M12 Motorway
Strategic Route Options Analysis
Preferred corridor route report

November 2016
Executive summary

The Australian and NSW governments are funding the Western Sydney Infrastructure Plan, a 10 year, $3.6 billion road investment program for western Sydney. The Plan will deliver new and upgraded roads to support integrated transport in the region and capitalise on the economic benefits from developing the planned western Sydney airport at Badgerys Creek.

As part of the plan, Roads and Maritime Services (Roads and Maritime) is proposing to build a new motorway – the M12 Motorway – to provide direct access to the planned western Sydney airport at Badgerys Creek and Sydney’s motorway network. The proposed M12 Motorway would run east-west between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham, a distance of about 16 kilometres.

The motorway would increase road capacity in the Western Sydney Priority Growth Area (WSPGA) and reduce predicted congestion and travel times. It would also improve the movement of freight in and through western Sydney.

Roads and Maritime engaged Aurecon Australasia Pty Ltd to carry out a strategic route options analysis for the M12 Motorway. This report documents the findings of the analysis and recommends a preferred corridor route for the motorway.

The study area

The project is required to provide access to the planned western Sydney airport at Badgerys Creek, with the main access to the airport proposed to be from the north. As such, the study area for the project has been developed generally around Elizabeth Drive, between The Northern Road and the M7 Motorway. The study area is bounded to the north by the WSPGA and the suburbs of Kemps Creek, Mount Vernon and Cecil Park. To the south the study area is bounded by the planned western Sydney airport at Badgerys Creek, the WSPGA and Western Sydney Parklands.

Shortlisted route options

In February 2016, eight shortlisted route options for the M12 Motorway were placed on public display. The display materials showed an area comprising half of zone C and all of zone D as subject to further investigation into the development of the future road network in the area.

During the public display period, Roads and Maritime carried out a Transport Study workshop including attendees from other 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 and other future transport projects to better cater for current and future land uses.

As a result of this, and in response to community feedback from the public display around land use and property impacts, modifications were made to the shortlisted route options in zones C and D. The changes to the shortlisted route options were:

- Options C1 and C2 replaced with options C3 and C4
- Zone D removed as the M12 Motorway would connect to The Northern Road.

The eight modified shortlisted route options are shown in Figure ES-1. Each route option falls within one of the two 300 metre wide corridors.
Environmental assessment of route options

A comparative assessment was carried out to evaluate each of the shortlisted route options. The range of topics assessed included:

- Biodiversity
- Aboriginal and non-Aboriginal heritage
- Land use and planning
- Socio-economic (including noise, traffic access and business impact)
- Soils and contamination
- Hydrology and flooding
- Landscape character
- Utilities.

These assessments were considered in the selection of the preferred corridor route for the project at a value management workshop.

The preferred corridor route

The preferred corridor route for the M12 Motorway is the modified orange option comprising a combination of route options A1, B5 and C4. The preferred corridor route is shown in Figure ES-2.

The preferred corridor route is 16 kilometres long and at its eastern extent connects to the M7 Motorway more than one kilometre south of Elizabeth Drive at a new interchange location.

The route is currently a 300 metre wide corridor and further design of the motorway would reduce this footprint to about 100-150 metres wide.

The route passes through the Western Sydney Parklands in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road.

The preferred corridor route then crosses Kemps Creek and travels in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the Elizabeth Drive landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange with a north-south access road to the airport about two kilometres long.

The preferred corridor route continues west, crossing Cosgroves Creek and passing through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill.

At its western extent, the preferred corridor route connects with The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout.

Selection of the preferred corridor route

The modified orange option was selected as the preferred corridor route as, compared to the other options, it would:

- Have less overall impact to existing land use and provide greater flexibility for future land use development
- Have reduced impact on listed threatened ecological communities and species
• Minimise impact to the M7 Motorway by locating the M12 Motorway interchange an appropriate spacing to adjacent interchanges on the M7 Motorway
• Have less severance of land and businesses
• Provide better functionality for the future traffic demand
• Have less impact on utilities
• Have less impact on existing roads
• Maintain the integrity of and improve management of the existing road network
• Provide for easier and safer construction, being located away from live traffic conditions.

What happens next?
Roads and Maritime will develop a concept design for the project based on the preferred route. This concept design will then be the subject of an Environmental Impact Statement under Environmental Planning and Assessment Act 1979 to obtain project approval for construction of the project. As part of this process, further environmental and technical investigations will be carried out to inform the design. The investigations will also respond to assessment requirements issued by the Department of Planning and Environment (known as the Secretary’s Environmental Assessment Requirements).

Throughout this process and through the detailed design and construction phases, Roads and Maritime will continue to consult with government agencies, key stakeholders and the community.
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1 Introduction

1.1 Project background

Roads and Maritime Services (Roads and Maritime) has engaged Aurecon Australasia Pty Ltd to carry out a strategic route options analysis for the M12 Motorway between the M7 Motorway, Cecil Hills and The Northern Road, Luddenham (the project). This report documents the findings of the analysis and recommends a preferred corridor route for the motorway.

1.1.1 Western Sydney Infrastructure Plan

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 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 proposed western Sydney airport at Badgerys Creek. 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 Western Sydney Priority Growth Area (WSPGA) (formerly South West Sydney Growth Centre and part of the Broader Western Sydney Employment Area) and the South West Priority Land Release Area.

There are five main projects included in the WSIP (refer to Figure 1-1). These are split into 10 stages ranging from early development to construction. The projects include the construction of new roads and significant upgrade of other roads, as follows:

- M12 Motorway between the M7 Motorway and The Northern Road generally parallel with Elizabeth Drive (the subject of this study)
- The Northern Road upgrade between Narellan and South Penrith
- Bringelly Road upgrade between The Northern Road and Camden Valley Way
- Werrington Arterial Road
- Additional local road upgrades near the proposed western Sydney airport at Badgerys Creek, to be proposed and managed by local councils.

Further details on the study area for the M12 Motorway is provided in Chapter 3.
**Figure 1.1: Western Sydney Infrastructure Plan strategic map**

**The Northern Road and Erskine Park Road**
- Intersection upgrade studies $1.1 million – complete
- Erskine Park Road intersection upgrades $29.1 million
- The Northern Road intersections upgrade $6.7 million

**Bungarribee Road and Flushcombe Road**
- Traffic lights scoping study $526,000

**Ross Street/Great Western Highway**
- Intersection upgrade $5 million in planning

**Werrington Arterial Road**
- $70 million
- Construction started 2015

**Smithfield Road**
- Upgrade $16.4 million

**Wetherill Street**
- Upgrade $8.2 million – complete

**Cumberland Highway**
- Intersection upgrades $5.8 million – complete

**The Northern Road and Bringelly Road Interchange**

**The Northern Road**
- Upgrade $1.6 billion
- Stage 1 construction started 2015

**Argyle Street/Camden Valley Way**
- Corridor upgrade and studies $2.3 million – complete
- Stage 2 – Macarthur Road Intersection $4.3 million
- Grahams Hill Road and Richardson Road Intersection $4 million

**Porrende Street**
- Upgrade scoping study $120,000

**Eagle Vale Drive**
- Upgrade $17.5 million

**Bringelly Road**
- Upgrade $509 million
- Construction started 2015

**Raby Road**
- From Eschol Park Drive to Stranraer Drive
- Scoping study $655,000

**LEGEND**
- Local Roads Package ($200 million
- Australian Government funded
- Major road projects
- Existing The Northern Road

**NOT TO SCALE**

Source: Roads and Maritime

**M12 Strategic Route Options Analysis**

**Preferred corridor route report**

**FIGURE 1.1:** Western Sydney Infrastructure Plan strategic map
1.2 Project objectives

1.2.1 Western Sydney Infrastructure Plan program objectives

The M12 Motorway project is part of the WSIP. The WSIP program themes and objectives are:

- Development and demand – Support the western Sydney airport, land use change and residential growth; balancing functional, social, environmental and value for money considerations
- Connectivity to airport – Provide a resilient connection for freight and people to the planned western Sydney airport
- Integrated network – Provide road improvements to support and integrate with the broader transport network
- Customer focus – Provide meaningful engagement with customers and stakeholders throughout the program life.

1.2.2 M12 Motorway Strategic Route Options Analysis project objectives

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

- Provide direct motorway standard east–west connection between the M7 Motorway and The Northern Road via the planned 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 M9 Outer Sydney Orbital.
1.3 Purpose and structure of the report

The purpose of this report is to describe the shortlisted route options for the M12 Motorway and the process carried out to identify the preferred corridor route. The report structure is presented in Table 1-1.

Table 1-1 Report structure

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<th>Description</th>
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<td>2. Need and strategic justification</td>
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<td>3. Existing environment</td>
<td>Describes the environmental features and constraints in the study area.</td>
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<td>4. Options identification process</td>
<td>Describes the long list of route options considered for the project and the assessment carried out to develop the shortlisted route options.</td>
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<td>Describes the shortlisted route options.</td>
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<td>7. Assessment of shortlisted route options</td>
<td>Assesses the shortlisted route options against a range of environmental aspects.</td>
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<td>8. Selection of the preferred corridor route</td>
<td>Identifies the process for analysing the shortlisted route options to determine the preferred corridor route for the project.</td>
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<td>9. Preferred corridor route</td>
<td>Describes the preferred corridor route for the project.</td>
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<td>10. Future actions</td>
<td>Identifies the future stages of the project.</td>
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2 Need and strategic context

2.1 Strategic need

The M12 Motorway would be a four-lane road (with scope to upgrade to six lanes when required) between the M7 Motorway and The Northern Road.

The M12 Motorway is required to:

- Support the planned western Sydney airport at Badgerys Creek by connecting Sydney’s motorway network to the airport
- Cater for the increased traffic generated by the planned western Sydney airport and surrounding future development in the Western Sydney Priority Growth Area (WSPGA) and South West Priority Land Release Area (SWPLRA).

These future developments are discussed below.

2.1.1 Western Sydney Priority Growth Area (WSPGA)

The WSPGA (comprising part of the former Broader Western Sydney Employment Area and the South West Growth Centre) is to be developed as a diverse employment centre. The WSPGA would provide more than 57,000 jobs over the next 30 years, and more than 200,000 jobs when fully established. 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.

2.1.2 South West Priority Land Release Area (SWPLRA)

The SWPLRA, encompassing part of the South West Growth Centre, is a major greenfield release area designed to meet anticipated housing demand in Sydney. The SWPRLA 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.

2.1.3 Planned western Sydney airport

The development of the planned western Sydney airport was announced by the Federal Government in April 2014. The draft environmental impact statement (EIS) was placed on public display at the end of 2015. 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 10 million annual passengers forecast by 2030 (Department of Infrastructure and Regional Development, 2015). Traffic modelling estimates that by 2031, the operating airport would generate:

- Around 47,000 passenger and employee vehicle trips per day
- Around 42,000 freight vehicle trips per day
- Additional peak hour traffic volumes of around 7900 per hour in the AM peak and around 6500 in the PM peak.

Traffic modelling carried out for the Western Sydney Airport draft Environmental Impact Statement (2015) identified that due to the planned future development in the
area, even without the development of the planned western Sydney airport, the road performance of Elizabeth Drive is expected to deteriorate by 2031. The modelling indicated a doubling in corridor traffic volumes by 2036 from existing 2015 traffic volumes, resulting in a 50 per cent increase in travel time on the network if the road is not upgraded. As such, additional road infrastructure would be required to provide the necessary capacity for future development and the planned western Sydney airport site.

The draft Airport Plan includes two access points into the airport site. One access is via the M12 Motorway which would be used by passengers, employees and potentially freight vehicles. The other is on The Northern Road which is anticipated to be used by employees and freight.

The draft airport EIS and draft Airport Plan are currently being updated and are expected to be finalised later this year.

Construction of the M12 Motorway would increase road capacity, facilitating the growth of and improve access to these future developments. The NSW Government is also planning other road upgrades in western Sydney to cater for the increased traffic generated by these future developments.

2.2 Strategic planning and policy framework

2.2.1 State Plans

State Priorities (NSW Make It Happen) 2015

In 2015, the NSW Government released the State Priorities, a series of policy initiatives designed to grow the economy, deliver infrastructure, and improve health, education and other services across NSW. There are 30 State Priorities. Twelve of these form the Premier’s Priorities.

Two of these priorities are relevant to the project:

• Reduce road fatalities
• Ensure that 90 per cent of peak travel on key road routes is on time.

The project would help to meet these State Priorities by providing a new motorway that would, in general, increase capacity along the corridor between the M7 Motorway and The Northern Road. This would reduce areas of congestion and improve travel times. This could also remove the conflict on Elizabeth Drive between local traffic and through traffic travelling from M7 Motorway to The Northern Road. Although the project would not be operational until after 2020, it would improve road network functionality between the M7 Motorway and The Northern Road.

The project would also be designed to meet current standards to ensure the safety of motorists using the motorway. In addition, as a ‘controlled access’ motorway, turning movements across traffic would be prohibited, reducing the potential for traffic incidents associated with conflicting traffic movements.

NSW Long Term Transport Master Plan 2012

The Long Term Transport Master Plan (Transport for NSW, 2012) outlines planned and coordinated actions to meet the challenges of the NSW transport system, including the road network, to the year 2032. In particular, it identifies the need to develop new transport connections to areas that support the South West Growth
Centre (now part of WSPGA) and to complete the Western Sydney Employment Area (now part of the WSPGA) arterial road network.

