broader Western Sydney Employment Area – Ecology Study (Eco Logical Australia 2013)
- Fairfield Biodiversity Strategy 2010 (Eco Logical Australia 2012a)
- Liverpool Biodiversity Management Plan 2012 (Eco Logical Australia 2012b)
- Biodiversity Strategy 2011-2020 Blacktown LGA (Eco Logical Australia 2011)
- The Cumberland Plain Recovery Plan (DECCW 2011b)
- Hawkesbury – Nepean Catchment Action Plan 2007- 2016 (Hawkesbury – Nepean CMA 2008)
- Penrith Biodiversity Strategy and Action Plan (Penrith City Council 2008b)
- Second Sydney Airport Draft Environmental Impact Statement (Dept. Transport and Regional Development 1997).

#### *4.4.2 Threatened species and ecological communities*

A number of threatened plant and animal species and ecological communities listed under either NSW or Commonwealth legislation occur within the study area (Figure 4-1 & Figure 4-2). The main endangered ecological community present is Cumberland Plain Woodland.



**Figure 4-1: Endangered Ecological Communities within and surrounding the study area under the TSC Act**



**Figure 4-2: Endangered Ecological Communities within and surrounding the study area under the EPBC Act**

#### *Fauna habitat*

Previous reports have suggested the habitat within the study area has been highly altered with introduced flora and fauna evident (Eco Logical Australia 2013). Similarly, the riparian habitats have been reported to be in fairly low condition, offering limited breeding and foraging opportunities for fauna (SKM 2012).

The remnant patches of woodland within the study area would offer foraging and breeding opportunities for woodland birds, small and arboreal mammals, small reptiles and the Cumberland Plain Land Snail. The aquatic creek systems would also offer foraging and breeding opportunities for woodland and aquatic birds, arboreal and mammals, small reptiles and aquatic fauna. The cleared lands offer limited recourses for native fauna; however, grazers such as Eastern Grey Kangaroos may use this habitat.

#### *Aquatic Fauna*

No threatened aquatic fauna has been recorded within a 10 kilometre area of the study area.

The study area occurs within the Hawkesbury/Nepean Catchment. A high number of farm dams are located within the study area may have the potential to provide habitat for aquatic species. In particular, large water bodies are located to the west of The Northern Road near Elizabeth Drive. Further, Duncan's Creek fills out into a large body of water in the south of the study area.

#### *Habitat connectivity*

There is limited contiguous habitat connectivity within the study area. The southern section of the study area is connected through riparian habitat along Badgerys Creek which extends north and south from the study area. Habitat connectivity also occurs through Duncan's Creek and its tributaries, eventually leading to an open water expanse.

Similarly, the mid and northern sections of the study area have riparian habitat connection through Mulgoa Creek and its tributaries, Surveyors Creek Nature Reserve and then through to the east into the Orchard Hills Defence site. This remnant patch of woodland is one of the largest intact remnant patches of Cumberland Plain Woodland and likely provides habitat for a suite of woodland flora and fauna species. This area is identified as a Priority Conservation Land (PCL) in the Cumberland Plain Recovery Plan (DECCW 2011b). It is also included on the Commonwealth Heritage list.

Some habitat connectivity also exists along The Northern Road where remnant trees and shrubs allow for fauna movements within the road corridor. This road habitat corridor is important for wildlife movements in an otherwise largely cleared landscape. Finally, much of the woodland habitat in the south-east of the study area is loosely connected.

Despite the limited contiguous habitat connectivity within the study area, the existing habitat is likely to provide stepping-stone connections. In this regard, there is a broad east-west connection in the northern part of the study area, which links from Prospect Reservoir, through Erskine Park, across Ropes Creek, Orchard Hills Defence Site, Mulgoa Nature Reserve (next to Glenmore Park) and then to the base of the Blue Mountains.

#### *Conservation areas*

A 'BioBank site' exists adjacent to Glenmore Park Stage 2, but it is not expected to be impacted by the project. Similarly, Mulgoa Nature Reserve occurs to the west of Glenmore Park and will not be impacted by the proposal.

As noted above, the Orchard Hills Defence site is identified as a Priority Conservation

Land (PCL) in the Cumberland Plain Recovery Plan.

#### 4.4.3 Summary of issues

##### *Construction*

The construction impacts associated with the project will be determined during preparation of the EIS. The construction of the project may have the following impacts:

- Clearing and disturbance of habitat that is likely to contain threatened fauna, including the Cumberland Plain Land Snail and several species of threatened terrestrial bird
- Potential clearing and/or disturbance of EECs, including Cumberland Plain Woodland
- Potential loss of connectivity between habitat areas resulting in habitat fragmentation and edge effects
- Clearing of native vegetation
- Animal strike during the construction of the project
- Potential introduction and/or spread of weeds, including noxious weeds
- Potential impacts on aquatic environments (both within and outside the proposed motorway alignment), habitats and species as a result of potential mobilisation of sediments and pollutants
- Removal of habitat, including riparian vegetation.

##### *Operation*

Once the project is operating, it may have the following potential impact:

- Lighting may potentially impact bats and other animal species, for example some nocturnal species may avoid the area, while lighting may attract insects providing a food source for micro-bats
- Increased likelihood of animal strike and possible increase in mortality/injury to animals
- Increased noise would potentially adversely impact some animal species
- Permanently altered habitat and connectivity.

#### 4.4.4 Proposed further assessments

During the development of the design and the preparation of the EIS, opportunities to avoid and minimise impacts to areas of ecological value will be explored. Roads and Maritime will carry out an assessment of impact on the ecological values of the project site and adjoining areas including terrestrial, riparian and aquatic areas. The assessment will be undertaken by an accredited consultant in accordance with the *NSW Biodiversity Offsets Policy for Major Projects*, including the *Framework for Biodiversity Assessment*.

At this stage, Roads and Maritime does not expect the project to have a significant impact on biodiversity matters listed under the EPBCA. Preparation of the EIS will include consideration of potential impacts to nationally listed biodiversity. That will include use of relevant survey guidelines, application of the *Matters of Environmental Significance – Significant Impact Guidelines* (DoE, 2013), and consideration of applicable recovery plans, threat abatement plans and conservation guidance.

If a potential significant impact on nationally listed biodiversity is identified during assessment of the project, Roads and Maritime will first endeavour to avoid that

impact. However, if it is unavoidable then Roads and Maritime will initiate a referral to the Australian Government, which may then trigger application of the NSW Bilateral Agreement with respect to environmental assessment.

## 4.5 Aboriginal Heritage

### 4.5.1 Overview

An extensive search of the OEH Aboriginal Heritage Information Management System (AHIMS) on the 2 February 2015 disclosed nine Aboriginal heritage items within the PEI study area. A summary of the AHIMS search is included in Table 4-3.

**Table 4-3: Summary of AHIMS search within The Northern Road PEI boundary**

Site ID	Site name	Site context	Site feature
45-5-0408	Mulgoa 1	Open site	Artefact
45-5-2617	B 31	Open site	Artefact
45-5-2618	B 32	Open site	Artefact
45-5-2629	B 39	Open site	Artefact
45-5-2636	B 6	Open site	Artefact
45-5-2642	B 24	Open site	Artefact
45-5-2643	B 25	Open site	Artefact
45-5-2670	B 92	Open site	Artefact
45-5-2671	B 91	Open site	Artefact

Of the nine Aboriginal sites identified, eight are grouped within a radius of about 1.7 km, located at the southern extent of the study area. The last remaining site is located at the northern edge of the study area.

As of 3 February 2015, there were no Native Title claims in the study area, with no other current claims in the study area identified in the National Native Title Tribunal Register.

## 4.6 Summary of issues

### *Construction*

Nine aboriginal sites have been identified. Depending on the detailed design and location of proposed surface infrastructure and construction activities, impacts on these sites may occur. The potential impact on these sites will be determined during the preparation of the EIS. The project will be designed and constructed to first avoid and then minimise the potential direct and indirect impacts on the known Aboriginal heritage sites. However, given the nature of the surface infrastructure required, it may be not be possible to avoid direct and / or significant impacts to the sites.

There would be also potential for direct impacts on unknown or unidentified archaeological items that may be uncovered, disturbed, damaged or destroyed. This will be taken into consideration during the preparation of the EIS and associated management plans.

### *Operation*

The operational impacts associated with the project will be determined during preparation of the EIS and based on the alignment determined during the concept design phase. Once the project is operating, the presence of the project may impact on any intrinsic Aboriginal cultural values of the area and any existing or potential Aboriginal sites within close proximity to the project.

### 4.6.1 Proposed further assessments

Roads and Maritime will prepare an Aboriginal Cultural Heritage Assessment Report in line with Roads and Maritime Procedure for Aboriginal Cultural Heritage

Consultation and Investigation (PACHCI). The assessment will:

- Summarise the findings and recommendations of the PACHCI Archaeological Survey Reports
- Identify and investigate the Aboriginal archaeological and cultural heritage values that are known or are predicted to be present by carrying out field surveys, test excavations and consultation with the registered Aboriginal stakeholders and Aboriginal knowledge holders, as required
- Prepare an assessment of known and potential impacts to Aboriginal objects, places and cultural values resulting from the construction and implementation of the project
- Identify feasible and reasonable mitigation and management measures (including measures to avoid significant impacts and an evaluation of the effectiveness of the measures)
- Prepare Aboriginal heritage constraints mapping
- Provide recommendation on any further archaeological work that may be required prior to construction.

## 4.7 Non-Aboriginal Heritage

### 4.7.1 Overview

The following non-Aboriginal heritage databases were searched on 29 January 2015 and the results are summarised in Table 4-4 (for items within study area or adjacent):

- World Heritage List (sourced from Australian Heritage Database)
- National Heritage List (sourced from Australian Heritage Database)
- Commonwealth Heritage List (sourced from Australian Heritage Database)
- NSW State Heritage Register (sourced from State Heritage Inventory)
- Liverpool LEP 2008 (sourced from State Heritage Inventory)
- Penrith LEP 2010 (sourced from State Heritage Inventory)
- Register of the National Trust of Australia NSW (non-statutory)
- Royal Australian Institute of Architects 20th Century Register of Significant Buildings (non-statutory).

**Table 4-4: Summary of heritage findings**

Register	Listings
World Heritage List	None
National Heritage List	None
Commonwealth Heritage List	None
NSW State Heritage Register	None
RMS Section 170 Heritage and Conservation Register	None
Liverpool LEP	8 local heritage items
Penrith LEP	8 local heritage items
Register of the National Trust of Australia NSW	None
Royal Australian Institute of Architects 20th Century Register of Significant Buildings	None

A total of 16 recorded heritage items (Table 4-5) were identified within, or adjacent to the proposal area. All of these were listed on statutory registers and none were listed on non-statutory registers.

**Table 4-5: Listed heritage items within The Northern Road study area.**

Item	Location	Property description	Significance	LGA	SHI number
Lawson's Inn Site	The Northern Road, opposite junction with Eaton Road, Luddenham	Inn/tavern Archaeological	Local	Liverpool	1970051
Luddenham Public School	The Northern Road, Luddenham	School	Local	Liverpool	1970085
Vicary's Winery Group*	The Northern Road, Luddenham	Winery/vineyard	Local	Liverpool	1970098
Vicary's Winery Horse Shed (Former)	The Northern Road, Luddenham	Shed	Local	Liverpool	1970453
Vicary's Winery Main House and Garden	The Northern Road, Luddenham	Cottage	Local	Liverpool	1970454
Vicary's Winery Vineyard	The Northern Road, Luddenham	Vineyard / landscape	Local	Liverpool	1970159
Vicary's Winery Woolshed	The Northern Road, Luddenham	Woolshed / shearing shed	Local	Liverpool	1970162
Vicary's Winery, Wine Tasting and Cellar Door Sales Building	The Northern Road, Luddenham	Winery / commercial premises	Local	Liverpool	1970178
Brick Cottage	Park Road, Luddenham	Residential	Local	Penrith	2260116
Brick Cottage	Campbell St, Luddenham	Residential	Local	Penrith	2260117
Luddenham Progress Hall	The Northern Road, Luddenham	Community Hall	Local	Penrith	2260119
Luddenham Uniting Church	The Northern Road, Luddenham	Church	Local	Penrith	2260120
Luddenham Uniting Church Cemetery	The Northern Road, Luddenham	Cemetery/Graveyard	Local	Penrith	2260121
St. James Church of England Cemetery	The Northern Road, Luddenham	Cemetery/Graveyard	Local	Penrith	2260123
St. James Church of England	The Northern Road, Luddenham	Church	Local	Penrith	2260122
Timber Cottages	29 and 41 The Northern Road, Luddenham	Cottages	Local	Penrith	2260118

All of the 16 identified heritage items above are located in Luddenham within the study area. It was noted that the Vicary's Winery Group listing included all individually listed buildings and structures within the same property. However, these items are still individually listed as the Vineyard, Woolshed, Horse Shed, Wine Tasting and Cellar Door Sales building and the Main Homestead.

