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# M12 Motorway

## State significant infrastructure scoping report

Roads and Maritime Services | May 2018





# Executive summary

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## Introduction and need

Roads and Maritime Services (Roads and Maritime) is seeking approval to build the M12 Motorway, an east-west motorway about 16 kilometres long between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham. The M12 Motorway is to provide the main access to the Western Sydney Airport at Badgerys Creek and to support increases in traffic demand due to land use change and residential growth.

The M12 Motorway includes the following key features:

- A new dual-carriageway motorway with two-lanes in each direction with a central median facilitating future expansion to six lane
- Three interchanges, being:
  - A motorway – to – motorway interchange with the M7 Motorway
  - A grade separated interchange with the Western Sydney Airport
  - A signalised intersection with The Northern Road with the provision for grade separation in the future.
- Bridge structures across Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek
- Bridge structures at Elizabeth Drive, Luddenham Road and other local roads
- Inclusion of active transport (pedestrian and cyclist) facilities
- Modifications to the local road network, if required, to facilitate connections across and around the motorway
- New service utilities and modifications to existing service utilities.

The M12 Motorway forms part of the Western Sydney Infrastructure Plan (WSIP). The WSIP is a joint initiative of the Australian and NSW governments to fund a \$3.6 billion road investment program for western Sydney.

The M12 Motorway is needed to support the Western Sydney Airport by connecting Sydney's motorway network to the airport, and to cater for predicted increased traffic generated by the Western Sydney Airport and surrounding future development in the Western Sydney Airport Growth Area and the South West Growth Area.

## Planning and assessment process

Roads and Maritime have formed the opinion the project is likely to significantly affect the environment. On this basis, the project is declared to be State significant infrastructure (SSI under section 5.12 (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and clause 1 of Schedule 3 of State Environmental Planning Policy (State and Regional Development) 2011. The project is therefore subject to Division 5.2 of the EP&A Act and requires the preparation of an environmental impact statement and approval of the NSW Minister for Planning.

Roads and Maritime will request that the Minister for Planning declare the project as critical SSI pursuant to section 5.13 of the EP&A Act as it is considered to be essential to the State for economic, environmental or social reasons. The declaration would be made pursuant to clause 16 of Schedule 5 of the State Environmental Planning Policy (State and Regional Development) 2001.

## Proposed scope of the environmental impact statement

The report supports an application under section 5.15 of the EP&A Act and clause 192 of the Environmental Planning and Assessment Regulation 2000 to carry out SSI. It aims to assist in the formulation of environmental assessment requirements by the Secretary of the Department of

Planning and Environment under Section 5.16, which would inform the preparation of the environmental impact statement.

The outcomes of the preliminary environmental investigations indicate the following key environmental issues will require further detailed assessment and may require project specific impact mitigation measures:

- Biodiversity
- Urban design, landscape character and visual amenity
- Aboriginal heritage
- Non-Aboriginal heritage
- Traffic and access
- Noise and vibration
- Socio-economic, land use and property
- Flooding and hydrology

A number of other environmental issues have also been identified. These issues are outlined within this report 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.

# Contents

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|  |            |
|--|------------|
| <b>Executive summary .....</b>                                 | <b>i</b>   |
| <b>Contents .....</b>  | <b>iii</b> |
| <b>Abbreviations and glossary .....</b>                        | <b>v</b>   |
| <b>1 Introduction .....</b>                                    | <b>1</b>   |
| 1.1 Overview of the project .....                              | 1          |
| 1.2 Statutory process .....                                    | 3          |
| 1.3 Purpose of this report .....                               | 3          |
| <b>2 Background .....</b>                                      | <b>4</b>   |
| 2.1 Strategic context and project need .....                   | 4          |
| 2.2 Project objectives .....                                   | 6          |
| 2.3 Selection of the preferred project .....                   | 7          |
| 2.4 Issues raised during consultation .....                    | 16         |
| <b>3 Project description .....</b>                             | <b>18</b>  |
| 3.1 Key project elements .....                                 | 18         |
| <b>4 Key environmental issues .....</b>                        | <b>21</b>  |
| 4.1 Overview .....   | 21         |
| 4.2 Biodiversity .....   | 23         |
| 4.3 Urban design, landscape character and visual amenity ..... | 38         |
| 4.4 Aboriginal heritage .....                                  | 44         |
| 4.5 Non-Aboriginal heritage .....                              | 47         |
| 4.6 Traffic and access .....                                   | 51         |
| 4.7 Noise and vibration .....                                  | 55         |
| 4.8 Socio-economic, land use and property .....                | 59         |
| 4.9 Hydrology and flooding .....                               | 64         |
| <b>5 Other environmental issues .....</b>                      | <b>69</b>  |
| 5.1 Overview .....   | 69         |
| 5.2 Soils, contamination and water quality .....               | 69         |
| 5.3 Air quality .....  | 73         |
| 5.4 Greenhouse gas and climate change .....                    | 74         |
| 5.5 Resource and waste management .....                        | 76         |
| <b>6 Conclusion .....</b>                                      | <b>79</b>  |
| <b>7 References .....</b>                                      | <b>80</b>  |
| 7.1 Reports/documents .....                                    | 80         |
| 7.2 Legislation and government plans .....                     | 81         |
| 7.3 Databases .....  | 81         |

## **Attachments**

Attachment A – Requirements of the Environmental Planning and Assessment Regulation 2000 checklist

## Abbreviations and glossary

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|              |   |
|--------------|---|
| AADT         | Annual average daily traffic  |
| ABS          | Australian Bureau of Statistics   |
| AHD          | Annual Height Datum   |
| AHIMS        | Aboriginal Heritage Information Management System   |
| ARI          | Annual recurrence interval  |
| AS           | Australian Standard   |
| ASS          | Acid Sulfate Soil   |
| CBD          | Central Business District   |
| CEEC         | Critically endangered ecological community  |
| CEMP         | Construction Environmental Management Plan  |
| DP&E         | Department of Planning and Environment  |
| DoEE         | Department of Environment and Energy  |
| EEC          | Endangered ecological community   |
| EPA          | Environmental Protection Authority  |
| EPL          | Environment Protection Licence  |
| EP&A Act     | <i>Environmental Planning and Assessment Act 1979</i> (NSW). Provides the legislative framework for land use planning and development assessment in NSW   |
| EPBC Act     | <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth). Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process. |
| FBA          | Framework for Biodiversity Assessment   |
| FM Act       | Fisheries Management Act 1994 (NSW)   |
| Heritage Act | Heritage Act 1977 (NSW)   |
| ICNG         | Interim Construction Noise Guideline  |
| ISEPP        | State Environmental Planning Policy (Infrastructure) 2007   |
| LEP          | Local Environment Plan  |
| LGA          | Local government area   |
| MNES         | Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .  |
| NPW Act      | <i>National Parks and Wildlife Act 1974</i> (NSW)   |
| OEH          | Office of Environment and Heritage  |

|                    |   |
|--------------------|---|
| PACHCI             | Procedure for Aboriginal Cultural Heritage Consultation and Investigation                             |
| PAD                | Potential Archaeological Deposit  |
| RNP                | Road Noise Policy   |
| Roads and Maritime | Roads and Maritime Services   |
| SEPP               | State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act. |
| SSI                | State significant infrastructure  |
| SWGA               | South West Growth Area  |
| The project        | The M12 Motorway between the M7 Motorway, Cecil Park and The Northern Road, Luddenham                 |
| TSC Act            | <i>Threatened Species Conservation Act 1995 (NSW)</i>   |
| VEC                | Vulnerable Ecological Community   |
| WSAGA              | Western Sydney Airport Growth Area  |
| WSIP               | Western Sydney Infrastructure Plan  |
| WSPT               | Western Sydney Parklands Trust  |



# 1 Introduction

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## 1.1 Overview of the project

Roads and Maritime Services (Roads and Maritime) is seeking approval to build the M12 Motorway, an east-west motorway about 16 kilometres long between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham (refer to Figure 1-1). The M12 Motorway is to provide the main access to the Western Sydney Airport and to support increase in traffic demand from land use change and residential growth. The project is located within the Penrith, Liverpool and Fairfield local Government areas (LGA).

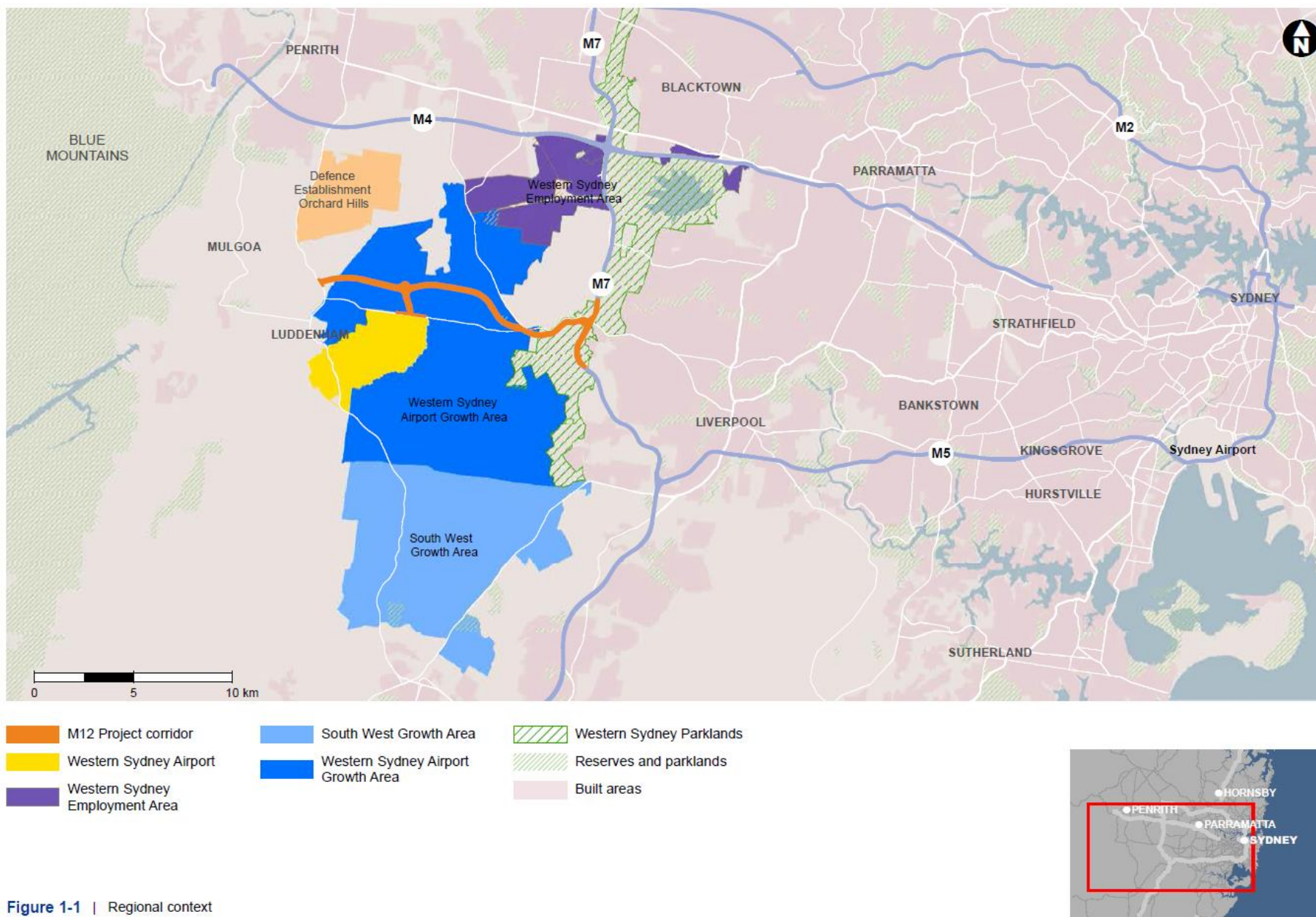
The M12 Motorway includes the following key features:

- A new dual-carriageway motorway with two-lanes in each direction with a central median facilitating future expansion to six lanes
- Three interchanges, being:
  - A motorway – to – motorway interchange with the M7 Motorway
  - A grade separated interchange with the Western Sydney Airport
  - A signalised intersection with The Northern Road with the provision for grade separation in the future.
- Bridge structures across Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek
- Bridge structures at Elizabeth Drive, Luddenham Road and other local roads
- Inclusion of active transport (pedestrian and cyclist) facilities
- Modifications to the local road network, if required, to facilitate connections across and around the motorway
- Modifications to existing service utilities
- Gantries to be installed on M7 Motorway ramps.

The M12 Motorway is predominately located in greenfield areas. The existing land uses are semi-rural residential, recreational, agricultural, commercial and industrial. The main populations are Kemps Creek, Mount Vernon and Cecil Hills.

The design, as described in more detail in Chapter 3, will continue to evolve through the design development, consultation and environmental assessment process. The final concept design would be presented in the future environmental impact statement.

The capital investment into the project is estimated at \$1.3 billion and due to the current project funding arrangement the M12 Motorway will potentially be delivered in stages. This will be confirmed through concept design phase and assessed through the EIS process.



**Figure 1-1** | Regional context

## 1.2 Statutory process

Roads and Maritime, as the proponent, has formed the view that the project is likely to significantly affect the environment. On this basis, the project is declared to be State significant infrastructure (SSI) under section 5.12 (2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by reason of the operation of clause 14 and clause 1 of Schedule 3 of the State Environmental Planning Policy (State and Regional Development) 2011.

Accordingly, the project is subject to Division 5.2 of the EP&A Act and requires the preparation of an environmental impact statement (EIS) and the approval of the Minister for Planning.

Roads and Maritime will also request that the Minister for Planning declare the project to be critical SSI pursuant to section 5.13 of the EP&A Act as it is considered to be essential to the State for economic, environmental or social reasons. The declaration would be made pursuant to clause 16 and Schedule 5 of the State Environmental Planning Policy (State and Regional Development) 2011.

## 1.3 Purpose of this report

Roads and Maritime has prepared this application report to support a SSI application under section 5.15 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 Appendix A to this report.

The purpose of this application report is to assist the formulation of environmental assessment requirements by the Secretary of the Department of Planning and Environment under section 5.16 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 application report and Secretary environmental assessment requirements 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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### 2.1 Strategic context and project need

Western Sydney is currently undergoing significant change and growth with major developments including the development of the Western Sydney Airport, and development of the Western Sydney Airport Growth Area (WSAGA) and the South West Growth Area (SWGA).

The WSAGA (comprising part of the former Broader Western Sydney Employment Area and the South West Growth Centre) is to be developed as an employment centre that would provide more than 57,000 jobs over the next 30 years, and more than 212,000 jobs forecast for the longer term. The area would involve substantial changes to the existing local road network, and place significant pressure on arterial roads that would service the employment area.

The SWGA, encompassing part of the South West Growth Centre, is a major greenfield release area designed to meet anticipated housing demand in Sydney. The SWGA would establish 18 new residential precincts and include around 110,000 new dwellings, more than 300,000 residents and more than 20,000 new jobs. The substantial traffic growth associated with the land release area is forecast to reduce accessibility to major arterial routes during peak periods and ultimately lead to critical deficiencies in road network capacity in the absence of road upgrades.

The development of the Western Sydney Airport was announced by the Federal Government in April 2014. The draft EIS was placed on public display at the end of 2015 and finalised in September 2016. The final Airport Plan was approved in December 2016. The final EIS and Airport Plan identified the M12 Motorway as being the main entry to the airport for passengers, employees and potentially freight vehicles. Two potential access points on Elizabeth Drive were also identified, which provide access to the commercial areas within the airport and The Northern Road was identified as providing access for employees and freight.

The airport would significantly increase traffic volumes along arterial roads and other roads in the area. The airport is planned to start operating in the mid-2020s, with Stage 1 comprising of a single runway, a terminal and other relevant facilities to accommodate approximately 10 million annual passengers as well as freight traffic (Department of Infrastructure and Regional Development, 2016). Traffic modelling estimates that by 2031 the operating airport would generate around 43,000 passenger and employee vehicle trips per day; and around 132 freight vehicle trips per day (Department of Infrastructure and Regional Development, 2016).

Elizabeth Drive currently provides the major connection between the M7 Motorway at Cecil Hills and The Northern Road at Luddenham. The 14 kilometre stretch of road also links a number of other important north-south routes within the region including Mamre Road, Cowpasture Road, and Wallgrove Road. The corridor is located about 47 kilometres west of the Sydney Central Business District (CBD) and forms the northern boundary to the Western Sydney Airport site and passes through the WSAGA.

Elizabeth Drive is a key collector road for the area. The road currently operates at a satisfactory level of performance. However, it is unlikely to support the future forecast increases in traffic demand. Traffic modelling carried out by Roads and Maritime indicate sections of Elizabeth Drive will operate at Level of Service E by 2026.

Traffic modelling carried out for the Western Sydney Airport EIS (2016) also identified that due to the planned future development in the area, even without the development of the Western Sydney



Airport, the road performance of Elizabeth Drive is expected to deteriorate by 2031. As such, additional road infrastructure would be required to provide the necessary capacity for future development and the Western Sydney Airport.

To support this planned growth and capitalise on the economic benefits, Roads and Maritime proposes to deliver new and upgraded roads within the area through the Western Sydney Infrastructure Plan (WSIP). One of the key projects of WSIP is a new east west motorway connecting the M7 Motorway and The Northern Road to the Western Sydney Airport.

The M12 Motorway would initially increase road capacity, facilitating the growth of and improve access to future developments including the Western Sydney Airport. It is proposed to be constructed generally parallel to the existing Elizabeth Road and would provide the primary through traffic route through the area and serve as the major access route to the Western Sydney Airport. Elizabeth Drive will remain and continue to support local traffic.

The M12 Motorway would provide four lanes (two either direction), facilitating future six lanes, between the M7 Motorway and The Northern Road.

The M12 Motorway is required to:

- Support the Western Sydney Airport by connecting Sydney's motorway network to the airport
- Cater for the increased traffic generated by the Western Sydney Airport and surrounding future development in the WSAGA and SWGA.

### 2.1.1 Consistency with strategic planning

The project would be consistent with a number of strategic planning documents as demonstrated in the following:

**Western Sydney Infrastructure Plan (WSIP)** - The M12 Motorway forms a key part of the Western Sydney Infrastructure Plan (WSIP). The WSIP is a joint initiative of the Australian and NSW governments to fund a \$3.6 billion road investment program for western Sydney. The WSIP will:

- Deliver major road infrastructure upgrades to support an integrated transport solution for the western Sydney region. Road upgrades will improve connections within western Sydney and benefit the region's growing population, by reducing travel times
- Support and capitalise on the economic benefits of developing the Western Sydney Airport. The airport will be transformational for western Sydney and be a catalyst for investment, growth and job creation for decades to come. It will need to be supported by a high quality surface transport network to ensure the efficient movement of people and freight
- Improve road transport capacity ahead of future traffic demand generated by planned residential and employment development in the WSAGA (formerly South West Sydney Growth Centre and part of the Broader Western Sydney Employment Area) and the SWGA.

The M12 Motorway would contribute to the provision of better road linkages within the western Sydney region and benefit the region's growing population by reducing commuting times.

**Future Transport 2056** – The Project forms part of the committed / funded initiatives (0–10yrs) that either have committed funding are committed /contractually committed, are for immediate detailed planning, or are part of key maintenance, renewal or safety programs.

**State Priorities (NSW Make It Happen) 2015** - The project would help achieve the transport and safety priorities by providing a new motorway that would increase capacity between the M7 Motorway and The Northern Road to accommodate future traffic demand; reduce areas of

congestion and improve travel times; and reduce the potential for traffic incidents through the provision of a controlled access motorway.

**Long Term Transport Master Plan** (Transport for NSW, 2012) - The project would support the recommendations in the master plan as it would cater for predicted increases in traffic and provide accessibility into the WSAGA and the SWGA.

**State Infrastructure Strategy** (NSW Government, 2012a) - The project aligns as it would deliver on infrastructure commitments made in the strategy to cater for freight and for projected population growth in the region.

**NSW Key Freight Routes Road Expenditure and Investment Plan** (Transport and Infrastructure Council, 2016) - The M12 Motorway (referred to as the 'Western Sydney Airport Motorway, M7 – The Northern Road') is identified in the plan as providing freight access to the Western Sydney Airport site. The proposed M12 Motorway would satisfy this need.

**A Plan for Growing Sydney** (Department of Planning and Environment, 2014 – previously the Draft Metropolitan Strategy for Sydney 2031) - The project supports this plan as it would deliver infrastructure for the Western Sydney Airport, the WSAGA and the SWGA. It would also help to connect centres in western Sydney to support their development, as well as future growth within the region.

**Greater Sydney Commission** - established under A Plan for Growing Sydney and is responsible for metropolitan planning in partnership with State and local government. The Greater Sydney Commission is planning for five 'districts' to connect local planning with the longer-term metropolitan planning for Greater Sydney. This big picture approach would better coordinate State and local government planning. The study area is located within the Western City District which includes Blue Mountains, Hawkesbury, Penrith, Camden, Campbelltown, Fairfield, Liverpool and Wollondilly Council areas

**The Sydney South West Sub-regional Strategy** (NSW Government, 2007) - The project supports the strategy as it would improve the capacity of the road network to support future growth, particularly in the WSAGA and the SWGA.

**Sydney's Cycling Future** (Transport for NSW, 2013) - The project would address the key focus of Sydney's Cycling Future by providing shared pedestrian and cycle off-road facilities between the M7 Motorway and The Northern Road.

## 2.2 Project objectives

Roads and Maritime has set project-specific objectives for the M12 Motorway. These project objectives provide goals and assessment measures for achieving project justification and fitness-for-purpose and to guide the success of the completed project. These objectives are:

- Provide direct motorway standard east–west connection between the M7 and The Northern Road via the Western Sydney Airport, allowing for future north–south connections
- Support the provision of an integrated regional and local public transport system
- Preserve the local access function of the existing Elizabeth Drive
- Provide active transport within the east–west corridor
- Provide for future connection to the Outer Sydney Orbital.

In doing so, it is intended the project will:

- Minimise its impacts on communities, the environment and heritage
- Integrate with current and proposed land uses.

## 2.3 Selection of the preferred project

### 2.3.1 Overview

The project went through a strategic route options analysis process to identify the preferred corridor route for the M12 Motorway. An overview of the stages in the strategic route options analysis is provided below:

**July 2015:** The M12 Motorway was announced as part of the WSIP and a series of community information sessions were held. The community was asked to provide feedback on the study area identified by Roads and Maritime as being the best general location for route options to be developed.

**September 2015:** A long list of possible route options were identified and assessed with consideration of technical, environmental constraints and community feedback received on the study area. This stage of the process is documented in the M12 Motorway Strategic Route Options Analysis: Options Identification Report (December 2015). The report can be accessed via the following link: <http://www.rms.nsw.gov.au/projects/sydney-west/m12-motorway/project-documents.html>.

**October 2015 – February 2016:** The long list of route options was reviewed to identify the shortlisted route options. This stage is documented in the M12 Motorway Strategic Route Options Analysis: Shortlisted Options Report (February 2016). The shortlisted route options were placed on public exhibition for comment in February 2016. <http://www.rms.nsw.gov.au/projects/sydney-west/m12-motorway/project-documents.html>.

**March 2016- November 2016:** The shortlisted route options were reviewed to identify the preferred route option. The preferred corridor route was announced in November 2016. This stage is documented in the M12 Motorway Strategic Route Options Analysis: Preferred Corridor Route Option (November 2016). The report can be accessed via the following link: <http://www.rms.nsw.gov.au/projects/sydney-west/m12-motorway/project-documents.html>.

**December 2016- June 2017:** Following announcement of the preferred corridor route, two strategic land use documents were developed: The Greater Sydney Commission released the draft South West District Plan and the Western Sydney Parklands prepared their draft Southern Parklands Vision. As illustrated by these documents, the M12 Motorway was in direct conflict with the future land use of the Cecil Hills Precinct of the Western Sydney Parklands. In response Roads and Maritime committed to investigate alternative options within the Western Sydney Parklands.

**June 2017:** Alternative options in the Western Sydney Parklands were developed in addition to the preferred corridor route. The options were presented at a supplementary value management workshop in June 2017. Attendees recommended a new option within the Western Sydney Parklands. The recommended option was announced in February 2018.