The project would support the recommendations in the master plan as it would cater for predicted increases in traffic and provide accessibility into the WSPGA and the SWPLRA.

**NSW State Infrastructure Strategy 2012**

The State Infrastructure Strategy (NSW Government, 2012a) sets out the State Government’s commitment to infrastructure delivery and reform initiatives to December 2017. The strategy notes the need for new transport infrastructure for the North West Growth Area and WSPGA.

While the strategy does not specifically identify the project, the State Infrastructure Strategy Update (Infrastructure NSW, 2014) notes that planning for the western Sydney airport at Badgerys Creek is proceeding and recommends that future transport corridors be constructed to connect the airport to the wider Sydney metropolitan area.

The project aligns with the State Infrastructure Strategy Update as it would deliver on infrastructure commitments made in the strategy to cater for freight and for projected population growth in the region.

**NSW State Freight Expenditure and Investment Plan**

The NSW Key Freight Routes Road Expenditure and Investment Plan (Transport and Infrastructure Council, 2016) was prepared to provide transparency around future road expenditure and funding. The plan identifies the need for a motorway to provide freight access to the planned western Sydney airport site (referred to as the ‘Western Sydney Airport Motorway, M7 – The Northern Road’). The proposed M12 Motorway would satisfy this need.

**Western Sydney Infrastructure Plan**

The Western Sydney Infrastructure Plan (WSIP) was prepared to support the development of a western Sydney airport at Badgerys Creek, WSPGA and the SWPLRA. The plan consists of the following road projects:

- The Northern Road upgrade between The Old Northern Road, Narellan and Jamison Road, South Penrith
- Bringelly Road upgrade between The Northern Road and Camden Valley Way
- New M12 Motorway between the M7 Motorway and The Northern Road generally parallel with the Elizabeth Drive alignment
- Werrington Arterial Road
- Local road upgrades near the planned Western Sydney Airport, to be proposed and managed by local councils.

The proposed western Sydney airport at Badgerys Creek would need to be supported by a quality surface transport network to ensure the efficient movement of passengers, employees and freight. The proposed road upgrades would provide better road linkages within the western Sydney region and benefit the region’s growing population by reducing commuting times.
Western Sydney Priority Growth Area

The M12 Motorway study area falls within the Western Sydney Priority Growth Area (WSPGA), located either side of Elizabeth Drive. The NSW Government is investigating opportunities for new jobs, homes and services around the planned western Sydney airport at Badgerys Creek and is preparing a draft Land Use and Infrastructure Strategy to guide new infrastructure investment, identify new homes and jobs close to transport, and coordinate the delivery of services in the area. The strategy is anticipated to be completed later in 2016.

While the land use strategy has yet to be finalised, the previous Broader Western Sydney Employment Area Draft Structure Plan 2013 identifies the Elizabeth Drive corridor as the main east – west arterial road catering to local traffic. The M12 Motorway would replace Elizabeth Drive as the key arterial corridor; however, Elizabeth Drive would retain its local and regional function, providing access to, and support for, the WSPGA.

A Plan for Growing Sydney

A Plan for Growing Sydney (Department of Planning and Environment, 2014 – previously the Draft Metropolitan Strategy for Sydney 2031) lays the strategic foundation for the city to respond to a growing population with changing needs. The plan has been prepared in conjunction with the NSW Long Term Master Plan (TfNSW, 2012) and the State Infrastructure Strategy (Infrastructure NSW, 2012) to fully integrate land use and infrastructure outcomes. It includes a vision for transforming the productivity of western Sydney through growth and investment.

The project supports this plan as it would deliver infrastructure for the planned western Sydney airport, the WSPGA and the SWPLRA. 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

The Greater Sydney Commission has been 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 six ‘districts’ to connect local planning with the longer-term metropolitan planning for Greater Sydney. This would be a big picture approach to better coordinate State and local government planning.

The study area for the project encompasses two districts:

- West District – this includes the Blue Mountains, Hawkesbury and Penrith council areas
- South West District – this includes the Camden, Campbelltown, Fairfield, Liverpool and Wollondilly council areas.

District plans would be developed for each district to direct the future planning. These Draft district plans are due to be released by the end of 2016.
Sydney South West Sub-regional Strategy 2009
The Sydney South West Sub-regional Strategy (NSW Government, 2007) sets out the vision for the management and development of the sub-region to 2031 by providing a framework for the long-term development of the area, guiding government investment and linking local and State planning issues.

The strategy recognises the need for, and importance of extending and upgrading transport networks to connect the SWPLRA to existing centres. A key direction of the strategy is to extend transport networks to connect the SWPLRA to existing centres. The strategy recognises the M12 Motorway as a key road to be delivered.

The project supports the strategy as it would improve the capacity of the road network to support future growth particularly in the WSPGA and the SWPLRA.

Sydney’s Cycling Future 2013
Sydney’s Cycling Future (Transport for NSW, 2013) presents a new direction in the way cycling is planned, prioritised and provided for in Sydney by:

- Investing in separated cycle paths and providing connected bicycle networks to major centres and transport interchanges
- Promoting better use of the existing network
- Engaging with stakeholders across government, councils, developers and bicycle users.

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.
3 Existing environment

3.1 Study area

The project is required to provide access to the planned western Sydney airport at Badgerys Creek, with the draft airport layout facilitating access from the north. The study area for the project has been developed generally around Elizabeth Drive, connecting from The Northern Road to the M7 Motorway (refer to Figure 3-1).

Elizabeth Drive is bounded to the north by the Western Sydney Priority Growth Area (WSPGA) and the suburbs of Mount Vernon and Cecil Park. It is bounded to the south, by the planned western Sydney airport at Badgerys Creek, the WSPGA, the suburbs of Kemps Creek and Badgerys Creek and the Western Sydney Parklands.

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 of the study area, where it passes through the floodplains associated with Cosgroves Creek, Oaky Creek, Badgerys Creek, South Creek and Kemps Creek. There are also numerous farm dams in the area.

Land use in the study area is predominantly semi-rural and include residential, agricultural, recreational, commercial and industrial land uses. The main population centres are the suburbs of Kemps Creek, Mount Vernon and Horsley Park.

Agricultural land uses include poultry farming, tomato and cucumber farms and commercial nurseries.

Recreational and community facilities include schools, the Kemps Creek Sporting and Bowling Club, the Western Sydney Parklands (including the Wylde Mountain Bike Trail), Kemps Creek Nature Reserve and the Sydney International Shooting Centre.

Commercial uses are mainly associated with the Kemps Creek village 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 assets through the study area including the M7 Motorway, Elizabeth Drive, Mamre Road, Luddenham Road, major electrical infrastructure and the Sydney Water Upper Canal system.
Figure 3-1 M12 Motorway study area

Legend
- M12 study area
- Nature Reserve
- Western Sydney airport at Badgerys Creek
- Western Sydney Parklands
- Notable facilities
- Creek

Source: Nearmap, LPI, Aurecon

M12 Strategic Route Options Analysis Preferred corridor route report

FIGURE 3-1: M12 Motorway study area
3.2 Biodiversity

The biodiversity environment of the study area is outlined in this section. Further information on the biodiversity environment in the study area is provided in Appendix A of this report.

3.2.1 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 3-2. These biodiversity features include seven threatened ecological communities listed on the NSW Threatened Species Conservation Act 1995 (TSC Act) as Vulnerable Ecological Communities (VEC), Endangered Ecological Communities (EEC) or Critically Endangered Ecological Communities (CEEC). The communities are:

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

There are also four vegetation communities with the potential to meet criteria under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The communities are:

- Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (EEC)
- Cooks River / Castlereagh Ironbark Forest in the Sydney Basin Bioregion (CEEC)
- Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (CEEC)
- Western Sydney Dry Rainforest and Moist Woodland on Shale (CEEC).

3.2.2 Threatened species

A search of threatened species within the study area was carried out on the Atlas of NSW Wildlife database and on the Matters of National Environmental Significance (MNES) Protected Matters Search Tool.

The study area includes 30 threatened fauna species that have either been recorded or are known to occur. Threatened fauna species of concern are:

- Varied Sittella (listed as vulnerable under the TSC Act) – there is one record in the north of the study area to the east of The Northern Road, one along Elizabeth Drive, three to the west of Kemps Creek Nature Reserve and two along the M7 Motorway at the Elizabeth Drive interchange
- Microbats (*Mormopterus norfolkensis* and *Scoteanax ruepellii*) (both listed as vulnerable under the TSC Act) – there are eight records within the study area, mainly occurring in and around the Western Sydney Parklands
- Cumberland Plain Land Snail (listed as endangered under the TSC Act) – there are 49 records within the study area, mainly occurring within Cumberland Plain Woodland associated with Kemps Creek Nature Reserve and the Western Sydney Parklands, as well as within the Cooks River Castlereagh Ironbark Forest south of Elizabeth Drive next to Bill Anderson Park

- Grey-headed Flying-fox (listed as vulnerable under the TSC Act and the EPBC Act) – there is one record at Kemps Creek Nature Reserve. This is a broad-ranging species that could occur across the study area, most likely in the more vegetated eastern half.

The study area includes 11 threatened flora species that have either been recorded or are known to occur. Of these, the threatened flora species likely to occur are:

- *Dillwynia tenuifolia* (listed endangered population (Kemps Creek) under the TSC Act) – occurring mainly in Cooks River Castlereagh Ironbark Forest (EEC) south of Elizabeth Drive next to Bill Anderson Park

- *Acacia pubescens* (listed as vulnerable under the TSC Act and the EPBC Act) – there are seven records within the study area, all near Kemps Creek Public School and Bill Anderson Park

- *Grevillea juniperina subsp. juniperina* (listed as vulnerable under the TSC Act) – there is one record near Bill Anderson Park

- *Grevillea parviflora subsp. parviflora* (listed as vulnerable under the TSC Act and EPBC Act) – there are 12 records concentrated at Kemps Creek in the Cooks River Castlereagh Ironbark Forest (EEC) near Bill Anderson Park

- *Persoonia nutans* (listed as endangered under the TSC Act and the EPBC Act) – there are eight records, mainly near Kemps Creek and one along South Creek to the north of Elizabeth Drive

- *Pimelea spicata* (listed as endangered under the TSC Act and the EPBC Act) – there are two records near the Luddenham Road / Elizabeth Drive intersection and near the end of Brolen Way

- *Pultenaea parviflora* (listed as endangered under the TSC Act and vulnerable under the EPBC Act) – there are 15 records concentrated around Kemps Creek in the Cooks River Castlereagh Ironbark Forest (EEC), near Bill Anderson Park, and one record on Elizabeth Drive towards the western end of the study area.

An assessment of likelihood of occurrence was made for the 30 threatened fauna species and 11 threatened flora species. There are a number of other threatened species that have the potential to occur in the study area. This assessment was based on database records, suitable habitat in the study area and professional judgement. Those species with a likelihood of occurrence in the study area are detailed in Table 3-1.

Four 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 to occur on the site, but insufficient information to categorise the species as likely or unlikely to occur

- Unlikely – there is a very low to low probability that a species uses the site.
Figure 3-2 Biodiversity features

Legend
- M12 study area
- Priority conservation lands
- Non-certified land
- Threatened fauna
- Threatened flora

Endangered Ecological Community
- Castlereagh Scribbly Gum Woodland
- Shale Gravel Transition Forest
- Cockes River / Castlereagh Ironbark Forest

Other vegetation
- Cumberland Plain Woodland
- Mud Shale Woodland
- River-flat Eucalypt Forest