#### **4.7.2 Summary of issues**

##### *Construction*

The construction of the project may have both direct and indirect impact on non-Aboriginal heritage items. Direct impact refers to situations where the project would result in a physical change to the item and/or the construction footprint and/or road reserve boundary would be likely to occur on part of the property on which the item is located. Indirect impact refers to impact on the value of a heritage item where direct impact does not occur (such as visual impacts).

##### *Operation*

The operational impacts associated with the project will be determined during preparation of the EIS. Permanent changes to the vistas to and from listed heritage items adjacent to the project may occur.

#### **4.7.3 Proposed further assessments**

Roads and Maritime will carry out an assessment of impacts on Non-Aboriginal Heritage. The assessment will:

- Describe the existing non-Aboriginal heritage and archaeological heritage values relevant to the project, including historic chronological mapping
- Include Statements of Heritage Impacts for all identified heritage items which could be directly or indirectly impacted within the project impact zone
- Identify feasible and reasonable mitigation and management measures, including measures to avoid significant impacts where possible.

#### **4.8 Noise and vibration**

##### **4.8.1 Overview**

The sound profile of the project area is typical of a mixed use rural and urban area. The background noise levels are largely influenced by road traffic, and vary in level due to traffic volumes and the distance from the road.

In some places the project area is close to suburban and rural-residential areas, for which the project would be a new or changed source of noise.

Sensitive receivers within the study area include residential properties, businesses, rural properties and recreational areas as well as:

- Luddenham public school – located at 24 Jamison Street but also has frontage to The Northern Road
- St James Church of England and associated cemetery – located along The Northern Road at Luddenham
- Luddenham Uniting Church and associated cemetery - located along The Northern Road at Luddenham
- Jehovah's Witnesses place of worship – located at 328 Homestead Road, Orchard Hills
- Penrith Christian School – located at 1 Simeon Road, Orchard Hills

- ImageNations Church – located at 1 Simeon Road, Orchard Hills
- Christ Church at the College – located at 338 Wentworth Road, Orchard Hills
- Montgrove College – located at 140 Bringelly Road, Orchard Hills.

The PEI study area corridor is narrow north of Elizabeth Drive and, as such, there are likely to be similar sensitive receivers outside of the PEI study area boundary that could be impacted through noise and vibration. These include a number of schools such as:

- Surveyors Creek Primary School along Garswood Road
- Penrith Anglican College along Wentworth Road
- Mary Mackillop Primary School – located at 150 Fragar Road, South Penrith.

Residential sensitive receivers are scattered throughout the study area, particularly around the townships of Luddenham, about 1 kilometre south of The Northern Road and Elizabeth Drive intersection; Glenmore Park and Orchard Hills, at the northern end of the study area.

#### *Vibration*

Impacts from ground vibration during construction activities can be categorised as:

- Disturbance to building occupants
- Impact on building contents
- Impact on building structures.

The proposal would have potential vibration impacts on a range of buildings and structures.

#### **4.8.2** *Summary of issues*

There are a number of sensitive receivers (primarily residential properties and businesses as well as schools and places of worship) located within and adjacent to the study area. These properties would provide both an operational and construction constraint for the proposal.

#### *Construction*

The construction of the project would be likely to have the following impacts:

- Some construction work may need to be carried out outside standard working hours to minimise impacts on business and areas of high traffic flow. This may have impacts on noise-sensitive receivers
- A number of noise-sensitive receivers would be impacted by construction traffic and the operation of plant and equipment. The extent of impact would vary according to the relationship of the construction works to the receiver location, intervening structures and the nature of construction work at various stages of the construction process
- There would be potential for construction vibration impacts on nearby buildings, heritage items and other structures. The level of impact would depend on the construction techniques used and the offset distances between the vibration source and the sensitive receiver.

The potential for vibration impact as a result of major work would depend on the selection of the preferred option, selection of construction plant, type of work and how close major work would be to receivers. Depending on the concept design, sensitive receivers may need to be considered via a vibration assessment as part of the EIS.

### *Operation*

The introduction of new and redistribution of existing traffic would alter noise levels in the area. Once the project is operating, new traffic noise may be introduced to areas where there is a currently low background noise level. There may be potential for traffic noise levels to exceed current standards in some areas.

Opportunities to minimise noise impacts during construction and operation by using less developed land and avoiding built up areas (e.g. Luddenham town centre) would be investigated during the development of options.

#### **4.8.3** *Proposed further assessments*

Roads and Maritime will carry out an assessment of the construction and operational noise and vibration impacts of the project. The assessment will:

- Describe the existing noise environment within the study area and surrounds, including baseline road traffic and background noise levels
- Assess noise and vibration impacts during construction and operation, on the identified sensitive receivers. The assessment of operational noise impacts will be carried out in accordance with the NSW Roads and Maritime *Environmental Noise Management Manual* (ENMM) or an updated iteration, *NSW Road Noise Policy 2011*, and Australian Standard AS2702-1984: “*Acoustics – Methods for the Measurement of Road Traffic Noise*”. The construction noise and vibration assessment will be carried out in accordance with the NSW *Interim Construction Noise Guideline* (ICNG), and *Assessing Vibration: A Technical Guideline*
- Identify feasible and reasonable noise mitigation measures to address noise exceedances at sensitive receivers. Requirements for noise walls and other design features to minimise noise would need to be considered at the concept design stage in accordance with the Roads and Maritime *Noise Mitigation Guideline* (RMS 2015a).

## **4.9** Socio-economic

### **4.9.1** *Overview*

The census area of Mulgoa - Luddenham - Orchard Hills was used to characterise the area and is considered representative of the study area (see Table 4-6). The area is generally rural in character and has a population density of 40.7 people per square kilometre, compared with 378 for greater Sydney. The main employment sectors in the area are construction, manufacturing and retail trade.

The number of registered vehicles per 1,000 people is 723 in the area, higher than the number for greater Sydney (601) and commuting by car is by far the most used method at 87% of workers, compared to 58% of workers in Greater Sydney. The use of public transport as a method of commuting to work is low, due to limited availability.

**Table 4-6: Area Statistics from Australian Bureau of Statistics (2011)**

	Mulgoa – Luddeham – Orchard Hills	Greater Sydney
Population	6,727	4,672,619
Population density (persons/km <sup>2</sup> )	40.7	378
No of businesses	1,385	478,797
No of businesses with 5 or more employees	144 (14%)	63,012 (13%)
Top industry employment sectors	Construction (14.8%) Manufacturing (11.1%) Retail trade (10.7%) Health Care and Social Assistance (8.2%) Transport postal and warehousing (7.3%) Education and training (6.9%)	Health care and social assistance (10.9%) Retail trade (9.8%) Professional scientific and technical services (9.6%) Manufacturing (8.5%) Education and training (7.6%)
Registered vehicles per 1,000 population	723	601
Method of travel to work	Car (87%) Walk (6%) Other, incl taxis (3%) Train or tram (2%)	Car (58%) Train or tram (9%) Bus (5%) Walk (4%) Other, incl taxis (2%)

### *Land use*

The land use in the study area is a mixture of semi-rural properties with some small areas of more concentrated urban use, such as Luddenham. The main land uses identified include:

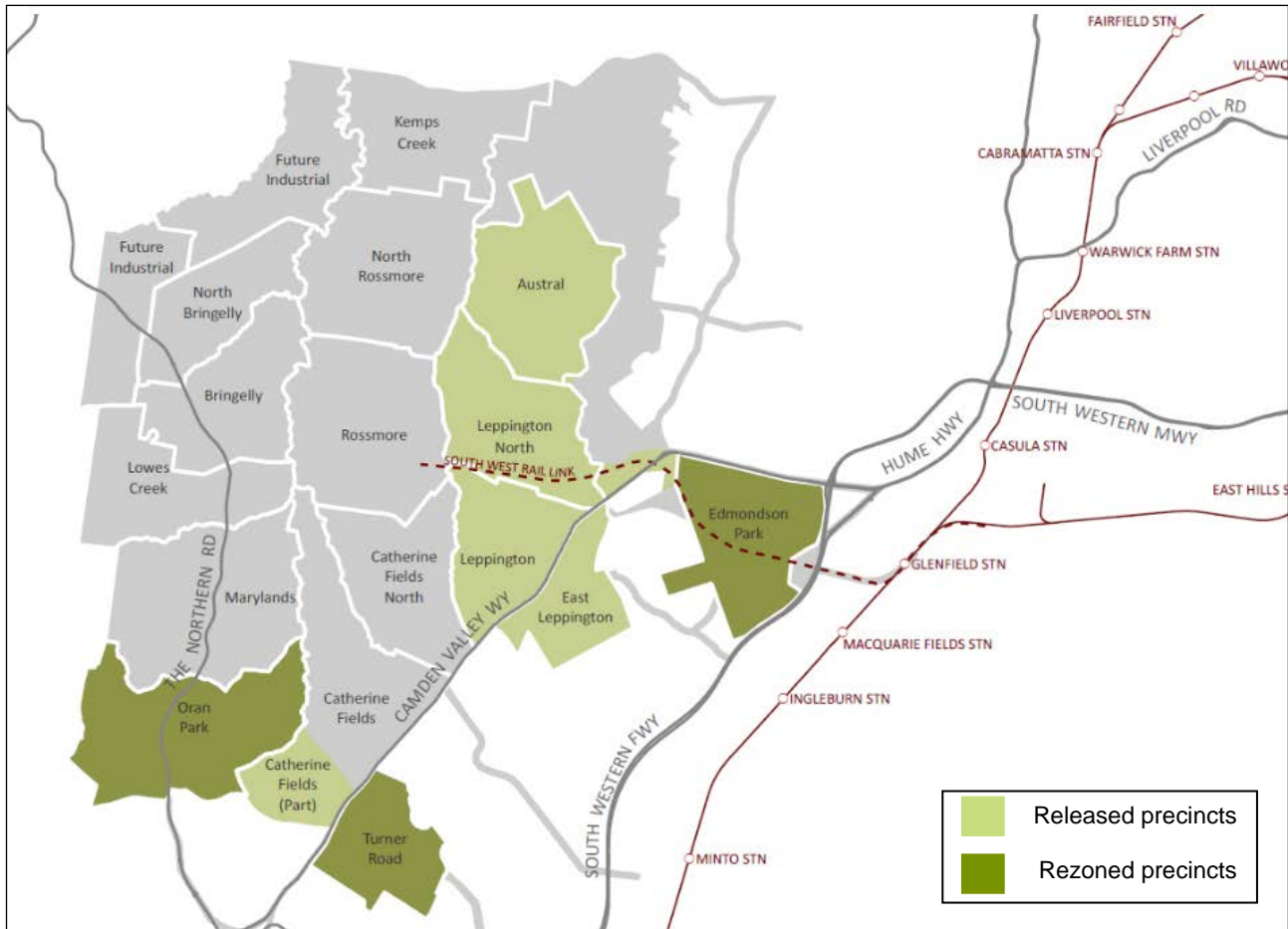
- Private properties, including residential and businesses, such as Vicary's Winery. The winery is also uses as a venue for functions
- Farm land (primary production) – located east and west of The Northern Road south of Elizabeth Drive. There are numerous farm dams in the study area. Leppington Pastoral Organic Fertilisers occupies a large area (about five square kilometres) partially in the south of the study area, west of The Northern Road
- The Orchard Hills Defence establishment –located along The Northern Road. The site occupies an area of about 1740 hectares, the majority of which is used as a buffer zone to ensure the safe storage munitions.
- Commonwealth Land (proposed site of the Western Sydney Airport) - located in the south of the study area, south of Elizabeth Drive. Luddenham public school – located at 24 Jamison Street but also has frontage to The Northern Road
- St James Church of England and associated cemetery – located along The Northern Road at Luddenham

- Luddenham Uniting Church and associated cemetery - located along The Northern Road at Luddenham
- Jehovah's Witnesses place of worship – located at 328 Homestead Road, Orchard Hills
- Penrith Christian School – located at 1 Simeon Road, Orchard Hills
- ImageNations Church – located at 1 Simeon Road, Orchard Hills
- Christ Church at the College – located at 338 Wentworth Road, Orchard Hills
- Montgrove College – located at 140 Bringelly Road, Orchard Hills
- Sydney Water Supply Pipeline – this pipeline crosses the study area just north of Gates Road
- Recreation areas/reserves:
  - Penrith Golf and Recreation Club – located along The Northern Road at the corner of Garswood Road
  - Orchard Hills Golf Club - located along The Northern Road east of Chain-O-Ponds Road
  - Luddenham Showground – located along Park Road in Luddenham
  - Sales Park – the park includes a cricket pitch and is located along The Northern Road in Luddenham
  - Wilmington Reserve - the park includes a basketball court and is located along Jamison Street in Luddenham
  - Freeburn Park - located along Blaxland Avenue in Luddenham.