### 2.3.2 Identification of long listed route options

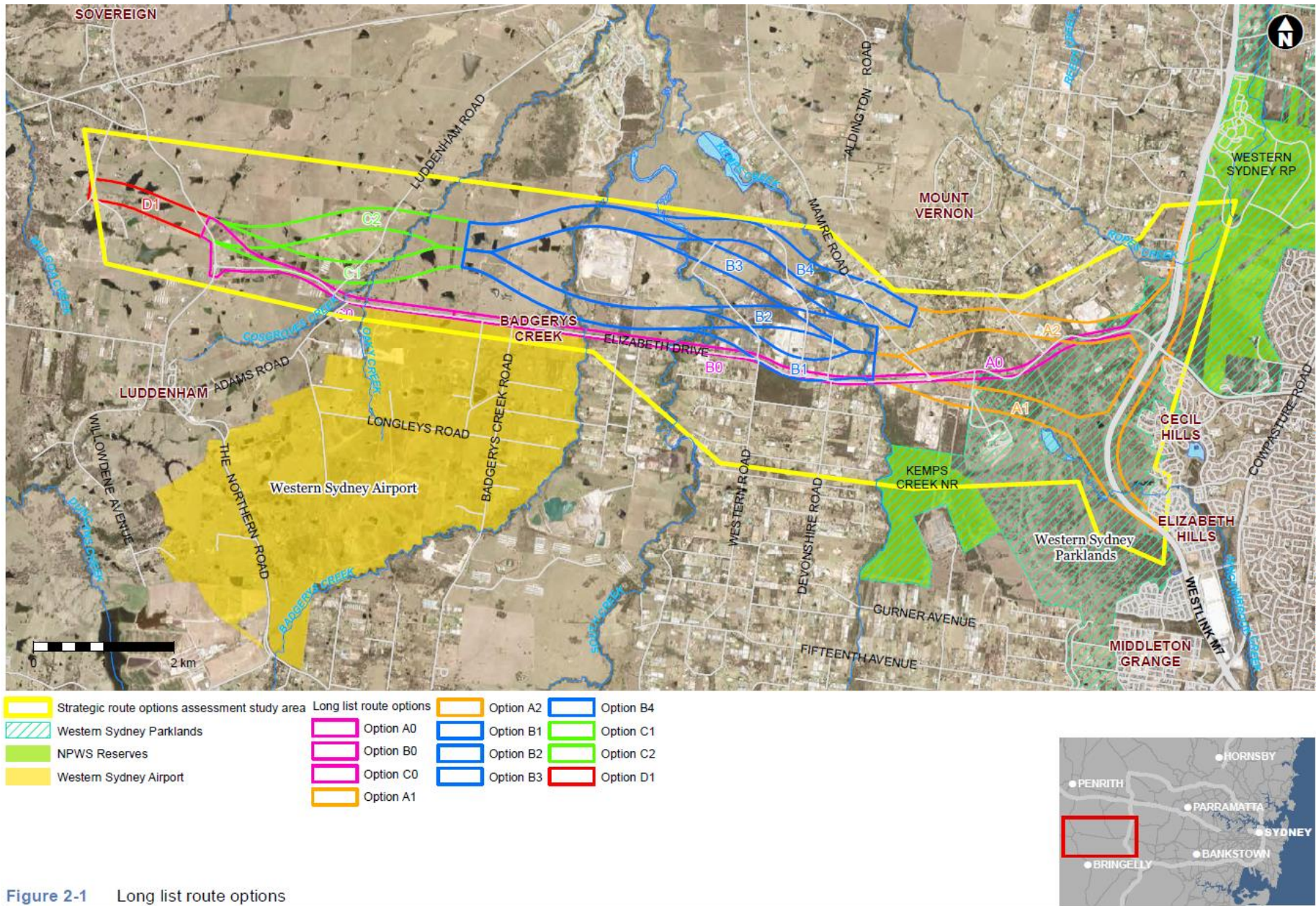
A long list of feasible route options were developed by combining design standards, terrain, geological, and hydrological data, environmental areas, property ownership, and cost information into a computer software package.

To enable ease of comparison, the study area was divided into four zones from east to west and named A, B, C and D. The corridor options could be connected across the different zones to produce 15 possible route options that became the long list of route options for the M12 Motorway. The long list route options and the corresponding zones are shown in Figure 2-1.

A range of desktop environmental assessments were undertaken to assess the long list of route options. The long list route options were then analysed in a value management workshop in October 2015 against a range of criteria including project delivery, land use impacts, community impacts, environmental and heritage impacts, connectivity and ease of use of the motorway. The

workshop was attended by Australian and NSW Government agencies, local councils and key stakeholders. The value management workshop discounted several options due to their impacts on the community and to properties and identified eight shortlisted route options to be further progressed. The workshop also identified recommendations to further refine options.





### 2.3.3 Identification of shortlisted route options

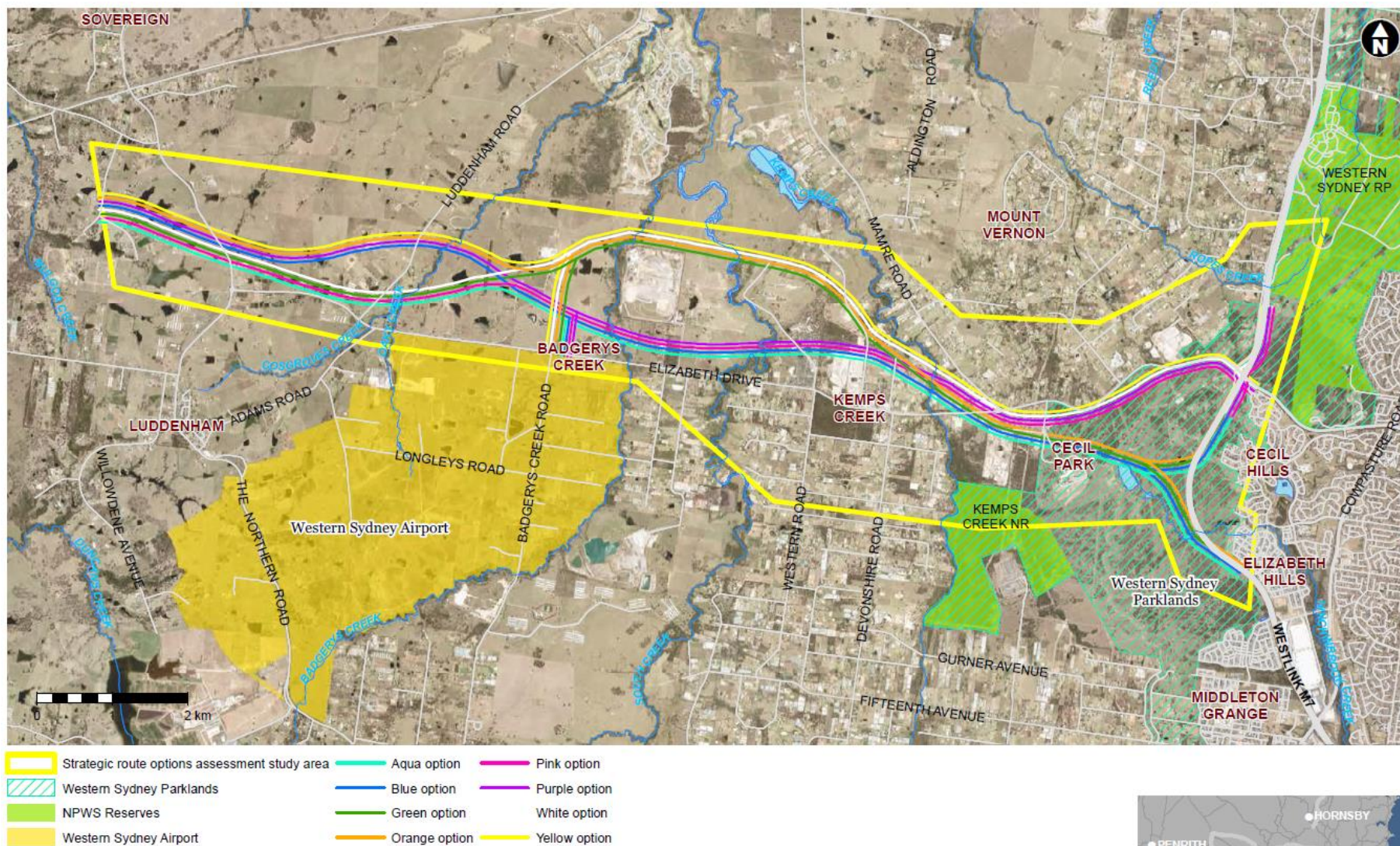
The shortlisted route options were further developed in line with the recommendations from the value management workshop held in October 2015. Each of the eight shortlisted options consisted of a 300 metres wide corridor, and to differentiate them from the long list of route options, the options were identified by colour.

In February 2016, the eight shortlisted route options were placed on public display. The shortlisted route options are shown in Figure 2-2.

During this period, Roads and Maritime carried out a Transport Study workshop including attendees from Australian and NSW Government agencies. The aim of the study was to identify the most suitable location for the M12 Motorway connection with The Northern Road, while considering other future transport projects to better cater for current and future land uses.

As a result of this workshop and in response to community feedback from the public display on land use and property impact, the shortlisted route options were modified.





**Figure 2-2** Short listed options

### 2.3.4 Identification of the preferred corridor route

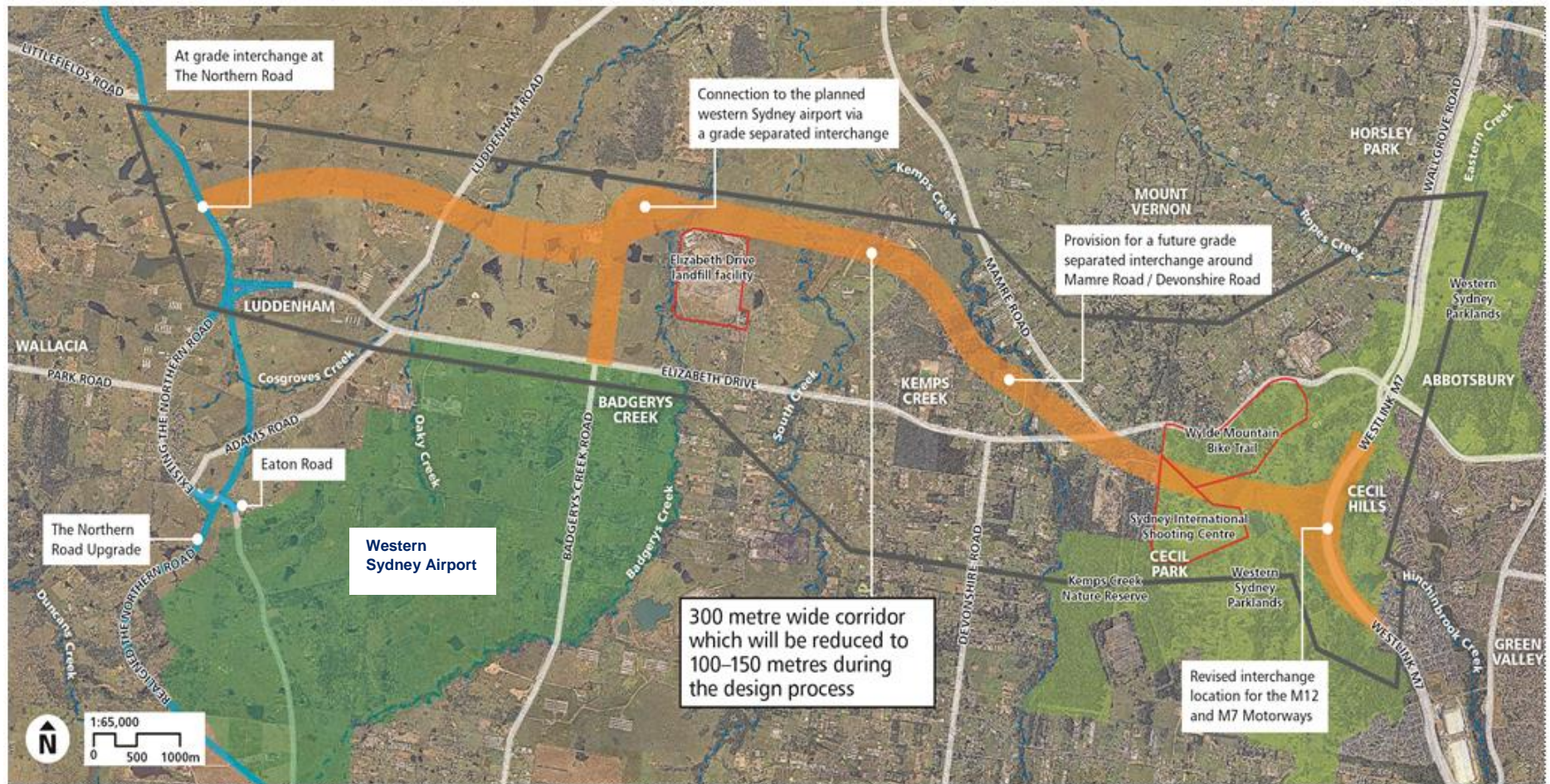
The modified route options were presented at a value management workshop in April 2016 to recommend the preferred corridor route for the M12 Motorway. The workshop was attended by representatives from Australian and NSW Government agencies, local councils and key stakeholders.

Detailed environmental investigations were carried out for the modified short listed options, which included field investigations. The results of these investigations together with community feedback and preliminary costings were used by workshop participants to carry out a comparative assessment of each option against the criteria used in the shortlisting process and to recommend a preferred corridor route.

After working through the outcomes of the value management workshop, the recommended preferred corridor route was identified as the modified orange route. On balance it performed best against the project objectives and selection criteria.

The preferred corridor route was announced in November 2016 and is shown in Figure 2-3.





**Figure 2-3** Announced preferred corridor route

### 2.3.5 Alignment within Western Sydney Parklands

Following announcement of the preferred corridor route and in response to the development of the Greater Sydney Commission draft South West District Plan and the draft Western Sydney Parklands Southern Vision, Roads and Maritime committed to reinvestigate alternative corridor options through the Western Sydney Parklands to avoid impacts where possible.

Three alternative options were developed and named as Option 1, Option 2 and Option 3. Each option passed through the Western Sydney Parklands with each being developed progressively north of the preferred corridor route. All options converged at the same point west of Range Road to tie-in to the remainder of the M12 Motorway.

A supplementary value management workshop was held in June 2016 2017. The workshop was attended by representatives from Australian and NSW Government agencies, local councils and key stakeholders. Due to geotechnical issues, Option 2 was not progressed to the supplementary value management workshop. Together with the preferred corridor route, Option 1 and Option 3 were assessed against the project objectives and selection criteria. The potential impacts of each option were based upon field investigations and community consultation carried out during the shortlisted options phase.

Based on the relative overall performance against the selection criteria, Option 3 was recommended as the preferred option.

The M12 Motorway with the new preferred alignment through the Western Sydney Parklands was announced in February 2018 and is shown in Figure 2-4.



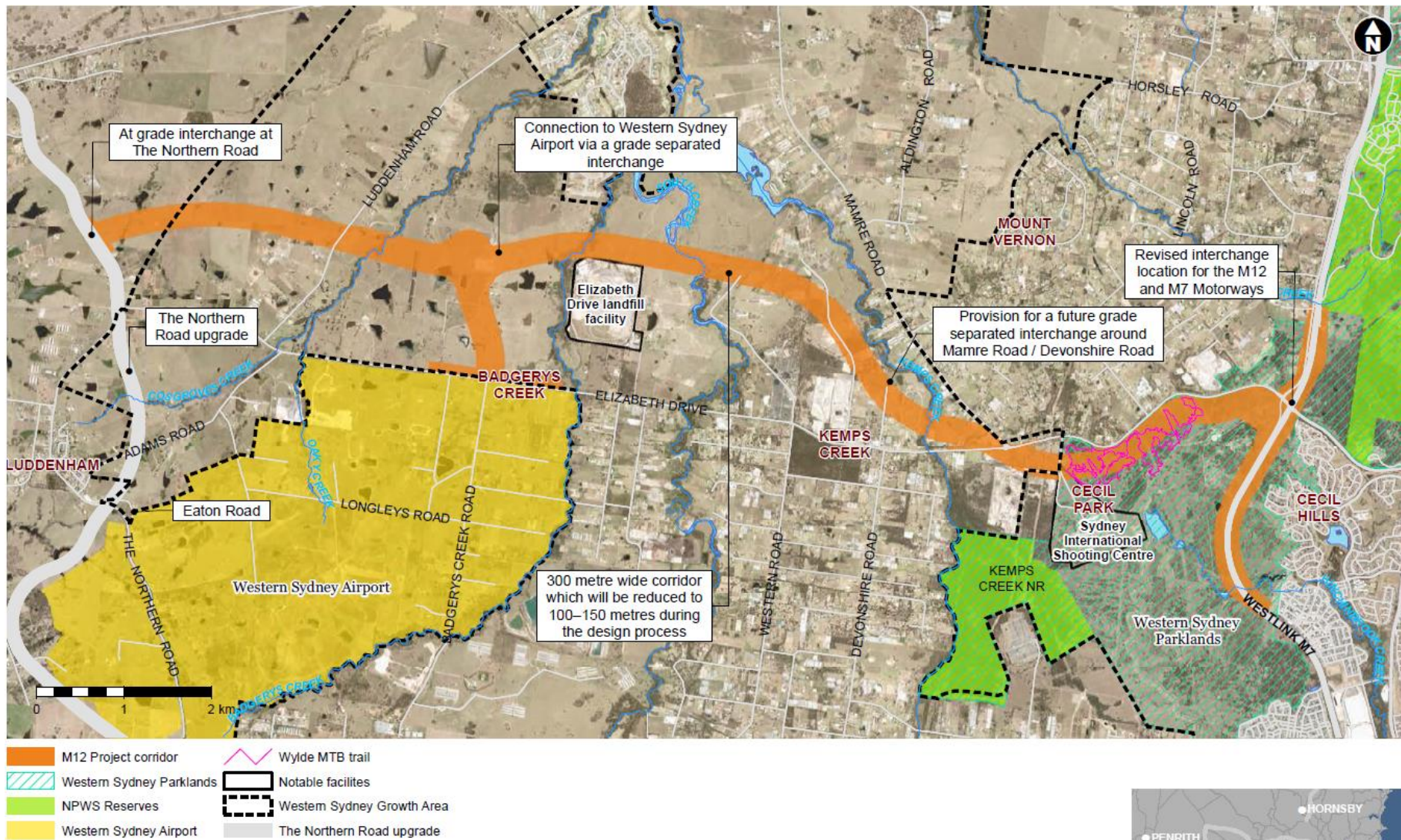


Figure 2-4 Preferred corridor route

## 2.4 Issues raised during consultation

Community consultation for the project has been undertaken throughout the strategic route options analysis study. There have been three formal consultation periods for the M12 Motorway:

- The announcement of the commencement of the strategic route options analysis study (13 July 2015 to 14 August 2015), and
- The announcement of the shortlisted route options feedback (8 February to 11 March 2016).

During these consultation periods a number of community events were held to give the community a chance to hear about the project, meet the project team and have their say. Community members were encouraged to provide their feedback, leave comments and make submissions at the information sessions or via mail, email or phone contact with the project team. Project information was also available on the Roads and Maritime website.

Briefings were also held during the consultation period with the following government agencies and key stakeholders:

- State and Federal MPs
- Fairfield City Council
- Liverpool City Council
- Penrith City Council
- North West Roads Group
- Western Sydney Parklands Trust
- University of Sydney.

The following key stakeholders were invited to attend a value management workshop, held in April 2016. Stakeholders attending the value management workshop included:

- Commonwealth Department of Infrastructure and Regional Development
- NSW Department of Planning and Environment
- Western Sydney Parklands Trust
- North West Roads Group Transport Management Centre
- Transport for NSW
- Penrith City Council
- Fairfield City Council
- Liverpool City Council.

The following stakeholders were invited to attend a supplementary value management workshop on June 2017:

- NSW Department of Planning and Environment
- Western Sydney Parklands Trust
- North West Roads Group Greater Sydney Commission
- Office of Environment and Heritage
- Government Architects Office
- Penrith City Council
- Fairfield City Council
- Liverpool City Council
- Department of Infrastructure and Regional Development

The following consultation tools and activities were undertaken to inform the community about the project and included:

- Community update newsletter
- Properties in the study area were door knocked
- Media release



- Facebook
- Newspaper advertisement (paper and online)
- Notifications via email, SMS and electronic variable message signs (VMS) in the study area
- Webpage, including a link on WSPT website
- WSIP Portal and M12 Portal
- Community information sessions
- Government agency briefings
- Stakeholder briefings
- One-to-one property owner meetings with property owners.

Feedback received from the community in early 2016 on the M12 Motorway shortlisted route options included the following concerns and suggestions:

- Impact on property access
- Impact on property values, acquisition and compensation
- Impact on the Sydney Society of Model Engineers
- Compensation for loss of business and/or business disturbance
- Impact on the Western Sydney Parklands
- Impact on future land use, plans and access
- Impact on air quality
- Noise impacts
- Impact on traffic
- Impact on flora and fauna
- Impact on dams and other water sources.

Feedback received during the preliminary design and access strategy in early 2018 included:

- Capacity of the motorway
- Property impact
- Impact to the Wylde Mountain Bike Trail
- Noise
- Concern regarding change of alignment

Roads and Maritime will continue to consult with the community, government agencies, local councils, Aboriginal community, specialist interest groups and utility providers during the preparation of the environmental impact statement. The EIS will outline the consultation activities carried out, issues raised, and how these have been responded to.

## 3 Project description

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Roads and Maritime is proposing to construct a new east-west motorway 16 kilometres in length from the M7 Motorway to The Northern Road. The motorway would provide four lanes (two in either direction) with a central median that would facilitate a six lane configuration in the future should it be required. The motorway would have a signposted at 100 km/hr and would include a shared user path (for pedestrians and cyclists) to connect with existing facilities.

The M12 Motorway includes the following key features:

- A new dual-carriageway motorway with two-lanes in each direction with a central median facilitating future expansion to six lanes
- Three interchanges, being:
  - A motorway – to – motorway interchange with the M7 Motorway
  - A grade separated interchange with the Western Sydney Airport access road
  - A signalised intersection with The Northern Road with the provision for grade separation in the future.
- Bridge structures across Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek.
- Bridge structures at Elizabeth Drive, Luddenham Road and other local roads
- Inclusion of active transport (pedestrian and cyclist) facilities
- Modifications to the local road network, if required, to facilitate connections across and around the motorway
- New services and modifications to existing service utilities.

The motorway is currently a 300 metre wide corridor; however the preferred project would be refined as part of the environmental assessment and concept design process. The project would include the features as generally described below.

### 3.1 Key project elements

#### Alignment

From its connection with the M7 Motorway, the alignment passes through the Western Sydney Parklands (Cecil Hills Precinct) to the south of the Elizabeth Drive corridor in a westerly direction. The alignment passes through the Wylde Mountain Bike Trail within the Western Sydney Parklands.

The M12 Motorway continues south-west before bridging over Range Road and heading in a north-west direction crossing Elizabeth Drive to the west of Mamre Road.

The M12 Motorway then crosses Kemps Creek, travels parallel to Clifton Avenue in a north-west direction, before heading west and passing through the southern boundary of the former Fleurs radio telescope site. The alignment then crosses South Creek, passing to the north of Kemps Creek Advanced Resource Recovery Park operated by SUEZ before crossing Badgerys Creek. The M12 Motorway then connects to the Western Sydney Airport via an interchange and a north-south access road about two kilometres long.

The M12 Motorway continues west crossing Cosgroves Creek and passing through rural and agricultural properties. It then crosses Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive.

The M12 Motorway continues west and connects to The Northern Road via an intersection about 900 metres north of the existing Elizabeth Drive roundabout and one kilometre south of Littlefields Road.

### **Intersections and Interchanges**

The M12 Motorway would be a controlled access motorway with no direct property or local road access. Access would be via three interchanges:

- M7 Motorway: An interchange between the M7 Motorway and the M12 Motorway. This would provide a free flowing all movements interchange
- Access to the Western Sydney Airport: the airport access road to Western Sydney Airport includes two entry lanes each way with capacity to upgrade to three lanes in the future. The interchange would be all movements
- The Northern Road: A signalised intersection would connect the M12 Motorway to The Northern Road as a motorway to arterial road connection. This would incorporate a set of traffic signals at The Northern Road and the M12 Motorway to provide all movements.