Source: Ecological, Neamap, LPI, Aurecon

Projection: GDA 1994 MGA Zone 56

M12 Strategic Route Options Analysis Preferred corridor route report

FIGURE 3-2: Biodiversity features
<table>
<thead>
<tr>
<th>Scientific name</th>
<th>Common name</th>
<th>TSC Act</th>
<th>EPBC Act</th>
<th>Habitat</th>
<th>Likelihood of occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthochaera phrygia</td>
<td>Regent Honeyeater</td>
<td>E4A</td>
<td>E</td>
<td>Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of <em>Casuarina cunninghamiana</em> (River Oak).</td>
<td>Potential</td>
</tr>
<tr>
<td>Apus pacificus</td>
<td>Fork-tailed Swift</td>
<td>P</td>
<td>C,J,K,</td>
<td>Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.</td>
<td>Potential</td>
</tr>
<tr>
<td>Ardea ibis</td>
<td>Cattle Egret</td>
<td>P</td>
<td>C,J,</td>
<td>Grassland, wooded land and terrestrial wetland.</td>
<td>Known</td>
</tr>
<tr>
<td>Callocephalon fimbriatum</td>
<td>Gang-gang Cockatoo</td>
<td>V</td>
<td></td>
<td>Tall mountain forests and woodland in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodland, and urban areas.</td>
<td>Potential</td>
</tr>
<tr>
<td>Chthonicola sagittata</td>
<td>Speckled Warbler</td>
<td>V</td>
<td></td>
<td><em>Eucalyptus</em>-dominated communities with a grassy understorey and sparse shrub layer, often on rocky ridges or in gullies.</td>
<td>Likely</td>
</tr>
<tr>
<td>Daphoenositta chrysoptera</td>
<td>Varied Sittella</td>
<td>V</td>
<td></td>
<td>Inhabits eucalypt forests and woodland, mallee and <em>Acacia</em> woodland.</td>
<td>Known</td>
</tr>
<tr>
<td>Dasyurus maculatus</td>
<td>Spotted-tailed Quoll</td>
<td>V</td>
<td>E</td>
<td>Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Ephippiorhynchus asiaticus</td>
<td>Black-necked Stork</td>
<td>E1</td>
<td></td>
<td>In NSW, floodplain wetlands of the major coastal rivers are key habitat. Also minor floodplains, coastal sandplain wetlands and estuaries.</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Falco subniger</td>
<td>Black Falcon</td>
<td>V</td>
<td></td>
<td>Woodland, shrubland and grassland, especially riparian woodland and agricultural land. Often associated with streams or wetlands.</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Falsistrellus</td>
<td>Eastern False Pipistrelle</td>
<td>V</td>
<td></td>
<td>Tall (higher than 20 m), moist habitats.</td>
<td>Potential</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC Act</td>
<td>EPBC Act</td>
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</tr>
<tr>
<td>tasmaniensis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gallinago hardwickii</td>
<td>Latham's Snipe</td>
<td>P</td>
<td>C,J,R, Mar</td>
<td>Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grassland or heathland.</td>
<td>Potential</td>
</tr>
<tr>
<td>Glossopsitta pusilla</td>
<td>Little Lorikeet</td>
<td>V</td>
<td></td>
<td>Dry, open eucalypt forest and woodland, including remnant woodland patches and roadside vegetation.</td>
<td>Likely</td>
</tr>
<tr>
<td>Haliaeetus leucogaster</td>
<td>White-bellied Sea-Eagle</td>
<td>P</td>
<td>C</td>
<td>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.</td>
<td>Likely</td>
</tr>
<tr>
<td>Hieraetus morphnoides</td>
<td>Little Eagle</td>
<td>V</td>
<td></td>
<td>Open eucalypt forest, woodland or open woodland, including sheoak or Acacia woodland and riparian woodland of interior NSW.</td>
<td>Known</td>
</tr>
<tr>
<td>Lathamus discolor</td>
<td>Swift Parrot</td>
<td>E1</td>
<td>E</td>
<td>Box-ironbark forest and woodland.</td>
<td>Known</td>
</tr>
<tr>
<td>Limosa</td>
<td>Black-tailed Godwit</td>
<td>V</td>
<td>C,J,K</td>
<td>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.</td>
<td>Potential</td>
</tr>
<tr>
<td>Litoria aurea</td>
<td>Green and Golden Bell Frog</td>
<td>E1</td>
<td>V</td>
<td>Marshes, dams and stream-sides, particularly those containing Typha spp. (bullrushes) or Eleocharis spp. (spikerushes). Some populations occur in highly disturbed areas.</td>
<td>Potential</td>
</tr>
<tr>
<td>Melanodryas cucullata</td>
<td>Hooded Robin (south-eastern form)</td>
<td>V</td>
<td></td>
<td>Open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Meridolum comeovirens</td>
<td>Cumberland Plain Land Snail</td>
<td>E1</td>
<td></td>
<td>Primarily inhabits Cumberland Plain Woodland. Also known in Shale Gravel Transition Forests, Castlereagh Swamp Woodland and the margins of River-flat Eucalypt Forest.</td>
<td>Known</td>
</tr>
<tr>
<td>Merops ornatus</td>
<td>Rainbow Bee-eater</td>
<td>P</td>
<td>J</td>
<td>Open forests and woodland, shrublands, farmland, areas of</td>
<td>Likely</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC Act</td>
<td>EPBC Act</td>
<td>Habitat</td>
<td>Likelihood of occurrence</td>
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<td>-------------------------------------------------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Miniopterus schreibersii</td>
<td>Eastern Bent-wing Bat</td>
<td>V</td>
<td></td>
<td>human habitation, inland and coastal sand dune systems, heathland, sedgeland, vine forest and vine thicket.</td>
<td></td>
</tr>
<tr>
<td>Mormopterus norfolkensis</td>
<td>Eastern Freetail Bat</td>
<td>V</td>
<td></td>
<td>Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.</td>
<td>Likely</td>
</tr>
<tr>
<td>Myotis macropus</td>
<td>Southern Myotis</td>
<td>V</td>
<td></td>
<td>Dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.</td>
<td>Known</td>
</tr>
<tr>
<td>Petroica phoenicea</td>
<td>Flame Robin</td>
<td>V</td>
<td></td>
<td>Forages in water bodies (including streams, or lakes or reservoirs) and fringing areas of vegetation within 20 m.</td>
<td>Likely</td>
</tr>
<tr>
<td>Phascolarctos cinereus</td>
<td>Koala</td>
<td>V</td>
<td>V</td>
<td>Breeds in upland tall moist eucalypt forests and woodland. In winter it uses dry forests, open woodland, heathland, pastures and native grasslands. Occasionally occurs in temperate rainforest, herbfields, heathland, shrublands and sedgeland at high altitudes.</td>
<td>Likely</td>
</tr>
<tr>
<td>Plegadis falcinellus</td>
<td>Glossy Ibis</td>
<td>P</td>
<td>C</td>
<td>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.</td>
<td>Likely</td>
</tr>
<tr>
<td>Pteropus poliocephalus</td>
<td>Grey-headed Flying-fox</td>
<td>V</td>
<td>V</td>
<td>Subtropical and temperate rainforest, tall sclerophyll forest and woodland, heathland and swamp as well as urban gardens and cultivated fruit crops.</td>
<td>Known</td>
</tr>
<tr>
<td>Scoteanax rueppellii</td>
<td>Greater Broad-nosed Bat</td>
<td>V</td>
<td></td>
<td>Woodland, moist and dry eucalypt forest and rainforest.</td>
<td>Known</td>
</tr>
<tr>
<td>Stagonopleura guttata</td>
<td>Diamond Firetail</td>
<td>V</td>
<td></td>
<td>Grassy eucalypt woodland, open forest, mallee, natural temperate grassland, secondary derived grassland, riparian</td>
<td>Likely</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC Act</td>
<td>EPBC Act</td>
<td>Habitat</td>
<td>Likelihood of occurrence</td>
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</tr>
<tr>
<td><em>Tringa nebularia</em></td>
<td>Common Greenshank</td>
<td>P</td>
<td>C,J,K</td>
<td>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).</td>
<td>Potential</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>areas and lightly wooded farmland.</td>
<td></td>
</tr>
<tr>
<td><strong>Flora</strong></td>
<td></td>
<td></td>
<td></td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><em>Acacia pubescens</em></td>
<td>Downy Wattle</td>
<td>V</td>
<td>V</td>
<td>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.</td>
<td>Known</td>
</tr>
<tr>
<td><em>Cynanchum elegans</em></td>
<td>White-flowered Wax Plant</td>
<td>E1</td>
<td>E</td>
<td>Dry rainforest; littoral rainforest; <em>Leptospermum laeavigatum-Banksia integrifolia subsp. integrifolia</em> (Coastal Tea-tree–Coastal Banksia) coastal scrub; <em>Eucalyptus tereticornis</em> (Forest Red Gum) or <em>Corymbia maculata</em> (Spotted Gum) open forest and woodland; and <em>Melaleuca armillaris</em> (Bracelet Honeymyrtle) scrub.</td>
<td>Potential</td>
</tr>
<tr>
<td><em>Dillwynia tenuifolia</em></td>
<td>Dillwynia tenuifolia, Kemps Creek</td>
<td>E2,V</td>
<td></td>
<td>Transition from Castlereagh Ironbark Forest to Castlereagh Scribbly Gum Woodland.</td>
<td>Known</td>
</tr>
<tr>
<td><em>Dillwynia tenuifolia</em></td>
<td></td>
<td>V</td>
<td></td>
<td>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.</td>
<td>Known</td>
</tr>
<tr>
<td><em>Eucalyptus benthamii</em></td>
<td>Camden White Gum</td>
<td>V</td>
<td>V</td>
<td>Open forest. Requires a combination of deep alluvial sands and a flooding regime.</td>
<td>Unlikely</td>
</tr>
<tr>
<td><em>Grevillea juniperina</em> subsp.*</td>
<td>Juniper-leaved Grevillea</td>
<td>V</td>
<td></td>
<td>Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel</td>
<td>Known</td>
</tr>
<tr>
<td>Scientific name</td>
<td>Common name</td>
<td>TSC Act</td>
<td>EPBC Act</td>
<td>Habitat</td>
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<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>juniperina</td>
<td></td>
<td></td>
<td></td>
<td>Transition Forest, on reddish clay to sandy soils derived from Wianamatta Shale and tertiary alluvium.</td>
<td></td>
</tr>
<tr>
<td>Grevillea parviflora subsp.</td>
<td>Small-flower Grevillea</td>
<td>V</td>
<td>V</td>
<td>Heath and shrubby woodland to open forest on sandy or light clay soils usually over thin shales.</td>
<td></td>
</tr>
<tr>
<td>Marsdenia viridiflora R. Br.</td>
<td>Marsdenia viridiflora</td>
<td>E2</td>
<td></td>
<td>Vine thickets and open shale woodland.</td>
<td></td>
</tr>
<tr>
<td>Pultenaea parviflora</td>
<td></td>
<td>E1</td>
<td>E</td>
<td>Well-structured clay soils. <em>Eucalyptus moluccana</em> (Grey Box) communities and areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.</td>
<td></td>
</tr>
<tr>
<td>Pimelea spicata</td>
<td>Spiked Rice-flower</td>
<td>E1</td>
<td>E</td>
<td>Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities are next to Castlereagh Scribbly Gum Woodland.</td>
<td></td>
</tr>
</tbody>
</table>

*EPBC Act Status: V - Vulnerable species, E - Endangered species, 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
3.2.3 Conservation areas

The WSPGA 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. This includes 162 hectares of extant native vegetation on non-certified land.

The study area also includes four areas, covering around 375 hectares, identified as a ‘priority for conservation’ as part of the Cumberland Plain Recovery Plan. One of these areas includes Kemps Creek Nature Reserve, which is in the south of the study area, next to the Western Sydney Parklands. However, the majority of the areas include a mix of tenure (both public and privately owned), including parts of the Western Sydney Parklands. 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.

There are also a number of regional habitat corridors, mostly associated with the riparian areas of the rivers and creeks that cross the area. These habitat corridors include South Creek, Badgerys Creek, Oaky Creek and Cosgroves Creek. Many of the corridors include threatened vegetation and potential fish habitat.

3.2.4 Western Sydney Parklands

The Western Sydney Parklands are located at the eastern end of the study area. The 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 Parklands since its establishment, including the Greening Western Sydney Program. This program started in 1992, with revegetation of Cecil Hills to Kemps Creek (in the M12 Motorway study area) occurring in 1998 (Western Sydney Parklands Trust [WSPT], 2013).

A 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 Parklands for recreation and education, community facilities, biodiversity conservation, cultural community awareness, sustainable urban farming and water management (WSPT, 2010).

The Parklands Plan of Management identifies areas along the length of the Parklands (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 Parklands and about 1000 hectares of Cumberland Plain Woodlands have been regenerated.

As part of the enhancement of biodiversity within the 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). These biobanking sites are shown on Figure 3-5. In addition, through the Wylde Mountain Bike Trail, there is a carbon offset site.

Further information is provided in the land use section of the report (section 3.5).
3.3 Aboriginal heritage

Aboriginal heritage is outlined in this section. Further information on the Aboriginal heritage environment in the study area is provided in Appendix B of this report.

3.3.1 Historical context

Cumberland Plain

The Cumberland Plain has been the subject of intensive archaeological investigation. To date, hundreds of Aboriginal sites have been recorded in the area. Most of these 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) during archaeological survey before development.

The picture of Aboriginal use 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. Large-scale research projects on the Cumberland Plain include Kohen's 1986 doctoral research on the western Cumberland Plain, Smith's major compilation and analysis of data for the northern Plain (Smith, 1989), McDonald and Rich's investigations at Rouse Hill (1993), and large-scale surveys for the western Sydney airport at Badgerys Creek (Navin Officer Heritage Consultants [NOHC], 1997).

Predictive model

Several predictive models have been developed to explain Aboriginal site locations on the Cumberland Plain. The following predictive statements and trends have been identified from previous investigations:

- Artefacts make up the main site type
- Other site types and features are likely to include scarred trees, potential archaeological deposits and stone procurement or quarry sites if exposures of suitable rock occur
- The occurrence of surface and subsurface stone artefacts is variable in all landforms types
- Landscape variables which determine access to fresh water and to other exploitable resources are a strong determinant of site frequency together with artefact density and diversity
- Low surface artefact incidences may not accurately reflect the composition or density of subsurface archaeological deposits. Some areas with few or no surface artefacts have been found to contain archaeological deposits with relatively higher artefact densities and areal incidence
- Intact archaeological material may remain below the plough zone (ie below the top 25 centimetres of soil)
- Aboriginal sites are most frequently located in near permanent water courses on creek banks, alluvial flats and lower hill slopes (basal slopes), or on high ground such as ridges and knolls, and within range of food resources and the raw materials for manufacturing tools
• Surface and subsurface artefact occurrences are mostly situated in relative proximity to permanent water sources such as creeks and rivers and wetland basins on alluvial flats. The majority of sites are located within 100 metres of a fresh water source.