#### *Current and future development*

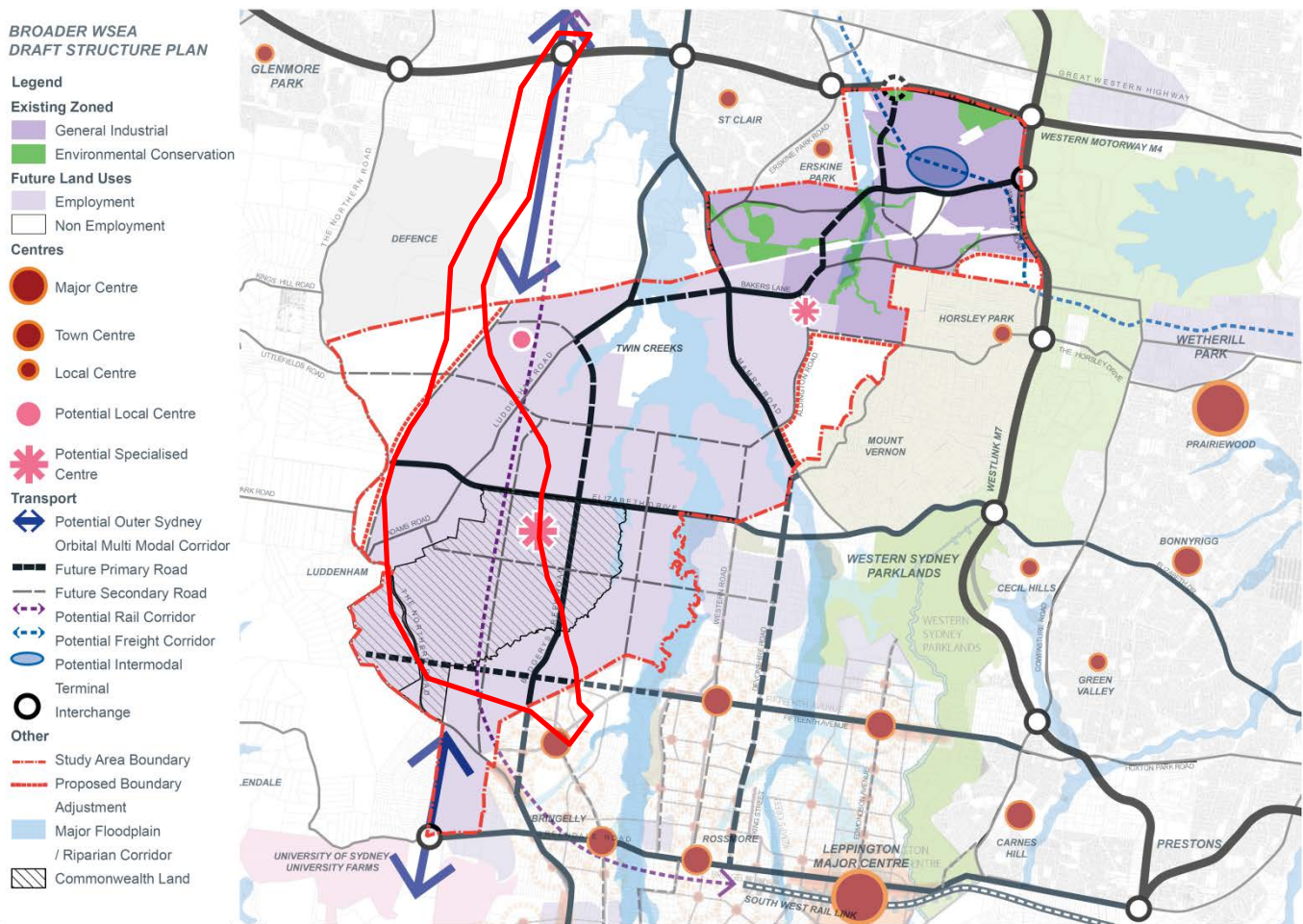
The South West Growth Centre is approximately 17,000 hectares, with a total of 18 precincts (refer to Figure 4-3). The precincts are being progressively released for development. This will continue for the next 30 years. The growth centre will house about 300,000 people in about 110,000 new residences. This area is within three local government areas:

- Liverpool Council
- Camden Council
- Campbelltown Council.



**Figure 4-3: South West Growth Centre (source: Dept of Planning and Infrastructure)**

The BWSEA is an area of about 6,300 hectares and is expected to be a large new employment area (refer to Figure 4-4). The main employment sectors are expected to be freight and logistics.



**Figure 4-4: Western Sydney Employment Area with study area (solid red line)  
(source: Dept of Planning and Infrastructure)**

#### 4.9.2 Summary of issues

The upgrade of The Northern Road would cater for the planned population growth in the region and would form a key connection to the proposed Western Sydney Airport. This section of The Northern Road is the last to be upgraded, with the remainder of the road either already upgraded or under assessment.

Large areas of undeveloped 'greenfield' land to the east and west, within the study area, offer some opportunities to minimise potential socio-economic impacts.

The town of Luddenham contain the highest constraints to any proposed road upgrade in terms of property impacts as properties are located closer to The Northern Road compared to other areas within the study area.

Property acquisition and the impact on local businesses and farms would need to be considered during the environmental assessment stage. Social and economic costs, including land acquisition or compensation and impacts to existing communities, would be a constraint for any proposed new alignment for The Northern Road. Any plans to upgrade The Northern Road would need to consider future developments in the area to ensure it is adequately integrated.

#### Construction

The potential socio-economic impacts that may result from construction of the project may include:

- Impacts associated with property acquisition, including uncertainty for residents and business owners about the property acquisition process and potential need to relocate
- Impacts on community facilities and on open public space areas and reserves
- Impact on local businesses and residents as a result of temporary changes to amenity (e.g. construction noise and vibration) and temporary road and footpath closures and detours
- Temporary influx of workers to the area.

#### *Operation*

Once operational, the potential socio-economic impacts of the project may include:

- Potential direct and indirect socio-economic impacts including on population and demography, access and connectivity, local business, agriculture, local tourism, social and recreational infrastructure, and community values
- Potential direct and indirect impacts on agricultural activities
- The project may increase traffic through reduce highway traffic through Luddenham, with impact on amenity
- Increased severance due to road widening
- Potential impact to flooding regimes which may result in impacts to properties, access and infrastructure.

The project would have several major social benefits, including:

- Increased efficiency of travel, especially during peak periods
- Improved connection to the South West Growth Centre, M4 and the Broader WSEA, including the proposed Western Sydney Airport
- Provision of opportunities to improve aspects of the public domain and new development opportunities would likely arise.
- Providing a strategic buffer between Luddenham and planned development of the Broader WSEA and Western Sydney Airport (depending on the preferred alignment of The Northern Road Stage 4).

#### **4.9.3** *Proposed further assessments*

Roads and Maritime will carry out a socio-economic impact assessment in accordance with the current '*RMS - Environmental Planning and Impact Assessment Practice Note for Socio-Economic Assessment*', which will consider the construction and operational stages of the project, including the positive and negative, direct and indirect impacts.

The assessment will include:

- A description of the social and economic profile for the communities and businesses surrounding the proposed motorway including, but not limited to:
  - Social characteristics: Including population and demography, families and housing, travel behaviour, socio-economic indicators for areas and need for assistance
  - Economic characteristics: Including labour force, income and employment and business and industry

- A business impact assessment to consider and assess the potential impacts (both positive and negative) on business in the area, with specific consideration of the likely change in travel patterns as a result of the project
- An assessment of the potential positive and negative impacts of the project on the social and economic values of the area during construction and operation of the project. This will include consideration of Luddenham and the potential positive and negative impact on the community and businesses along the existing and future road corridor
- Assessment of impacts to community facilities
- Identification of feasible and reasonable management and safeguard measures, including measures to enhance the project's benefits to avoid, manage or mitigate its potential impacts.

#### 4.10 Landscape and visual amenity

##### 4.10.1 Overview

The land to the west of The Northern Road is steep in parts and has a number of creeks and tributaries of the Mulgoa Creek draining through the landscape. The southwest of the study area in particular has undulating areas, including creeks in gullies. There are also a number of farm dams in this area.

East of The Northern Road (which runs along a ridge line) the land is gently undulating with two ridgelines forming the main topographical features. One is located to the west of Luddenham Road and the other is in the Aldington Road / Mt Vernon Road areas. Creeks in this part of the study area include Badgerys Creek, Cosgroves Creek, Oaky Creek and Blaxland Creek.

##### *Landscape character*

Landscape character varies from generally semi-rural in the majority of the study area to occasional pockets of suburban areas including at Luddenham and Glenmore Park. There are residences along the both sides of the road, usually set back from the road except at Luddenham where they front the road. The road reserves are vegetated with large trees. The topography of the area is undulating. Considering the generally sparse vegetation either side of The Northern Road as a result of current and past agricultural uses, extensive scenic views to the east and west are present within the study area. In general, the vista within the study area is of a picturesque semi-rural character.

##### *Visual sensitivity*

The Northern Road is a tourist drive (tourist drive 18) and offers some views to the west towards the Blue Mountains. Identification of viewpoints would generally be from:

- Road users on The Northern Road
- Residents and businesses along The Northern Road
- Recreational users of the Orchard Hills Golf Club and Penrith Golf and Recreation Club
- Users of the proposed Western Sydney Airport.

##### 4.10.2 Summary of issues

##### *Construction*

The construction of the project would be likely to have the following impacts:

- Visual impacts associated with construction activities (sites/compounds, machinery, temporary structures etc.) on visual amenity looking towards the Blue

Mountains, as well as the and semi-rural character of the area

- Physical impacts on existing public open space and use of land
- Impacts on the visual amenity of some sensitive receivers located near construction work, and on road users.

#### *Operation*

Once the project is operating, it may have the following impacts:

- Potential impacts on the area's semi-rural scenic values. In particular, the project may impact views of the Blue Mountains
- Additional road infrastructure associated with the proposed motorway would make the road visually dominant within the landscape, particularly at intersections and interchanges
- The landscape character would be altered
- Should the noise impact assessment identify the need for noise walls, this could create a visual impact to nearby sensitive receivers and potential noise mitigation treatments may alter the physical appearance of some buildings and sites.

#### *4.10.3 Proposed further assessments*

Further assessment of the potential for visual impacts and landscape character impacts along the proposed motorway alignment will be undertaken in accordance with the Roads and Maritime guideline 'Environmental Impact Assessment-Guidance Note, Guideline for Landscape Character and Visual Impact Assessment', and will include:

- Identification of the visual qualities present, including the existing landscape character of the region, sensitive locations, catchments and key viewpoints
- An evaluation of how well the design fits into the built, natural and community landscape
- A landscape character impact assessment assessing a series of landscape character zones along the route character. Each zone will be defined through the development of an understanding of land use, topography, and vegetation in combination with other factors
- A visual impact assessment of the project in the whole and parts on the landscape and urban character of the area, views to and from the project, magnitude of change to existing views and the visual sensitivity of the viewers
- The identification of feasible and reasonable measures to mitigate impacts. Identified mitigation measures will be incorporated into the project design.