### **Bridges**

The M12 Motorway would include a series of bridge structures and viaducts to provide grade separated interchanges to maintain connectivity of existing local roads and to span over waterways and floodplains. While the bridge structures have yet to be designed, it is anticipated that these would include:

- Bridges over rivers, creeks and major floodplains including Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek
- Bridges over local roads including Elizabeth Drive and Luddenham Road.
- Overpasses to carry local traffic over the main carriageways including interchange bridge and ramp structures at the Clifton Avenue, M7 Motorway and the Western Sydney Airport.

### **Provision for pedestrian and cyclists**

Shoulders on the M12 Motorway would be designed to be suitable for cyclist use. In addition, further provision for a separate pedestrian/ cyclist shared path along part of the motorway is being investigated. This could include incorporating a cycleway along the length of the M12 Motorway from The Northern Road to the Western Sydney Parklands. The cycleway would connect to the existing shared user path network. Existing pedestrian/cyclist bridges across the M7 Motorway would need to be relocated for the project.

### **Utility services**

The project would cross over a number of utility services including:

- WaterNSW Supply Pipelines
- Telstra and Optus optical fibre assets
- Sydney Water mains
- Eastern gas pipeline and Jemena 150mm gas main
- TransGrid 500kV and 330KV overhead electricity lines
- Endeavour Energy 33kV and 132kV overhead electricity line

As part of the project, utilities will be relocated or protected during construction.

### **Ancillary work**

Ancillary work would be required to enable the construction of the project. The type and extent of ancillary works required would depend on the construction methodology and construction techniques chosen by the construction contractor.

Ancillary works associated with the project could potentially include:

- Demolition of houses and associated structures
- Public utility adjustment, relocation and protection
- Bridge pier foundation works and abutment protection
- Casting yards for bridge construction
- Crane and hard stand area set up
- Property adjustments
- Temporary property access arrangements
- Landscaping and revegetation works
- Installation of temporary sedimentation basins and other erosion and sedimentation controls
- Installation of road sign and traffic controls
- Establishment of construction site compounds and stockpiles including:
  - Main site compounds that incorporate site offices, sheds, workshops, storage and access roads
  - Several small satellite site compounds
  - Bridge site compounds
  - Areas for the delivery and storage of bridge girders
  - Concrete and asphalt batch plants
  - Crushing plants and material processing sites
  - Stockpile sites for materials, temporary spoil storage and mulch.

The location and size of ancillary construction facilities would be developed as part of the concept design and EIS. In confirming these facilities, existing land use activities, potential environmental impacts and amenity impacts on the surrounding community would be taken into account.

The project would not include some preliminary works, including surveys, test drilling, test excavations, geotechnical investigations or other tests, surveys, sampling or investigation for the purposes of the design or assessment of the project.

## 4 Key environmental issues

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### 4.1 Overview

Key issues for the project are those that have potential high or moderate impacts (actual or perceived), and for which assessment is necessary to determine the level of impact and to develop appropriate management and mitigation measures.

The outcomes of the preliminary environmental investigations indicate the following key environmental issues will require further detailed assessment to assess the potential impact of the project and may require project specific impact mitigation measures:

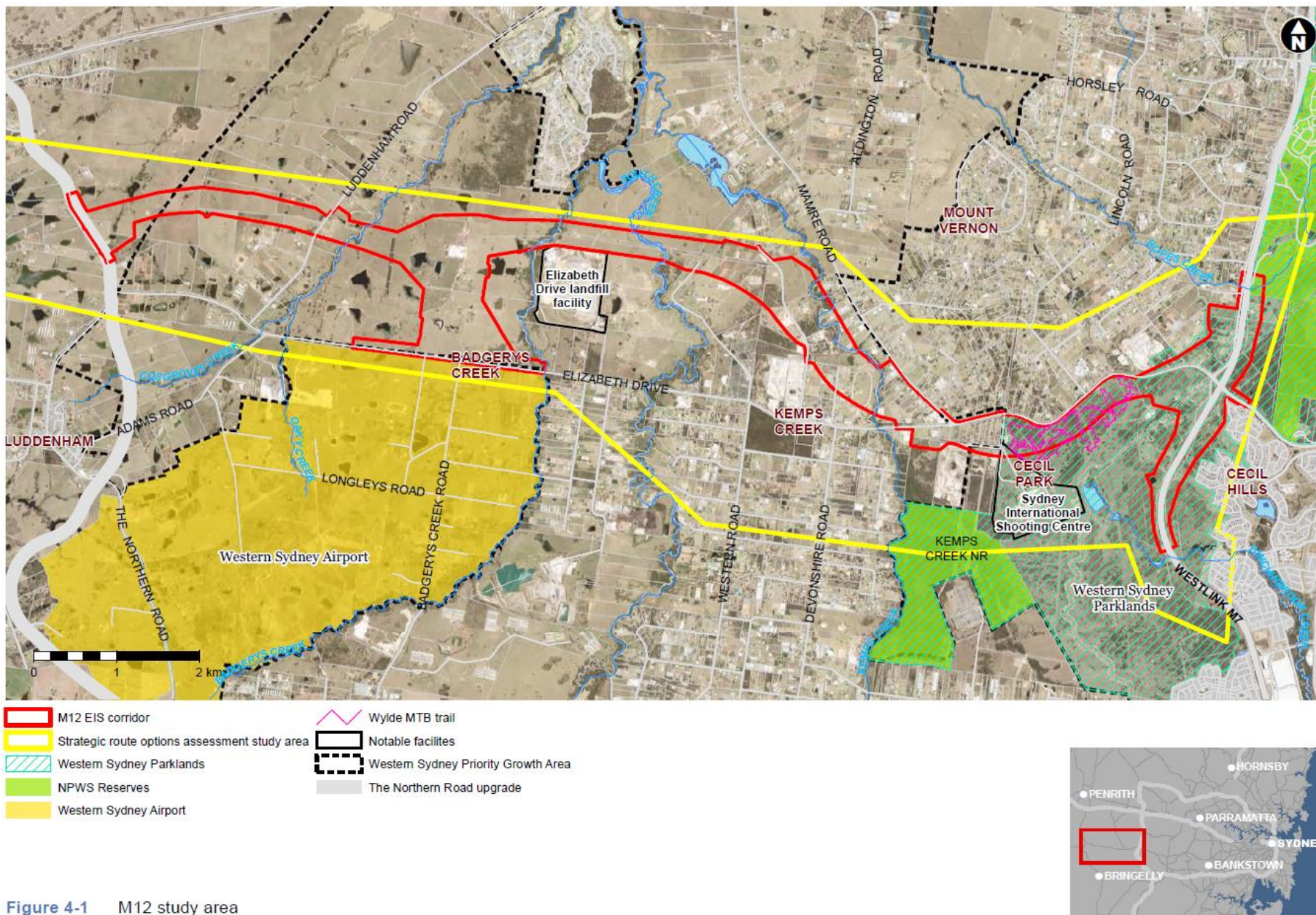
- Biodiversity
- Urban design, landscape character and visual amenity
- Aboriginal heritage
- Non-Aboriginal heritage
- Traffic and access
- Noise and vibration
- Socio-economic, land use and property
- Flooding and hydrology

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. It is expected that these other environmental issues would not likely be key issues; however the potential impact of these other environmental issues would be assessed further in the EIS for the project.

Information provided below is based on desktop and field based surveys carried during the shortlisted route options phase. Biodiversity surveys were supplemented in 2017 by autumn/winter surveys.

The study area referred to below is the area presented to the community in which route options were developed and is shown on Figure 4-1.





## 4.2 Biodiversity

### 4.2.1 Overview

Biodiversity investigations were carried out in the study area in March 2016. The biodiversity investigations involved database searches of the NSW BioNet Atlas of Wildlife and the Commonwealth Protected Matters Search Tool and a review of regional vegetation mapping. Targeted field investigations were also carried out to validate vegetation communities and their condition against mapped vegetation and identify significant habitat features. An assessment was also made as to whether the vegetation community met Critically Endangered or Endangered criteria under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Field surveys of the M12 project corridor were carried out from late May 2017 to mid-August 2017 to further validate vegetation communities and condition against mapped vegetation. Targeted threatened fauna surveys (season dependant) in the M12 project corridor were also carried out during this period.

#### 4.2.1.1 Vegetation communities

The key biodiversity features in the study area relate to remnant vegetation and habitat and threatened vegetation and species, as shown in Figure 4-2a and 4-2b.

Vegetation communities identified within the study area include seven threatened ecological communities listed on the former *Threatened Species Conservation Act 1995* (TSC Act) (now the *Biodiversity Conservation Act 2016* (BC Act) and four vegetation communities that meet the criteria under the EPBC Act.

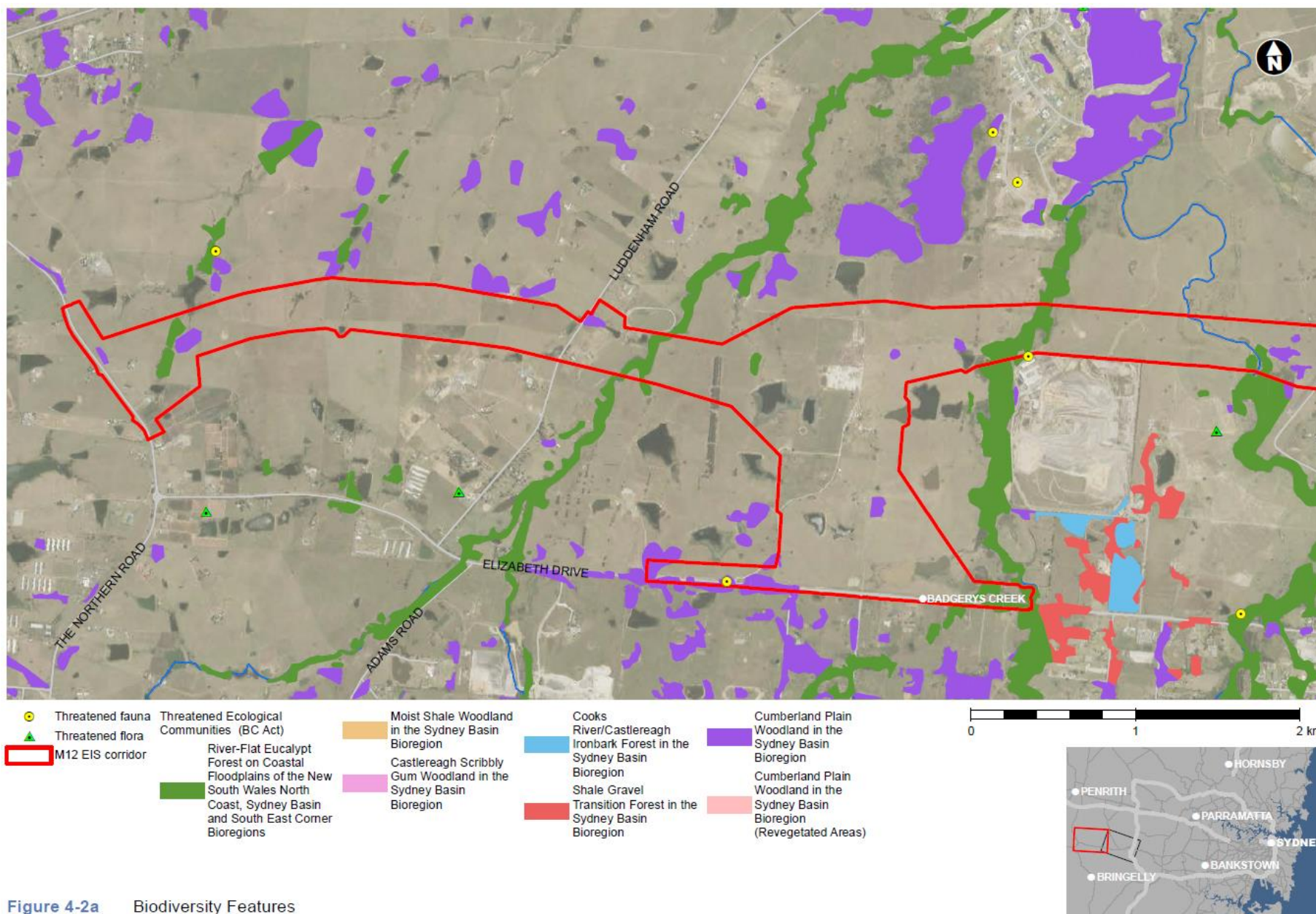
The seven TSC Act listed communities are:

- Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion (Vulnerable Ecological Communities)
- Cumberland Plain Woodland in the Sydney Basin Bioregion (Critically Endangered Ecological Communities)
- River-flat Eucalypt Forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions (Endangered Ecological Communities)
- Shale Gravel Transition Forest in the Sydney Basin Bioregion (Endangered Ecological Communities)
- Moist Shale Woodland in the Sydney Basin Bioregion (Endangered Ecological Communities)
- Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion (Endangered Ecological Communities).

The following four EPBC Act listed communities are:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (EEC). The project crosses this community near Clifton Avenue.
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC). The project crosses this community within the Western Sydney Parklands.
- Western Sydney Dry Rainforest and Moist Woodland on Shale (Critically Endangered). The community is located within the Western Sydney Parklands, within the project corridor
- Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion (Critically Endangered).





**Figure 4-2a** Biodiversity Features



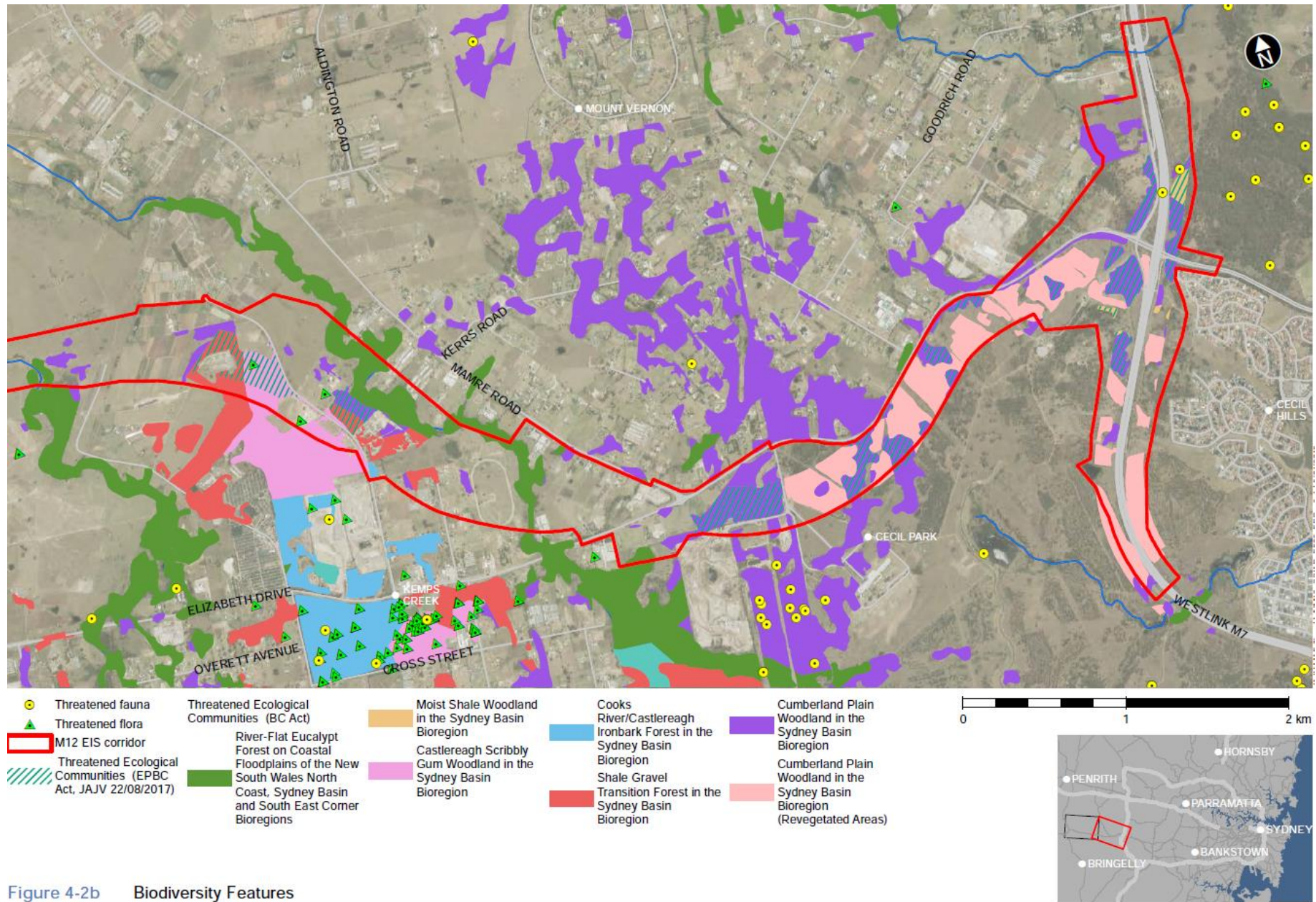


Figure 4-2b Biodiversity Features

#### **4.2.1.2 Threatened species**

An assessment of likelihood of occurrence was made for the threatened species identified by database searches based on known habitat values in the study area and professional judgment. Those species with a likelihood of occurrence in the study area are detailed in Table 4-1.

Five terms for the likelihood of occurrence of species are used in this report:

- Known – the species was or has been observed on the site
- Likely – there is a medium to high probability that a species uses the site
- Potential – there is suitable habitat for a species occurs on the site, but insufficient information to categorise the species as likely to occur, or unlikely to occur
- Unlikely – there is a very low to low probability that a species uses the site.
- No – species not considered to occur on the site

Of the 58 threatened fauna species identified by database searches, ten are known to occur, 11 are likely to occur, 11 have the potential to occur, 24 are unlikely to occur and two are not considered to occur.

Of the 28 threatened flora species identified by database searches, eight are known to occur, four have potential to occur, 14 are unlikely to occur and two are not considered to occur.

Table 4-1 Threatened species likelihood of occurrence within the study area

| Scientific name                 | Common name  | TSC Act | EPBC Act   | Habitat   | Likelihood of occurrence |
|---------------------------------|--|---------|------------|---|--------------------------|
| <b>Fauna</b>                    |  |         |            |   |                          |
| <i>Anthochaera phrygia</i>      | Regent Honeyeater  | E4A     | E          | Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <i>Casuarina cunninghamiana</i> (River Oak).  | Potential                |
| <i>Apus pacificus</i>           | Fork-tailed Swift  |         | C,J,K, Mar | Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.  | Known                    |
| <i>Ardea alba</i>               | Great Egret, White Egret   |         | C,J        | Swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs | Known                    |
| <i>Ardea ibis</i>               | Cattle Egret   |         | C,J, Mar   | Grassland, wooded land and terrestrial wetland.   | Known                    |
| <i>Botaurus poiciloptilus</i>   | Australasian Bittern   |         | E          | Wetlands with tall dense vegetation, in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. Favours permanent and seasonal freshwater habitats  | Potential                |
| <i>Calidris ferruginea</i>      | Curlew Sandpiper   |         | CE, C,J,K  | Intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons. Around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand in both fresh and brackish waters.  | Unlikely                 |
| <i>Callocephalon fimbriatum</i> | Gang-gang Cockatoo   | V       |            | Tall mountain forests and woodland in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodland, and urban areas.   | Potential                |
| <i>Callocephalon fimbriatum</i> | Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Area | E2, V   |            | Forest and woodland, urban fringes  | No                       |
| <i>Chalinolobus dwyeri</i>      | Large-eared Pied Bat, Large Pied Bat   | V       | V          | Low to mid-elevation dry open forest and woodland   | Likely                   |

| Scientific name                   | Common name                                | TSC Act | EPBC Act | Habitat   | Likelihood of occurrence |
|-----------------------------------|--|---------|----------|---|--------------------------|
| <i>Chthonicola sagittata</i>      | Speckled Warbler                           | V       |          | <i>Eucalyptus</i> -dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.   | Likely                   |
| <i>Cuculus optatus</i>            | <i>Oriental Cuckoo, Horsfield's Cuckoo</i> |         | C,J,K    | Closed forest, low woodland, mangrove, open forest, tall forest, woodland   | Potential                |
| <i>Daphoenositta chrysoptera</i>  | Varied Sittella                            | V       |          | Inhabits eucalypt forests and woodland, mallee and <i>Acacia</i> woodland.  | Known                    |
| <i>Dasyornis brachypterus</i>     | <i>Eastern Bristlebird</i>                 | E1      | E        | Dense, low vegetation including heath and open woodland with a heathy understorey.  | Unlikely                 |
| <i>Dasyurus maculatus</i>         | Spotted-tailed Quoll                       | V       | E        | Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.   | Unlikely                 |
| <i>Ephippiorhynchus asiaticus</i> | Black-necked Stork                         | E1      |          | In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also minor floodplains, coastal sandplain wetlands and estuaries.  | Unlikely                 |
| <i>Falco subniger</i>             | Black Falcon                               | V       |          | Woodland, shrubland and grassland, especially riparian woodland and agricultural land. Often associated with streams or wetlands.   | Unlikely                 |
| <i>Falsistrellus tasmaniensis</i> | Eastern False Pipistrelle                  | V       |          | Tall (higher than 20 m), moist habitats.  | Potential                |
| <i>Gallinago hardwickii</i>       | Latham's Snipe                             |         | J,K, Mar | Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grassland or heathland.  | Potential                |
| <i>Glossopsitta pusilla</i>       | Little Lorikeet                            | V       |          | Dry, open eucalypt forest and woodland, including remnant woodland patches and roadside vegetation.   | Likely                   |
| <i>Grantiella picta</i>           | <i>Painted honeyeater</i>                  | V       | V        | Open, dry, eucalypt woodland, typically with an abundance of ironbark eucalypts and an open subcanopy of paperbarks.  | Unlikely                 |
| <i>Haliaeetus leucogaster</i>     | White-bellied Sea-Eagle                    | V       | C        | Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas. | Likely                   |
| <i>Heleioporus australiacus</i>   | <i>Giant Burrowing Frog</i>                | V       | V        | Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based, soaks or pools   | Unlikely                 |



| Scientific name                  | Common name  | TSC Act | EPBC Act | Habitat   | Likelihood of occurrence |
|----------------------------------|--|---------|----------|---|--------------------------|
|                                  |  |         |          | within first or second order streams.   |                          |
| <i>Hieraaetus morphnoides</i>    | Little Eagle   | V       |          | Open eucalypt forest, woodland or open woodland, including sheoak or <i>Acacia</i> woodland and riparian woodland of interior NSW.  | Known                    |
| <i>Hirundapus caudacutus</i>     | White-throated Needletail  |         | C,J,K    | Wooded areas, including open forest and rainforest, heathland, partly cleared pasture, plantations or remnant vegetation at the edge of paddocks.                                       | Potential                |
| <i>Hoplocephalus bungaroides</i> | Broad-headed Snake   | E       | V        | Rock crevices and under flat sandstone rocks on exposed cliff edges within the Hawkesbury, Narrabeen and Shoalhaven group sandstones  | Unlikely                 |
| <i>Lathamus discolor</i>         | Swift Parrot   | E1      | CE       | Box-ironbark forest and woodland.   | Known                    |
| <i>Limosa limosa</i>             | Black-tailed Godwit  | V       | C,J,K    | Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found around muddy lakes and swamps.             | Potential                |
| <i>Litoria aurea</i>             | Green and Golden Bell Frog   | E1      | V        | Marshes, dams and stream-sides, particularly those containing <i>Typha</i> spp. (bullrushes) or <i>Eleocharis</i> spp. (spikerushes). Some populations occur in highly disturbed areas. | Likely                   |
| <i>Litoria littlejohni</i>       | Littlejohn's Tree Frog, Heath Frog   |         | V        | Heath based forests and woodlands, under leaf litter and low vegetation, upper reaches of permanent streams and in perched swamps.  | Unlikely                 |
| <i>Litoria raniformis</i>        | Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog | E       | V        | Permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.                         | Unlikely                 |
| <i>Mixophyes balbus</i>          | Stuttering Frog, Southern Barred Frog (in Victoria)                              | E       | V        | Rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.   | Unlikely                 |
| <i>Macquaria australasica</i>    | Macquarie Perch  | E       | E        | Clear water and deep, rocky holes with dense vegetation cover.  | Unlikely                 |
| <i>Melanodryas cucullata</i>     | Hooded Robin (south-eastern form)  | V       |          | Open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.  | Unlikely                 |
| <i>Meridolum</i>                 | Cumberland Plain Land Snail  | E1      |          | Primarily inhabits Cumberland Plain Woodland. Also known in Shale Gravel Transition Forests, Castlereagh Swamp  | Known                    |