• Stream order may provide a predictive framework for the incidence and nature of associated archaeological deposits (JMCHM 2005a):
  • Fourth and fifth order streamlines are likely to be associated with more complex and possibly stratified archaeological evidence, which reflects more permanent and repeated occupation.
  • Third order streamlines are likely to be associated with evidence of frequent occupation such as knapping floors. Higher artefact densities are found in the lower reaches of tributary creeks.
  • Second order streamlines are likely to be associated with sparse archaeological evidence, probably related to occasional use and/or occupation.
  • First order streamlines are likely to be associated with sparse archaeological evidence, and this may be indistinguishable from, or may define, a background level of artefact incidence.

• Creek junctions could provide a point of focus for site activity. The size of the junction could influence the size and complexity of sites (McDonald and Rich, 1993; JMCHM 1997, 2005).

• High value potential archaeological deposits are most likely to be located on aggrading landforms within valley floor contexts and fringing basal slopes, on locally elevated and well-drained ground.

• There is a general trend for relatively elevated landforms such as ridge and spurline crests to contain low site densities and artefact incidences; however sites with large numbers of artefacts may still be present on ridge tops and hill crests.

• Sites situated in alluvial and aggrading sedimentary or colluvial contexts retain the potential to include high value stratified archaeological deposits.

• At a micro-topographic level, artefact distributions would most likely be situated on locally elevated, well-drained ground with relatively level or low gradients. Micro-topographic contexts which are both low-lying and poorly drained, or comprise high gradient slopes, are likely to contain no, or very low, artefact densities.

• Artefact assemblages generally comprise a small proportion of formal tool types with the majority of assemblages dominated by unretouched flakes and debitage.

• Excavations along higher order stream lines (particularly South Creek and Ropes Creek) have detected extensive archaeological deposits, thought to be the result of repeated occupation events, within about 150 metres of the stream banks (eg Brayshaw McDonald Pty Ltd, 1995; Total Earth Care Pty Ltd, 2007).

• Silcrete is the dominant raw material evident at most surface and subsurface artefact distributions, followed by tuff/chert. Substantial sources of silcrete, mostly associated with tertiary gravel deposits, are located in the north western Cumberland Plain at places such as St Marys, Plumpton Ridge, Marsden Park, Schofields, Riverstone, Deans Park, Llandilo and Ropes Creek. However, a low areal incidence of surface silcrete gravels occurs across large areas of the Cumberland Plain and may have served as a low-key source of workable stone for knapping. Silcrete cobbles and amorphous naturally fractured gravels have been noted during surveys and excavations at Luddenham and Erskine Park (eg Dallas 1988; Brayshaw 2005; NOHC 2005; Steele 2007).
• Single trees and stands of remnant older growth vegetation retain the potential for evidence of Aboriginal modification (mostly scars resulting from the removal of bark). The large-scale nature of historical vegetation clearance across the Cumberland Plain means that old-growth remnants are now rare.

• Grinding grooves (shallow linear grooves produced during the manufacture of ground edges on stone artefacts such as axes) are a rare site type on the Cumberland Plain. They may occur where Minchinbury sandstone is exposed.

Areas of predicted Aboriginal archaeological sensitivity in the study area are shown on Figure 3-3.

3.3.2 Heritage recordings in the study area

Database and previous report searches

A search of the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) was conducted on 8 September, 2015. This was combined with review of relevant heritage reports. On the AHIMS system, there are 55 Aboriginal heritage items/recordings within the M12 Motorway study area, and another five Aboriginal heritage items/recordings near the M12 Motorway study area.

The items/recordings within and near the study area are:

• Twenty-nine stone artefact scatters
• Twenty isolated finds (single stone artefacts)
• One grinding groove site
• One modified tree
• Two subsurface stone artefact scatter sites – previously Potential Archaeological Deposits
• Two sites with stone artefacts and Potential Archaeological Deposits
• Five Potential Archaeological Deposits.

Sites recorded as occurring in the M12 Motorway study area are presented in Table 3-2 (this includes AHIMS listed sites and sites identified from previous heritage studies that are unlisted). The site locations are shown in Figure 3-3.
FIGURE 3-3: Heritage features

Legend
- M12 study area
- Aboriginal site
- Non-Aboriginal site
- Cultural landscapes
  - Archaeological sensitivity
  - State heritage register
  - Local heritage item

Source: Navin Officer, Neamap, LPI, Aurecon

Projection: GDA 1994 MGA Zone 55

Note: Aboriginal heritage site locations are general in nature to protect exact locations

M12 Strategic Route Options Analysis Preferred corridor route report
Table 3-2 Heritage sites recorded in the M12 Motorway study area

<table>
<thead>
<tr>
<th>AHIMS site ID</th>
<th>Site name</th>
<th>Site type</th>
<th>Recorder</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-5-0214</td>
<td>Kemps Creek</td>
<td>artefact scatter</td>
<td>Haglund (1978)</td>
</tr>
<tr>
<td>45-5-0215</td>
<td>South Creek</td>
<td>grinding groove</td>
<td>Haglund (1978)</td>
</tr>
<tr>
<td>45-5-0496</td>
<td>Fleurs 1</td>
<td>artefact scatter</td>
<td>Sydney University (1984-85)</td>
</tr>
<tr>
<td>45-5-0528</td>
<td>Fleurs 2</td>
<td>artefact scatter</td>
<td>Sydney University (1984-85)</td>
</tr>
<tr>
<td>45-5-2008</td>
<td>SC4</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2009</td>
<td>SC5</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2010</td>
<td>SC6</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2011</td>
<td>SC3</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2012</td>
<td>SC2</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2013</td>
<td>SC1</td>
<td>isolated find</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2014</td>
<td>CPSC1</td>
<td>artefact scatter</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2015</td>
<td>CPSC2</td>
<td>artefact scatter</td>
<td>NOHC (1997a)</td>
</tr>
<tr>
<td>45-5-2308</td>
<td>P-CP8</td>
<td>artefact scatter</td>
<td>Brayshaw &amp; Rich (1995)</td>
</tr>
<tr>
<td>45-5-2309</td>
<td>BC/ED1</td>
<td>artefact scatter</td>
<td>Brayshaw (1995)</td>
</tr>
<tr>
<td>45-5-2310</td>
<td>KC/ED2</td>
<td>artefact scatter</td>
<td>Brayshaw (1995)</td>
</tr>
<tr>
<td>45-5-2419</td>
<td>IFSC 9; Cecil Park</td>
<td>isolated find</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2427</td>
<td>IFSC 10; Cecil Park</td>
<td>isolated find</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2428</td>
<td>IFSC 8; Cecil Park</td>
<td>isolated find</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2429</td>
<td>CPSC 3; Cecil Park</td>
<td>artefact scatter</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2430</td>
<td>IFSC 7; Cecil Park</td>
<td>isolated find</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2426</td>
<td>IFSC 11; Cecil Park</td>
<td>isolated find</td>
<td>NOHC (1997b)</td>
</tr>
<tr>
<td>45-5-2561</td>
<td>GLC1</td>
<td>artefact scatter</td>
<td>Nicholson (1999)</td>
</tr>
<tr>
<td>45-5-2562</td>
<td>EG6</td>
<td>artefact scatter</td>
<td>Nicholson (1999)</td>
</tr>
<tr>
<td>45-5-2563</td>
<td>DLC2</td>
<td>artefact scatter</td>
<td>Nicholson (1999)</td>
</tr>
<tr>
<td>AHIMS site ID</td>
<td>Site name</td>
<td>Site type</td>
<td>Recorder</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------</td>
<td>--------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>45-5-2722</td>
<td>PAD-OS-6</td>
<td>subsurface artefact scatter</td>
<td>Mills</td>
</tr>
<tr>
<td>45-5-2723</td>
<td>PAD-OS-5</td>
<td>subsurface artefact scatter</td>
<td>Mills</td>
</tr>
<tr>
<td>45-5-2724</td>
<td>PAD-OS-3</td>
<td>subsurface artefact scatter</td>
<td>Mills</td>
</tr>
<tr>
<td>45-5-2793</td>
<td>CP-OS-4</td>
<td>subsurface artefact scatter</td>
<td>Mills</td>
</tr>
<tr>
<td>45-5-2748</td>
<td>CH-ST-1</td>
<td>modified tree</td>
<td>Mills</td>
</tr>
<tr>
<td>45-5-2762</td>
<td>B95</td>
<td>artefact scatter</td>
<td>NOHC (1997c)</td>
</tr>
<tr>
<td>45-5-2763</td>
<td>B87</td>
<td>artefact scatter</td>
<td>NOHC (1997c)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*note this site is incorrectly mapped on AHIMS and occurs outside the study area</td>
</tr>
<tr>
<td>45-5-2976</td>
<td>SH4 formerly PAD 9 Hoxton Park</td>
<td>PAD</td>
<td>JMCHM (2001)</td>
</tr>
<tr>
<td>45-5-3294</td>
<td>PP-5</td>
<td>artefact scatter</td>
<td>Rawson</td>
</tr>
<tr>
<td>45-5-3106</td>
<td>Kemps Creek (KC PAD 1)</td>
<td>PAD/artefact</td>
<td>JMCHM (2001)</td>
</tr>
<tr>
<td>45-5-3802</td>
<td>Isolated Artefact 1 (Penrith)</td>
<td>isolated find</td>
<td>Dallas</td>
</tr>
<tr>
<td>45-5-3804</td>
<td>Isolated Artefact 4 (Penrith)</td>
<td>isolated find</td>
<td>Dallas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOHC (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NOHC (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>NOHC (2009)</td>
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<td>NOHC (2009)</td>
</tr>
<tr>
<td>45-5-3848</td>
<td>PAD1 (Liverpool)</td>
<td>PAD</td>
<td>JMCHM (2009)</td>
</tr>
<tr>
<td>45-5-3999</td>
<td>PAD 2001-6</td>
<td>PAD</td>
<td>AHMS</td>
</tr>
<tr>
<td>45-5-4000</td>
<td>Artefact Scatter PAD 2002-46</td>
<td>PAD/artefact</td>
<td>AHMS</td>
</tr>
<tr>
<td>45-5-4006</td>
<td>Artefact Scatter PAD 2007-4</td>
<td>PAD/artefact</td>
<td>AHMS</td>
</tr>
<tr>
<td>45-5-4007</td>
<td>Artefact Scatter 2008-4</td>
<td>artefact scatter</td>
<td>AHMS</td>
</tr>
<tr>
<td>45-5-4008</td>
<td>Isolated Object 2009-5</td>
<td>isolated find</td>
<td>AHMS</td>
</tr>
<tr>
<td>45-5-4009</td>
<td>Isolated Object 2010-5</td>
<td>isolated find</td>
<td>AHMS</td>
</tr>
</tbody>
</table>
Aboriginal heritage sites/ items identified in the field

During field investigations for the project, an attempt was made to re-find a number of sites that were identified from existing records. The results of these investigations are detailed in Appendix B. The investigations also identified five new Aboriginal heritage sites. These are detailed in Table 3-3.

Table 3-3 Field identified Aboriginal heritage sites/ items

<table>
<thead>
<tr>
<th>Site name</th>
<th>Site type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 A1</td>
<td>Surface artefact occurrence</td>
<td>The site is situated on a spur line overlooking Badgerys Creek. The artefacts found included:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• White quartz flake on a small pebble, 15 x 11 x 7 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Red silcrete core made on tabular shaped material, 38 x 25 x 14 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• White quartz core on a small pebble, 18 x 18 x 15 mm. The subsurface archaeological potential away from exposures and eroded surfaces is assessed to be high.</td>
</tr>
<tr>
<td>M12 A2</td>
<td>Surface artefact occurrence</td>
<td>The site is situated on a creek flat about 1 km south of the confluence of Badgerys Creek and South Creek. The artefact found was:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cream silcrete complete flake, 30 x 15 x 10 mm. The subsurface archaeological potential away from exposures and eroded surfaces is assessed to be high.</td>
</tr>
<tr>
<td>M12 A3</td>
<td>Surface artefact occurrence</td>
<td>The site is situated on an undulating creek flat about 130 m from Badgerys Creek. The artefact found was:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Red silcrete flake with retouch along right-hand margin towards the distal end, post depositional latitudinal break, 54 x 10 x 5 mm. The subsurface archaeological potential away from exposures and eroded surfaces is assessed to be high.</td>
</tr>
<tr>
<td>M12 A4</td>
<td>Surface artefact occurrence</td>
<td>The site is situated on the northern bank of South Creek. The artefacts found included:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Purple banded complete flake made from fine-grained siliceous material 22 x 15 x 10 mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Quartzite flaked piece with negative scars, one side cortical or other ambiguous fracture surface, made on a cobble stone, 90 x 55 x 25 mm. The subsurface archaeological potential away from exposures and eroded surfaces is assessed to be high.</td>
</tr>
</tbody>
</table>
### Site Name | Site Type | Description
--- | --- | ---
M12 A5 | Surface artefact occurrence | The subsurface archaeological potential away from exposures and eroded surfaces is assessed to be high. This site is situated on a slope of a low rise around 100 m east of Kemps Creek. The artefact found was:
- Red silcrete core with at least two negative parallel scars initiated from the same face and made on a non-cortical angular piece, 54 x 10 x 5 mm
The subsurface archaeological potential is assessed to be low.

### 3.3.3 Aboriginal land claims and native title
A parcel of land within the study area was subject to an Aboriginal land claim under the *Aboriginal Land Rights Act 1983*, lodged by Gandangara Local Aboriginal Land Council on 19 March 2008.

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

### 3.4 Non-Aboriginal heritage
Non-Aboriginal heritage is outlined in this section. Further information on the non-Aboriginal heritage environment in the study area is provided in Appendix B of this report.