The design of the project will be in keeping with urban design principles for the project and the Roads and Maritime guideline 'Beyond the Pavement: RTA Urban Design Policy, Procedures and Design Principles' (RTA, 2009), which identifies the following urban design principles regarding road infrastructure:

- Contributing to urban structure and revitalisation
- Fitting with the built fabric
- Connecting modes and communities
- Fitting with the landform
- Responding to the natural pattern
- Incorporating heritage and cultural contexts

- Designing roads as an experience in movement
- Creating self-explaining road environments
- Achieving integrated and minimal maintenance design.

#### 4.11 Utilities

Aurecon was engaged to undertake a Utility Impact Investigation for The Northern Road Upgrade – Stages 3 and 4 in May 2015. Roads and Maritime will undertake further strategic utilities investigations. The Aurecon investigation determined the following critical and major existing utilities:

##### 4.11.1 Stage 3

Sydney Water – SyW1.1 (DN750 DICL & DN900 SCL), SyW1.2 (DN450 DICL), SyW1.3 (DN600 CICL), SyW1.4 (DN750 SCL) and SyW1.5 (DN500 CICL and DN375 CICL) pipelines feeding to and from the Orchard Hills Water Treatment Plant.

Water NSW - StW1.1 (DN3000 SCL & DN2100 SCL Prospect supply pipelines) – which supply raw water to the Prospect Water Filtration Plant.

Telstra - mobile towers in the project area include off The Northern Road near the Defence Establishment Orchard Hills and off The Northern Road near Wentworth Road.

Transgrid - 330kV double circuit overhead conductors (TG1.1) crossing The Northern Road near Glenmore Parkway.

Endeavour Energy - substation located near the intersection of The Northern Road and Gates Road.

##### 4.11.2 Stage 4

Sydney Water – SyW2.1 (DN200 DICL & DN150 CICL) pipelines are located along Park Road, and The Northern Road up to the town of Luddenham, constituting the single source of supply to Luddenham.

Telstra - mobile towers in the project area include off The Northern Road opposite Park Road and near the intersection of The Northern Road with Mersey Road.

Transgrid - 330kV overhead power (TG2.1) crossing The Northern Road and Elizabeth Drive.

Endeavour Energy - substation located near the intersection of The Northern Road and Gates Road. Endeavour Energy has plans for new feeder connections from this substation, and also to upgrade the capacity of the substation by augmentation. Further, there is a 33kV feeder, parallel to The Northern Road and Park Road.

## 5 Other environmental issues

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### 5.1 Overview

Other environmental issues listed below are considered to be of relatively lesser consequence taking into account the scope of the project, the existing environment and the implementation of standard and best practice management and mitigation measures. It is considered unlikely that these will be key issues for the project; however, further assessment will be carried out as part of the EIS. Any environmental management and safeguard measures required to minimise and mitigate impacts will be documented as part of the EIS. These issues are:

- Soils, contamination and water quality
- Air quality
- Greenhouse gases and climate change
- Resource and waste management.

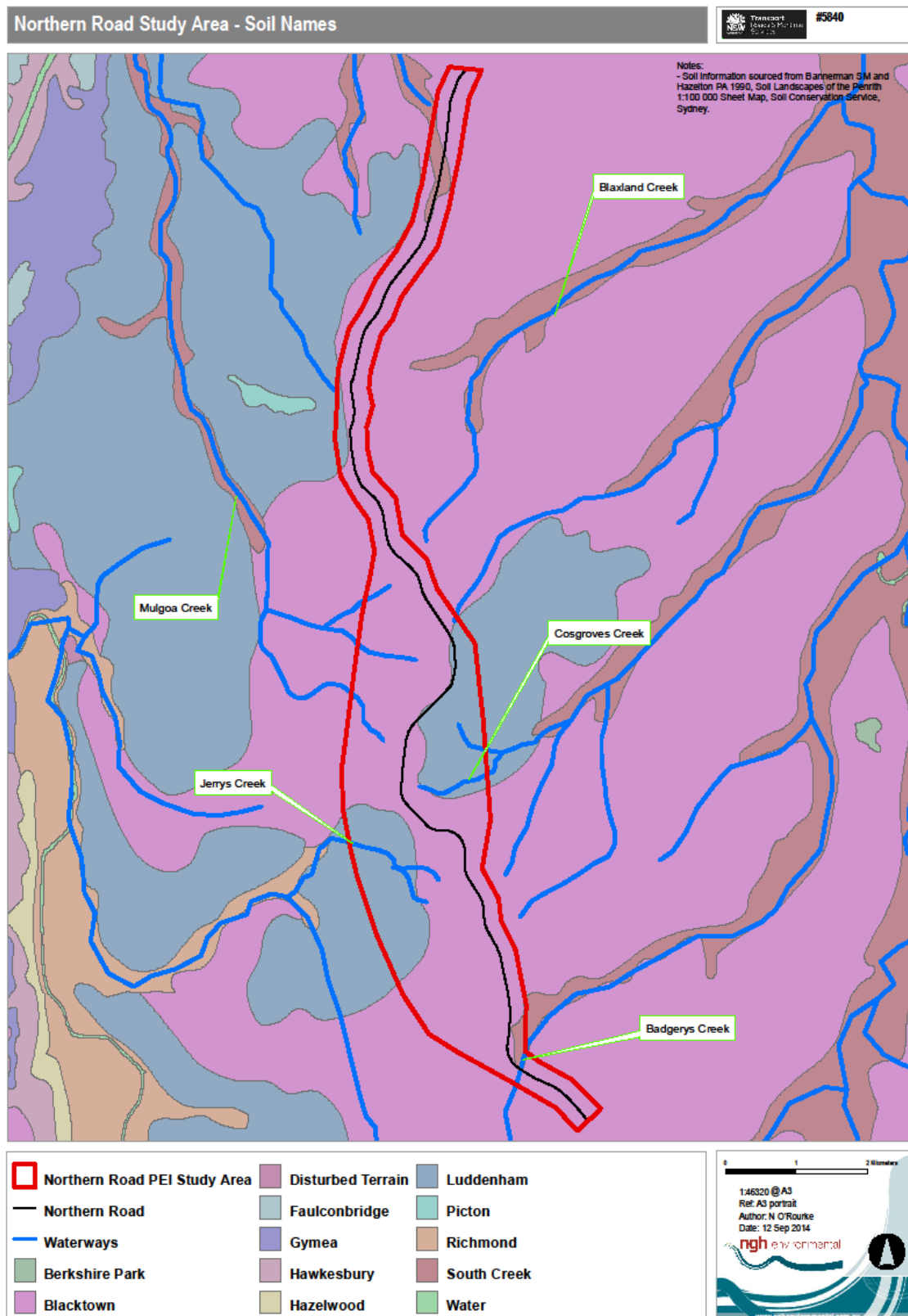
### 5.2 Soils and contamination

#### 5.2.1 Overview

##### *Soils*

The majority of the study area consists of Blacktown residual soils, with small patches of the erosion prone Luddenham soils in the southern half of the study area and two small patches of alluvial soils, one each at the northern and southern extents (Bannerman and Hazelton 1990). Richmond soils are found along parts of creek lines in the south west of the study area.

Blacktown soils are considered to offer poor soil drainage while Luddenham soils are considered to be highly susceptible to erosion (Bannerman and Hazelton 1990). An overlay of the study area on the Penrith 1:100 000 soil sheet map (Bannerman and Hazelton 1990) has been included in Figure 5-1 and Figure 5-2.