| Scientific name                            | Common name               | TSC Act | EPBC Act  | Habitat  | Likelihood of occurrence |
|--|---------------------------|---------|-----------|--|--------------------------|
| <i>corneovirens</i>                        |                           |         |           | Woodland and the margins of River-flat Eucalypt Forest.  |                          |
| <i>Merops ornatus</i>                      | Rainbow Bee-eater         |         | J         | Open forests and woodland, shrublands, farmland, areas of human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.  | Likely                   |
| <i>Miniopterus schreibersii oceanensis</i> | Eastern Bent-wing Bat     | V       |           | Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.   | Likely                   |
| <i>Monarcha trivirgatus</i>                | Spectacled Monarch        |         | Mar       | Broadleaf thicket / shrubland, subtropical rainforest, tropical rainforest, wet sclerophyll forest.  | Unlikely                 |
| <i>Motacilla flava</i>                     | Yellow Wagtail            |         | C,J,K     | Damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra.   | Unlikely                 |
| <i>Mormopterus norfolkensis</i>            | Eastern Freetail Bat      | V       |           | Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.   | Known                    |
| <i>Myiagra cyanoleuca</i>                  | Satin Flycatcher          |         | Mar       | Heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, coastal forests, woodlands, mangroves and drier woodlands and open forests   | Unlikely                 |
| <i>Myotis macropus</i>                     | Southern Myotis           | V       |           | Forages in water bodies (including streams, or lakes or reservoirs) and fringing areas of vegetation within 20 m.  | Likely                   |
| <i>Numenius madagascariensis</i>           | Eastern Curlew            | CE      | CE, C,J,K | Sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass.  | Unlikely                 |
| <i>Pandion haliaetus</i>                   | Osprey                    | V       | Mar       | Estuarine and inshore marine waters, coastal rivers, in tall (usually dead or dead-topped) trees in coastal habitats from open woodland to open forest, within 1-2 km of water.  | Unlikely                 |
| <i>Petauroides volans</i>                  | Greater Glider            |         | V         | Taller, montane, moist eucalypt forests with relatively old trees and abundant hollows.  | Unlikely                 |
| <i>Petrogale penicillata</i>               | Brush-tailed Rock-wallaby | E       | V         | Rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks, dense rainforest, wet sclerophyll forest, vine thicket, dry sclerophyll forest, and open forest. | Unlikely                 |
| <i>Petroica phoenicea</i>                  | Flame Robin               | V       |           | Breeds in upland tall moist eucalypt forests and woodland. In winter it uses dry forests, open woodland, heathland, pastures   | Likely                   |

| Scientific name                  | Common name                                  | TSC Act | EPBC Act | Habitat   | Likelihood of occurrence |
|----------------------------------|--|---------|----------|---|--------------------------|
|                                  |  |         |          | and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathland, shrublands and sedgeland at high altitudes.  |                          |
| <i>Phascolarctos cinereus</i>    | Koala  | V       | V        | Eucalypt woodland and forests.  | Potential                |
| <i>Phascolarctos cinereus</i>    | Koala in the Pittwater Local Government Area | E2, V   | V        | Eucalypt forest and woodland. Key likely habitats within Pittwater Council are Swamp Mahogany Forest, ecotone between Spotted Gum Forest and Hawkesbury Sandstone Open-Forest, Northern form of Coastal Sandstone Woodland and Whale Beach, Red Bloodwood-Scribbly Gum Woodland, Bilgola Plateau Forest and the Grey Ironbark – Grey Gum form of the Newport Bangalay Woodland. | No                       |
| <i>Plegadis falcinellus</i>      | Glossy Ibis                                  |         | C        | Edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Occasionally in estuaries, deltas, saltmarshes and coastal lagoons.   | Likely                   |
| <i>Pommerhelix duralensis</i>    | Dural Land Snail                             | E       | E        | Interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris.  | Unlikely                 |
| <i>Prototroctes maraena</i>      | Australian Grayling                          | E       | V        | Cool, clear, freshwater streams with gravel substrate and areas alternating between pools and riffle zones  | Unlikely                 |
| <i>Pseudomys novaehollandiae</i> | New Holland Mouse, Pookila                   | V       | V        | Open heathlands, woodlands and forests with a heathland understorey and vegetated sand dunes  | Unlikely                 |
| <i>Pteropus poliocephalus</i>    | Grey-headed Flying-fox                       | V       | V        | Subtropical and temperate rainforest, tall sclerophyll forest and woodland, heathland and swamp as well as urban gardens and cultivated fruit crops.  | Known                    |
| <i>Rhipidura rufifrons</i>       | Rufous Fantail                               |         | Mar      | Wet sclerophyll forests, often in gullies dominated by eucalypts usually with a dense shrubby understorey often including ferns.  | Unlikely                 |
| <i>Rostratula australis</i>      | Australian Painted Snipe                     | E       | E        | Shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans.  | Potential                |
| <i>Scoteanax rueppellii</i>      | Greater Broad-nosed Bat                      | V       |          | Woodland, moist and dry eucalypt forest and rainforest.   | Known                    |

| Scientific name                 | Common name                 | TSC Act | EPBC Act   | Habitat   | Likelihood of occurrence |
|---------------------------------|-----------------------------|---------|------------|---|--------------------------|
| <i>Stagonopleura guttata</i>    | Diamond Firetail            | V       |            | Grassy eucalypt woodland, open forest, mallee, natural temperate grassland, secondary derived grassland, riparian areas and lightly wooded farmland.  | Likely                   |
| <i>Tringa nebularia</i>         | Common Greenshank           |         | C,J,K, Mar | Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).   | Potential                |
| <b>Flora</b>                    |                             |         |            |   |                          |
| <i>Acacia bynoeana</i>          | Bynoe's Wattle, Tiny Wattle | E       | V          | Heath or dry sclerophyll forest on sandy soils, open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple.   | Potential                |
| <i>Acacia pubescens</i>         | Downy Wattle                | V       | V          | Open woodland and forest, including Cooks River/ Castlereagh Ironbark Forest, Shale/ Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.   | Known                    |
| <i>Allocasuarina glareicola</i> |                             | E1      | E          | Open woodland with <i>Eucalyptus parramattensis</i> , <i>Eucalyptus fibrosa</i> , <i>Angophora bakeri</i> , <i>Eucalyptus sclerophylla</i> and <i>Melaleuca decora</i> . Common associated understorey species include <i>Melaleuca nodosa</i> , <i>Hakea dactyloides</i> , <i>Hakea sericea</i> , <i>Dillwynia tenuifolia</i> , <i>Micromyrtus minutiflora</i> , <i>Acacia elongata</i> , <i>Acacia brownei</i> , <i>Themeda australis</i> and <i>Xanthorrhoea minor</i> . | Potential                |
| <i>Asterolasia elegans</i>      |                             | E1      | E          | Occurs on Hawkesbury sandstone in sheltered forests on mid-to lower slopes and valleys.   | Unlikely                 |
| <i>Cryptostylis hunteriana</i>  | Leafless Tongue-orchid      | V       | V          | Heathlands, heathy woodlands, sedgeland, Xanthorrhoea spp. plains, dry sclerophyll forests (shrub/grass sub-formation and shrubby sub-formation), forested wetlands, freshwater wetlands, grasslands, grassy woodlands, rainforests and wet sclerophyll forests   | Unlikely                 |



| Scientific name                                      | Common name  | TSC Act | EPBC Act | Habitat   | Likelihood of occurrence |
|--|--|---------|----------|---|--------------------------|
| <i>Cynanchum elegans</i>                             | White-flowered Wax Plant   | E1      | E        | Dry rainforest; littoral rainforest; <i>Leptospermum laevigatum</i> - <i>Banksia integrifolia</i> subsp. <i>integrifolia</i> (Coastal Tea-tree–Coastal Banksia) coastal scrub; <i>Eucalyptus tereticornis</i> (Forest Red Gum) or <i>Corymbia maculata</i> (Spotted Gum) open forest and woodland; and <i>Melaleuca armillaris</i> (Bracelet Honey myrtle) scrub.   | Potential                |
| <i>Dillwynia tenuifolia</i>                          | Dillwynia tenuifolia, Kemps Creek  | E2,V    |          | Transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland.   | Known                    |
| <i>Dillwynia tenuifolia</i>                          |  | V       |          | Scrubby/ dry heath areas in Castlereagh Ironbark Forest and Shale Gravel Transition Forest, transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland, and disturbed escarpment woodland on Narrabeen sandstone.  | Known                    |
| <i>Dillwynia tenuifolia</i>                          | Dillwynia tenuifolia Sieber ex D.C in the Baulkham Hills Local Government Area | E2, V   |          | Vegetation similar to Cumberland Plain Woodland, on Wianamatta Shale soils  | No                       |
| <i>Eucalyptus aggregata</i>                          | Black Gum  | V       | V        | Alluvial soils, on cold, poorly-drained flats and hollows adjacent to creeks and small rivers. Often grows with other cold-adapted eucalypts, such as Snow Gum or White Sallee ( <i>Eucalyptus pauciflora</i> ), Manna or Ribbon Gum ( <i>E. viminalis</i> ), Candlebark ( <i>E. rubida</i> ), Black Sallee ( <i>E. stellulata</i> ) and Swamp Gum ( <i>E. ovata</i> ). Black Gum usually occurs in an open woodland formation with a grassy groundlayer dominated either by River Tussock ( <i>Poa labillardierei</i> ) or Kangaroo Grass ( <i>Themeda australis</i> ), but with few shrubs. | Unlikely                 |
| <i>Eucalyptus benthamii</i>                          | Camden White Gum   | V       | V        | Open forest. Requires a combination of deep alluvial sands and a flooding regime.   | Unlikely                 |
| <i>Eucalyptus scoparia</i>                           | Wallangarra White Gum  | E1      | V        | Open eucalyptus forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typical at high altitudes. Natural distribution is in northern NSW  | No                       |
| <i>Genoplesium baueri</i>                            | Yellow Gnat-orchid   | E1      | E        | Dry sclerophyll forest and moss gardens over sandstone  | Unlikely                 |
| <i>Grevillea juniperina</i> subsp. <i>juniperina</i> | Juniper-leaved Grevillea   | V       |          | Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest, on reddish clay to sandy soils derived from   | Known                    |

| Scientific name  | Common name   | TSC Act | EPBC Act | Habitat   | Likelihood of occurrence |
|--|---|---------|----------|---|--------------------------|
|  |   |         |          | Wianamatta Shale and tertiary alluvium.   |                          |
| <i>Grevillea parviflora</i> subsp. <i>parviflora</i>       | Small-flower Grevillea  | V       | V        | Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.  | Known                    |
| <i>Haloragis exalata</i> subsp. <i>exalata</i>             | Wingless Raspwort, Square Raspwort  | V       | V        | Protected and shaded damp situations in riparian habitats.  | Unlikely                 |
| <i>Leucopogon exolasius</i>                                | Woronora Beard-heath  | V       | V        | Woodland on sandstone (and sandy alluvium) and prefers rocky hillsides along creek banks. The species occupies areas with low nutrient soils, up to an altitude of 100 m.   | Unlikely                 |
| <i>Marsdenia viridiflora</i> subsp. <i>viridiflora</i>     | Marsdenia viridiflora R. Br. subsp. <i>viridiflora</i> population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas | E2      |          | Vine thickets and open shale woodland.  | Potential                |
| <i>Melaleuca deanei</i>                                    | Deane's Melaleuca   | V       | V        | In ridgetop woodland, with only 5% of sites in heath on sandstone.  | Unlikely                 |
| <i>Pelargonium</i> sp. <i>Striatellum</i> (G.W.Carr 10345) | Omeo Stork's-bill   | E1      | E        | Known to occur in habitat usually located just above the high water level of irregularly inundated or ephemeral lakes. During dry periods, the species is known to colonise exposed lake beds.  | Unlikely                 |
| <i>Persoonia acerosa</i>                                   | Needle Geebung  | V       | V        | Dry sclerophyll forest, scrubby low-woodland and heath on low fertility soils.  | Unlikely                 |
| <i>Persoonia nutans</i>                                    | Nodding Geebung   | E1      | E        | Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest. | Known                    |
| <i>Pimelea curviflora</i> var. <i>curviflora</i>           |   | V       | V        | Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.   | Unlikely                 |
| <i>Pimelea spicata</i>                                     | Spiked Rice-flower  | E1      | E        | Well-structured clay soils. <i>Eucalyptus moluccana</i> (Grey Box) communities and areas of ironbark on the Cumberland Plain.   | Known                    |

| Scientific name                | Common name                | TSC Act | EPBC Act | Habitat  | Likelihood of occurrence |
|--------------------------------|----------------------------|---------|----------|--|--------------------------|
|                                |                            |         |          | Coast Banksia open woodland or coastal grassland in the Illawarra.   |                          |
| <i>Pultenaea parviflora</i>    |                            | E1      | V        | Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities are next to Castlereagh Scribbly Gum Woodland. | Known                    |
| <i>Syzygium paniculatum</i>    | Magenta Lilly Pilly        | E1      | V        | Occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.   | Unlikely                 |
| <i>Thelymitra kangaloonica</i> | Kangaloon Sun Orchid       | E4A     | CE       | Endemic to the Central Coast/Tablelands of NSW, in the Fitzroy Falls/Robertson/Kangaloon area. Grows in seasonally swampy sedgeland on grey silty clay loam at 600–700 m above sea level.    | Unlikely                 |
| <i>Thesium australe</i>        | Austral Toadflax, Toadflax | V       | V        | Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass ( <i>Themeda australis</i> ).                  | Unlikely                 |

\*EPBC Act Status: V Vulnerable species, E Endangered species, CE Critically Endangered, C Migratory(CAMBA), J Migratory(JAMBA), K Migratory(ROKAMBA), Mar Marine

\*TSC Status: V Vulnerable, E1 Endangered, E4A Critically Endangered, E4 Presumed Extinct, E2 Endangered Population

The final number of threatened species recorded or those with a medium to high likelihood of occurrence within and near the project would be confirmed based on targeted field surveys and presented in the environmental impact statement.

#### **4.2.1.3 Conservation**

The WSAGA south of Elizabeth Drive includes around 849 hectares of habitat identified for conservation and vegetation retention in the bio-certification order for the State Environmental Planning Policy (SEPP) (Sydney Region Growth Centres) 2006. Within the study area, this includes around 162 hectares of extant native vegetation on non-certified land within the Western Sydney Parklands. The M12 project corridor passes through around 164.49 ha of non-certified land.

The study area also includes land identified as a 'priority for conservation' as part of the Cumberland Plain Recovery Plan. These lands are identified as core biodiversity areas and priorities for investment to be secured for biodiversity conservation and protection as an offset to impact in the Cumberland Plain. The M12 project passes through around 7.36 ha of land identified as a priority for conservation.

Kemps Creek Nature Reserve is located within the study area. It has been reserved under the *National Parks and Wildlife Act 1974* as it contains elements of conservation significance such as threatened species or vegetation of local or regional significance. Kemps Creek Nature Reserve is mapped as 'priority for conservation' in the Cumberland Plain Recovery Plan. The M12 project is located outside of and to the north of Kemps Creek Nature Reserve.

There are also a number of regional habitat corridors, mostly associated with the riparian areas of the rivers and creeks that cross the M12 project. These habitat corridors include South Creek, Kemps Creek, Badgerys Creek, and Cosgroves Creek. Many of the habitat corridors include threatened vegetation and potential fish habitat. The Western Sydney Parklands also provides important regional habitat connectivity.

#### **4.2.1.4 Western Sydney Parklands**

The Western Sydney Parklands are located at the eastern end of the study area. The Western Sydney Parklands were originally identified in the Sydney Region Outline Plan (NSW State Planning Authority, 1968) to cater for the infrastructure and future regional open space needs of a growing western Sydney. Work has been carried out to regenerate the Western Sydney Parklands since its establishment, including the Greening Western Sydney Program. This program started in 1992, with revegetation of Cecil Hills to Kemps Creek occurring in 1998 (Western Sydney Parklands Trust [WSPT], 2013).

The Western Sydney Parklands Plan of Management (2010) has been prepared to direct the future development and management of the Parklands. It includes a number of objectives relating to the use of the Western Sydney Parklands for recreation and education, community facilities, biodiversity conservation, cultural community awareness, sustainable urban farming and water management (WSPT, 2010). The Plan of Management is currently being updated in line with its statutory review process and is anticipated to be published by the end of the year. As part of the review process the Western Sydney Parklands Trust has developed its vision for the Cecil Hills Precinct as being a place for active and passive recreational facilities.

The Western Sydney Parklands Plan of Management (2010) identifies areas (in the Abbotsbury, Cecil Park North, Cowpasture and Cecil Park precincts) for management as bushland corridors to provide habitat connectivity. These areas have progressively seen extensive investment in



revegetation to help re-create the vegetation communities that previously existed in the area, and contribute to the regional biodiversity connectivity of western Sydney (WSPT, 2010). Since 2010, about 180,000 plants have been added to the Western Sydney Parklands and about 1000 hectares of Cumberland Plain Woodlands have been regenerated. As noted above, the project passes through an area of the Western Sydney Parklands that has been progressively revegetated.

As part of the enhancement of biodiversity within the Western Sydney Parklands, a number of biobanking agreements have been made under the TSC Act. Known as the Biodiversity Banking and Offsets Scheme, 'BioBanking' is designed to address the loss of biodiversity values from habitat degradation. BioBanking enables 'biodiversity credits' to be generated by landowners and developers who commit to enhance and protect biodiversity values on their land through a biobanking agreement. More than 400 biobanking credits were created (since 2010) and just under 300 credits sold (WSPT, 2010). In addition, through the Wylde Mountain Bike Trail, there is a carbon offset site. The project crosses through a portion of a BioBanking offset site and through the carbon offset both established by the Western Sydney Parklands Trust.

## 4.2.2 Summary of issues

### 4.2.2.1 Construction

During the construction of the project, the following impacts may result:

- Direct removal and edge effects of threatened ecological communities including the critically endangered (EPBC Act) Cumberland Plain Woodland in the Sydney Basin Bioregion.
- Direct and indirect impacts to threatened flora and fauna species, and their habitats listed under the TSC Act or EPBC Act (such as removal, fragmentation and weed infestation).
- Direct and indirect impacts to native vegetation and native fauna not listed as threatened.
- Potential impacts to the existing biobanking agreement site that would require appropriate offset in recognition that the associated biodiversity credits have already been retied to satisfy the offset requirement for a completed infrastructure project.
- Potential impacts on aquatic habitat through installation of instream structures (bridges/culverts) and through the mobilisation of sediments and pollutants, which may enter into creeks.
- Regional habitat corridors could be directly and indirectly impacted.
- Potential direct and indirect impacts to bushland corridors in the Western Sydney Parklands, including an area of revegetation.

### 4.2.2.2 Operation

- During operation, the project may present a potential barrier to fauna movement, particularly through Western Sydney Parklands and along creek lines.
- Potential increase in vehicle strike to native fauna.
- New sources of light and noise may impact upon bats and other fauna species.

## 4.2.3 Proposed further assessments

The BC Act and its supporting regulations commenced on 25 August 2017. The BC Act repeals the TSC Act along with other natural resource management legislation.

The BC Act sets out the environmental impact assessment framework for threatened species, threatened ecological communities and Areas of Outstanding Biodiversity Value (formerly critical habitat) for Part 5 activities (amongst other types of development).

On 27 November 2017 Roads and Maritime applied to the Secretary of the Department of Planning and Environment requesting the project be considered a pending or interim application under

clause 27 of the Biodiversity Conservation (Savings and Transitional) Regulation 2017. This was requested on the basis that the biodiversity assessment component of the environmental assessment for the project was substantially commenced prior to the start of the new Act. On 5 April 2018 correspondence was received from the Secretary of the Department of Planning and Environment confirming that the project can be assessed in accordance with the TSC Act.

Roads and Maritime will also be referring the project for consideration under the provisions of the EPBC Act as there is the potential for significant impact on Matters of National Environmental Significance (MNES). Should the Department of the Environment and Energy determine that the action is controlled, Roads and Maritime will undertake environmental assessment in accordance with the Commonwealth and NSW Bilateral Agreement.

The following activities are proposed to be undertaken to further address this issue:

- During development of the concept design, opportunities to avoid or minimise impacts to areas of ecological values would be investigated
- Undertake a full biodiversity assessment in accordance with the Framework for Biodiversity Assessment (FBA) (OEH 2014) and the Biodiversity Offsets Policy for Major Projects (OEH 2014) by a person accredited in accordance with Section 142B(1)(c) of the TSC Act. This assessment would:
  - Identify and address the existing environment within the construction footprint of the project.
  - Assess direct and indirect potential ecological impacts including biodiversity values not covered by the FBA eg aquatic biodiversity and vehicle strike.
  - Identify design measures that could be incorporated into the design to facilitate connectivity.
  - Identify additional management measures including offsets (in accordance with Biodiversity Offsets Policy for Major Projects (OEH 2014).
- Submit a referral to the Commonwealth Department of Environment and Energy due to potential significant impacts to critically endangered ecological communities listed under the EPBC Act.

## 4.3 Urban design, landscape character and visual amenity

### 4.3.1 Overview

The landscape character of the study area varies from rural in the west to semi-rural through the remainder of the study area. The open space and bushland areas characterised by the Western Sydney Parklands is located at the eastern end of the study area.

#### 4.3.1.1 Landscape

The landscape in and around the study area is considered to be typical of the Cumberland Plain, with rolling hills and small valleys between generally north–south ridge lines. In the east and west of the study area, the topography is gently undulating, flattening out in the middle of the study area, where it passes through the floodplains associated with Kemps Creek, South Creek, Badgerys Creek, Cosgroves Creek and Oaky Creek. There are numerous farm dams in the area.

The undulating topography of the study area means there are some wide-ranging views providing scenic pastoral views. In the western part of the study area, as the land rises to meet The Northern Road, there are views west to the Greater Blue Mountains World Heritage Area. In the eastern part of the study area the land rises to a high point (around 110m AHD) in the Western Sydney Parklands.

#### 4.3.1.2 Landscape character zones

The study area can be characterised by five landscape character zones:

- LCZ1 – Parklands and reserves

- LCZ2 – Elevated rural residential development
- LCZ3 – Low lying rural/commercial
- LCZ4 – Undulating rural residential
- LCZ5 – Urban residential development

Each zone has similar landscape properties or defined spatial qualities. These zones are shown in **Error! Reference source not found.** and described in the following sections.

#### LCZ1 – Parklands and reserves

This landscape character zone covers a section of the Western Sydney Parklands and the Kemps Creek Nature Reserve. The Western Sydney Parklands are located in the south-east of the study area, south of Elizabeth Drive, with a portion to the north of Elizabeth Drive and east of the M7 Motorway. The Western Sydney Parklands are planned to be developed into Australia's largest urban parkland system, with open space for recreation and conservation, major built recreational facilities and infrastructure projects.

A section of the WaterNSW Supply Pipelines runs north-south through the open land of the Western Sydney Parklands.

The additional features of this landscape character zone are:

- Land use – protected bush of environmental significance and Western Sydney Parklands with public open and recreational spaces; and two sports facilities (Sydney International Shooting Centre and Wylde Mountain Bike Trail).
- Topography – elevated undulating landform with shallow depressions forming a sparse network of creeks.
- Vegetation – existing native vegetation (including some threatened ecological communities), highly modified from past land uses, particularly land clearing. Some areas have seen extensive investment in revegetation to restore native vegetation communities on the site.

#### LCZ2 – Elevated rural residential development

This landscape character zone is located at the north-east of the study area, north of Elizabeth Drive and between Mamre Road and the M7 Motorway. The zone contains rural residential lands with some agricultural and commercial activities that maintain a rural landscape character and the environmental values of the area.