#### 3.4.1 Early historical overview

**European exploration and settlement**

Europeans first entered the Nepean district, in 1788, 11 years before they returned to stay permanently. During 1788, the Governor, Arthur Phillip, led exploring parties to probe the outlying regions that had never been visited by Europeans. From a rise near the present Pennant Hills, Phillip first observed the Blue Mountains, but called the northern portion the Carmarthen Hills (after the Secretary of State for the British Foreign Office) and the southern portion the Lansdowne Hills. From the rising of these mountains he had no doubt a large river would be found. However, at that time his search for the river proved unsuccessful (Murray and White, 1988).

In June 1789, almost 18 months after the arrival of the First Fleet, Phillip’s predictions were confirmed. Captain Watkin Tench (Marine in charge of the new outpost at Rose Hill) led an expeditionary party to the banks of the Nepean River ‘through a country untrodden before by a European foot’ (Power, 1983).

The alluvial flats next to the Nepean River and the woodlands that occupied the rolling country of the Sydney hinterlands were quickly recognised as an essential agricultural and pastoral resource for the new colony. By the 1820s and 1830s most of the hinterland had been taken up by a patchwork of land grants. Large estates quickly developed through buying and selling, some controlled by absentee landlords, and others by families who established residential farms.
Roads
The M12 Motorway study area is situated around three early key access roads, Cowpasture Road in the east, The Northern Road in the west, and Elizabeth Drive, linking the two.

Cowpasture Road dates from a route surveyed in 1805 that provided a route south from Prospect to the Nepean Crossing and the self-selected pastures of the colony’s wild cattle (http://www.camdenhistory.org.au/).

Elizabeth Drive dates from the early 1800s and was originally constructed as a ‘corduroy’ road, using round logs as a base. It was established to provide access to the areas’ land grants and was originally known as the Orphan School Road as it extended west from the Orphan School in what is now Bonnyrigg. Its name was later changed to Mulgoa Road, in reference to its western extent, but subsequently changed again in 1952 to honour the visit of Queen Elizabeth II (http://penrithhistory.com/mt-vernon/).

Early settlers
The pattern of early European land ownership across the study area was dominated by a small number of individuals and their families, notably Wylde, Kemp, Bayly, Badgery, Piper, Johnston, Smith, Blaxland and Henderson.

Anthony Fenn Kemp was an officer in the NSW Corps and was in the vanguard of those who arrested Governor Bligh in 1808. Kemp received two land grants in the study area, 300 acres in 1810 (Parishes of Melville and Cabramatta), and 500 acres in 1820 (Parish of Melville). Kemp named his estate ‘Mount Vernon’, presumably after George Washington’s home in Virginia in the United States of America. Kemps Creek is named after him (SM&DHS, 2009).

In 1799, James Badgery and his wife Elizabeth arrived in the new colony. As Badgery had few financial resources he was not eligible for a grant of land so he leased property in Sydney and 11 acres on the Hawkesbury where he undertook intensive farming. By 1803, Badgery was granted 100 acres along the Hawkesbury.

After the floods of 1806, Badgery began looking for land elsewhere. He was granted 840 acres along South Creek and what would become Badgerys Creek, in the names of his three children, Ann, Henry and Andrew and his unborn child William. When Governor Macquarie confirmed the grant he refused William’s 200 acres and granted the 640 acres all in the name of James Badgery. He called his property Exeter Farm after his home town in England. James continued to expand his holdings, buying up other properties on what is now the southern side of Elizabeth Drive. These properties were subdivided in the 1880s as the Exeter Farms subdivision.

In November 1813, John Blaxland, (elder brother of Gregory Blaxland) was granted 6,710 acres of land between the Nepean River and Badgerys Creek which he named Luddenham after his former home in England. The residential and business focus of the estate was on the river at Wallacia. The remaining lands were used for grazing.

Nicholas Bayly, an officer in the NSW Corps, received two land grants in 1799 and 1800, totalling 566 acres at the ‘Eastern Farms’ and at Cabramatta. The latter he named ‘Bayly Park’. By 1814, he had established his family home there. After his death in 1823, Bayly Park (then 2500 acres) was purchased by Richard Jones who renamed the property ‘Fleurs’ (SM&DHS, 2009).
Industry
Early industries in the Liverpool area included a tanning pit on Orange Grove Road, brickfields on Orange Grove Road and along Brickmaker’s Creek, a steam mill and a windmill (Keating, 1996). One of the earliest shipbuilding yards was built on the Georges River near its junction with Williams Creek, where ships of up to 40 tons were built. A quarry almost opposite this property provided stone for the building of the Lansdowne Bridge.

The district continued as a farming village on the outskirts of Liverpool, and grapes are still grown in the area.

The arrival of the railway in 1856 encouraged local businessmen to start businesses in the area. J.H. Atkinson bought the estates of Collingwood and Sophienburgh and made the necessary improvements on these properties to induce teamsters to unload at Liverpool and send their loads to Sydney by rail. In the early 1900s there were about 40 families living in Badgerys Creek including the Nobbs, Freeburn, Shadlow and Dorahy families, who remained in the area until properties began to be resumed from 1986 for the planned western Sydney airport at Badgerys Creek.

3.4.2 Heritage items in the study area

Database and previous report searches
Heritage items listed on the State Heritage Inventory within and next to the M12 Motorway study area are shown in Table 3-4. There are 10 heritage recordings within the M12 Motorway study area and eight near the study area, including four within the Commonwealth-owned lands of the proposed airport site at Badgerys Creek.

Five recordings in the study area are listed on statutory registers. These are:
- The Sydney Water Supply Upper Canal System
- An inter-war house built in the Spanish Mission style
- The Luddenham Road Alignment
- The Sydney University McGarvie-Smith Farm
- The site of the former Fleurs radio telescope arrays.

Although the site of the Fleurs radio telescope arrays is listed on the Penrith Local Environmental Plan 2010 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. It is likely that the site is of national significance, and it therefore requires further assessment.
<table>
<thead>
<tr>
<th>Heritage Item Within the study area</th>
<th>Property description</th>
<th>Significance</th>
<th>LGA</th>
<th>SHI number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Canal System (Pheasants Nest Weir to Prospect Reservoir)</td>
<td>Utilities - Infrastructure</td>
<td>State (SHR) including Liverpool and Fairfield</td>
<td>Liverpool</td>
<td>5051481</td>
</tr>
<tr>
<td>Sydney Water Supply Upper Canal</td>
<td>Utilities – water supply</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970096</td>
</tr>
<tr>
<td>Liverpool Offtake Reservoir</td>
<td>Utilities - water supply</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970060</td>
</tr>
<tr>
<td>Inter-war Spanish Mission House</td>
<td>Residential</td>
<td>Local</td>
<td>Fairfield</td>
<td>1570069</td>
</tr>
<tr>
<td>Luddenham Road Alignment</td>
<td>Road</td>
<td>Local</td>
<td>Penrith</td>
<td>2260843</td>
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<tr>
<td>McGarvie-Smith Farm</td>
<td>Educational</td>
<td>Local</td>
<td>Penrith</td>
<td></td>
</tr>
<tr>
<td>The Fleurs Radio Telescope</td>
<td>Scientific / educational</td>
<td>Local</td>
<td>Penrith</td>
<td></td>
</tr>
<tr>
<td>Fibro building, McGarvie-Smith Farm Iron Shed</td>
<td>Agricultural - Built environment requires further investigation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McGarvie-Smith Farm The Big Chook</td>
<td>Agricultural - Promotional feature</td>
<td>Local</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Heritage Item Near the study area</th>
<th>Property description</th>
<th>Significance</th>
<th>LGA</th>
<th>SHI number</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘Bayley [Bayly] Park’</td>
<td>Residential</td>
<td>Local</td>
<td>Penrith</td>
<td>2260104</td>
</tr>
<tr>
<td>‘Fleurs Stud’ [Bayly Park] garden and tree avenue</td>
<td>Residential (cultural landscape)</td>
<td>Local</td>
<td>Penrith</td>
<td></td>
</tr>
<tr>
<td>Brick Farmhouse</td>
<td>Residential</td>
<td>Local</td>
<td>Penrith</td>
<td>2260106</td>
</tr>
<tr>
<td>Gateposts to Colesbrook</td>
<td>Residential</td>
<td>Local</td>
<td>Penrith</td>
<td>2260105</td>
</tr>
<tr>
<td>Road Bridge</td>
<td>Bridge</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970101</td>
</tr>
<tr>
<td>St. John’s Anglican Church Cemetery</td>
<td>Cemetery/ Graveyard</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970450</td>
</tr>
<tr>
<td>St. John’s Anglican Church Group incl church and cemetery</td>
<td>Churchyard Archaeological-Terrestrial</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970061</td>
</tr>
<tr>
<td>Badgerys Creek Public School</td>
<td>School</td>
<td>Local</td>
<td>Liverpool</td>
<td>1970043</td>
</tr>
</tbody>
</table>
Eight items are situated outside of, but near the northern boundary of the study area. These comprise the Bayly Park homestead (subsequently ‘Fleurs’), and gardens, a brick farmhouse on Aldington Road and remnant gateposts. The four remaining sites are located on the Commonwealth-owned lands of the planned western Sydney airport site; they are the St Johns Anglican Cemetery, Badgerys Creek Public School, St Johns Anglican Church group and Road Bridge. These last four items are still listed, however, moving forward, would be subject to the approval of the airport.

Field investigations
Five previously identified non-Aboriginal sites were inspected during the field investigations. These were:

- McGarvie Smith farm (comprising three previous recordings including the ‘fibro building’ and ‘farm iron shed’)
- Fleurs radio telescopes
- The ‘Big Chook’.

Five new recordings of non-Aboriginal heritage sites M12 H1 to M12 H5, were made during the field investigations (refer to Table 3-5). Sites M12 H2 and M12 H5 were identified during the desktop assessment as items ID6 and ID2 respectively.

Table 3-5 Newly identified non-Aboriginal heritage items

<table>
<thead>
<tr>
<th>ID</th>
<th>Name/description</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12 H1</td>
<td>South Creek Bridge</td>
<td>Local</td>
</tr>
<tr>
<td>M12 H2</td>
<td>Cecil Public School (and post office)</td>
<td>Potentially local</td>
</tr>
<tr>
<td>M12 H3</td>
<td>WW2 Era Airstrip (Fleurs Aerodrome)</td>
<td>Local</td>
</tr>
<tr>
<td>M12 H4</td>
<td>McMaster farm</td>
<td>State and/or National</td>
</tr>
<tr>
<td>M12 H5</td>
<td>Exeter farm estate house</td>
<td>Local and/or state</td>
</tr>
</tbody>
</table>

Potential non-Aboriginal heritage items
A review of early mapping and aerial photography of the study area identified potential non-Aboriginal heritage items that are unlisted on heritage registers. These comprise potential archaeological deposits and standing structures that may have heritage significance. The locations have not been verified through visual inspection and are indicative only. These items are outlined in Table 3-6 and shown in Figure 3-3.
Table 3-6 Potential non-Aboriginal heritage items

<table>
<thead>
<tr>
<th>ID</th>
<th>Name/description</th>
<th>Date</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cottage and sheds</td>
<td>1918</td>
<td>Crown plan C.3163.2030</td>
</tr>
<tr>
<td>5</td>
<td>Pennall (residence)</td>
<td>No date</td>
<td>Roll plan 4 – Roll Plan – LTO Charting Maps</td>
</tr>
<tr>
<td>4</td>
<td>Woodbine cottage</td>
<td>1982</td>
<td>DP58544</td>
</tr>
<tr>
<td>3</td>
<td>Cooloo (residence)</td>
<td>1866?</td>
<td>DP51358</td>
</tr>
<tr>
<td>7</td>
<td>Structure</td>
<td>1906</td>
<td>Reconnaissance map of the neighbourhood of Liverpool Camp</td>
</tr>
<tr>
<td>8</td>
<td>Standing structure</td>
<td>1930</td>
<td>1930 Cecil Hills aerial photograph</td>
</tr>
<tr>
<td>9</td>
<td>Standing structure</td>
<td>1930/06</td>
<td>1930 Cecil Hills aerial photograph and reconnaissance map of the neighbourhood of Liverpool Camp</td>
</tr>
<tr>
<td>10</td>
<td>Structure</td>
<td>1930</td>
<td>1930 Cecil Hills aerial photograph</td>
</tr>
</tbody>
</table>

3.4.3 Potential heritage landscapes

Potential 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 3-7 and shown in Figure 3-3.

Table 3-7 Potential heritage landscapes

<table>
<thead>
<tr>
<th>ID</th>
<th>Heritage item</th>
<th>Significance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>KC-1</td>
<td>South Creek Basin</td>
<td>High local visual/natural importance</td>
<td>A landscape of undulating hills with remnant Paper Bark (Melaleuca sp.) and River She-Oak (Casuarina sp.) vegetation groves along creek banks and paddocks.</td>
</tr>
<tr>
<td>L1</td>
<td>South Creek, remnant native vegetation corridor</td>
<td>Regional importance</td>
<td>A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.</td>
</tr>
<tr>
<td>L12</td>
<td>Vegetation community, Clifton Avenue, Kemps Creek</td>
<td>Regional significance</td>
<td>Remnant native vegetation mostly within private lots, bounded by Elizabeth Drive, Western Road and Kemps Creek Public School.</td>
</tr>
<tr>
<td>L13</td>
<td>Badgerys Creek remnant native vegetation corridor</td>
<td>Regional importance</td>
<td>A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.</td>
</tr>
<tr>
<td>L23</td>
<td>Kemps Creek remnant native vegetation corridor</td>
<td>Regional importance</td>
<td>A natural area wildlife habitat and scenic area with pockets of vegetation varying in size.</td>
</tr>
<tr>
<td>L27</td>
<td>South, Kemps and Badgerys creek confluence weirs</td>
<td>Regional significance</td>
<td>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.</td>
</tr>
</tbody>
</table>
### 3.5 Land use and planning

Land use factors are outlined in this section. Further information on land use within the study area is provided in Appendix C of this report.