**Figure 5-1: Soil names (Source: Bannerman and Hazelton 1990)**

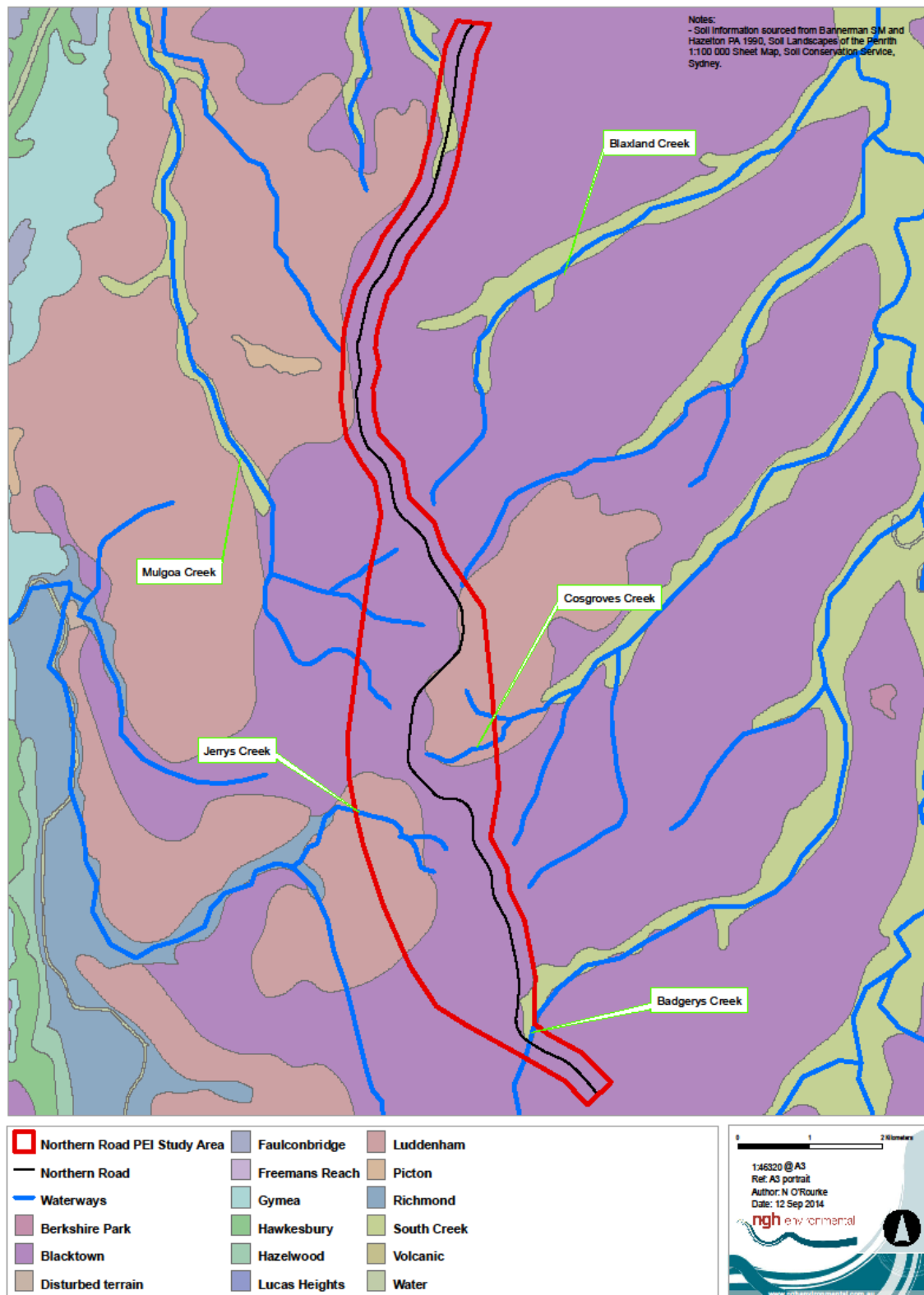


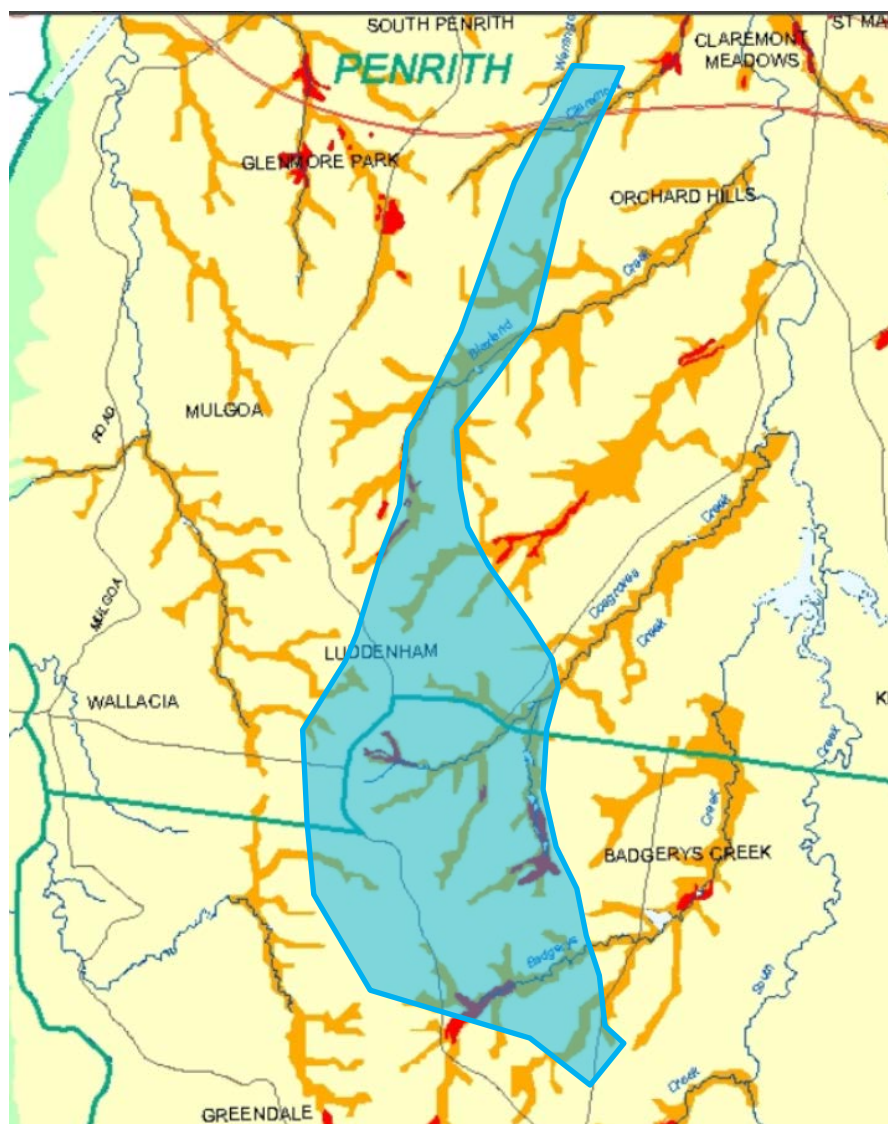
Figure 5-2: Soil processes (Source: Bannerman and Hazelton 1990)

#### *Acid sulphate soils*

No acid sulphate soils or areas currently considered potential acid sulphate soils are present within the study area.

#### *Salinity*

Patches of known salinity and other areas of moderate salinity potential are present within the study area. The entire Northern Road PEI study area is considered of low to moderate salinity potential (Figure 5-3).



**Figure 5-3: Salinity potential within the study area Green = LGA boundaries. Yellow = low potential for salinity. Orange = moderate potential for salinity. Red = known salinity (Source: DIPNR 2002)**

#### *Contamination*

A search of the EPA Contaminated Land record was undertaken on 4 February 2015. A total of four current notices relating to two sites within the Liverpool LGA and six current notices relating to eight sites within the Penrith LGA were identified. The 'Elura Liquid Waste Disposal Site' is located within the study area at Lot 4 The Northern Road, Luddenham and is subject to a current notice.

The Orchard Hills Defence Establishment is used for the storage of munitions and range of other defence related activities, such as of weapon ranges, fire training areas, and fuel storage and distribution from above ground and underground storage

tanks. Assessment of unexploded ordinances (UXO) in the EIS may be necessary depending on route options if traversing or in close proximity to the Orchard Hills Defence Establishment. The site also contains a sewerage treatment plant, and two landfills for waste disposal.

Potential risks from known contamination have been identified at the Orchard Hills Defence Establishment. These risks are actively managed by Defence to ensure that impact to human health or the environment is minimised. There is no indication that contamination extends off-site. A Stage 1 Desktop assessment and limited Stage 2 intrusive investigations, including assessment of soil and groundwater quality have been completed for the site (Commonwealth of Australia 2013).

Considering the land uses in the locality, particularly agricultural uses, potential contaminants may occur in the soils.

### *5.2.2 Potential impacts*

#### *Construction*

The construction of the project is likely to have the following impacts:

- There would be potential erosion and sedimentation due to the exposure of soils, particularly when the project traverses Mulgoa Creek, Cosgroves Creek, Badgerys Creek, Jerrys Creek and Duncans Creek.
- There would be potential for water quality impacts from the accidental spill of materials (including chemicals) during construction, and runoff from exposed or unclean surfaces
- There would be potential for groundwater contamination if construction activity intersects with groundwater
- There may be potential to find, expose and disturb contaminated land, particularly UXOs on the Commonwealth Defence Lands.

#### *Operation*

Once the project is operating, it could have the following impacts:

- Soil and water quality could be affected by any spills that may occur from bridge and road maintenance activities or vehicle accidents
- Soil and water quality could be affected by road runoff containing suspended solids, nutrients from atmospheric fallout, spills and other pollutants from vehicle, tyre and pavement wear.

### *5.2.3 Proposed further assessment*

Roads and Maritime will carry out an assessment of impacts on soils and water quality. The assessment will:

- Review existing topography, soil (including acid sulphate and salinity risk maps), geological and contamination information pertaining to the project area and the findings of the soil testing program to inform potential impacts of the works
- Carry out geotechnical field investigations to further characterise the existing soil geotechnical conditions
- Identify sensitive surface and groundwater receiving environments
- Search databases (including the Environmental Protection Authority (EPA) Public Register of Licenses, the OEH Contaminated Land Record of Notices and National Pollutant Inventory Database) to ascertain potential contamination/pollution issues in the area

- Carry out a Phase 1 environmental site assessment including a review of site history (including a review of historical aerial photographs, historical land title information, and the NSW groundwater database)
- Assess the potential for subsidence and other associated land movements in the area, and the potential to encounter acid sulphate soil and/or saline soils or soft soils
- Review the soil types present to understand the potential sources and magnitude of erosion, including both water-borne and air-borne material. Assess erosion and sediment impacts during construction and operation. This task will include an assessment of water quality
- Assess impact on groundwater and groundwater receiving environments
- Provide recommendations for erosion and sediment control measures during construction and operation of the project. Recommendations will be consistent with the *Managing Urban Stormwater: Soils and Construction volume 1 and volume 2* series published by the former NSW Department of Environment and Climate Change (DECC) in 2008.

#### 5.2.4 Management and safeguard measures

Soil, contamination and water quality issues are commonly encountered on Roads and Maritime road projects and can be managed and mitigated through the implementation of standard management and safeguard measures, which Roads and Maritime will detail in the EIS. They will include:

- A remedial action plan or appropriate construction environmental management plan prepared in accordance with the relevant EPA guidelines, if it is necessary to address contaminated areas
- Construction sediment and erosion control plans and construction spill emergency procedures as part of the Construction Environmental Management Plan (CEMP) for the project.

Roads and Maritime has successfully managed acid sulphate soils and potential acid sulphate soils on other road construction projects and, while specialist management techniques may be required, these are typically well developed. However, the extent of acid sulphate soils identified to date is not anticipated to present a substantial constraint to the project's development or construction.

### 5.3 Air Quality

#### 5.3.1 Overview

Separate searches of the National Pollution Inventory Database on 3 February 2015 were conducted for both the Liverpool and Penrith LGAs. Each LGA is discussed separately below:

##### *Liverpool*

A total of 17 facilities were found on the National Pollution Inventory Database that impact the air quality in the Liverpool LGA. None are located within The Northern Road PEI study area. The nearest are the Inghams Badgerys Creek farms which is about 2 kilometres east of the southern section of the study area.

##### *Penrith*

A total of 19 facilities were found on the National Pollution Inventory Database that impact the air quality in the Penrith LGA. Of these, three are located within The Northern Road study area; namely:

- Baiada Luddenham 1 Poultry Facility
- Baiada Luddenham 2 Broiler Facility

- Baiada Luddenham 3 Broiler Facility.

The following are the mostly commonly reported industry emissions (in order of output):

- Carbon monoxide
- Total Volatile Organic Compounds
- Oxides of Nitrogen
- Particulate Matter (PM)<sub>10</sub>
- Ethanol.

#### *Sensitive receivers*

Sensitive receivers within the study area (both the Liverpool and Penrith LGAs) include local residents, commercial businesses, rural and light industrial businesses and road users. It is expected that any upgrade to The Northern Road would not lead to increased traffic in itself. Rather, it would cater for increased traffic loads through population growth, the proposed Western Sydney Airport and other developments.

The proposal would impact any nearby sensitive receivers during construction, in particular from dust emissions.

### *5.3.2 Potential impacts*

#### *Construction*

During construction, air quality impacts are likely to be caused by dust generation and emissions from earthworks, spoil storage and transport, vehicles, and plant and equipment.

#### *Operation*

Once the project is operational, potential impacts on air quality would result from changes in patterns of vehicle emissions. The project is likely to see an increase in traffic volumes due to population increases and new developments, including the proposed Western Sydney Airport.

### *5.3.3 Proposed further assessment*

Roads and Maritime will carry out an air quality investigation to evaluate the impact of emissions of key pollutants to inform mitigation and management measures for the design and operation of the project. The assessment will:

- Review the available local meteorological data, local climate and existing local air quality in the area
- Identify relevant air quality goals and standards, sensitive receptors, activities and weather conditions potentially impacting air quality
- Prepare an emissions inventory for two modelling years (year one and ten of operation), including for carbon dioxide, nitrogen dioxide and particulate matter
- Prepare a qualitative assessment of the potential impacts during construction
- Prepare an impact assessment report based on the findings of the modelling, including all details of the methodology and comparisons with the relevant air quality assessment criteria for both the 'do minimum' and 'do something' scenarios
- Identify feasible and reasonable management measures (particularly dust suppression measures) to be implemented.

#### 5.3.4 *Management and safeguard measures*

The potential for air quality impacts on Roads and Maritime road projects is common and can be managed through the development of construction management plans and appropriate consideration of air quality issues during detailed design. Roads and Maritime will detail the management measures and safeguards to be implemented during construction and operation in the EIS. Safeguards will include the implementation of appropriate dust control measures during construction.

### 5.4 Greenhouse gases and climate change

#### 5.4.1 *Overview*

Transport is a substantial contributor to greenhouse gas emissions in Australia and as such, there is a need to consider how a road infrastructure project may directly or indirectly contribute to greenhouse gas emissions. Greenhouse gas emissions sources can be categorised into three different scopes; namely, scope one, scope two, and scope three.

The *NSW Climate Impact Profile* (DECCW, 2010) identifies the following projected climate change impacts for the Western Sydney region:

- By 2050, the climate is virtually certain to be hotter, with a likely increase in rainfall, especially in summer. Winter rainfall is unlikely to change. However, changes in weather patterns that cannot be resolved by the climate models mean that rainfall in coastal regions is difficult to simulate
- Run-off and stream flow are likely to increase in summer and autumn and decrease in spring and winter
- Altered fire regimes have the potential to cause major ecological change.

#### 5.4.2 *Potential impacts*

##### *Construction*

The construction of the project would contribute to greenhouse gas emissions, either directly (scope one) or indirectly (scope two), as a result of:

- Fuel consumption for transporting materials to site and the operation of construction equipment
- Vegetation clearing
- Indirect greenhouse gas emissions such as through embodied energy of products used for construction works, and their supply chains (such as concrete, and steel), or through the generation of electricity for consumption by the project.

##### *Operation*

Once the project is operating, greenhouse gas emissions would be generated from electricity use of road lighting, embodied energy in maintenance materials, and fuel in the use of equipment, machinery and materials to maintain the motorway. There would be likely to be some offset due to a reduction in fuel used because of the traffic efficiencies provided by the project across the local road network.

The project could be impacted by climate change due to changes in sea level rise, increased rainfall and rainfall intensity, increased potential for localised flooding, and extreme temperatures, which may potentially impact its operation and maintenance.

#### 5.4.3 *Proposed further assessment*

Road and Maritime will:

- Quantify operational greenhouse gas emissions, including the effects of land clearance and the change in predicted vehicular emissions, and compare against existing scenarios
- Quantify construction greenhouse gas emissions
- An identification of feasible and reasonable opportunities and mitigation measures that may be implemented to reduce greenhouse gas emissions associated with construction of the project.