The additional features of this landscape character zone are:

- Land use – generally comprises rural properties, including areas of primary production with homesteads and commercial and educational facilities alongside the main roads (Elizabeth Drive, Duff Road and Cecil Road).
- Topography – undulating hills.
- Vegetation – native vegetation mostly along the fence line of properties and creeks.

#### LCZ 3 – Low-lying rural/commercial

This landscape character zone is located between Badgerys Creek and Mamre Road and the Kemps Creek Nature Reserve to the east. This zone includes a number of educational, recreational and sports facilities, as well as businesses along Elizabeth Drive. Generally, the settlement pattern is considerably influenced by industrial and commercial land use. Significant land is occupied by the Kemps Creek Advanced Resource Recovery Park (operated by SUEZ), Andreasens Green Wholesale Nurseries, Hi-Quality Group and Brandown Quarries.

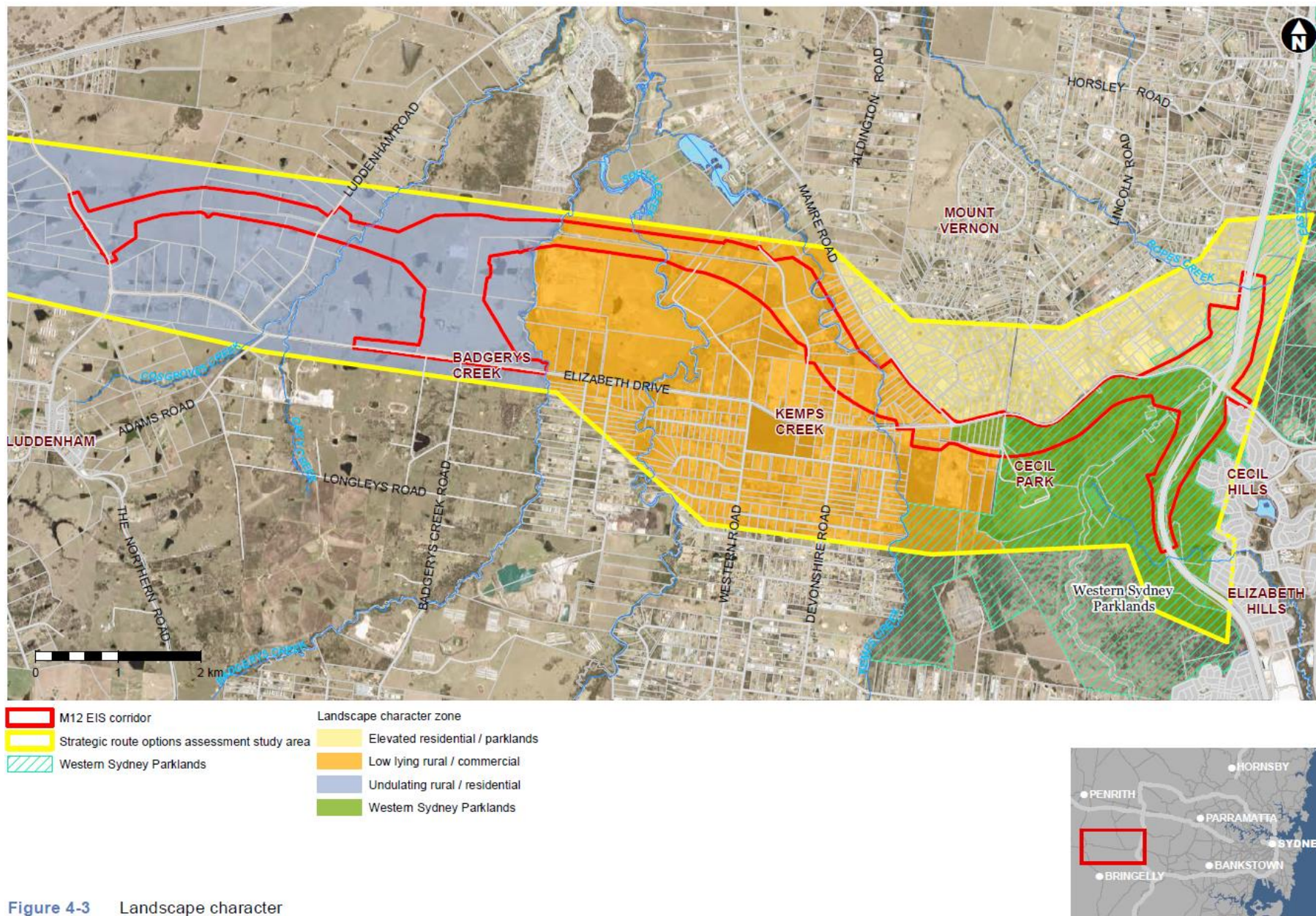
A bushland area in the centre of the zone, south of Elizabeth Drive, is classified as a 'priority for conservation' as part of the Cumberland Plain Recovery Plan.

As this zone is low-lying and close to Badgerys Creek, it is subject to regular localised flooding. The zone is drained from south to north by Badgerys, South and Kemps creeks.

The additional features of this landscape character zone include:

- Land use – generally comprises rural properties, including areas of primary production with homesteads and a significant commercial/industrial use alongside Elizabeth Drive. Educational, religious and sports facilities are also located within the area.
- Topography – characteristic of a depositional basin with low-lying plains and shallow depressions forming a sparse network of creeks.
- Vegetation – apart from protected native bushland area, the vegetation is mostly located along the creek lines.





#### LCZ 4 – Undulating rural residential

This landscape character zone is located to the western end of the study area. The zone consists of low-density rural residential lands that have a rural landscape character with property boundaries separated by vegetation and creeks, creating a distinct settlement pattern. The topography also reflects its rural nature with undulating hills with cleared vegetation for agriculture. The zone is traversed by Cosgroves Creek.

The additional features of this landscape character zone are:

- Land use – generally comprises rural properties, including areas of primary production with homesteads and some recreational facilities alongside Luddenham Road.
- Topography – gently undulating hills.
- Vegetation – native vegetation has been extensively cleared and exotic species have been planted along the fence lines of some properties.

#### LCZ 5 – Urban residential development

This landscape character zone is located to the east of the M7 Motorway, at the western extent of the suburb of Cecil Hills. It mostly comprises two-storey residential housing with low tree canopy cover. A small shopping centre is located within the suburb to the east.

The additional features of this landscape character zone are:

- Land use – urban residential properties.
- Topography – gently undulating hills.
- Vegetation – residential garden plantings with limited street trees.

### 4.3.2 Summary of issues

#### 4.3.2.1 Construction

During the construction of the project, the following impacts may result:

- Visual impacts associated with construction activities (vegetation clearing, substantial cuts and fills particularly through the Western Sydney Parklands, site offices and stockpile sites, construction machinery and plant, temporary structures and signage, light spill etc.)
- Physical impacts on existing public open space and use of land.
- Visual amenity impacts on sensitive receivers near construction activities, and on road users from construction vehicle movements.

#### 4.3.2.2 Operation

During the operation of the project, the following impacts may result:

- Potential impacts on the area's semi-rural scenic values through introducing new visual elements in the landscape (new motorway, interchanges, bridge structures, ramps, large cuts, retaining walls, potential noise barriers, lighting and signage) with some views across pastoral scenes impacted, and at the western end, views towards the Blue Mountains interrupted.
- Impacts to the aesthetic values and landscape character of the surrounding area, including through the Western Sydney Parklands and recreational sites including the Wylde Mountain Bike Trail.
- Impacts on views for residences, motorway users and users of other roads in the area.
- Project would be visible from the airport site at Badgerys Creek and by air travellers.

### 4.3.3 Proposed further assessments

The urban design, landscape character and visual impact assessment will be guided by the M12 Motorway Strategic Urban Design Concept. It contains the following objectives and principles:



- Create a unique and distinct identity interpreting the rich sense of place, Aboriginal and cultural heritage
- Utilise structures, bridges and earthworks as expressions of identity, place, values and sustainability
- Create an active, liveable and vibrant corridor
- Provide connectivity and access along and across the corridor
- Accentuate natural patterns through revegetation and express the new through contrasting landmark plantings
- Create an enjoyable experience with diverse and distinctive views and sense of journey and arrival
- Design a simple, cohesive and sustainable motorway that offers a flexible and diverse choice of transport modes
- Engage with the community and stakeholders.

The objectives would be incorporated into the development of the concept design and refined to produce an integrated engineering and urban design outcome.

A detailed urban design, landscape character and visual impact assessment would be prepared in accordance with the Roads and Maritime guideline 'Environmental Impact Assessment Practice Note: Guideline for Landscape Character and Visual Impact Assessment', to provide (as a minimum):

- An analysis of the built and natural environment and community context of the study area.
- Build upon the urban design strategy that identifies the objectives and principles to be applied to the concept design.
- A landscape character impact assessment assessing the landscape character zones across the study area.
- A visual impact assessment of the project including views to and from the project, assessment of 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 would be developed in accordance with the urban design strategy and Roads and Maritime's guideline Beyond the Pavement: RTA urban design policy, procedures and design principles (RTA 2009), which outlines the following urban design principles for 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.

The project would also be designed in accordance with: -

- South Western Sydney – Urban Design Strategy (working document) (Roads and Maritime 2015)
- Bridge Aesthetics: Design guidelines to improve the appearance of bridges in NSW (RTA, 2012)
- Noise wall design guideline: Design guidelines to improve the appearance of noise walls in NSW (RTA, 2007)
- Landscape guideline: Landscape design and maintenance guidelines to improve the quality, safety and cost effectiveness of road corridor planting and seed (RTA, 2008)

- Shotcrete Design Guidelines: Design guidelines to avoid, minimise and improve the appearance of shotcrete (RTA, 2005).

## 4.4 Aboriginal heritage

### 4.4.1 Overview

Early historical observations described the Cumberland Plain as a mosaic of Aboriginal groups associated with particular areas of land. The language spoken by the traditional inhabitants of the Cumberland Plain was Darug, which extended to Thurralwal to the north; along the coast to the Hawkesbury River and inland to what are now Windsor, Penrith, and Campbelltown.

The picture of Aboriginal utilisation and occupation of the Cumberland Plain is constantly being revised and refined as archaeological methods improve and more archaeological data becomes available for the area. Most of the Aboriginal archaeological sites have been recorded in the northern sector of the Cumberland Plain, defined as that area of the Wianamatta Shale Plain where the creek lines drain north and west to the Hawkesbury River, and have been identified during the course of archaeological survey before development.

The study area falls within the Deerubbin Local Aboriginal Land Council and the Gandangara Local Aboriginal Land Council. In accordance with Stage 2 of Roads and Maritime's Procedure for Aboriginal Cultural Heritage Consultation and Investigation (PACHCI) both councils were consulted on the project and an Aboriginal archaeological survey was conducted over 70 per cent of the corridor's length between July and September 2017. Fieldwork was conducted sporadically due to difficulties in securing access to multiple private land parcels.

#### **4.4.1.1 Aboriginal heritage sites/items identified in the field**

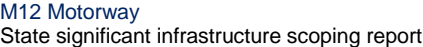
A search of the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) was conducted on 14 June, 2017. This was combined with review of relevant heritage reports. Four new Aboriginal sites were identified during the survey. One of these sites was a duplicate of previously incorrectly recorded registered site. Sixteen of the twenty five sites listed on AHIMS within the study corridor were reidentified within the study corridor. Therefore, a total of nineteen sites were reliably found to exist within the study corridor (including sixteen previously registered AHIMS and three newly identified sites). All nineteen Aboriginal sites include stone artefacts.

A total of fourteen Potential Archaeological Deposits (PADs) were identified on the basis of the commonly used model of archaeological stone artefact distribution which holds that stone artefacts occur in readily detectable densities within the soil's 'A' horizon close to creeks and water bodies.

The site locations are shown in Figure 4-4.

The study area also contains areas of predicted Aboriginal archaeological sensitivity as shown on Figure 4-4. These areas have been identified based on previous predictive models by Haglund (1980), Kohen (1986-292), Smith (1989) and McDonald and Rich (1993).





#### **4.4.1.2 Native title and land claims**

A parcel of land within the study area is subject to an Aboriginal Native Title Land Claim lodged by Gandangara Local Aboriginal Land Council on 19 March 2008 under the *Aboriginal Land Right Act 1983*. This claim is currently undetermined. The land claim is not located within or near the project.

There are no active native title claims and no native title holders under the *Native Title Act 1993* within the study area.

### **4.4.2 Summary of issues**

#### **4.4.2.1 Construction**

During the construction of the project, the following impacts may result:

- Direct or indirect impacts to known Aboriginal heritage sites including areas of Aboriginal archaeological sensitivity.
- Potential direct or indirect impacts to unknown or unidentified heritage sites and archaeological items.
- Potential direct or indirect impacts to Aboriginal cultural heritage.

#### **4.4.2.2 Operation**

During the operation of the project, there may be impacts on areas of Aboriginal cultural sensitivity.

The cultural value of the project to Aboriginal people has not been determined to date. There could be potential impacts to Aboriginal cultural heritage values due to the placement of the project within the landscape, and the visual impact this may have on areas identified as having cultural significance.

### **4.4.3 Proposed further assessments**

Roads and Maritime will prepare an Aboriginal Cultural Heritage Assessment Report in line with Roads and Maritime PACHCI. The assessment will also be carried out in accordance with:

- Aboriginal Cultural Heritage Consultation Requirements for Proponents (DECCW, 2010)
- Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW, 2010a)
- Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW, 2010b).

The assessment will:

- Continue consultation with the local Aboriginal community.
- Identify and investigate Aboriginal archaeological and cultural heritage values and areas/landscapes that are known or predicted to occur by carrying out field survey, test excavations (where required), and consultation with registered Aboriginal stakeholders and Aboriginal knowledge holders as required.
- Assess potential impacts on the identified Aboriginal archaeological and cultural heritage sites and areas/landscapes.
- Identify management measures to reduce the impact of the project on Aboriginal cultural heritage.

## 4.5 Non-Aboriginal heritage

### 4.5.1 Overview

#### 4.5.1.1 Listed heritage items

Non-Aboriginal heritage investigations were carried out across the study area during the shortlisted options phase and were based on desktop assessment and field surveys. Due to access constraints field validation of the entire study area was not carried out.

The desktop assessment included the following:

- Literature review of previous heritage reports
- Review of parish maps, crown maps and deposited plans
- Database searches of the following:
  - Australian Heritage Database – World Heritage List, National Heritage List, Commonwealth Heritage List
  - State Heritage Inventory – State Heritage Register, LEP listings
  - Register of National Trust of Australia
  - Royal Australian Institute of Architects 20th Century Register of Significant Buildings
  - Roads and Maritime's Section 170 Register.

A search of the above databases identified nine listed heritage items within the study area. Of these, five are crossed by the project as shown in Table 4-2. The WaterNSW Supply Pipelines (listed as the Upper Canal System and Sydney Water Supply Upper Canal) is recorded twice- as a State significant item on the State Heritage Register, and on the local heritage schedule of the Liverpool Local Environment Plan 2008 (Liverpool LEP). Two non-listed heritage items were identified during desktop investigations as being crossed by the project. They comprise a fibro building and iron shed, both located on the McGarvie-Smith Farm. These are shown in Table 4-2.

Table 4-2 Listed non-Aboriginal heritage items crossed by project

| Heritage item   | Property description             | Significance                   | LGA                               | SHI number |
|---|----------------------------------|--------------------------------|-----------------------------------|------------|
| within the study area   |                                  |                                |                                   |            |
| Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)          | Utilities - Infrastructure       | State (SHR)                    | Including Liverpool and Fairfield | 5051481    |
| Sydney Water Supply Upper Canal   | Utilities – water supply         | Local                          | Liverpool                         | 1970096    |
| The Fleurs Radio Telescope  | Scientific / educational         | Local                          | Penrith                           |            |
| McGarvie-Smith Farm   | Educational                      | Local                          | Penrith                           |            |
| Luddenham Road Alignment  | Road                             | Local                          | Penrith                           | 2260843    |
| Fibro building, McGarvie-Smith Farm<br>Iron Shed<br>McGarvie-Smith Farm | Agricultural - Built environment | requires further investigation | Penrith                           |            |



#### 4.5.1.2 Field investigations

Three previously identified non-Aboriginal sites located within the M12 project corridor were inspected during the field investigations. These were:

- McGarvie Smith farm (comprising the 'fibro building' and 'farm iron shed')
- Fleurs radio telescopes.

Although the site of the Fleurs radio telescope arrays is listed on the *Penrith Local Environmental Plan 2010* (Penrith LEP) and recognised for its local significance, it may be of greater historical significance. Between 1954 and 1963, Fleurs was the leading field station of the CSIRO's Division of Radiophysics, and was home to three innovative cross-type radio telescopes, the Mills Cross, Shain Cross and the Chris Cross. The Chris Cross was the world's first cross-grating interferometer and the first radio telescope to provide a two-dimensional daily map of the Sun (Orchiston 2004). Members of the Australian astronomical community consider the site to be historically important. The site has the potential to be of national significance, and therefore requires further assessment.

Similarly, the McGarvie Smith Farm is recognised for its local heritage significance, however may be of greater historical significance. The farms educational purposes for animal husbandry and pastoral experimentation for students from across the Commonwealth as well as the University of Sydney makes it a significant site in the history of these industries. Given this site has the potential to be of national significance further assessment is required.

Five new recordings of non-Aboriginal heritage sites M12 H1 to M12 H5 within the study area were made during the field investigations. Of these, four are crossed by the project as shown in Table 4-3.

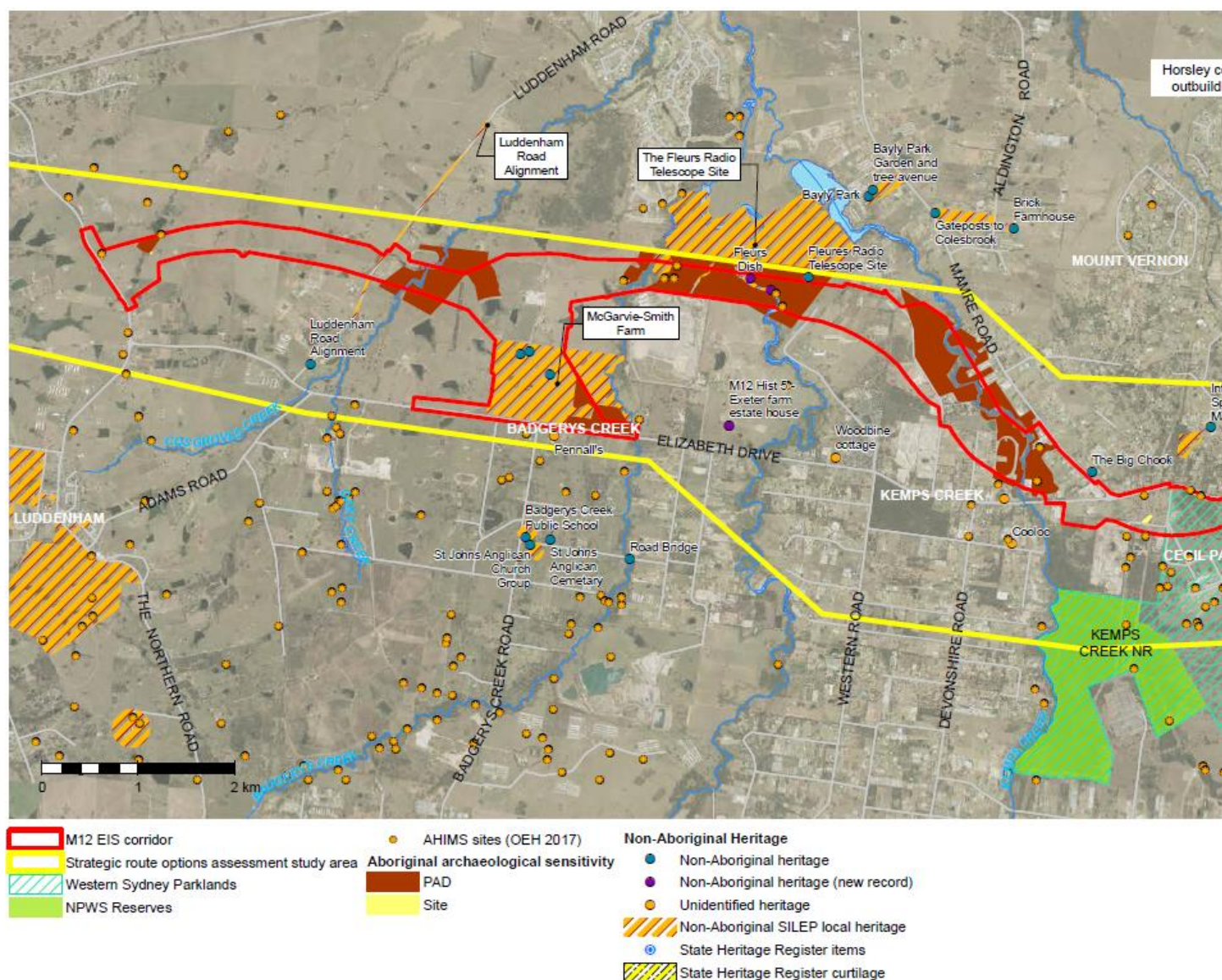
Table 4-3 Newly identified non-Aboriginal heritage items crossed by project

| ID     | Name/description                      | Potential significance |
|--------|---------------------------------------|------------------------|
| M12 H1 | South Creek Bridge                    | Local                  |
| M12 H2 | Cecil Public School (and post office) | Potentially local      |
| M12 H3 | WW2 Era Airstrip (Fleurs Aerodrome)   | Local                  |
| M12 H4 | McMaster farm                         | State and/or National  |

#### 4.5.1.3 Potential heritage landscapes

Potential non-Aboriginal heritage landscapes within and near the study area are assessed in the South Creek Valley Heritage Study (Perumal Murphy, 1990) and Penrith Heritage Study (Fox Associates, 1991). Landscapes with high local or regional significance are detailed in Table 4-4 and shown in





**Figure 4-4** Heritage features

**Table 4-4** Potential non-Aboriginal heritage landscapes

| ID   | Heritage item                                     | Significance                         | Description   |
|------|---|--------------------------------------|---|
| KC-1 | South Creek Basin                                 | High local visual/natural importance | A landscape of undulating hills with remnant Paper Bark ( <i>Melaleuca</i> sp.) and River She-Oak ( <i>Casuarina</i> sp.) vegetation groves along creek banks and paddocks. |
| L1   | South Creek, remnant native vegetation corridor   | Regional importance                  | A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.   |
| L12  | Vegetation community, Clifton Avenue, Kemps Creek | Regional significance                | Remnant native vegetation mostly within private lots, bounded by Elizabeth Drive, Western Road and Kemps Creek Public School.   |

| ID  | Heritage item  | Significance          | Description   |
|-----|--|-----------------------|---|
| L13 | Badgerys Creek remnant native vegetation corridor                        | Regional importance   | A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.   |
| L23 | Kemps Creek remnant native vegetation corridor                           | Regional importance   | A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.   |
| L27 | South, Kemps and Badgerys creek confluence weirs Scenic Landscape        | Regional significance | A scenic landscape comprising the weirs and surrounds at the confluences of Badgerys and Kemps creeks with South Creek. Badgerys Creek weir is no longer functioning. |
| L29 | Vegetation community, Clifton Avenue, Kemps Creek                        | Regional significance | Remnant native vegetation mostly within private lots.   |
| L30 | McMaster Field Station Scenic Landscape, Elizabeth Drive, Badgerys Creek | Regional significance | A pastoral landscape with lake-like water bodies, native vegetation and a backdrop of green hills. Lack of intrusive transmission wires is important.                 |
| L45 | Cosgroves Creek remnant native vegetation corridor                       | Regional importance   | A natural area, wildlife habitat and scenic area with pockets of excellent creek-side vegetation varying in size.   |
| L47 | Row of Tallowwood trees Luddenham Road                                   | Local significance    | Avenue of planted tallowwood trees, forming a cultural landscape.   |
| L48 | Remnant vegetation on Lawson Road, Badgerys Creek                        | Local significance    | A group of native trees on Lawson Road forming a cultural landscape.  |
| L54 | Remnant vegetation on Elizabeth Drive                                    | Regional significance | Indigenous roadside eucalypts forming a natural avenue with other native trees on Elizabeth Drive.  |
| L55 | Remnant vegetation on Elizabeth Drive                                    | Regional significance | Indigenous roadside eucalypts forming a natural avenue with other native trees on Elizabeth Drive, contiguous with Badgerys Creek corridor.                           |

## 4.5.2 Summary of issues

### 4.5.2.1 Construction

During the construction of the project, the following impacts may result:

- Direct impacts such as physical changes to the item or curtilage of known and potential non-Aboriginal heritage sites including the site of the Fleurs radio telescope, McGarvie-Smith Farm, and McMasters Farm.
- Indirect impacts such as visual impacts on curtilage or from vibration on known and potential non-Aboriginal heritage sites.