The study area is located across three local government areas: Penrith City, Fairfield City and Liverpool City. Land use in the area is regulated by these councils and by State Environmental Planning Policies (SEPPs) and Commonwealth and state Government strategies. The suburbs within the study area are:

- Luddenham
- Badgerys Creek
- Kemps Creek
- Mount Vernon
- Cecil Park.

<table>
<thead>
<tr>
<th>ID</th>
<th>Heritage item</th>
<th>Significance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L29</td>
<td>Vegetation community, Clifton Avenue, Kemps Creek</td>
<td>Regional significance</td>
<td>Remnant native vegetation mostly within private lots.</td>
</tr>
<tr>
<td>L30</td>
<td>McMaster Field Station Scenic Landscape, Elizabeth Drive, Badgerys Creek</td>
<td>Regional significance</td>
<td>A pastoral landscape with lake-like water bodies, native vegetation and a backdrop of green hills. Lack of intrusive transmission wires is important.</td>
</tr>
<tr>
<td>L45</td>
<td>Cosgroves Creek remnant native vegetation corridor</td>
<td>Regional importance</td>
<td>A natural area, wildlife habitat and scenic area with pockets of excellent creek-side vegetation varying in size.</td>
</tr>
<tr>
<td>L47</td>
<td>Row of Tallowwood trees Luddenham Road</td>
<td>Local significance</td>
<td>Avenue of planted tallowwood trees, forming a cultural landscape.</td>
</tr>
<tr>
<td>L48</td>
<td>Remnant vegetation on Lawson Road, Badgerys Creek</td>
<td>Local significance</td>
<td>A group of native trees on Lawson Road forming a cultural landscape.</td>
</tr>
<tr>
<td>L54</td>
<td>Remnant vegetation on Elizabeth Drive</td>
<td>Regional significance</td>
<td>Indigenous roadside eucalypts forming a natural avenue with other native trees on Elizabeth Drive.</td>
</tr>
<tr>
<td>L55</td>
<td>Remnant vegetation on Elizabeth Drive</td>
<td>Regional significance</td>
<td>Indigenous roadside eucalypts forming a natural avenue with other native trees on Elizabeth Drive, contiguous with Badgerys Creek corridor.</td>
</tr>
</tbody>
</table>
3.5.1 Zoning and land use

Zoning
The applicable zoning maps are Penrith Local Environmental Plan 2010, Penrith Local Environmental Plan (Glenmore Park Stage 2) 2009, Liverpool Local Environmental Plan 2008 and Fairfield Local Environmental Plan 2013. These identify the following zonings within the study area:

- E2 environmental conservation
- E3 environmental management
- E4 environmental living
- R1 general residential
- R2 low density residential
- R3 medium density residential
- RE1 public recreation
- RU1 primary production
- RU2 rural landscape
- RU4 primary production small lots
- SP1 special activity
- SP2 infrastructure
- Western Sydney Parklands (not zoned, but acknowledged as a separate item).

The predominant zonings in the study area are:

- 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 (more than 19 per cent of the study area).

Land uses
The study area includes a wide array of land uses which are described in Table 3-8 and shown in Figure 3-4.
3.5.2 Land development activity

**Current and approved development applications**

There are a number of development applications that have been approved or are active within the study area. Two mosques have been approved in the Kemps Creek area by Council. A cemetery has also been approved in the western portion of the study area. There is also an active development application for the Ifran College property for a two storey building. The Kemps Creek Sporting and Bowling Club has a development application for a number of additions and alterations, including extending the bistro and kitchen, extending the existing terrace and a new children’s play area.

**Western Sydney Priority Growth Area**

The Western Sydney Priority Growth Area (WSPGA) is in the Liverpool and Penrith council areas. The majority of the study area is located in the WSPGA.

The WSPGA would provide local people with better access to jobs within and around the airport, as well as infrastructure and services for local residents. The Department of Planning and Environment will work closely with Liverpool City Council and Penrith City Council to prepare a draft land use and infrastructure strategy. This will guide new infrastructure investment, identify new homes and jobs close to transport and coordinate services in the area. Once it is prepared, the draft strategy will be released for consultation with the community.

**Infrastructure development**

There are a number of road projects in and around the study area to upgrade roads in western Sydney as part of the Western Sydney Infrastructure Plan (as mentioned in chapter 1 of this report). In addition, there are some feasibility studies being carried out to preserve a corridor for heavy rail through the study area. These investigations include the M9 Outer Sydney Orbital Preservation study, the South West Rail Link Extension Corridor and the Western Sydney Rail Needs Scoping Study.

---

**Table 3-8: Land uses within the study area**

<table>
<thead>
<tr>
<th>Land use</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>There are both urban residential and rural residential land uses through the study area. The urban residential land uses are confined to the east of the M7 Motorway, being Cecil Hills. The main rural residential precincts in the study area are associated with the suburbs of Kemps Creek, Mt Vernon and Cecil Park. However, there are rural residential properties located throughout the remainder of the study area and residences located on some agricultural/hobby farm properties. Overall, both urban and rural residential land uses comprise around 12 per cent of the study area. The WSPGA is mostly north of Elizabeth Drive and west of Mamre Road. This would limit future residential development, while increasing industrial and commercial development in the study area.</td>
</tr>
<tr>
<td>Commercial</td>
<td>Concentrated areas of retail activities are associated with the suburb of Kemps Creek (Kemps Creek village shops). This includes activities such as service stations, hardware stores, machinery and automotive repairs, ducting and supply stores, cafes and groceries and liquor stores. Other</td>
</tr>
</tbody>
</table>
standalone individual retail activities are connected to some of the agricultural properties mentioned above including farms onselling produce.

Combined with industrial land uses, commercial land uses comprise four per cent of the study area.

### Land use

<table>
<thead>
<tr>
<th>Land use</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>Agricultural land uses through the study area are grazing, horticulture and intensive animal production. These include hobby and commercial farms predominantly crops (such as vegetables), poultry and plant nurseries. An Industry &amp; Investment NSW report (Analysis of Population Census and Agriculture Census data in Sydney Statistical Division, July 2010) identifies the importance of agricultural activities in the Penrith and Liverpool local government areas. Vegetable farming in these areas resulted in almost $16 million of produce, while poultry farming was valued at over $17 million in Penrith City Council and $19 million in Liverpool City Council. Overall, agricultural land use comprises around 55 per cent of the study area.</td>
</tr>
</tbody>
</table>
| Western Sydney Parklands | Western Sydney Parklands are on the eastern extent of the study area, to the south of Elizabeth Drive. The idea of a ‘green girdle’ through Western Sydney was identified in the County of Cumberland Planning Scheme (NSW Government, 1949). However, the Western Sydney Parklands were originally identified in the Sydney Region Outline Plan (NSW State Planning Authority, 1968) to provide for infrastructure and future regional open space needs for a growing Western Sydney. The Parklands are now 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 Parklands comprise 5280 hectares and stretch 27 kilometres from Blacktown in the north to Leppington in the south. The Parklands are in the Blacktown, Fairfield and Liverpool local government areas. The Parklands have recreational space as well as conservation, infrastructure, agriculture, water supply and other essential community facilities. The Parklands Plan of Management 2020 Supplement indicates the area of Parklands south of Elizabeth Drive would continue to contain a range of mixed uses, including:  
  - Sydney International Shooting Centre (existing)  
  - Wylde Mountain Bike Trail (existing)  
  - Water supply canal (existing)  
  - A bushland corridor to connect Kemps Creek Nature Reserve to the bushland corridor that runs north–south through the Parklands (proposed). There are also a number of biobanking agreement sites (including M7 West and Cecil Park SE) and a carbon credit site (carbon sequestration) within the Parkland extents in the study area.  
  A potential business hub (Elizabeth Drive business hub) has also been identified that spans Elizabeth Drive. The hub would form part of a broader sports and active recreation hub in the Parklands. Potential land uses include warehouse, storage and distribution premises, transport related services, tourist and visitor accommodation, business premises and office premises. |
### Land use Description

To the north of Elizabeth Drive, the Western Sydney Parklands currently consists of environmental bushland corridor or vacant land. As well as the potential Elizabeth Drive business hub, another hub along Wallgrove Road (known as the Wallgrove Road business hub) has been identified in the Parklands Plan of Management 2020 Supplement. The Wallgrove Road hub has been designated for uses such as industrial and transport related services, which would complement existing local businesses. Potential land uses include warehouse, storage and distribution premises, transport related services, tourist and visitor accommodation, business premises, office premises.

A view of the current and future development of the Parklands is shown in Figure 3-5.

Together with recreational facilities, the Western Sydney Parklands in the study area comprise 18 per cent of the study area.

| Industrial | There are a number of industrial developments through the study area. These include a number of waste facilities, the largest being the Elizabeth Drive landfill site. There are also a number of quarry sites and a brick pit. These are located in the more populous areas to the east of the study area. There are also a number of smaller industrial operations including automotive repairs and upholstery businesses in Kemps Creek. Combined with commercial land uses, industrial land uses comprise four per cent of the study area. |
| Community facilities | There are limited community facilities in the study area. In Kemps Creek, there are a few facilities including a post office and a rural fire station. In addition, a long established Animal Welfare League NSW is located along Elizabeth Drive. |
| Educational facilities | There are few educational facilities within or next to the study area. Facilities that are within the study area include Kemps Creek Public School, Ifran College and Christadelphian Heritage College. In addition, along Elizabeth Drive, there is the Science of the Soul Study Centre and Badgerys Creek Public School which closed in 2014. |
| Places of worship | There are no churches or other religious facilities in the study area other than the educational facilities mentioned above. However, two mosques have been approved in the Kemps Creek area. |
| Transport and utilities infrastructure | Through the study area, there are a number of state, regional and local roads. The main roads within the study area include the M7 Motorway, Elizabeth Drive, The Northern Road, Mamre Road and Luddenham Road. There are a number of utility infrastructure/ installations within the study area. Large facilities include a number of substations, mobile telecommunications towers and a radar installation. Other utilities include gas pipelines and electrical transmission lines. Sydney Water facilities through the study area include the Upper Canal system located in the east of the study area. Together, transport and utilities infrastructure comprise around five per cent of the study area. |
| Recreational facilities | There are a number of recreational facilities within the study area comprising eighteen per cent of the study area. These include a number of opportunities and facilities in the Western Sydney Parklands (see section 2.4.6) as well as a number of other recreational facilities in the study area, including: |

- Reserves/parks including Bill Anderson Park and, Overett Reserve. Kemps Creek Nature Reserve
### Land use

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luddenham Raceway</td>
</tr>
<tr>
<td>Sydney Society of Model Engineers Model Park</td>
</tr>
<tr>
<td>Kemps Creek Sporting and Bowling Club</td>
</tr>
<tr>
<td>Martial Arts and yoga centre in Kemps Creek</td>
</tr>
<tr>
<td>A number of horse riding and stabling facilities.</td>
</tr>
</tbody>
</table>

#### Planned western Sydney airport at Badgerys Creek

While this is not a current land use in the study area, land has been allocated and reserved for the airport, with a draft environmental impact statement and draft Airport Plan exhibited in late 2015. The airport site is south of Elizabeth Drive in the western part of the study area between Badgerys Creek and Cosgroves Creek.

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**Planned western Sydney airport at Badgerys Creek**

The site of the planned western Sydney airport is located south of Elizabeth Drive at the western end of the study area. The draft EIS and draft Airport Plan for the planned western Sydney airport at Badgerys Creek was released in October 2015. These documents identified the initial development (Stage 1) and foreshadow the long term development of the airport. Approval is being sought for Stage 1 only of the airport development.

Stage 1 consists of a single 3700 metre runway on a north-east/south-west orientation and aviation support facilities to provide an operational capacity of 10 million passengers annually as well as freight traffic. This is designed to cater for this demand, which would be for the first five years of operation (from 2025 to 2030).

The first runway (to be built as part of Stage 1) is to be built on the north-western side of the airport site, south of Elizabeth Drive. Due to the proximity of the runway end to Elizabeth Drive, there are a number of functional assets and development control areas required to support the operation of the airport that are located outside of the airport site. Some of these are located to the north of Elizabeth Drive. Of importance is the HIAL (High Intensity Approach Lighting), Obstacle Limitation Surface (OLS) and the Glide Slope Building Restriction Area. These requirements would need to be considered in the design of the motorway.
Figure 3-5: Strategic regional and Western Sydney Parklands land uses

Legend
- M12 study area
- western Sydney airport at Badgerys Creek
- Western Sydney Parklands
- UpperCanal/System
- Western Sydney Priority Growth Area
- Environmental bushland corridor

Biobanking site
WSP Carbon Credit Area
Environmental conservation
Elizabeth Drive Business Hub
Wollgrove Road Business Hub

Source: Cardno, Nearmap, LPI, Aurecon

M12 Strategic Route Options Analysis Preferred corridor route report

FIGURE 3-5: Strategic regional and Western Sydney Parkland land uses
3.6 Socio-economic

Socio-economic factors are outlined in this section. Further information on the socio-economic environment in the study area is provided in Appendix D of this report.