#### 5.4.4 *Management and safeguard measures*

Greenhouse gas and climate change issues are commonly encountered on Roads and Maritime projects and can be managed and mitigated through the implementation of standard management and safeguard measures, which Roads and Maritime will detail in the EIA. These will be undertaken in accordance with the Transport Authorities Greenhouse Group *Greenhouse Gas Assessment Workbook for Road Project*, and will include:

- Incorporating climate change considerations into the project design, particularly with regard to providing flood immunity
- Minimising vegetation clearance wherever possible
- Minimising waste and re-using materials wherever possible
- Reducing construction transport requirements through use of local staff, resources, suppliers, and landfills, wherever possible
- Reducing operational impacts where practicable (e.g. through vegetation plantings as part of urban design, solar for lighting etc.).

### 5.5 Resource and waste management

#### 5.5.1 *Overview*

The project would require construction resources and manufactured items during the construction stage. These may include, but are not limited to:

- Fill material (e.g. rock, sand, gravel, sandstone, brick)
- Bitumen and asphalt
- Timber and steel
- Water and fuel
- Soil and plant species (e.g. for landscaped areas)
- Composite materials
- Manufactures items (e.g. poles, pipes, cables, signs).

Various waste streams would be generated during construction and operation of the project. The main waste streams that are likely to be produced during construction include:

- Excavated material: Including rock, gravel, clay and sand
- Demolition waste: Including building materials, bridge removal materials, vegetation, and kerbs and pavements
- Vegetation waste: From the removal of trees, shrubs and groundcovers

- Packaging materials: Including crates, pallets, cartons, plastics and wrapping materials
- Liquid wastes
- Construction materials
- General waste from construction sites: Including office wastes, scrap materials and biodegradable waste.

### 5.5.2 *Potential impacts*

#### *Construction*

Construction of the project would generate liquid and solid waste. Also, resource use requirements for the project may affect the availability of resources for other uses.

#### *Operation*

Additional wastes would be generated during routine maintenance and repair activities over time. The type and volume of the wastes generated would be dependent on the nature of the activity, but would predominantly consist of green waste, oil, road materials, as well as contaminated waste resulting from potential fuel spills and leaks.

### 5.5.3 *Proposed further assessment*

Roads and Maritime will assess the resource and waste management impacts of the project. The assessment will:

- Identify waste streams generated during the construction stage of the project
- Assess waste management impacts associated with construction activities
- Identify management and mitigation measures for resource use and waste across the project including disposal sites and transport impacts.

### 5.5.4 *Management and safeguard measures*

Resource and waste management issues are commonly encountered on Roads and Maritime road projects and can be managed and mitigated through the implementation of standard management and safeguard measures, which will be detailed in the EIS. These will include the following measures:

- Construction waste management will follow the waste hierarchy principles of avoid, reduce, reuse, recycle, recover, treat and dispose
- A waste management strategy will be prepared for the project detailing the management and disposal methods of waste generated by the project. All generated wastes will be managed and disposed of in accordance with relevant State legislation and government policies including the *Waste Avoidance and Resource Recovery Act 2001*, the *Waste Avoidance and Resource Recovery Strategy 2007* (DECC, 2007) and the NSW Government's Waste Reduction and Purchasing Policy. The *Waste Classification Guidelines* (DECCW, 2008) will also be used to classify the different types of waste
- Waste materials will be transported to and from the site by covered trucks, where possible
- A waste register will be maintained for the site. It would detail the types of waste collected, amounts, date/time and details of disposal
- The construction contractor will be required to re-use materials where feasible, including material collected on site.

## 6 Conclusion

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Roads and Maritime is seeking approval for the proposed upgrade of The Northern Road Stages 3 and 4. This project would include widening the existing two lane corridor to a maximum of eight lanes. This includes two bus lanes. The upgrade is also expected to include a range of renewed and formalised infrastructure such as bridges, retaining walls, drainage, safety barriers and lighting.

Roads and Maritime has formed the opinion that the project is likely to significantly affect the environment and would, therefore, require an environmental impact statement. Accordingly, the project is State Significant Infrastructure under Part 5.1 of the EP&A Act and approval is required from the Minister for Planning.

The key environmental issues identified for the project are the following matters:

- Traffic and transport
- Flooding and hydrology
- Ecology
- Aboriginal heritage
- Non-Aboriginal heritage
- Noise and vibration
- Socio-economic
- Landscape and visual amenity
- Land use.

The environmental impact statement will include the following:

- A detailed description of the project including its components, construction activities and potential staging
- A comprehensive assessment of the potential impacts on the key issues including a description of the existing environment, assessment of potential direct and indirect and construction, operation and staging impacts
- Description of measures to be implemented to avoid, minimise, manage, mitigate, offset and/or monitor the potential impacts
- Identify and address issues raised by stakeholders.

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## Attachment A

### Requirements of the Environmental Planning and Assessment Regulation 2000

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Clause 192 of the *Environmental Planning and Assessment Regulation 2000* requires that an application for approval of the Minister to carry out State Significant Infrastructure must include:

- (a) details of any approval that would, but for s 115ZG of the Act, be required for the carrying out of the State significant infrastructure, and
- (b) details of any authorisations that must be given under section 115ZH of the Act if the application is approved, and
- (c) a statement as to the basis on which the proposed infrastructure is State significant infrastructure, including, if relevant, the capital investment value of the proposed infrastructure.

#### **Approvals that would otherwise apply**

Approvals that may be required to carry out SSI, if not for s 115ZG of the EP&A Act, include:

- An Aboriginal heritage impact permit under s 90 of the *National Parks and Wildlife Act 1974*
- An approval under Part 4, or an excavation permit under s 139, of the *Heritage Act 1977*.

#### **Authorisations if the application is approved**

Authorisations that may be required for the project under s 115ZH of the EP&A Act include:

- A consent under s 138 of the *Roads Act 1993*
- An environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in s 43 of that Act).

#### **State Significant Infrastructure statement**

Clause 14(1) of State Environmental Planning Policy (State and Regional Development) 2011 provides that development is declared to be State Significant Infrastructure pursuant to s 115U(2) of the Act if it is permissible without development consent under Part 4 of the Act under a SEPP; and is specified in the categories of development in Schedule 3.

State Environmental Planning Policy (Infrastructure) (ISEPP) permits development for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent. As The Northern Road upgrade is for a road and road infrastructure facilities, and is to be carried out by Roads and Maritime Services, the project is permissible without development consent under Part 4 of the EP&A Act.

Schedule 3 of State Environmental Planning Policy (State and Regional Development) 2011 provides that general public authority activities for infrastructure or other development that (but for Part 5.1 of the EP&A Act and within the meaning of Part 5 of the Act) would be an activity for which the proponent is also the determining authority, and would, in the opinion of the proponent, require an environmental impact statement to be obtained under the EP&A Act.

Roads and Maritime has formed the opinion that The Northern Road upgrade Stage 3 and 4 is likely to significantly affect the environment and would require an environmental impact statement to be obtained under s 112 of the EP&A Act.

On this basis the project is State significant infrastructure. Approval from the Minister for Planning and Infrastructure is required under s 115W of the EP&A Act.

## Attachment B

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Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1°; ^^ rounded to 0.1°; ^^^ rounded to 0.1°). Copyright the State of NSW through the Office of Environment and Heritage.  
 Search criteria : Licensed Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth  
 Report generated on 8/09/2014 4:18 PM

Kingdom	Scientific Name	Common Name	NSW status	Comm. status	Records
Community	<i>Agnes Banks Woodland in the Sydney Basin Bioregion</i>	Agnes Banks Woodland in the Sydney Basin Bioregion	E3		K
Community	<i>Blue Gum High Forest in the Sydney Basin Bioregion</i>	Blue Gum High Forest in the Sydney Basin Bioregion	E4B	CE	K
Community	<i>Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion</i>	Blue Mountains Shale Cap Forest in the Sydney Basin Bioregion	E3	CE	K
Community	<i>Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion</i>	Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion	V2		K
Community	<i>Castlereagh Swamp Woodland Community</i>	Castlereagh Swamp Woodland Community	E3		K
Community	<i>Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion</i>	Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	E3		K
Community	<i>Cumberland Plain Woodland in the Sydney Basin Bioregion</i>	Cumberland Plain Woodland in the Sydney Basin Bioregion	E4B	CE	K
Community	<i>Elderslie Banksia Scrub Forest</i>	Elderslie Banksia Scrub Forest	E3		K
Community	<i>Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Shale gravel Transition Forest in the Sydney Basin Bioregion</i>	Shale gravel Transition Forest in the Sydney Basin Bioregion	E3	CE	K
Community	<i>Shale/Sandstone Transition Forest</i>	Shale/Sandstone Transition Forest	E3	E	K
Community	<i>Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion</i>	Southern Sydney sheltered forest on transitional sandstone soils in the Sydney Basin Bioregion	E3		K
Community	<i>Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions</i>	Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	E3		K
Community	<i>Western Sydney Dry Rainforest in the Sydney Basin Bioregion</i>	Western Sydney Dry Rainforest in the Sydney Basin Bioregion	E3	CE	K



# EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 03/02/15 17:51:44

[Summary](#)

[Details](#)

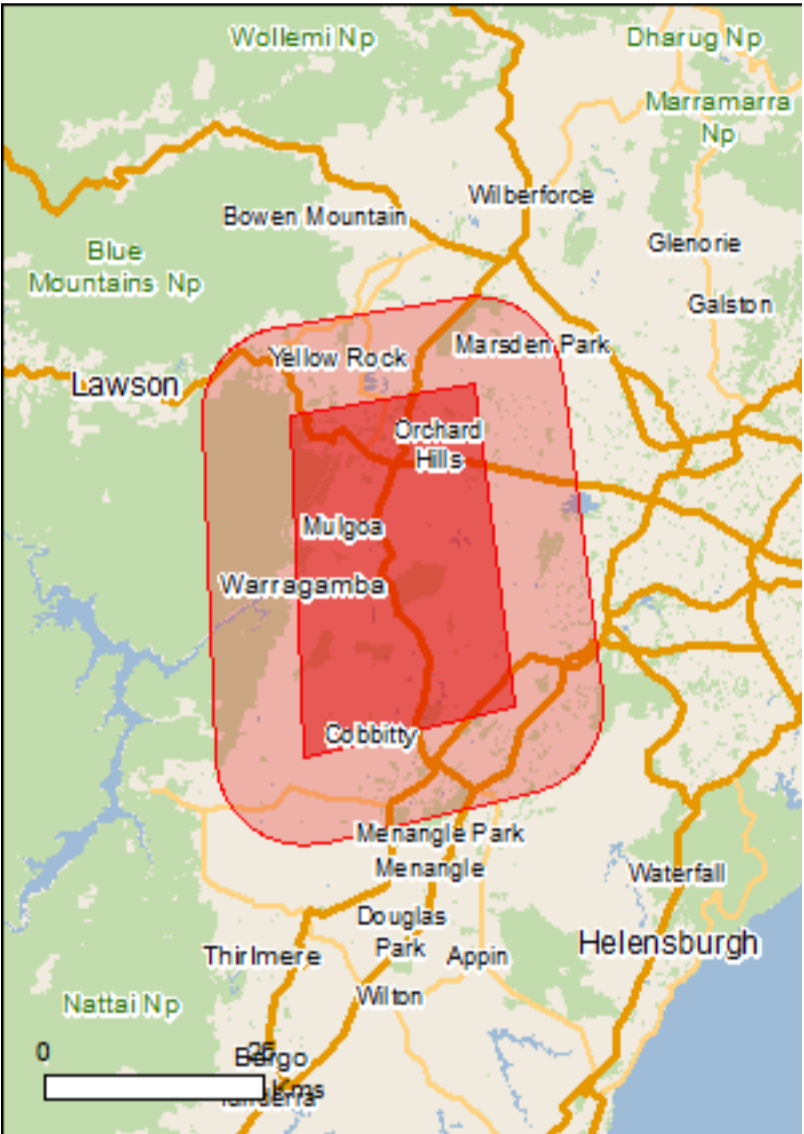
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