There is also the potential for non-Aboriginal heritage items to be discovered during construction. These are likely to be archaeological deposits of earlier habitation and industrial activities.

## Operation

During the operation of the project, the following impacts may result:

- Permanent changes to the vistas to and from listed heritage items adjacent to the project, including heritage landscapes.
- Permanent alteration to curtilage of a heritage listed item.

### 4.5.3 Proposed further assessments

A non-Aboriginal heritage assessment will be prepared and, where required, a Statement of Heritage Impact in accordance with the Burra Charter (ICOMOS, 1999) and the Assessing Heritage Significance, NSW Heritage Manual 2, 2001 (NSW Heritage Office, 2001), and the Statement of Heritage Impact guidelines (Heritage Office, 2002). The report will include:

- Historical research into the early settlement of the area and updated search of relevant databases.
- Describe the existing non-Aboriginal heritage and archaeological heritage values relevant to the project as informed by literature reviews, database searches, field validation and test excavation (where required based on the results of background research, field surveys and nature of the potential impact).
- Consultation with the relevant stakeholders such as the Office of Environment and Heritage and local councils.
- An assessment of the potential impacts of the project, for all identified heritage items.
- Identification of reasonable and feasible management measures to minimise any impact to known non-Aboriginal heritage sites.

## 4.6 Traffic and access

### 4.6.1 Overview

Elizabeth Drive is the key east-west route in the study area providing connections to important north-south routes including the M7 Motorway, Mamre Road and The Northern Road. Other regional roads connecting to Elizabeth Drive in the study area include Badgerys Creek Road, Devonshire Road and Luddenham Road.

Elizabeth Drive forms the northern boundary to the Western Sydney Airport and is currently a two-lane arterial road with no pedestrian or cycle paths along its length.

#### 4.6.1.1 Traffic volumes

General traffic

Existing traffic volumes along Elizabeth Drive have been extrapolated into eastbound, westbound and peak demands, as shown in Table 4-55. The weekend only traffic volumes are significantly less than the weekday volumes as noted by the much higher weekday five-day Annual Daily Traffic (ADT) compared to the seven day ADT.

Table 4-5 Elizabeth Drive traffic counts by direction (June 2017)

| Elizabeth Drive monitoring location | Direction | 7-day ADT (veh) | 5-day ADT (veh) | AM peak (veh/hr) | PM peak (veh/hr) |
|-------------------------------------|-----------|-----------------|-----------------|------------------|------------------|
| East of A9 The Northern Road        | EB        | 4327            | 4861            | 668              | 301              |
|                                     | WB        | 4379            | 4864            | 250              | 657              |
| Badgerys Creek Road to              | EB        | 5981            | 6973            | 962              | 435              |



|                    |    |        |        |      |      |
|--------------------|----|--------|--------|------|------|
| Devonshire Road    | WB | 6081   | 7036   | 405  | 871  |
| West of Mamre Road | EB | 9754   | 11,147 | 1252 | 733  |
|                    | WB | 10,354 | 11,844 | 747  | 1309 |
| East of Mamre Road | EB | 10,975 | 12,485 | 1358 | 881  |
|                    | WB | 11,470 | 13,043 | 816  | 1383 |

While the traffic volumes in Table 4-55 highlight current traffic volumes in the study area are not significant, the justification for a new motorway connection is the future development of the area. This includes the development of the Western Sydney Airport and urban development through the WSAGA.

As identified in Section 2.1, the WSAGA is to provide more than 57,000 jobs over the next 30 years, and more than 200,000 jobs when fully established, while the South West Priority Growth Area would include around 110,000 new dwellings and more than 20,000 new jobs within the area. The Western Sydney Airport is expected to generate 43,000 passenger and employee vehicle trips per day, and around 132 freight vehicle trips per day.

Traffic modelling carried out by Roads and Maritime indicated based on the projected traffic demand from the WSAGA and the Western Sydney Airport, Elizabeth Drive would operate with a Level of Service E by 2026.

In addition, traffic modelling carried out as part of the Western Sydney Airport EIS found that due to the planned future development in the area, even without the development of the Western Sydney Airport, the road performance of Elizabeth Drive is expected to deteriorate by 2031.

The M12 Motorway would need to cater for all traffic generated by the new airport as well as increased local development and regional traffic. This includes the support services to the airport, which would develop around the airport site.

As the M12 Motorway would be a controlled access motorway (that is, it would have limited access points), Elizabeth Drive would continue to cater for local trips, including property and business access.

#### **4.6.1.2 Freight movements**

Elizabeth Drive is a designated heavy vehicle route used by 4.6 metre high vehicles, 19 metre B-double vehicles, 23 metre B-double vehicles and 25/26 metre B-double vehicles.

Eighty six per cent of vehicles travelling along the western end of Elizabeth Drive are classified as light vehicles (C1 and C2). Of the 14 per cent heavy vehicle volumes (recorded by Matrix, June 2017), the main types of trucks using this road are classified C3 (two-axle trucks), C4 (three-axle truck), or C9 (six-axle articulated trucks).

As with the traffic flow patterns noted in Section 4.6.1.1, the commercial (heavy) vehicle flows supplying businesses in the study area are much higher along the eastern end of Elizabeth Drive than the western end. This is due to the increase in number of industrial and commercial businesses located around Mamre Road and Elizabeth Drive supplying demand to the rest of Sydney via Elizabeth Drive and the M7 Motorway.

Between Mamre Road and Wallgrove Road the two-way seven-day ADT for commercial vehicles is around 4124 vehicles per day. The daily flow along the western end between The Northern Road and Luddenham Road is almost a third of this with only 1226 vehicles per day.



Future freight demands are expected to grow considerably with the development of the WSAGA and the Western Sydney Airport which would attract major freight and logistics companies.

#### **4.6.1.3 Active transport (walking and cycling)**

There are no existing, dedicated walking and cycling (on-road or off-road) facilities in the study area. There are a number of active transport paths on adjoining routes including an off-road facility along the length of the M7 Motorway and an on-road path along the eastern end of Elizabeth Drive, from the M7 Motorway through to Liverpool (outside the scope of this study).

There is also a popular mountain bike trail through the Western Sydney Parklands south of Elizabeth Drive on Range Road. This is a recreational cyclist facility and does not provide any connectivity to other cycle ways for commuter cyclists. There are also formal and informal walking tracks through the Western Sydney Parklands in the study area.

#### **4.6.1.4 Public transport**

As the land use in the study area is semi-rural, the population density is low and there are limited public transport options. There are two public bus services that operate along Elizabeth Drive in the study area:

- Route 801 – Liverpool to Badgerys Creek.
- Route 813 – Fairfield to Bonnyrigg.

Bus route 789 also runs perpendicular to the study area along The Northern Road, between Luddenham and Penrith. Buses only travel along the eastern end of Elizabeth Drive and there are no bus services or bus facilities along the western end.

There are no rail facilities in the study area. The closest stations to the study area are:

- Liverpool Station, about 11 kilometres east of Elizabeth Drive at Cecil Hills, where passengers can travel on the Cumberland Line, Airport/Inner West & South Line, Bankstown Line and the South West Rail Link services.
- Leppington Station, about eight kilometres south of Elizabeth Drive at Kemps Creek, where passengers can travel on the Airport/Inner West & South Line.

## **4.6.2 Summary of issues**

### **4.6.2.1 Construction**

The majority of the project is through greenfield areas offline from major arterial routes and unlikely to cause substantial disruption to the road network. However, there are some points along the route which cross State and local roads, which may cause temporary disruptions /delays and increased traffic volumes from construction vehicles. These roads include:

- M7 Motorway
- Elizabeth Drive
- The Northern Road
- Mamre Road
- Luddenham Road
- Clifton Avenue.

During the construction of the project, the following impacts may also result:

- Deterioration in traffic performance due to heavy vehicle movements, narrowing of lanes and speed reductions.
- Temporary and permanent disruptions or adjustment to some private property access roads and local / regional roads. Some disruption and permanent adjustment to existing pedestrian and cyclist pathways.
- Potential disruption to recreational walkers and cyclists within the Western Sydney Parklands.

- Changed traffic patterns likely to be short-term while road users adjust and become familiar with changed traffic patterns.

Construction of the project would require ancillary facilities which may include, but not be limited to, stockpiles, compounds and concrete batching facilities. The location of the project in a greenfield area provides an opportunity for these facilities to be located away from public roads, thereby minimising traffic disruptions.

### **Operation**

Upon completion the M12 Motorway would provide the required road capacity to accommodate the increase in traffic demand. It would provide direct access from the M7 Motorway, The Northern Road and wider Sydney to the Western Sydney Airport.

The M12 Motorway is likely to result in a reduction of future congestion on the surrounding road network by separating through traffic from local traffic (Elizabeth Drive). This would enhance freight efficiency and provide consistent and higher travel speeds on the M12 Motorway and more reliable conditions on the broader road network.

The project may also benefit bus services by reducing the predicted volume of traffic on local roads to maintain connectivity with the local connecting street network.

During the operation of the project, the following would also result:

- Provide the main access to the Western Sydney Airport and cater for increased traffic generated by the Western Sydney Airport and development in the WSAGA and SWGA.
- Potential changes to existing traffic patterns and movements due to the introduction of a new motorway.
- Permanent road modifications.
- Permanent changes to some property and private road access.
- Changes to access arrangements around interchanges.
- Provision of pedestrian and cyclist facilities.
- Permanent dislocation to recreational bike trails in the Western Sydney Parklands.
- Maintain function of Elizabeth Drive as local / property access road.

### **4.6.3 Proposed further assessments**

Roads and Maritime will undertake a full construction and operational traffic and access working paper to inform the EIS. The assessment will:

- Identify the existing road network, traffic conditions including volumes and intersection performance.
- Describe how construction traffic would access the project (including ancillary facilities) and any impacts on the surrounding road network.
- Assess construction impacts, including likely construction traffic volumes, peak volume periods, haulage routes, construction compound locations and access, and temporary changes to access.
- Identify the future predicted traffic growth due to urban development in the area including the Western Sydney Airport and the WSAGA.
- Provide an assessment of the existing and future traffic and transport environment for a range of operational scenarios including the 'do minimum' option, including an assessment to the local and regional road network, speed environment, parking and access arrangements, provision for public transport and changes to pedestrian and cyclist facilities.
- An assessment of road safety.
- Identify feasible and reasonable mitigation measures for the construction and operational stages of the project.

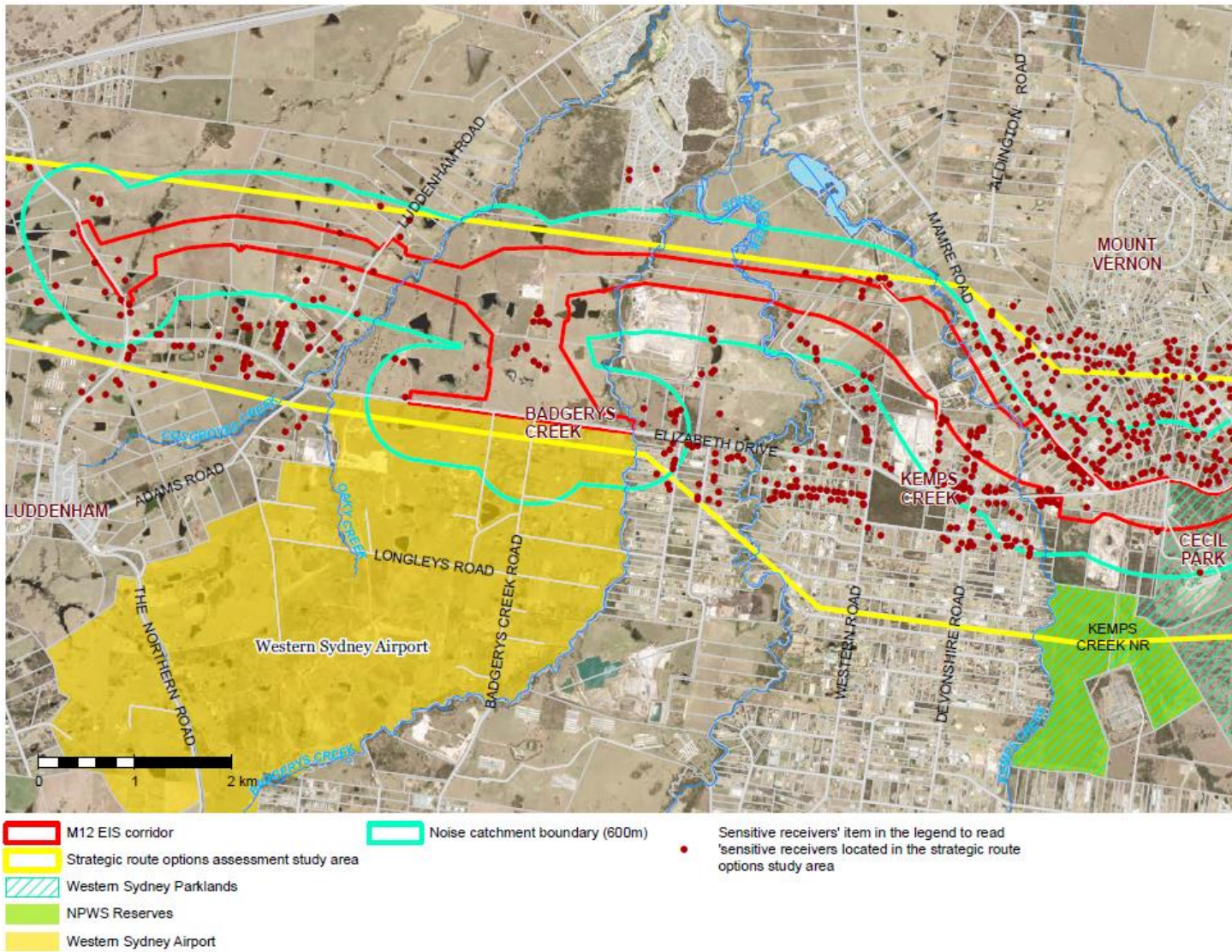
## 4.7 Noise and vibration

### 4.7.1 Overview

The study area is mostly a rural residential environment, experiencing rural and pastoral views with a low background noise. The environment is more urban towards the east, with some commercial and industrial activities. However, the amenity of the area still remains rural in nature.

Road traffic noise is also consistent with a rural environment of local roads, with the exception of the M7 Motorway located at the eastern end of the study area. Other main road noise sources include Elizabeth Drive, Mamre Road and The Northern Road.

Noise sensitive receivers in and near the study area are mostly found around the township of Kemps Creek and the suburb of Mount Vernon. The densest area of sensitive receivers is located to the east of the M7 Motorway in the suburb of Cecil Hills. These noise sensitive receivers are identified in

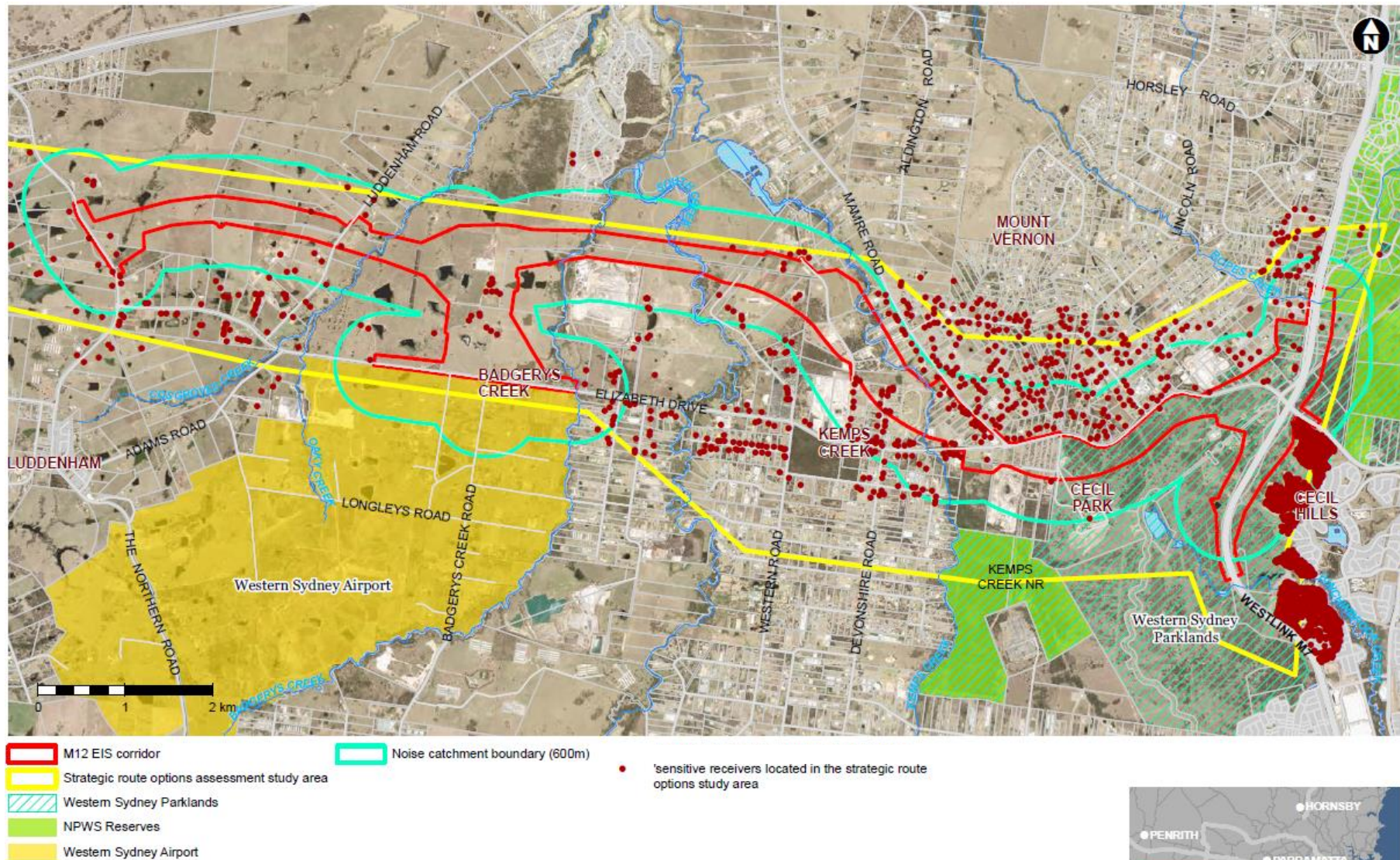


**Figure 4-5** Sensitive noise receivers

Sensitive receivers potentially affected by noise from the project include:

- Residential properties – the main residential precincts are associated with Kemps Creek, Mount Vernon, Cecil Hills and Cecil Park.
- Parks and recreational facilities including the Western Sydney Parklands.





**Figure 4-5** Sensitive noise receivers

## 4.7.2 Summary of issues

### 4.7.2.1 Construction

The M12 Motorway is located predominately in greenfield areas where existing noise levels are low. As a result noise sensitive receivers would be impacted by construction noise including the operation of large machinery. However, given the project is being constructed offline the need to carry out works at night is minimised.

During the construction of the project, the following impacts may result:

- Potential construction noise criteria exceedances at sensitive receivers, through normal working hours. Any works undertaken outside of standard construction hours to minimise impacts to the road network or for safety reasons, may affect residential and non-residential sensitive receivers.
- Potential noise exceedances of the sleep disturbance criteria.
- Potential noise from ancillary facilities.
- Potential vibration impacts from construction equipment, causing annoyance and potentially damage to structures.
- Potential cumulative noise impacts from other construction projects that may be undertaken at or near the same time.

### 4.7.2.2 Operation

During the operation of the project, the following impacts may result:

- The project would result in the re-distribution of traffic on the surrounding road network, which would change the operational noise environment of existing roads.
- The project would introduce a new traffic noise source into areas with existing low background levels.
- Potential exceedance of operational road noise and vibration criteria at sensitive receivers.
- Cumulative noise impacts from the operation of the project and the Western Sydney Airport.

## 4.7.3 Proposed further assessments

A construction noise and vibration assessment will be carried out during the preparation of the EIS in accordance with Interim Construction Noise Guideline (ICNG) (DECC, 2009) and Roads and Maritime's Construction Noise and Vibration Guidelines. An operational noise and vibration assessment will also be carried out in accordance with NSW's Road Noise Policy (RNP) (EPA, 2011), Roads and Maritime's Noise Criteria Guideline (NMG) (Roads and Maritime, 2015) and Department of Environment and Conservation (DEC) Assessing Vibration: A technical Guideline (DEC 2006).

The assessment will include:

- Background noise monitoring and concurrent traffic counts.
- Identification of the study area and sensitive receivers near the project who may be affected by noise and vibration impacts during construction and operation.
- Identification of construction rating background noise levels.
- Construction noise and vibration assessment to assess noise levels and vibration limits, including an assessment of any out of hours work.
- Selection of relevant operational noise criteria.
- Operational noise assessment to assess the operational noise levels using predicted levels of traffic noise for all receiver locations at year of opening and 10 years after for the build and no build scenarios.
- Appropriate safeguards and management measures to minimise project noise and vibration impacts during construction and operation.



## 4.8 Socio-economic, land use and property

### 4.8.1 Overview

The study area is located across the Penrith, Fairfield and Liverpool LGAs and specifically across the suburbs of Mount Vernon, Kemps Creek, Badgerys Creek and Luddenham. The study area is also located within western Sydney, which is defined by the western Sydney Regional Organisation of Councils as being a region covered by the Penrith, Parramatta, Liverpool, Fairfield, Blacktown, Blue Mountains, Canterbury-Bankstown, Cumberland and Hawkesbury LGA's.

The study area is predominately semi-rural and includes residential, agricultural, recreational, commercial and industrial land uses. The main population centres are the suburbs of Kemps Creek, Cecil Hills and Mount Vernon. Elizabeth Drive is bounded to the north by the WSAGA and the suburbs of Mount Vernon and Cecil Park, and, to the south, by the Western Sydney Airport, the WSAGA, the suburbs of Kemps Creek, and Badgerys Creek, and the Western Sydney Parklands.

In 2016 the population for Penrith, Liverpool and Fairfield LGA's was 196,066, 204,326 and 198,817 respectively (ABS, 2017). The population within each suburb within the study area is outlined in Table 4.6. The results are from the 2016 Australian Bureau of Statistics (ABS) Census.

Table 4.6 Population data for the study area (ABS, 2016)

| Penrith LGA<br>196,066  | Liverpool LGA<br>204,326   | Fairfield LGA<br>198,817   |
|---|--|--|
| <ul style="list-style-type: none"><li>• Mount Vernon -1,192</li><li>• Kemps Creek – 2,268</li><li>• Luddenham – 1,828</li></ul> | <ul style="list-style-type: none"><li>• Cecil Park - 771</li></ul> | <ul style="list-style-type: none"><li>• Badgerys Creek - 225</li></ul> |

Substantial population growth is anticipated to occur in western Sydney in the next 25 years, with an increase in population of around 1 million people and an additional 400,000 dwellings to be built. This increase is in part due to the North West and South West Growth Areas. In addition, the WSAGA, the Western Sydney Airport as well as the NSW Government's current job geographical diversification strategy will result in an increase in job opportunities in western Sydney.

The 2014 NSW Population Projections data indicates that population in the LGAs would increase by over 220,000 people by 2031 (Department of Planning, 2014). Within the study area, any increase in population would be within the WSAGA, which comprises Penrith and Liverpool LGA's.

In 2011, nearly 215,000 people were employed in the three LGAs. Around 51 percent of the workforce were employed in manufacturing, retail trade, health care and social assistance, construction, transport, postal and warehousing.