3.6.1 LGA demographic profile

The study area encompasses a number of different suburbs across three local government areas (LGAs) (Penrith City Council, Fairfield City Council and Liverpool City Council) (known hereafter as the three LGAs).

Population

The population of the three LGAs located in the study area (based on ABS Census of Population and Housing, 2011) and a breakdown of the population by age brackets is provided in Table 3-9.

<table>
<thead>
<tr>
<th>Age bracket</th>
<th>Penrith City</th>
<th>Liverpool City</th>
<th>Fairfield City</th>
<th>Greater Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
<td>Number</td>
</tr>
<tr>
<td>2011 population</td>
<td>178,465</td>
<td>100</td>
<td>180,142</td>
<td>100</td>
</tr>
<tr>
<td>0 – 9</td>
<td>26,047</td>
<td>14.6</td>
<td>28,203</td>
<td>15.6</td>
</tr>
<tr>
<td>10 – 19</td>
<td>25,752</td>
<td>14.4</td>
<td>27,777</td>
<td>15.4</td>
</tr>
<tr>
<td>20 – 29</td>
<td>26,729</td>
<td>14.9</td>
<td>25,688</td>
<td>14.2</td>
</tr>
<tr>
<td>30 – 39</td>
<td>25,806</td>
<td>14.4</td>
<td>26,901</td>
<td>14.9</td>
</tr>
<tr>
<td>40 – 49</td>
<td>24,374</td>
<td>13.6</td>
<td>26,445</td>
<td>14.7</td>
</tr>
<tr>
<td>50 – 59</td>
<td>23,018</td>
<td>12.9</td>
<td>20,912</td>
<td>11.6</td>
</tr>
<tr>
<td>60 – 64</td>
<td>9600</td>
<td>5.4</td>
<td>7726</td>
<td>4.3</td>
</tr>
<tr>
<td>65+</td>
<td>17,139</td>
<td>9.7</td>
<td>16,490</td>
<td>9.2</td>
</tr>
</tbody>
</table>

Substantial population growth is anticipated to occur in western Sydney\(^1\) in the next 25 years, with an increase in population of around one 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 Centres (South West Growth Centre now forms part of the WSPGA). In addition, the WSPGA, the planned western Sydney airport at Badgerys Creek 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 three LGAs would increase by more than 220,000 people by 2031 (Department of Planning, 2014).

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\(^1\) The Western Sydney Region comprises the 14 Local Government Areas as defined by NSW Department of Planning and Environment; Blue Mountains, Hawkesbury, Penrith, The Hills, Blacktown, Parramatta, Holroyd, Auburn, Fairfield, Bankstown, Liverpool, Camden, Campbelltown and Wollondilly.
Within the study area, any increase in population would be largely within the WSPGA.

### Employment

According to the ABS Census of Population and Housing Statistics (2011) and Bureau of Transport Statistics (2014), in 2011, nearly 215,000 people were employed in the LGAs. The unemployment rate of the Penrith City LGA (5.5 per cent) was comparable to that of Greater Sydney (5.7 per cent). Liverpool City and Fairfield City LGAs recorded a notably higher unemployment rate of 7.0 per cent and 9.7 per cent respectively.

The participation rate (the number of people who are either employed or are actively looking for work) of the different LGAs is lower than Greater Sydney. The participation rate for Penrith LGA is 88.6 per cent, comparable to that of Greater Sydney at 88.8 per cent. The participation rates in Liverpool City and Fairfield City LGA are lower at 86.7 per cent and 83.7 per cent respectively.

In terms of the industries where the majority of people are employed, the top five industries of employment in the LGAs (combined) in 2011 were:

- ‘Manufacturing’ (average of 14.5 per cent)
- ‘Retail trade’ (average of 11.2 per cent)
- ‘Health care and social assistance’ (average of 9.6 per cent)
- ‘Construction’ (average of 8.8 per cent)
- ‘Transport, postal and warehousing’ (average of 7.3 per cent).

Combined, the five industries on average employed 51 per cent of the total workforce residing in the three LGAs.

In all three LGAs, more than half of the labour force travelled outside the local government area to work. The greatest of these is in Liverpool City, where 57 per cent of the population travel outside the area.

Section 3.6.3 discusses the industries that generate employment in the three LGAs.

#### 3.6.2 Transport and access

As mentioned in section 3.6.1, more than half of the labour force travels outside the local government areas to work.

In all three LGAs, the majority of people use a private vehicle (car – as driver, car – as passenger, motorbike, or truck) to get to work, and only a small proportion uses public transport. Details on the transport mode of choice is shown in Table 3-10.

### Table 3-10 Transport use of the three LGAs (compared with Greater Sydney)

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage of transport use</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Penrith</td>
</tr>
<tr>
<td>Private vehicles</td>
<td>72.9%</td>
</tr>
<tr>
<td>Public transport</td>
<td>10.7%</td>
</tr>
</tbody>
</table>
The consistent use of private vehicles is far above the average of Greater Sydney. This indicates that there is a lack of regular public transport services to places of employment from these areas, which makes the private vehicle the only feasible options for many people.

3.6.3 Business activity

There were 39,255 businesses in the three LGAs in 2013 (ABS, 2015). The largest number of businesses in the LGAs were in the following categories: ‘construction’, ‘transport, postal and warehousing’ and ‘rental, hiring and real estate services’ (refer to Table 3-11). Other key observations from the review of business activity were as follows:

- The three LGAs have a significantly larger proportion of businesses in the ‘construction’ industry (over 20 per cent) than Greater Sydney (14.3 per cent)
- The three LGAs have a larger proportion of businesses in the ‘transport, postal and warehousing’ industry (over 10 per cent) than Greater Sydney (6.5 per cent)
- Fairfield City LGA has a notably larger proportion of ‘manufacturing’ businesses (7.3 per cent) than Penrith City LGA (5.6 per cent), Liverpool City LGA (5.8 per cent) and Greater Sydney (3.8 per cent)
- Fairfield City LGA has a slightly larger proportion of ‘retail trade’ businesses (8.6 per cent) than Penrith City LGA (6.4 per cent), Liverpool City LGA (6.9 per cent) and Greater Sydney (6.4 per cent)
- Of the three LGAs, Fairfield City LGA (13,825) has the greatest number of businesses, followed by Liverpool City LGA (13,142) and Penrith City LGA (12,288)
- Together, the total number of businesses in the three LGAs accounted for 8.5 per cent of total businesses in Greater Sydney.

Table 3-11 Number of businesses in the three LGAs (compared with Greater Sydney)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Penrith</th>
<th>Liverpool</th>
<th>Fairfield</th>
<th>Greater Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry and fishing</td>
<td>297</td>
<td>299</td>
<td>142</td>
<td>6460</td>
</tr>
<tr>
<td>Mining</td>
<td>11</td>
<td>3</td>
<td>3</td>
<td>792</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>688</td>
<td>756</td>
<td>1005</td>
<td>17,624</td>
</tr>
<tr>
<td>Electricity, gas, water and waste services</td>
<td>53</td>
<td>36</td>
<td>40</td>
<td>1131</td>
</tr>
<tr>
<td>Construction</td>
<td>2859</td>
<td>2953</td>
<td>2948</td>
<td>66,277</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>451</td>
<td>602</td>
<td>663</td>
<td>20,609</td>
</tr>
<tr>
<td>Retail trade</td>
<td>791</td>
<td>902</td>
<td>1191</td>
<td>29,562</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>299</td>
<td>371</td>
<td>471</td>
<td>17,050</td>
</tr>
<tr>
<td>Transport, postal and warehousing</td>
<td>1253</td>
<td>1746</td>
<td>1555</td>
<td>30,216</td>
</tr>
<tr>
<td>Information media and telecommunications</td>
<td>72</td>
<td>72</td>
<td>47</td>
<td>6600</td>
</tr>
</tbody>
</table>
A total of 75 local businesses were identified in the M12 Motorway study area. The breakdown for each zone in the study area is:

- Zone A: 28 businesses
- Zone B: 36 businesses
- Zone C: 11 businesses.

A breakdown of the type of business in each zone is provided in Table 3-12.

Of these businesses, the largest proportion are involved in agriculture (27 businesses, representing 37 per cent of all businesses in the study area). This constitutes a small proportion of total businesses in the three LGAs (about four per cent of the total number of agricultural businesses) (ABS 2015).

The next most affected business categories are retail trade (20 per cent of all businesses in the study area) and arts and recreation (nine per cent).

### Table 3-12 Business type in each zone

<table>
<thead>
<tr>
<th>Business type</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% within zone</td>
<td>Number</td>
</tr>
<tr>
<td>Agricultural</td>
<td>12</td>
<td>44</td>
<td>11</td>
</tr>
<tr>
<td>Construction</td>
<td>3</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>Quarrying/waste services</td>
<td>2</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>
### Business type

<table>
<thead>
<tr>
<th>Business type</th>
<th>Zone A</th>
<th></th>
<th>Zone B</th>
<th></th>
<th>Zone C</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>% within zone</td>
<td>Number</td>
<td>% within zone</td>
<td>Number</td>
<td>% within zone</td>
</tr>
<tr>
<td>Arts and recreation services</td>
<td>3</td>
<td>11</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>Professional, scientific and technical services</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Retail trade</td>
<td>2</td>
<td>7</td>
<td>11</td>
<td>31</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Rental, hiring and real estate services</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Education and training</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Health care and social assistance</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other services (automotive/machinery repair and maintenance)</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Accommodation, cafes and restaurants</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other services (personal services)</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 3.6.4 Agricultural activity

The ABS Agricultural Census identified that in 2011, the three LGAs had a total of 14,850 hectares of agricultural land, used for crops, grazing and forestry plantation. This accounted for nearly 14 per cent of total agricultural land in the Greater Sydney area, of which Fairfield comprised the largest proportion being six per cent.

The three LGAs produced an array of agricultural commodities in 2011. Table 3-13 shows the number of agricultural enterprises and accompanying percentage share by commodity type for each of the LGAs. In the three LGAs, the key observations include:

- ‘Fruit, nut and vegetable’ producers comprise the bulk of agricultural enterprises in the three LGAs, contributing more than 50 per cent of all agricultural businesses. This was followed by ‘cattle’ at almost 20 per cent.
- The number of ‘fruit, nut and vegetable’ producers and ‘poultry and eggs’ producers for the three LGAs also accounted for a greater percentage to the total number of agricultural enterprises in the three LGAs compared to that of Greater Sydney area.
Sydney. This suggests that there is a relatively high level of agricultural production of these commodities in the three LGAs.

- Liverpool LGA had the highest number of agricultural enterprises accounting for 227 enterprises out of a total of 524 agricultural enterprises in the three LGAs (43 per cent). This was followed by Penrith LGA with 189 enterprises and Fairfield LGA with 58 enterprises.

### Table 3-13 Agricultural enterprises in the three LGAs, by commodity type

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Penrith City</th>
<th>Liverpool City</th>
<th>Fairfield City</th>
<th>Greater Sydney</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>%</td>
<td>Number</td>
<td>%</td>
</tr>
<tr>
<td>Broad acre crops</td>
<td>1</td>
<td>0.5</td>
<td>9</td>
<td>3.2</td>
</tr>
<tr>
<td>Fruits, nuts and vegetables</td>
<td>75</td>
<td>39.7</td>
<td>173</td>
<td>62.5</td>
</tr>
<tr>
<td>Poultry and eggs</td>
<td>29</td>
<td>15.3</td>
<td>33</td>
<td>11.9</td>
</tr>
<tr>
<td>Cattle</td>
<td>57</td>
<td>30.2</td>
<td>39</td>
<td>14.1</td>
</tr>
<tr>
<td>Sheep</td>
<td>6</td>
<td>3.2</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>Other livestock</td>
<td>21</td>
<td>11.1</td>
<td>18</td>
<td>6.5</td>
</tr>
<tr>
<td>Total agricultural</td>
<td>189</td>
<td>11.1</td>
<td>277</td>
<td>6.5</td>
</tr>
</tbody>
</table>

### Study area agribusinesses

The commodities produced by agricultural businesses in the study area were obtained from the Australian Bureau of Statistics (ABS). However, these are for Statistical Area Level 2 (SA2), which, while cover the study area, also encompass an area further afield.

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. The total gross value of agricultural production in this SA2 is about $10 million.

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. The total gross value of agricultural production in this SA2 is about $25 million.

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). The total gross value of agricultural production in this SA2 is about $67 million.
Within the study area only, a review of land use data indicated there is about 3,971 hectares of agricultural land. This comprises:

- 1,715 hectares in zone A
- 1,483 hectares in zone B
- 773 hectares in zone C.

3.6.5 Study area community profile

The following suburbs are located either partially or fully in the study area:

- Cecil Park
- Mount Vernon
- Kemps Creek
- Badgerys Creek
- Luddenham.

Community profiles for these suburbs, based on the results of the 2011 ABS Census data are discussed in the following sections.