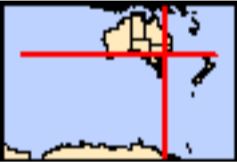
[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

[Coordinates](#)

[Buffer: 10.0Km](#)



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

<a href="#">World Heritage Properties:</a>	1
<a href="#">National Heritage Places:</a>	1
<a href="#">Wetlands of International Importance:</a>	None
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	8
<a href="#">Listed Threatened Species:</a>	54
<a href="#">Listed Migratory Species:</a>	24

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

<a href="#">Commonwealth Land:</a>	27
<a href="#">Commonwealth Heritage Places:</a>	5
<a href="#">Listed Marine Species:</a>	28
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine</a>	None

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

Place on the RNE:	145
State and Territory Reserves:	15
Regional Forest Agreements:	None
Invasive Species:	54
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

## Details

### Matters of National Environmental Significance

World Heritage Properties		[ Resource Information ]
Name	State	Status
<a href="#">The Greater Blue Mountains Area</a>	NSW	Declared property
National Heritage Properties		[ Resource Information ]
Name	State	Status
Natural		
<a href="#">The Greater Blue Mountains Area</a>	NSW	Listed place

### Listed Threatened Ecological Communities

[ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
<a href="#">Coastal Upland Swamps in the Sydney Basin Bioregion</a>	Endangered	Community may occur within area
<a href="#">Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest</a>	Critically Endangered	Community likely to occur within area
<a href="#">Shale Sandstone Transition Forest of the Sydney Basin Bioregion</a>	Critically Endangered	Community likely to occur within area
<a href="#">Temperate Highland Peat Swamps on Sandstone</a>	Endangered	Community known to occur within area
<a href="#">Turpentine-Ironbark Forest in the Sydney Basin Bioregion</a>	Critically Endangered	Community likely to occur within area
<a href="#">Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion</a>	Endangered	Community likely to occur within area
<a href="#">Western Sydney Dry Rainforest and Moist Woodland on Shale</a>	Critically Endangered	Community likely to occur within area
<a href="#">White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</a>	Critically Endangered	Community may occur within area

### Listed Threatened Species

[ Resource Information ]

Name	Status	Type of Presence
Birds		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Endangered	Species or species habitat known to occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within

Name	Status	Type of Presence
area		
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
<a href="#">Macquaria australasica</a> Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
<a href="#">Prototroctes maraena</a> Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
<a href="#">Heleioporus australiacus</a> Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Litoria aurea</a> Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Litoria littlejohni</a> Littlejohn's Tree Frog, Heath Frog [64733]	Vulnerable	Species or species habitat may occur within area
<a href="#">Litoria raniformis</a> Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat may occur within area
<a href="#">Mixophyes balbus</a> Stuttering Frog, Southern Barred Frog (in Victoria) [1942]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Dasyurus maculatus maculatus (SE mainland population)</a> Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
<a href="#">Petrogale penicillata</a> Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pseudomys novaehollandiae</a> New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
<a href="#">Acacia bynoeana</a> Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Acacia flocktoniae</a> Flockton Wattle [3134]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Acacia gordonii</a> [5031]	Endangered	Species or species habitat likely to occur within area
<a href="#">Acacia pubescens</a> Downy Wattle, Hairy Stemmed Wattle [18800]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Acrophyllum australe</a> [3983]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Allocasuarina glareicola</a> [21932]	Endangered	Migration route known to occur within area
<a href="#">Asterolasia elegans</a> [56780]	Endangered	Species or species habitat likely to occur within area
<a href="#">Caladenia tessellata</a> Thick-lipped Spider-orchid, Daddy Long-legs [2119]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptostylis hunteriana</a> Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
<a href="#">Cynanchum elegans</a> White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
<a href="#">Eucalyptus benthamii</a> Camden White Gum, Nepean River Gum [2821]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Genoplesium baueri</a> Yellow Gnat-orchid [7528]	Endangered	Species or species habitat likely to occur within area
<a href="#">Grevillea parviflora subsp. parviflora</a> Small-flower Grevillea [64910]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Haloragis exalata subsp. exalata</a> Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
<a href="#">Haloragodendron lucasii</a> Hal [6480]	Endangered	Species or species habitat likely to occur within area
<a href="#">Leucopogon exolasius</a> Woronora Beard-heath [14251]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Melaleuca deanei</a> Deane's Melaleuca [5818]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Micromyrtus minutiflora</a> [11485]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pelargonium sp. Striatellum (G.W.Carr 10345)</a> Omeo Stork's-bill [84065]	Endangered	Species or species habitat known to occur within area
<a href="#">Persoonia acerosa</a> Needle Geebung [7232]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
<a href="#">Persoonia bargoensis</a> Bargo Geebung [56267]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Persoonia hirsuta</a> Hairy Persoonia [19006]	Endangered	Species or species habitat likely to occur within area
<a href="#">Persoonia nutans</a> Nodding Geebung [18119]	Endangered	Species or species habitat likely to occur within area
<a href="#">Pimelea curviflora var. curviflora</a> [4182]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Pimelea spicata</a> Spiked Rice-flower [20834]	Endangered	Species or species habitat known to occur within area
<a href="#">Pomaderris brunnea</a> Rufous Pomaderris [16845]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pterostylis gibbosa</a> Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area
<a href="#">Pterostylis saxicola</a> Sydney Plains Greenhood [64537]	Endangered	Species or species habitat known to occur within area
<a href="#">Pultenaea glabra</a> Smooth Bush-pea, Swamp Bush-pea [11887]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Pultenaea parviflora</a> [19380]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Rhizanthella slateri</a> Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
<a href="#">Streblus pendulinus</a> Siah's Backbone, Sia's Backbone, Isaac Wood [21618]	Endangered	Species or species habitat known to occur within area
<a href="#">Thelymitra kangaloonica</a> Kangaloon Sun Orchid [81861]	Critically Endangered	Species or species habitat known to occur within area
<a href="#">Thesium australe</a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
Reptiles		
<a href="#">Hoplocephalus bungaroides</a> Broad-headed Snake [1182]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[ <a href="#">Resource Information</a> ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding known to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land	[ Resource Information ]
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The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land -
Commonwealth Land - Airservices Australia
Commonwealth Land - Australian Postal Commission
Commonwealth Land - Australian Postal Corporation
Commonwealth Land - Australian Telecommunications Commission
Commonwealth Land - Australian Telecommunications Corporation
Commonwealth Land - Commonwealth Bank of Australia
Commonwealth Land - Commonwealth Trading Bank of Australia
Commonwealth Land - Defence Housing Authority
Commonwealth Land - Defence Service Homes Corporation
Commonwealth Land - Deputy Director of War Service Homes
Commonwealth Land - Director of Defence Service Homes
Commonwealth Land - Director of War Service Homes
Commonwealth Land - Overseas Telecommunications Commission (Australia)
Commonwealth Land - Telstra Corporation Limited
Defence - 1CAD ORCHARD HILLS KINGSWOOD
Defence - AIR HEADQUARTERS AUSTRALIA - GLENBROOK
Defence - AIRTC CAMDEN
Defence - AIRTC ST MARYS
Defence - BRINGELLY RADIO RECEIVING STATION
Defence - HMAS NIRIMBA
Defence - INGLEBURN AREA (Bardia Barracks)
Defence - LONDONDERRY PARACHUTE DROP ZONE
Defence - LONDONDERRY RTS (Communication Station)
Defence - PENRITH DEPOT (Army Stores)
Defence - RANMME (DEOH)
Defence - SIGNAL STRS DEPOT-KINGSWOOD

Commonwealth Heritage Places	[ Resource Information ]
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Name	State	Status
Natural		
<a href="#">Orchard Hills Cumberland Plain Woodland</a>	NSW	Listed place
<a href="#">Shale Woodland Llandilo</a>	NSW	Listed place
Indigenous		
<a href="#">Cubbitch Barta National Estate Area</a>	NSW	Listed place
Historic		
<a href="#">Camden Post Office</a>	NSW	Listed place
<a href="#">Llandilo International Transmitting Station</a>	NSW	Listed place

Listed Marine Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding known to occur within area
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Breeding known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur

Name	Threatened	Type of Presence
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]		Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]		Species or species habitat likely to occur within area

Extra Information

Places on the RNE		[ Resource Information ]
Note that not all Indigenous sites may be listed.		
Name	State	Status
Natural		
<a href="#">The Blue Mountains</a>	NSW	Indicative Place
<a href="#">Agnes Banks Nature Reserve and Adjoining Areas</a>	NSW	Registered
<a href="#">Bents Basin State Recreation Area and Adjacent Areas</a>	NSW	Registered
<a href="#">Blue Mountains National Park (1980 boundary)</a>	NSW	Registered
<a href="#">Castlereagh Jewel Beetle Habitat and Movement Corridor</a>	NSW	Registered
<a href="#">Castlereagh State Forest and Adjacent Area</a>	NSW	Registered
<a href="#">Kemps Creek Natural Area</a>	NSW	Registered
<a href="#">Mulgoa Natural Area</a>	NSW	Registered
<a href="#">Orchard Hills Cumberland Plain Woodland</a>	NSW	Registered
<a href="#">Riverstone Natural Area</a>	NSW	Registered
<a href="#">Shale Woodland Llandilo</a>	NSW	Registered
<a href="#">Western Sydney Shale Woodland St Marys</a>	NSW	Registered
Indigenous		
<a href="#">Plumpton Ridge Aboriginal Sites</a>	NSW	Indicative Place

Name	State	Status
<a href="#">Red Bird Site</a>	NSW	Indicative Place
<a href="#">Shaws Creek Rock Shelter KII</a>	NSW	Indicative Place
<a href="#">Cubbitch Barta National Estate Area</a>	NSW	Registered
<a href="#">Lapstone Area</a>	NSW	Registered
<a href="#">Native Institution</a>	NSW	Registered
Historic		
<a href="#">Briarcliffe</a>	NSW	Indicative Place
<a href="#">Bringelly Radio Receiving Station Complex</a>	NSW	Indicative Place
<a href="#">Camden Airport</a>	NSW	Indicative Place
<a href="#">Castlereagh Area</a>	NSW	Indicative Place
<a href="#">Castlereagh Cemetery</a>	NSW	Indicative Place
<a href="#">Cobbitty Weir</a>	NSW	Indicative Place
<a href="#">Concrete Arch Bridge Across Megarritys Creek</a>	NSW	Indicative Place
<a href="#">Cottage</a>	NSW	Indicative Place
<a href="#">Eurama</a>	NSW	Indicative Place
<a href="#">Fire Station (former)</a>	NSW	Indicative Place
<a href="#">Homestead Site &amp; Windbreak</a>	NSW	Indicative Place
<a href="#">House</a>	NSW	Indicative Place
<a href="#">Minnaville</a>	NSW	Indicative Place
<a href="#">Mount Hunter Rivulet Weir</a>	NSW	Indicative Place
<a href="#">Prospect Reservoir Area</a>	NSW	Indicative Place
<a href="#">Schofields Aerodrome (former)</a>	NSW	Indicative Place
<a href="#">The 13th Jyotirlinga (icon)</a>	NSW	Indicative Place
<a href="#">The Lewers Bequest &amp; Penrith Regional Art Gallery &amp; Garden</a>	NSW	Indicative Place
<a href="#">The Rooty Hill</a>	NSW	Indicative Place
<a href="#">Upper Room Chapel, Hall and Cemetery</a>	NSW	Indicative Place
<a href="#">Warragamba Emergency Scheme</a>	NSW	Indicative Place
<a href="#">Cottage rear Macquarie Grove House</a>	NSW	Interim List
<a href="#">Bernera including Site and Knoll</a>	NSW	Registered
<a href="#">Brownlow Hill Garden</a>	NSW	Registered
<a href="#">Brownlow Hill Homestead</a>	NSW	Registered
<a href="#">Camden Courthouse</a>	NSW	Registered
<a href="#">Camden Park</a>	NSW	Registered
<a href="#">Camden Park Garden and Nursey</a>	NSW	Registered
<a href="#">Camelot</a>	NSW	Registered
<a href="#">Camelot Gardeners Lodge</a>	NSW	Registered
<a href="#">Camelot Stables</a>	NSW	Registered
<a href="#">Campbelltown Courthouse</a>	NSW	Registered
<a href="#">Campbelltown Post Office (former)</a>	NSW	Registered
<a href="#">Cattle Watering Tank and Reservoir</a>	NSW	Registered
<a href="#">Church of the Holy Innocents</a>	NSW	Registered
<a href="#">Coaching Inn now a Pair of Houses</a>	NSW	Registered
<a href="#">Combewood, Outbuildings and Garden</a>	NSW	Registered
<a href="#">Cottage</a>	NSW	Registered
<a href="#">Denbigh including Slab Outbuildings and Grounds</a>	NSW	Registered
<a href="#">Denham Court and St Marys Anglican Chapel</a>	NSW	Registered
<a href="#">Emu Plains Community Arts Centre</a>	NSW	Registered
<a href="#">Englorie Park</a>	NSW	Registered
<a href="#">Epping Forest</a>	NSW	Registered
<a href="#">Faulconbridge House</a>	NSW	Registered
<a href="#">Fernhill</a>	NSW	Registered
<a href="#">Fernhill Setting</a>	NSW	Registered
<a href="#">Frazer Memorial Presbyterian Church</a>	NSW	Registered
<a href="#">Gledswood</a>	NSW	Registered
<a href="#">Gledswood Garden</a>	NSW	Registered
<a href="#">Glen Alpine</a>	NSW	Registered
<a href="#">Glen Leigh and Outbuildings</a>	NSW	Registered
<a href="#">Glenalvon and Stables</a>	NSW	Registered
<a href="#">Glenfield Farm</a>	NSW	Registered
<a href="#">Glenlee</a>	NSW	Registered
<a href="#">Glenmore</a>	NSW	Registered
<a href="#">Harrington Park Homestead</a>	NSW	Registered
<a href="#">Heber Chapel</a>	NSW	Registered
<a href="#">Home Farmhouse</a>	NSW	Registered
<a href="#">Horningsea Park</a>	NSW	Registered
<a href="#">Horsley Garden</a>	NSW	Registered