A review of local businesses within the study area identified a total of 75 local businesses. The largest share of businesses operating in the study area was:

- Agricultural (37 per cent)
- Retail trade (20 per cent)
- Arts and recreation (nine per cent).

Agricultural land uses include poultry farming, tomato and cucumber farms and commercial nurseries. In terms of agricultural land uses, statistics from the ABS identify:

- In the Mulgoa – Luddenham – Orchard Hills SA2, there is a total of 2278 hectares of agricultural land. The main agricultural commodities are vegetables (70 hectares), fruit and nuts (52 hectares) and meat cattle.
- In the Horsley Park – Kemps Creek SA2, there is a total of 825 hectares of agricultural land. The main agricultural commodities are vegetables (143 hectares), livestock (meat cattle and pigs) and broadacre crops.
- In the Badgerys Creek - Greendale SA2, there is a total of 4245 hectares of agricultural land. The main agricultural commodities are vegetables (322 hectares), broadacre crops (154 hectares) and livestock (beef cattle and pigs).

Land use in the area is regulated by Penrith, Liverpool and Fairfield councils and by State Environmental Planning Policies (SEPPs) and Commonwealth and State Government strategies. Land uses in the study area are semi-rural and include residential, agricultural, recreational, commercial and industrial land uses (refer to Figure 4-6). Predominate land uses within the study area include:

- RU2 rural landscape (35 per cent of the study area)
- RU4 primary production small lots (22 per cent of the study area)
- Western Sydney Parklands (19 per cent of the study area).

While not a current land use within the study area, land has been set aside for the Western Sydney Airport, south of Elizabeth Drive at Badgerys Creek. The EIS prepared for the airport identified the initial development (Stage 1) and foreshadowed the long term development of the airport. Stage 1 comprises a single runway and aviation support facilities to provide an operational capacity of 10 million passengers annually as well as freight traffic. The M12 Motorway would connect to the Western Sydney Airport via a north-south access road in the vicinity of Badgerys Creek Road. Approval for Stage 1 of the Western Sydney Airport was granted in September 2016.

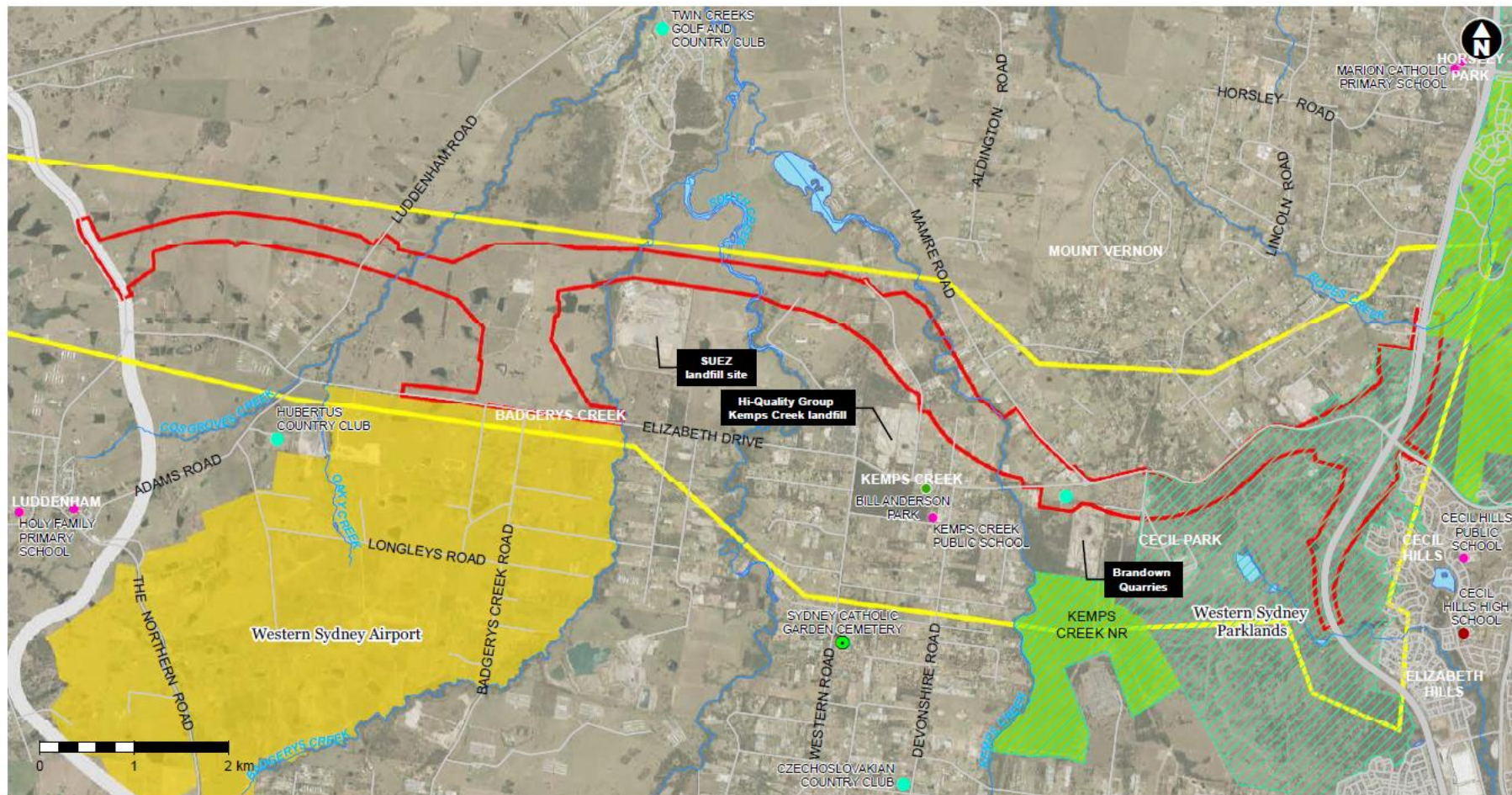
The Western Sydney Parklands are located at the eastern of the study area. The Western Sydney Parklands are managed under the *Western Sydney Parklands Act 2006* and strategic direction is provided under the State Environmental Planning Policy (Western Sydney Parklands) and the Western Sydney Parklands Plan of Management 2020. The Western Sydney Parklands comprise 5280 hectares and stretch 27 kilometres from Blacktown in the north to Leppington in the south. The Western Sydney Parklands have recreational space as well as conservation, infrastructure, agriculture, water supply and other essential community facilities (refer to Figure 4-7). Within the study area, the Western Sydney Parklands includes the Wylde Mountain Bike Trail, the Sydney International Shooting Centre, walking tracks, bushland corridors and areas set aside for conservation (refer to Figure 4.7). As identified earlier, the Western Sydney Parklands Trust has developed its vision for the Cecil Hills Precinct, otherwise referred to as the Southern Parklands Vision. Under the Southern Parklands Vision passive and active recreational facilities are expected to grow and diversify, within the Cecil hills Precinct, to cater for a growing western Sydney population.

In addition to the recreational facilities within the Western Sydney Parklands, the study area also includes schools, the Kemps Creek Sporting and Bowling Club and Kemps Creek Nature Reserve.

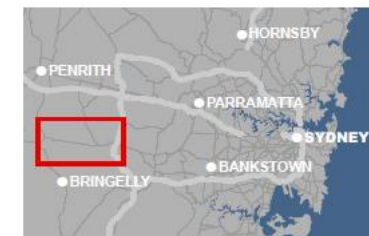
Commercial uses are mainly associated with the Kemps Creek shops including service stations, food stores and hardware/ maintenance shops. Industrial uses include the Elizabeth Drive landfill and quarry sites.

There are a number of transport and utility infrastructure within the study area including the M7 Motorway, Elizabeth Drive, major electrical infrastructure and the Sydney Water Supply Pipelines.





- |   |   |
|---|---|
| <span style="border: 2px solid red; padding: 2px;"> </span> M12 EIS corridor  | <span style="color: green;">●</span> Cemetery         |
| <span style="border: 2px solid yellow; padding: 2px;"> </span> Strategic route options assessment study area  | <span style="color: cyan;">●</span> Club              |
| <span style="background: repeating-linear-gradient(45deg, transparent, transparent 2px, green 2px, green 4px); border: 1px solid green; padding: 2px;"> </span> Western Sydney Parklands      | <span style="color: red;">●</span> High School        |
| <span style="background: repeating-linear-gradient(-45deg, transparent, transparent 2px, lightgreen 2px, lightgreen 4px); border: 1px solid lightgreen; padding: 2px;"> </span> NPWS Reserves | <span style="color: green;">●</span> Park             |
| <span style="background: yellow; border: 1px solid black; padding: 2px;"> </span> Western Sydney Airport  | <span style="color: magenta;">●</span> Primary School |
| <span style="background: grey; border: 1px solid black; padding: 2px;"> </span> The Northern Road upgrade   |   |



**Figure 4-6** Land use features



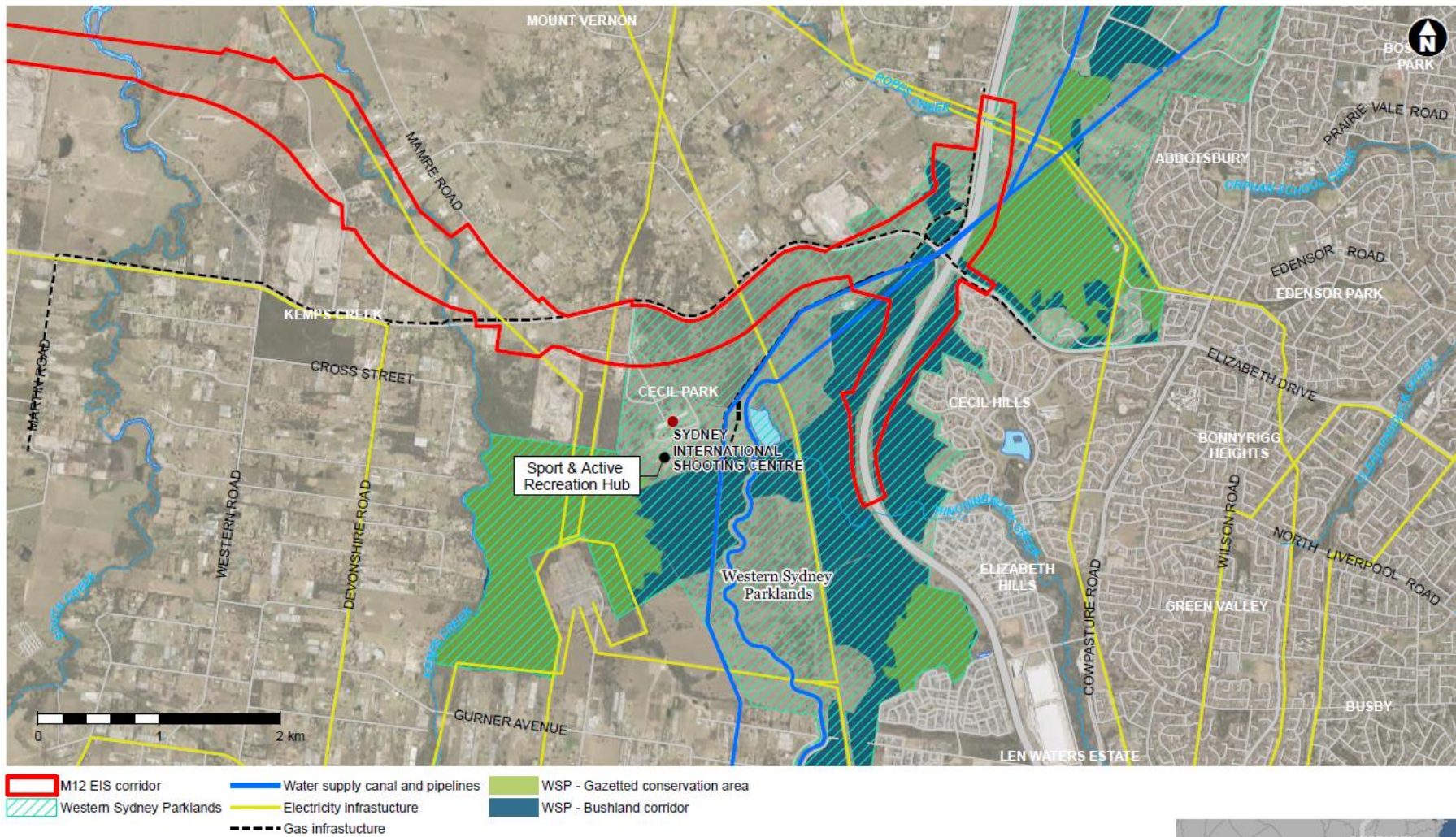


Figure 4-7 Western Sydney Parklands land uses

## 4.8.2 Summary of issues

### 4.8.2.1 Construction

During the construction of the project, the following impacts may result:

- Impacts associated with property acquisition, including uncertainty for residents and business owners about the property acquisition process and potential need to relocate.
- Impacts to the Western Sydney Parklands including the Wylde Mountain Bike Trail, a biobanking site and carbon offset site, bushland corridors and access to the International Shooting Centre.
- Impact on local businesses, residents and users of community facilities located close to the construction work and construction compounds due to increased noise and vibration, dust and construction traffic.
- Impacts to agricultural land and businesses from the potential loss of land and related infrastructure.
- Temporary disruptions or access restrictions to road users, including to pedestrians and cyclists.
- Temporary disruptions to access to private properties, businesses and community facilities.
- Direct and indirect employment opportunities for businesses to supply goods, services and materials to the project's construction.

### 4.8.2.2 Operation

During the operation of the project, the following impacts may result:

- Increased road capacity to service growth from land use changes including the Western Sydney Airport.
- Improved access from the M7 Motorway to the Western Sydney Airport.
- Potential for improved active transport connectivity.
- The motorway would impact upon a section of the Western Sydney Parklands, which is currently used for conservation, recreational and amenity purposes.
- Increased severance, either actual or perceived, to communities located north and south of the motorway.
- Potential changes to existing traffic patterns and movements on the surrounding network, including consequential amenity impacts, due to the introduction of a new motorway.
- The amenity of residents in close proximity to the project is likely to decrease by the presence of increased road traffic noise.
- Fragmentation and severance of agricultural and large rural properties that could affect current and future land use development.
- Sterilisation of isolated parcels of land within the Western Sydney Parklands.
- Changes in access arrangements to private property.

## 4.8.3 Proposed further assessments

Roads and Maritime will carry out a socio-economic impact assessment in accordance with Roads and Maritime guidelines Environmental Planning and Impact Assessment Practice Note for Socio-Economic Assessment (EIA-N05) (Roads and Maritime, 2013), which will consider the construction and operational stages of the project. The assessment will include:

- Identification of the existing socio-economic environment including social and economic characteristics, community/ recreational facilities or features of community value, and existing land use environment, including details of property ownership.
- Identification of community values attached to places, facilities within the study area.
- A discussion around the future land use proposed for the area surrounding the M12 Motorway.
- Property acquisition requirements both temporary and permanent.
- Identification and assessment of potential socio-economic impacts associated with the construction and operation of the project including an assessment of:
  - Direct and indirect property impacts.



- Direct and indirect business and agribusiness impacts.
- Existing and future land use and properties.
- Community and recreational facilities including within the Western Sydney Parklands.
- Community values.
- Access and connectivity.
- Amenity changes due to the presence of a new motorway and road traffic noise.
- Changes in traffic flows including diversion of future traffic to the surrounding network.
- Land use changes.
- Residual, sterilised or isolated areas of land.
- Consultation with the affected community, businesses and stakeholders so that consultation outcomes can be considered in the design and assessment.
- Identification of potential safeguards and management measures to reduce the socio-economic impacts of the project.

## 4.9 Hydrology and flooding

### 4.9.1 Overview

The study area is within the South Creek sub-catchment, which is a sub-catchment of the Hawkesbury-Nepean River. The South Creek sub-catchment covers around 490 square kilometres.

The following are the major creeks in the study area are crossed by the project and which all generally flow from south to north:

- South Creek
- Kemps Creek - this is a major tributary of South Creek
- Badgerys Creek - this is a minor tributary of South Creek
- Cosgroves Creek - this is a minor tributary of South Creek.

There are also a number of smaller creeks, such as Hinchinbrook Creek, and unnamed tributaries in the study area. Most of the creeks have been modified as a result of development in the area, mainly through the inclusion of farm dams.

The topography in and around the study area is rolling hills and small valleys between generally north–south ridgelines. In the east and west of the study area, the topography is gently undulating, flattening out in the middle, where it passes through the floodplains associated with Cosgroves Creek, Oaky Creek, Badgerys Creek, South Creek and Kemps Creek. Creeks flow from south to north through the study area.

The areas around Badgerys Creek, South Creek and Kemps Creek are subject to localised flooding (**Error! Reference source not found.**). Flooding through South Creek typically occurs as a result of local catchment runoff. However, in the lower reaches of South Creek (north of the study area), the floodplain forms a large flood storage area during major floods in the Hawkesbury-Nepean River system.

Historic flood levels for local flood events in 1986 and 1988 have been obtained from the Flood Study Report, South Creek (NSW Department of Water Resources, 1990) (refer to **Error! Reference source not found.**7). The locations within the study area are Elizabeth Drive (where it crosses South Creek) and Overett Avenue, Kemps Creek (located south of Elizabeth Drive). The locations of Bringelly Road, Bringelly and Luddenham Road, St Clair are provided as they are south and north of the study area respectively to show the change in flood levels in the area. **Error! Reference source not found.**7 shows flood levels are deeper to the south and shallower to the north.



Table 44-7 Historic flood levels (1986 and 1988)

| Location                     | 1986 flood level<br>(m AHD) | 1988 flood level<br>(m AHD) |
|------------------------------|-----------------------------|-----------------------------|
| Bringelly Road – downstream  | –                           | 57.59                       |
| Overett Avenue               | –                           | 43.41                       |
| Elizabeth Drive – upstream   | 42.73                       | 43.33                       |
| Elizabeth Drive – downstream | 42.06                       | 42.66                       |
| Luddenham Road               | 29.5                        | 29.8                        |

Several flood studies have been carried out for South Creek including the Updated South Creek Flood Study (Worley Parsons, 2015) which was prepared to reflect the substantial change that had occurred in the sub-catchment since the 1990 Flood Study Report.

The results for the 100-year annual recurrence interval (ARI) flood event are shown in **Error! Reference source not found.8**. These results show the water surface profile (that is, levels modelled in the creeks) and include the influence from elevated flood levels from the Hawkesbury-Nepean flood event.

Table 44-8: Peak 100-year ARI flood level (2015)

| Creeks         | Peak flood levels                      |                                       |                           |
|----------------|--|---------------------------------------|---------------------------|
|                | Upstream of Elizabeth Drive<br>(m AHD) | Downstream of Elizabeth Drive (m AHD) | Overett Avenue<br>(m AHD) |
| South Creek    | 42.9                                   | 42.8                                  | 43.6                      |
| Kemps Creek    | 47.7                                   | 46.7                                  | -                         |
| Badgerys Creek | 46.5                                   | 46.2                                  | -                         |

The study found the extent of inundation during the 100-year ARI flood event is mostly through undeveloped or rural areas. However, pockets of inundation do occur on developed land through the suburb of Kemps Creek.

As expected, flow velocities vary across the study area with the highest velocities recorded in South Creek and its tributaries. For a 100-year ARI flood event, peak in-channel velocities of South Creek upstream of Elizabeth Drive typically range between 0.8 and 1.0 metres per second. Peak in-channel velocities are similar for Badgerys Creek. However, Kemps Creek has lower velocities (between 0.6 and 0.8 metres per second).

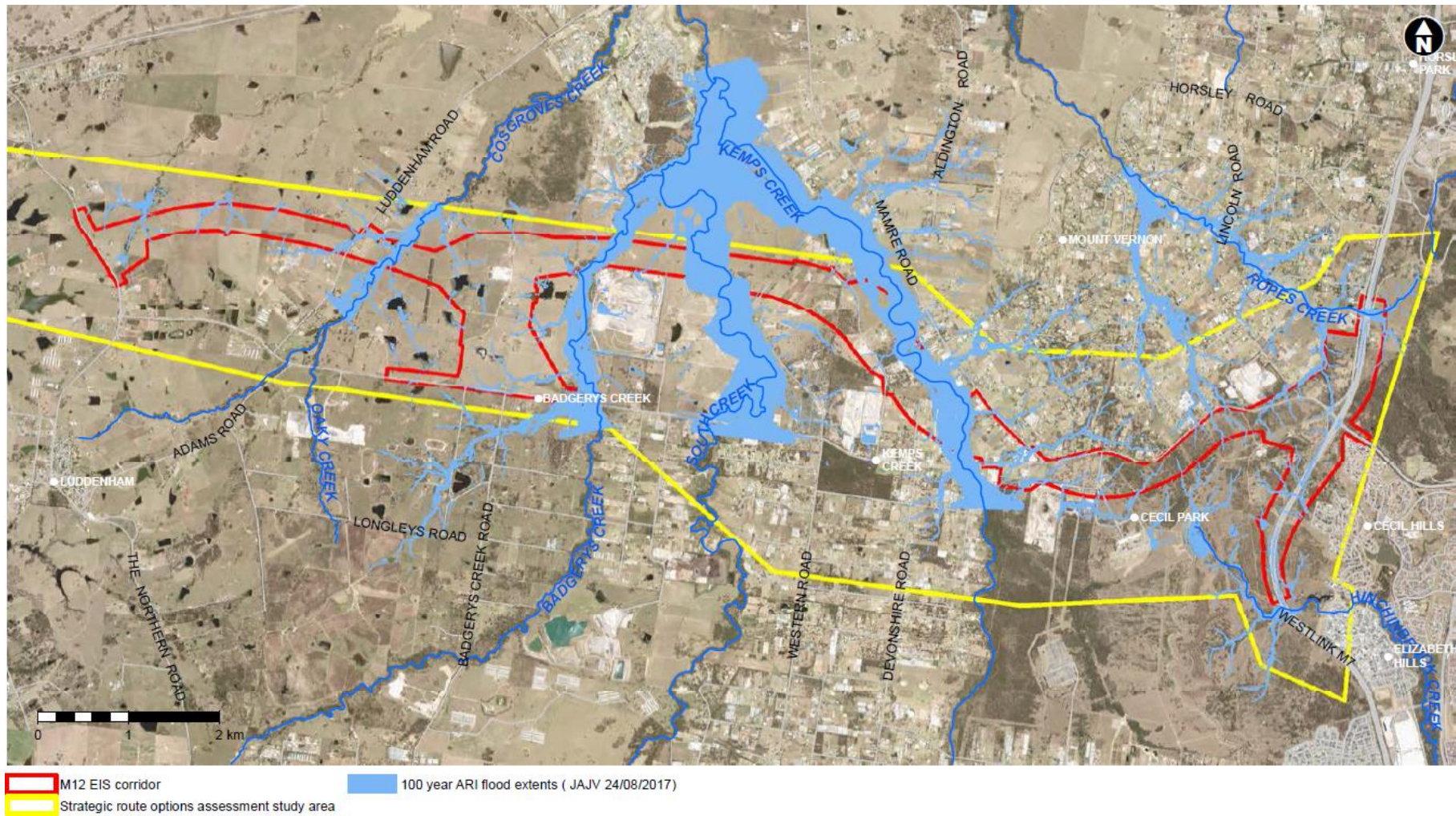
Flooding depths for a 100-year ARI event (that is, water above the existing ground level) vary across the study area. In-stream depths for South Creek are over five metres. However, across the floodplains for all the creeks (South Creek, Kemps Creek and Badgerys Creek) flood depths are between 0.5 and 2.5 metres.

All of the road and rail crossings assessed in the South Creek sub-catchment are predicted to experience some inundation during flood events. In the study area, Elizabeth Drive is overtopped in all flood events at all three creek crossings (Badgerys Creek, South Creek and Kemps Creek).