Name	State	Status
<a href="#">Horsley Homestead, Outbuildings and Surrounds</a>	NSW	Registered
<a href="#">Hoxton Park Airport</a>	NSW	Registered
<a href="#">Ingleburn Army Camp</a>	NSW	Registered
<a href="#">James Ruses Grave</a>	NSW	Registered
<a href="#">John Street Group</a>	NSW	Registered
<a href="#">Kelvin, Outbuildings and Curtilage</a>	NSW	Registered
<a href="#">King Family Farm Sites and Trees</a>	NSW	Registered
<a href="#">Kirkham Stables and Curtilage</a>	NSW	Registered
<a href="#">Knapsack Viaduct</a>	NSW	Registered
<a href="#">Lapstone Hill Railway and Landscape Area</a>	NSW	Registered
<a href="#">Macaria</a>	NSW	Registered
<a href="#">Macarthur Family Cemetery</a>	NSW	Registered
<a href="#">Macquarie Field Garden</a>	NSW	Registered
<a href="#">Macquarie Field House</a>	NSW	Registered
<a href="#">Macquarie Grove House</a>	NSW	Registered
<a href="#">Mamre and Curtilage</a>	NSW	Registered
<a href="#">Maryland Garden and Setting</a>	NSW	Registered
<a href="#">Maryland and Outbuildings</a>	NSW	Registered
<a href="#">Matthew Healeys Grave</a>	NSW	Registered
<a href="#">Mulgoa Group and Landscape</a>	NSW	Registered
<a href="#">Museum of Fire</a>	NSW	Registered
<a href="#">National Australia Bank</a>	NSW	Registered
<a href="#">Nepean Park</a>	NSW	Registered
<a href="#">Norman Lindsay Gallery Museum and Garden</a>	NSW	Registered
<a href="#">Pair of Houses</a>	NSW	Registered
<a href="#">Pair of Houses and Slab Outbuildings</a>	NSW	Registered
<a href="#">Police Station and Residence</a>	NSW	Registered
<a href="#">Prefabricated Cottages Ingleburn Village</a>	NSW	Registered
<a href="#">Prime Ministers Corridor of Oaks and Surrounds</a>	NSW	Registered
<a href="#">Queen Street Group</a>	NSW	Registered
<a href="#">Quondong</a>	NSW	Registered
<a href="#">Railway Station</a>	NSW	Registered
<a href="#">Richmond Villa</a>	NSW	Registered
<a href="#">Robin Hood Farm</a>	NSW	Registered
<a href="#">Shop and Residence (former)</a>	NSW	Registered
<a href="#">Sir Henry Parkes Grave and Cemetery</a>	NSW	Registered
<a href="#">St Elmo</a>	NSW	Registered
<a href="#">St John the Evangelist Anglican Church</a>	NSW	Registered
<a href="#">St Johns Anglican Church Group</a>	NSW	Registered
<a href="#">St Johns Catholic Church Group</a>	NSW	Registered
<a href="#">St Johns Church, Cemetery and Trees</a>	NSW	Registered
<a href="#">St Johns Hill and John Street Conservation Area</a>	NSW	Registered
<a href="#">St Johns Rectory and Stables</a>	NSW	Registered
<a href="#">St Mary Magdalene Anglican Church &amp; Cemetery</a>	NSW	Registered
<a href="#">St Marys Permanent Cottage Area</a>	NSW	Registered
<a href="#">St Matthews Anglican Church &amp; Churchyard</a>	NSW	Registered
<a href="#">St Pauls Anglican Church Group</a>	NSW	Registered
<a href="#">St Pauls Anglican Church and Graveyard</a>	NSW	Registered
<a href="#">St Pauls Catholic Church</a>	NSW	Registered
<a href="#">St Pauls Rectory</a>	NSW	Registered
<a href="#">St Peters Anglican Cemetery</a>	NSW	Registered
<a href="#">St Peters Anglican Church</a>	NSW	Registered
<a href="#">St Peters Anglican Church Group</a>	NSW	Registered
<a href="#">St Peters Rectory and Stables</a>	NSW	Registered
<a href="#">St Stephens Anglican Church &amp; Graveyard</a>	NSW	Registered
<a href="#">St Thomas Anglican Church &amp; Cemetery</a>	NSW	Registered
<a href="#">Studley Park</a>	NSW	Registered
<a href="#">The Cottage</a>	NSW	Registered
<a href="#">The Homestead</a>	NSW	Registered
<a href="#">The Horseshoe Bridge</a>	NSW	Registered
<a href="#">Thornton Hall &amp; Surrounds</a>	NSW	Registered
<a href="#">Town Hall (former)</a>	NSW	Registered
<a href="#">Varro Ville</a>	NSW	Registered
<a href="#">Victoria Bridge</a>	NSW	Registered
<a href="#">Werrington House</a>	NSW	Registered
<a href="#">Wesleyan Chapel</a>	NSW	Registered

Name	State	Status
<a href="#">Wivenhoe including Conservatory</a>	NSW	Registered
State and Territory Reserves		<a href="#">[ Resource Information ]</a>
Name	State	
Agnes Banks	NSW	
Bents Basin	NSW	
Blue Mountains	NSW	
Burraborang	NSW	
Castlereagh	NSW	
Gulguer	NSW	
Kemps Creek	NSW	
Leacock	NSW	
Mulgoa	NSW	
Prospect	NSW	
Wianamatta	NSW	
Wianamatta	NSW	
William Howe	NSW	
Windsor Downs	NSW	
Yellomundee	NSW	
Invasive Species		<a href="#">[ Resource Information ]</a>

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
<a href="#">Acridotheres tristis</a> Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
<a href="#">Alauda arvensis</a> Skylark [656]		Species or species habitat likely to occur within area
<a href="#">Anas platyrhynchos</a> Mallard [974]		Species or species habitat likely to occur within area
<a href="#">Carduelis carduelis</a> European Goldfinch [403]		Species or species habitat likely to occur within area
<a href="#">Carduelis chloris</a> European Greenfinch [404]		Species or species habitat likely to occur within area
<a href="#">Columba livia</a> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<a href="#">Lonchura punctulata</a> Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
<a href="#">Passer domesticus</a> House Sparrow [405]		Species or species habitat likely to occur within area
<a href="#">Passer montanus</a> Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
<a href="#">Pycnonotus jocosus</a> Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Streptopelia chinensis</a> Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
<a href="#">Sturnus vulgaris</a> Common Starling [389]		Species or species habitat likely to occur within area
<a href="#">Turdus merula</a> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
<a href="#">Rhinella marina</a> Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
<a href="#">Bos taurus</a> Domestic Cattle [16]		Species or species habitat likely to occur within area
<a href="#">Canis lupus familiaris</a> Domestic Dog [82654]		Species or species habitat likely to occur within area
<a href="#">Felis catus</a> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#">Feral deer</a> Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
<a href="#">Lepus capensis</a> Brown Hare [127]		Species or species habitat likely to occur within area
<a href="#">Mus musculus</a> House Mouse [120]		Species or species habitat likely to occur within area
<a href="#">Oryctolagus cuniculus</a> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#">Rattus norvegicus</a> Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
<a href="#">Rattus rattus</a> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<a href="#">Vulpes vulpes</a> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<a href="#">Alternanthera philoxeroides</a> Alligator Weed [11620]		Species or species habitat likely to occur within area
<a href="#">Anredera cordifolia</a> Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
<a href="#">Asparagus aethiopicus</a> Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
<a href="#">Asparagus asparagoides</a> Bridal Creeper, Bridal Veil Creeper, Smilax,		Species or species

Name	Status	Type of Presence
Florist's Smilax, Smilax Asparagus [22473]		habitat likely to occur within area
<a href="#">Asparagus plumosus</a>		
Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
<a href="#">Asparagus scandens</a>		
Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
<a href="#">Cabomba caroliniana</a>		
Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
<a href="#">Chrysanthemoides monilifera</a>		
Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
<a href="#">Chrysanthemoides monilifera subsp. monilifera</a>		
Boneseed [16905]		Species or species habitat likely to occur within area
<a href="#">Chrysanthemoides monilifera subsp. rotundata</a>		
Bitou Bush [16332]		Species or species habitat likely to occur within area
<a href="#">Cytisus scoparius</a>		
Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
<a href="#">Dolichandra unguis-cati</a>		
Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
<a href="#">Eichhornia crassipes</a>		
Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
<a href="#">Genista linifolia</a>		
Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
<a href="#">Genista monspessulana</a>		
Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
<a href="#">Genista sp. X Genista monspessulana</a>		
Broom [67538]		Species or species habitat may occur within area
<a href="#">Lantana camara</a>		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
<a href="#">Lycium ferocissimum</a>		
African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
<a href="#">Nassella neesiana</a>		
Chilean Needle grass [67699]		Species or species habitat likely to occur within area
<a href="#">Nassella trichotoma</a>		
Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
<a href="#">Opuntia spp.</a>		
Prickly Pears [82753]		Species or species habitat likely to occur within area
<a href="#">Pinus radiata</a>		
Radiata Pine Monterey Pine, Insignis Pine, Wilding		Species or species

Name	Status	Type of Presence
Pine [20780]		habitat may occur within area
<a href="#">Protasparagus plumosus</a>		
Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
<a href="#">Rubus fruticosus aggregate</a>		
Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
<a href="#">Sagittaria platyphylla</a>		
Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
<a href="#">Salix spp. except S.babylonica, S.x calodendron &amp; S.x reichardtii</a>		
Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
<a href="#">Salvinia molesta</a>		
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
<a href="#">Senecio madagascariensis</a>		
Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<a href="#">Ulex europaeus</a>		
Gorse, Furze [7693]		Species or species habitat likely to occur within area

Reptiles
<a href="#">Hemidactylus frenatus</a>
Asian House Gecko [1708]

Nationally Important Wetlands	[ Resource Information ]
Name	State
<a href="#">Thirlmere Lakes</a>	NSW

# Coordinates

-33.74417 150.59492,-33.71858 150.78322,-33.99183 150.82441,-34.0343 150.60869,  
-33.74417 150.59492

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Department of Environment, Climate Change and Water, New South Wales](#)
- [-Department of Sustainability and Environment, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment and Natural Resources, South Australia](#)
- [-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [-Environmental and Resource Management, Queensland](#)
- [-Department of Environment and Conservation, Western Australia](#)
- [-Department of the Environment, Climate Change, Energy and Water](#)
- [-Birds Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-SA Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Atherton and Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [-State Forests of NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.