Results for overtopping of Elizabeth Drive in the 100-year ARI flood event are shown in **Error! Reference source not found.9.**

Table 44-9 Overtopping of Elizabeth Drive during the peak 100-year ARI flood event

| Creeks         | Depth of water on Elizabeth Drive |
|----------------|-----------------------------------|
| South Creek    | 180 mm                            |
| Kemps Creek    | 500 mm                            |
| Badgerys Creek | 270 mm                            |



**Figure 4-8** 100 year ARI Flood Extents





## 4.9.2 Summary of issues

### 4.9.2.1 Construction

During the construction of the project, the following impacts may occur:

- A large flood during construction may have the potential to impact construction works.
- Temporary waterway crossings or instream structures would potentially cause hydrological impacts to creeklines, which could result in increased or decreased flows downstream.
- Watercourses may be required to be realigned 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.

### 4.9.2.2 Operation

During the operation of the project, the following impacts may occur:

- The addition of new infrastructure such as bridges, culverts and embankments and modifications to waterways may change water flow, velocity and flooding characteristics, such as inundation and afflux levels (afflux is the rise in water level on the upstream side of a structure).
- Bridges/culverts and embankments may change the velocity, location, and flooding characteristics, including time of inundation and flow depths.
- Concentrated surface flows could result in erosion and scour of waterways (particularly under bridge structures or culvert openings).
- Potential localised change in area/ shape of waterway channels resulting in changes to peak flows and floodplain storage.
- Providing a road with improved flood immunity from surrounding roads to allow use during flooding.

## 4.9.3 Proposed further assessments

A hydrology and flooding impact assessment would be prepared as part of the EIS and would:

- Describe the catchments in the study area around the project, including existing hydrology and flooding characteristics (flood levels and velocities) for a range of storm events.
- Identify the flood immunity objectives for the project and design the project to achieve the flood immunity through the correct sizing of bridges and culverts.
- Assess the impacts to flooding and hydrology characteristics for a range of design storm events and effects on the surrounding areas including to properties, structures and future land use development.
- Assess potential impacts of climate change and partial blockage on flooding and hydrology.
- Provide input into the concept design to ensure the design meets the project objective of providing a minimum 100 year average recurrence interval flood immunity, and identify feasible and reasonable mitigation measures to minimise impacts to flooding on surrounding areas.



## 5 Other environmental issues

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### 5.1 Overview

Other environmental issues listed below are considered to be of lesser consequence, than the key issues identified in Chapter 4 for the project. It is unlikely that these would be key issues for the project; however, further assessment would be undertaken as part of the EIS for the project. Environmental management and safeguard measures required to minimise and mitigate impacts would be documented as part of the EIS.

### 5.2 Soils, contamination and water quality

#### 5.2.1 Overview

##### **5.2.1.1 Water quality**

There are a number of surface water bodies through the study area, including named and ephemeral creeks and farm dams. Named creeks through the study area include Hinchinbrook Creek, Ropes Creek, South Creek, Kemps Creek, Badgerys Creek, and Cosgroves Creek.

A review of the historical land uses has indicated any contamination to surface water sources could be as a result of:

- Agricultural land usage based on potential for contamination via the application of pesticides, herbicides and fertilisers
- Kemps Creek Advanced Resource Recovery Park operated by SUEZ (EPL 4068) accepts general solid waste (non-putrescible), asbestos waste, waste tyre and restricted solid waste industrial waste
- Hydrocarbon contamination associated with vehicle access tracks, roads and onsite fuel tanks on farmland
- Asbestos Containing Material (ACM) associated with former farm infrastructure.
- Buried fill material (including ACM)
- Inappropriate waste disposal
- Previous use of septic tanks in the agricultural areas
- Heavy metals potential associated with old fertilizers or previous activities.

Water quality sampling was carried out as part of the water quality assessment for the EIS for the Western Sydney Airport (DIRD, 2016). Water quality sampling at Badgerys and Cosgroves creeks identified generally high nutrient loads that were elevated well above the Australian New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) water quality trigger values. Turbidity and total suspended solids were generally within acceptable levels, dissolved solids were found to be relatively low. Conductivity levels were high and above levels that are typical for lowland rivers.

The high nutrient loads and the low dissolved oxygen levels are mostly due to the agricultural nature of the surrounding land use, particularly the presence of livestock and effluent irrigation.

##### **5.2.1.2 Groundwater**

The direction of groundwater flow is likely to be controlled by the proximity to local surface water bodies and areas of higher permeability alluvium. Regional groundwater flow direction is expected to be consistent with the topography generally south to north towards South Creek.

According to *A Groundwater Resource Assessment of the Triassic Rocks of the Sydney Basin* (2009), the reported airlift yield for the study area is between 0.0 and 0.3 litres per second, while the groundwater salinity levels are between 5000 and 10,000 milligrams per litre.

Groundwater levels can be expected to vary depending on topography, proximity to creeks, and stratigraphic profile. Shallow, perched groundwater tables can be expected to be found in the lower-lying floodplain areas near natural creek channels.

Information obtained from the Department of Primary Industries – Office of Water website (<http://allwaterdata.water.nsw.gov.au/water.stm>) indicates there are 28 groundwater boreholes within a 500 metres radius of the study area.

There is limited information contained within the drillers' logs on the groundwater level present in the abovementioned groundwater bores. Where available, depth to water within identified groundwater bores was noted as 4.4 metres below ground level. However, towards the west of the site, where there were fewer boreholes, the only available information indicated available depth to water as 23.8 metres below ground level.

#### **5.2.1.3 Soils**

The *Soil Landscapes of the Penrith 1:100,000 Sheet* (Bannerman and Hazelton, 1990) indicates that four types of soil landscapes occur in the study area including: Blacktown, Luddenham, Picton and South Creek. The first three are associated with the Wianamatta Group shales that underlie the whole of the study area. The soils can be up to 1.5 metres thick, derived from weathering of the shales, and typically display a high erosion potential and moderate to high reactivity. The Blacktown and Luddenham soils predominate, with Picton soils expected to be encountered near the eastern and western boundaries of the study area.

The South Creek soils are deep, layered, alluvial soils occurring in the creek channels and floodplain areas. The depth of alluvium, particularly in the main creek channels, may be several metres thick. Red and yellow podzolic soils (these are typically leached soils) are commonly found in the floodplain terraces.

#### **5.2.1.4 Geology**

Reference to the 1:100 000 scale Geological Series, Sheet 9030 (Edition 1) 1991 Map of Penrith, indicates the study area is underlain by

- Bringelly Shale, consisting of Shale, carbonaceous Claystone, Laminite, fine to medium grained lithic Sandstone, rare coal and tuff
- Quaternary aged sediments that comprise fine-grained sand, silt, and clay.

The study area is largely underlain by Bringelly Shale moving into discrete areas of Quaternary sediments associated with Badgerys Creek, South Creek.

#### **5.2.1.5 Soil contamination**

A preliminary site investigation for contamination was carried out for the shortlisted route options. The investigation was based on desktop investigations and a site walkover to assess site condition, evaluation of previous site activities and identify disturbed areas and fill.

A search of the NSW Environment Protection Authority (EPA) contaminated sites register under the *Contaminated Lands Management Act 1997* (CLM Act) was carried out for the Liverpool City LGA, the Fairfield City LGA and Penrith City LGA on 9 February 2016. The search found:

- Four records for four sites within Fairfield City LGA

- Two records for two sites within Liverpool LGA
- Seven records for seven sites within Penrith City LGA.

These sites are more than 500 metres from the project. Due to the distance and generally being hydrologically separated from the project, no further consideration of these sites is required.

In addition, one notified contamination site (under section 60 of the CLM Act) – the Caltex service station in Kemps Creek – was identified in the study area.

A search for Environment Protection Licences under the *Protection of the Environment Operations Act 1997* (POEO Act) found there were seven current licences and one revoked licence within 500 metres of the project. These were:

- A recycling facility
- A brick pit
- Three waste disposal facilities (one revoked)
- An advanced waste treatment facility
- A recycling park
- A poultry farm.

During subsequent field investigations, the following specific areas of note in terms of potential contamination in the study area were noted:

- A number of earthen dams made of unknown materials
- Aboveground storage tanks (and potential for underground storage tanks)
- Some hydrocarbon stains in and adjacent to Elizabeth Drive road reserve
- Asbestos cement fragments in road reserves
- Services and utilities through the site with the potential to act as contaminant preferential flow paths
- Moderate amount of general waste in road reserves including plastic, glass, rubber, paper and cans
- Evidence of illegal dumping
- A crashed and abandoned vehicle
- A scalded/bare patch of ground in the road reserve
- Roads and Maritime stockpile site.

#### **5.2.1.6 Acid sulfate soils**

Acid sulfate soils are naturally occurring materials which contain iron sulphides and their oxidation products and are typically found in estuarine and alluvial environments that are low-lying (generally at less than 10 metres AHD). As such, areas around the creek lines of Kemps Creek, South Creek, Badgerys Creek, Cosgroves Creek and Oaky Creek would be areas where acid sulfate soil materials could potentially be found. However, there is no known occurrence of acid sulfate soil within the study area.

Reference to the Australian Soil Resources Information System (ASRIS) Acid Sulfate Soils (ASS) map layer suggests the study area is characterised by a C4- Extremely Low Probability in relation to ASS risk. However, according to the database map legend, the accuracy of the data was deemed to be very low.

#### **5.2.1.7 Salinity**

The *Salinity Potential in Western Sydney 2002* map shows land in the study area generally has moderate salinity potential (NSW Department of Infrastructure, Planning and Natural Resources, 2003). Smaller areas associated with creeks and associated floodplains were mapped as having known salinity or high salinity potential.

The moderate classification means that in general the salinity levels of the soils are within acceptable limits, but that scattered higher salinity areas are known to occur in some small areas, which have not been identified.

## 5.2.2 Summary of issues

### 5.2.2.1 Construction

During the construction of the project, the following impacts may result:

- Potential impact to water quality from accidental chemical spills or materials during construction or improper management of run-off, sediment control and discharge from the construction site. This is of particular concern where the project would cross the main watercourses including Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek.
- Potential impact to bank stability of waterways traversed by the project.
- Potential for contamination of groundwater where groundwater intersection occurs during construction.
- Impacts to soils due to spills or leaks of fuels, or from construction plant and equipment incidents.
- Potential erosion and sedimentation issues due to earthworks, vegetation clearing and when soils are exposed. This issue would be exacerbated by the steeper gradients present along the eastern portion of the project, which could result in increased velocity of run-off during rain events and an increased risk of erosion and sedimentation of downstream environments.
- Potential to disturb contaminated material leading to the offsite migration of contaminants.
- Potential localised groundwater drawdown if construction activities (deep cuts) intersects with groundwater table.

### 5.2.2.2 Operation

During the operation of the project, the following impacts could occur:

- Accidental spills may affect soil and water quality of local waterways.
- Potential contamination of local waterways resulting from runoff from the road. Road runoff would typically contain oils and greases, nutrients from atmospheric fallout, petrochemicals and heavy metals as a result of vehicle leaks, operational wear and road wear.
- Potential localised reduction in the groundwater recharge area as a result of an impermeable road surface.

The project is unlikely to impact on contaminated land once construction has been completed.

## 5.2.3 Proposed further assessments

The following activities are proposed to be undertaken as part of the EIS to further address this issue:

- Review existing topography, soil (including acid sulphate and salinity risk maps), geological and identify any sensitive surface and groundwater receiving environments.
- Identification of the waterways that may be impacted by construction and operation of the project.
- Characterise and assess the hydrogeology and groundwater conditions and assess impacts of construction and operation of the project on the groundwater regime, the environment and groundwater users.
- Carry out geotechnical field investigations to further characterise the existing soil geotechnical conditions.
- Confirm the findings of the preliminary environmental investigation (contamination) and carry out a Phase 2 environment site assessment, where required.
- Assess the activities and potential hazards and risks to erosion and sedimentation during construction and operation.
- Assessment of the potential impacts to waterways, including field investigations.



- Carry out a detailed analysis of the risk of erosion and sedimentation in accordance with the Roads and Maritime Erosion and Sedimentation Management Procedure (2008).
- Identify the need for construction sedimentation basins and operational water quality basins or other water quality treatment measures.
- Identify feasible and reasonable management and mitigation measures to prevent water and pollution, and details of the proposed stormwater management measures to contain pollutants. Measures will take into consideration the Managing Urban Stormwater: Soils and Construction (The Blue Book) publications.

## 5.2.4 Management and safeguard measures

Potential soils, contamination and water quality impacts would be managed and mitigated through the implementation of standard safeguards and management measures. Standard safeguards and management measures would include:

- Where required, use of energy dissipaters, scour protection and erosion protection measures would be used at outlets to protect natural watercourses.
- Soil and water quality impacts would be managed in accordance with the Blue Book – Managing Urban Stormwater, Soils and Construction Volume1 4th Edition, March 2014 (EPA, 2014 & DECC 2008).
- Stockpile sites would be managed in accordance with the Stockpile Site Management Guideline (EMS-TG-10) (RTA, 2011a).
- Management of contaminated land in accordance with Roads and Maritime's Contaminated Land Management Guideline.
- A contamination remedial action plan (if required, based on contamination investigations being undertaken as part of the EIS) would be prepared in accordance with the relevant EPA guidelines.
- Construction sediment and erosion control plans and construction spill emergency procedures as part of the Construction Environmental Management Plan (CEMP) for the project.
- Construction dewatering carried out on site would be managed in accordance with the Technical Guideline Environmental Management of Construction Site Dewatering (EMS-TG-011) (RTA, 2011b).

## 5.3 Air quality

### 5.3.1 Overview

The study area is located in a predominately rural residential environment but contains a number of sensitive receivers, as outlined in Section 4.7, including residents, schools, and recreational /open spaces.

A review of the National Pollutants Inventory (NPI) (Department of the Environment) found that the existing air quality in the vicinity of the project is primarily influenced by emissions from the following industrial activities:

- Chicken processing plants.
- Landfill facility.
- Brick manufacturers.

### 5.3.2 Summary of issues

#### 5.3.2.1 Construction

During the construction of the project, the following impacts may result:

- Dust generation from earthworks, spoil stockpiling and vehicles travelling on unsealed access roads. The nature of any increase in dust would depend on the scale of activities and quantities of material handled.
- Temporary, localised increases in air quality impacts from emissions, such as exhaust fumes, generated by the operation of machinery and other construction vehicles. The impact of these emissions would be limited to the construction phase.

#### **5.3.2.2 Operation**

Once the project is operational, potential impacts to air quality would mainly result from increase in traffic numbers in the area. This is due to the project servicing the Western Sydney Airport and surrounding new developments.

The project is expected to have a minimal impact on air quality as traffic on the motorway would be free flowing so that congestion related emissions are reduced. However, there is also the potential for actual or perceived reduction in air quality or health impacts to nearby residents due to the introduction of a new motorway into an otherwise rural residential landscape.

There would be potential cumulative impacts from the operation of the airport and the project, as well as surrounding land use development.

### **5.3.3 Proposed further assessments**

Further assessment of potential air quality impacts will be carried out during the preparation of the EIS. The assessment will include:

- Identification of relevant air quality goals and standards, and sensitive receivers (such as residential properties) located near the project.
- An assessment of existing ambient air quality in the vicinity of the project.
- An assessment of meteorological conditions which may influence the impacts of the project.
- An assessment of the potential impacts of the project on air quality during construction and operation. The operational air quality assessment will take into existing and future operational scenarios.
- Identification of appropriate safeguards and management measures to reduce the impact of the project on air quality during construction and operation.

### **5.3.4 Management and safeguard measures**

The potential for air quality impact on 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 in the EIS. Safeguards would include the implementation of appropriate dust control measures during construction.

## **5.4 Greenhouse gas 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, and are referred to as scope one, scope two, or scope three:

- Scope 1 emissions are direct emissions generated on-site, such as those from plant and equipment and land clearing.
- Scope 2 includes use of energy where emissions are generated off-site, such as electricity.
- Scope 3 includes emissions in the supply chain, or those from the use of a product. These include embodied energy in construction materials and vehicles travelling on the completed project.

GHG emissions would be generated during the construction and operation of the project.

Projected climate change impacts for western Sydney are identified in The NSW Climate Impact Profile (DECCW, 2010). The report predicts that, by 2050:

- Temperatures would be hotter, with a likely increase in rainfall, especially in summer
- Winter rainfall is unlikely to change
- Run-off and stream flow are likely to increase in summer and autumn
- Run-off and stream flow are likely to decrease in spring and winter
- Altered fire regimes could cause major ecological change.

## 5.4.2 Summary of issues

### 5.4.2.1 Construction

The construction of the project would result in greenhouse gas emissions. The activities that would result in greenhouse gas emissions include:

- Clearing of vegetation
- Fuel consumption from construction plant, machinery and vehicles
- Embodied energy of construction products and their supply chains (eg concrete, and steel)
- Generation of electricity consumed by the project.

Impacts related to altered weather patterns as a result of climate change may include increased rainfall in summer months and warmer temperatures in winter months. This may increase the potential for erosion and sedimentation of soils during construction works.

### 5.4.2.2 Operation

Greenhouse gases emitted during the operation of the project would be associated with maintenance activities and the operation of private motor vehicles on the road network. These emissions would contribute to the total greenhouse gas emissions for NSW.

An increased road surface area and more intense rainfall events would lead to an increase in stormwater runoff in the study area.

## 5.4.3 Proposed further assessments

Further assessment of potential greenhouse gas and climate change impacts will be carried out during the preparation of the EIS. The assessment will include:

- A greenhouse gas assessment as defined by the Greenhouse Gas Protocol.
- A climate change risk assessment based on Draft Australian Standard (DR AS 5334) Climate change adaptation for settlements and infrastructure, AS/NZS ISO 31000:2009 Risk management – Principles and guidelines and ISO/IEC 31010:2009 Risk management – Risk assessment techniques.
- Identification of feasible and reasonable management measures that may be implemented to reduce greenhouse gas emissions during construction and operation.

## 5.4.4 Management and safeguard measures

- Considering energy efficiency and carbon emissions when selecting vehicles, plant and construction equipment.
- Minimising vegetation clearing whenever possible.
- Using appropriately sized vehicles, plant and construction equipment for the task and properly maintaining such equipment to achieve optimum fuel efficiency.
- Switching off vehicles, plant and construction equipment when not in use.
- Minimising waste and re-using materials wherever possible.
- Reducing construction transport requirements through use of local staff, resources, suppliers and landfills where possible.
- Consideration of the preferential selection of materials, vehicles and construction equipment with characteristics such as lower embodied energy and greater fuel efficiency, where feasible.
- Development of an optimal design, including the vertical and horizontal alignments and reduction of stop start driving. These reductions would be cumulative over the design life of the project.

## 5.5 Resource and waste management

### 5.5.1 Overview

The construction of the project has the potential to generate substantial waste materials. Significant quantities of waste materials such as green waste, litter and road infrastructure materials would be generated as part of construction activities. These materials would be collected for off-site disposal at a suitable location by the responsible maintenance contractor.

Large quantities of materials such as road infrastructure materials would be required for the construction of the project. The project is also likely to require large cut and fill activities and may require importation and/or disposal of large quantities of fill materials.

Resource management and waste minimisation would be considered throughout various stages of the project from design and construction through to operation.

### 5.5.2 Summary of issues

#### 5.5.2.1 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.

Construction materials and resources that would be required by the project include, but are not limited to:

- Fill material (eg rock, sand, gravel)
- Concrete and/or asphalt (pavement)
- Concrete structures (such as bridge sub-structures)
- Timber and steel elements
- Water and fuel
- Pre-fabricated items (eg poles, pipes, cables, signs)
- Soil and plant species (eg for landscaped areas)

Different types of waste would be generated during construction of the project. These could include:

- Excavated material



- Demolition wastes from the removal of structures
- Contaminated waste
- Liquid waste
- Vegetation waste: from tree removal
- Excess construction materials
- Packaging materials such as crates, pallets, cartons, plastics and wrapping materials
- General waste from construction sites: Including office wastes, scrap materials and biodegradable waste.

During the construction of the project, the following impacts may result:

- The generation of waste streams from construction
- Spills and leaks from vehicles and construction machinery
- The on-site or off-site disposal of unsuitable or surplus earthworks material
- The off-site disposal of hazardous materials.

#### **5.5.2.2 Operation**

During the operation of the project, additional wastes could be generated during routine maintenance and repair activities.

### **5.5.3 Proposed further assessments**

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

- The estimated quantity of spoil that would be generated.
- Identification of a waste hierarchy to reduce the volume of excess spoil generated by the project, such as through design, use within the project or use on other projects.
- Indicative resource requirements for the project.
- Specific waste impacts of the project.
- Opportunities to reduce waste and use recycled materials (such as the use of recycled materials, bulk delivery of goods to minimise packaging and arrangements with suppliers to return any unused construction materials), and options for spoil reuse.
- Strategies to minimise excess material, and waste disposed of to landfill.

### **5.5.4 Management and safeguard measures**

Resource and waste management issues 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 Resource and Waste Management Plan 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.
- Waste will be classified according to Waste Classification Guidelines (DECCW, 2008).
- 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 would be required to re-use materials where feasible, including material collected on site.
- Solid waste materials awaiting disposal would be appropriately contained and stored in a manner that would ensure they do not escape into the environment.

- Waste materials will be transported to and from the site by covered trucks where possible.

## 6 Conclusion

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Roads and Maritime is seeking approval to construct the M12 Motorway, an east-west motorway about 16 kilometres long between the M7 Motorway and The Northern Road. It would include:

- A new dual-carriageway motorway with two-lanes in each direction with a central median facilitating future expansion to six lanes
- Three interchanges, being:
  - A motorway – to – motorway interchange with the M7 Motorway
  - A grade separated interchange with the Western Sydney Airport
  - A signalised intersection with The Northern Road with the provision for grade separation in the future.
- Bridge structures across Kemps Creek, South Creek, Badgerys Creek and Cosgrove Creek
- Bridge structures at Elizabeth Drive, Luddenham Road and other local roads
- Inclusion of active transport (pedestrian and cyclist) facilities
- Modifications to the local road network, if required, to facilitate connections across and around the motorway
- Modifications to existing service utilities
- Gantries to be installed on M7 Motorway ramps.

Roads and Maritime has formed the opinion that the impacts of the M12 Motorway are likely to significantly affect the environment and require the preparation of an EIS under the EP&A Act. Accordingly, the project is State significant infrastructure under Division 5.2 of the EP&A Act. Approval from the Minister for Planning is required for the project.

The key environmental issues identified for the project include:

- Biodiversity
- Visual amenity, urban design and landscaping
- Aboriginal heritage
- Non-Aboriginal heritage
- Traffic and transport
- Noise and vibration
- Socio-economic, land use and property
- Hydrology and flooding

The EIS 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
- Identification and consideration of issues raised by stakeholders.

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## 7.2 Legislation and government plans

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- Penrith Local Environmental Plan 2010
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- Soils Landscapes Map (Penrith Sheet 9030).

# Attachment A

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Requirements of the Environmental Planning and  
Assessment Regulation 2000



# 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 section 5.23 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 5.24 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 the SSI, if not for section 5.23 of the EP&A Act, include:

- Permit under section 201, 205, or 219 of the *Fisheries Management Act 1994* for dredging or reclamation work
- An Aboriginal heritage impact permit under section 90 of the *National Parks and Wildlife Act 1974*
- An approval under Part 4, or an excavation permit for excavation under section 139 of the *Heritage Act 1977*
- Water use approval under section 89, a water management work approval under section 90 or an activity approval under section 91 of the *Water Management Act 2000*. Section 5.23 does not remove the need to obtain an aquifer interference approval under the Water Management Act 2000, if that were to be otherwise required.

## Authorisations if the application is approved

Authorisations that may be required for the project under section 5.24 of the EP&A Act include:

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

## 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 section 5.12 (2) of the Act if it is permissible without development consent under Part 4 of the Act under a State environmental planning policy; and is specified in the categories of development in Schedule 3.

Clause 94 of the 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 M12 Motorway is for a road and road infrastructure facilities, and is to be carried out by Roads and Maritime, the project is permissible without development consent under Part 4 of the EP&A Act.

Clause 1(1) of 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 Division 5.2 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.

For the M12 Motorway, Roads and Maritime has formed the opinion that the impact of the project is likely to significantly affect the environment. On this basis the project is declared to be State significant infrastructure (SSI) under section 5.12 (2) of the EP&A Act by reason of the operation of clause 14 and clause 1 of Schedule 3 of the State Environmental Planning Policy (State and Regional Development) 2011. Accordingly, the project is subject to Division 5.2 of the EP&A Act and requires the approval of the Minister for Planning.







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