Cecil Park

- Population of 1,477 people with a median age of 31. Three hundred and thirty nine are under the age of 15, while 108 are over the age of 65
- Four hundred and ninety eight people are born overseas (main three birthplaces are Italy, Iraq and Fiji). Six hundred people speak another language, with the main languages being Italian, Assyrian and Arabic
- The majority of the population (1,417) live in private dwellings. Three hundred and sixty one dwellings are separate houses
- There is an average household size of 3.2
- Median weekly personal income is $723
- Ninety-five per cent of households own one or more motor vehicle
- There is an unemployment rate of 4.5 per cent, which is lower than the unemployment rate of Liverpool City LGA
- More residents are employed in manufacturing, retail trade and construction compared to other industries
- Seventy-eight per cent of people travel to work either all the way or part way as driver or passenger in a private vehicle.

Mount Vernon

- Population of 1,036 people, with a median age of 39. Two hundred and eight are under the age of 15 and 109 over the age of 65
- Two hundred and sixty three people were born overseas (main three birthplaces are Italy, Iraq and Malta). Three hundred and forty four people speak another language, with the main languages being Italian, Maltese and Assyrian
• Most of the population (994) live in private dwellings, with 278 dwellings being separate houses
• There is an average household size of 3.5
• Median weekly personal income is $597
• Ninety-six per cent of households own one or more motor vehicles
• Has an unemployment rate of 3.2 per cent, which is much lower than the unemployment rate of the Penrith City LGA and the lowest in the study area
• More residents are employed in construction, retail trade and manufacturing compared to other industries
• Eighty per cent of people travel to work either all the way or part way as driver or passenger in a private vehicle.

Kemps Creek
• This suburb is the most populous in the study area with 2,309 people. The median age is 38 with 447 people under the age of 15 and 337 over the age of 65
• Six hundred and fifty people were born overseas (main three birthplaces are Italy, China and Malta). Nine hundred and fifty seven speak a language other than English, with the main languages being Italian, Arabic and Chinese
• The majority of the population (2,117) live in private dwellings, with 597 dwellings being separate houses
• The average household size is 3.4 persons
• Median weekly personal income is $475
• Ninety-one per cent of dwellings own one or more motor vehicle
• Has an unemployment rate of 3.5 per cent, which is substantially lower than the Penrith City and Fairfield City rates of unemployment.
• More residents are employed in construction, retail trade and agriculture, forestry and fishing compared to other industries
• Seventy-five per cent of people travel to work either all the way or part way as driver or passenger in a private vehicle.

Badgerys Creek
• Population of 455 people, with a median age of 34. Ninety people are under the age of 15, while there are 55 over the age of 65
• Ninety seven people were born overseas (main three birthplaces are China, Malta and New Zealand). One hundred and three speak a language other than English, with the main languages being Chinese, Maltese and Italian
• Most of the population (387) live in private dwellings, all being separate houses
• The average household size is 3.5 persons
• Median weekly personal income is $413
• Ninety-four per cent of dwellings own one or more motor vehicle
• Unemployment rate for the suburb is 6.1 per cent, which is lower than the Fairfield City unemployment rate, but slightly higher than the unemployment rate of Greater Sydney

• More residents are employed in construction, agriculture, forestry and fishing and retail trade compared to other industries

• Around 72.5 per cent of residents travel to work either all the way or part way as driver or passenger in a private vehicle.

Luddenham

• Population of 1,496 people, with a median age of 36. Three hundred and thirty two people are under the age of 15, while there are 181 over the age of 65

• Two hundred and twelve people were born overseas (main three birthplaces are UK, Italy and Malta). One hundred and ninety six people speak a language other than English, with the main languages being Arabic and Italian

• Most of the population (1,423) live in private dwellings, with 429 dwellings being separate houses

• The average household size is 3.2 persons

• Median weekly personal income of $634

• Ninety-six per cent of dwellings own one or more motor vehicles

• Unemployment rate for the suburb is 4.3 per cent, which is lower than the rate for the Penrith City LGA

• More residents are employed in construction, retail trade and manufacturing compared to other industries

• Around 78 per cent of residents travel to work either all the way or part way as driver or passenger in a private vehicle.

3.6.6 Property

The study area has 1334 properties, with a number of different property types (mainly residential, commercial, industrial and general rural).

As well as residences, the properties typically include other assets:

• Agricultural properties include sheds, dams and stock infrastructure

• Commercial properties include structures and fencing

• Industrial properties include structures, storage laydown areas and fencing.

3.6.7 Community services and facilities

There are a number of community services and facilities throughout the study area, for educational, recreational and leisure purposes.

Educational facilities within or next to the study area, include Kemps Creek Public School, Irfan College and Christadelphian Heritage College.

Religious facilities within the study area, include The Science of the Soul Study Centre located along Elizabeth Drive. In addition, there are two mosques approved for development.
Recreational facilities in the study area include the Sydney International Shooting Centre at Cecil Park, Wylde Mountain Bike Trail and other reserves/parks including Bill Anderson Park and Overett Reserve. Western Sydney Parklands comprises passive recreational areas, including a number of established and paved walking and cycling paths. Bushcare activities in the Parklands are another activity that brings a community together in the study area.

Other recreational facilities include Twin Creeks Golf Club, Luddenham Raceway, Sydney Society of Model Engineers Model Park, a martial arts centre in Kemps Creek and the Kemps Creek Sporting and Bowling Club.

There are no other community services and facilities including aged care/assisted living homes and health services located in the study area. There are limited emergency services in the study area, with a rural fire brigade station located on Elizabeth Drive.

### 3.6.8 Community values

Community values are elements of everyday life that matter to a community. Depending on the demographics and location of a community, these values can differ. The information contained in this section is based on community feedback from the consultation period and assessment of the surrounding land use and environment.

#### Residents and businesses

Local residents and business owners value where they live and what they own, with minimal desire to move and some hesitancy to change.

Family heritage and connections to the study area were also identified as important, particularly for families that have resided in the area for many generations. As such, these families have a strong connection to their properties and to the area generally.

There are also concerns about the acquisition and compensation of property and businesses. Communities within the study area value their ability to carry on their lives as normal once the M12 Motorway is built. Further changes to the area as a result of the Western Sydney Priority Growth Area are not seen as an immediate concern.

#### Local amenities and facilities

The local and broader community value the current amenities and facilities within the study area as they provide recreational, hobby and social opportunities. Each facility has a varied sense of place with their users. This is evident through the numerous submissions were made in relation to routes impacting the Sydney Society of Model Engineers in Luddenham during consultation on the possible route options in early 2016.

Several submissions were also made in both consultation periods focusing on minimising the impact to the Western Sydney Parklands, the Wylde Mountain Bike Trail, Kemps Creek Sporting and Bowling Club, and the Kemps Creek village shops.
Recreational facilities including the Western Sydney Parklands, Wylde Mountain Bike Trail, Sydney International Shooting Centre, Sydney Society of Model Engineers, Luddenham Raceway and the number of horse riding and stabling facilities cater for more than the local community. Users from outside the study area frequent these facilities, making them regional or even state facilities.

**Natural environment**
The study area’s rural character and built and natural heritage were identified during consultation as key contributors to the region’s lifestyle and amenity. This is both in terms of environmental quality of life (such as noise and air quality) and existing biodiversity in the area. Protection of these characteristics is important to the local community.

Several submissions were made highlighting the importance of conserving different species of flora as they are important to the environmental values of the area. The community values the protection of the natural environment as it contributes to the liveability and general amenity of the area.

**3.6.9 Access and movement patterns**
This is a brief review of vehicular, pedestrian and cyclist facilities in the study area. Further information is provided in section 3.10.

**Road network**
There are a number of motorways, main arterials and sub-arterials in the study area to access areas within the study area as well as connecting to other main roads and employment areas outside of the study area. These include:

- M7 Motorway
- A9 – The Northern Road
- Elizabeth Drive
- Mamre Road
- Wallgrove Road.

Other main roads include Badgerys Creek Road, Devonshire Road and Luddenham Road. The main roads in the study area are shown in Figure 3-8.

**Active transport (walking and cycling)**
There are limited existing, dedicated walking and cycling 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 and an on-road path along the eastern end of Elizabeth Drive, from the M7 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. This is a recreational cyclist facility and does not provide any connectivity to other cycleways for commuter cyclists.
Public transport
As the land use in the study area is semi-rural and the population density is low, there are limited public transport options. This is supported by the number of people who use a private vehicle, rather than public transport to get to work (section 2.5).

There are two public bus services that operate along Elizabeth Drive:

- 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.

As shown in these route diagrams, buses only travel along the eastern end of Elizabeth Drive; there are no bus services or bus facilities along the western end.

There are no rail facilities in the study area. The closest train interchanges to the study area are Liverpool Station and Leppington Station, which are located a number of kilometres away to the east and south of the study area.

3.7 Noise environment

The study area is mostly a rural residential environment, experiencing rural and pastoral views with a low background noise. The environment becomes 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.

There are 1697 noise sensitive receivers in and near the study area, mostly found around the township of Kemps Creeks and the suburb of Mount Vernon. The densest area of sensitive receivers are located to the east of the M7 Motorway in the suburb of Cecil Hills. There are a number of receivers who are not within the study area, but are situated within 600 metres of the shortlisted options. These noise sensitive receivers are identified in Figure 3-6.
Figure 3-6 Noise receivers
3.8 Soils, contamination and water

Soil, contamination and water risks and features in the study area are outlined in this section. Further information on contamination risks in the study area is provided in Appendix F of this report.

3.8.1 General topography

The study area generally comprises fairly flat or gently undulating topography across the western half, with some low, rolling hills across the eastern boundary near Mount Vernon and the Western Sydney Parklands. While ground elevations vary from about 90 metres Australian Height Datum (AHD) in the west to about 110 metres AHD in the east, the lowest areas are in the middle of the study area. This area is dissected by the natural system of creeks and minor channels that flow from south to north. The lowest point is between the Badgerys Creek and South Creek crossings at about 40 metres AHD.

3.8.2 Geology

The Penrith 1:100 000 Geological Sheet 9030 (Clark and Jones, 1991) indicates that the study area is underlain by:

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

3.8.3 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.

3.8.4 Soil contamination

A phase 1 environmental site assessment was carried out for the shortlisted route options (refer to Appendix F).

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 shortlisted route options. Due to the distance and generally being hydrologically separated from the options, 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 route options in the study area. 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 observations were made about contamination in the study area:

- There is a range of industrial, agricultural and rural residential properties. These sites were not viewed on site, but areas of note such as machinery, structures and any stockpiles were noted from outside the properties
- There are a number of earthen dams made of unknown materials, notably a moderate sized earthen dam downslope of the CSR Bricks and Roofing Quarry/Plant within an ephemeral drainage line
- No drummed liquids were observed to be stored within the study area
- No evidence of underground storage tanks was observed
- Aboveground storage tanks were observed at:
  - A private property located off Wallgrove Road (one tank)
  - At 239–285 Wallgrove Road (one tank with capacity of about 2000 litres)
  - Andreasens nursery (two tanks with capacity of 2000 and 1000 litres)
  - At the rear of 2311–2337 Elizabeth Drive (one tank)
- No chemical storage areas were observed
- No evidence of sheep dips or spraying booths were observed
- No visual or odorous indicators of contamination were identified during the site inspection with the exception of:
  - Several hydrocarbon stains and asbestos cement fragments on the Range Road shoulders
  - Asbestos cement fragments in the verge of the Clifton Road / Elizabeth Drive intersection
  - Hydrocarbon staining in a shoulder area in front of the Kemps Creek Sporting and Bowling Club
• Sheeting fragments with asbestos containing material (ACM) in the shoulder area of Clifton Road. The fragments were noted to be in poor condition, less than 10 centimetre square in size and were at an approximate density of less than 100 centimetre square per metre

• No visual indicators of contamination were observed, such as stressed vegetation, (grasses, trees or shrubs), or staining/dischromation of soils other than minor surface staining and the asbestos containing material identified above

• Several services (telecommunications, electricity, gas and water) have the potential to act as preferential flow paths. In addition, engineered drains were noted throughout the existing road corridors discharging to stormwater drainage and road verges

• There are a number of power and light poles and associated stay poles

• Moderate amounts of general waste materials were observed throughout road median and verge areas (including shoulders and truck parking bays). General waste comprised plastic and glass litter, rubber, paper, cans and concrete

• Illegal dumping was observed along several road shoulders; waste materials comprised foam/plastic chairs, oil drums, tyres and general waste

• Several soil stockpiles were observed in the land to the south of Elizabeth Drive, opposite Mamre Road. Stockpiles ranged in size from about five to 30 cubic metres and comprised soil and metal (sheeting) materials and possibly construction and demolition waste

• A soil and rock stockpile, of about 100 cubic metres, was observed north of the Upper Canal System Pheasants Nest Weir to Prospect Reservoir. The stockpile was vegetated and appeared to be aged, and included several tyres

• A crashed and abandoned vehicle was observed at the intersection of Mamre Road and Elizabeth Drive

• A scalded/bare patch of ground, about 300 metres square, was observed to the north of a truck turning bay associated with the Brandown landfill site

• A Roads and Maritime stockpile of basalt aggregate was observed within a locked shoulder area about 500 metres east of Range Road. Illegal dumping was noted in the neighbouring area.

A list of Areas of Environmental Concern (AECs) and Contaminants of Potential Concern (CoPCs) for the study area and the route options were identified as part of the Phase 1 investigation. There are some general AECs across all route options. These are:

• AEC 1 - General Site Area (underneath driveways, roads, building foundations, garden beds and parklands and along verges, shoulders)

• AEC 2 - General site area

• AEC 3 – Buildings / site infrastructure

• AEC 4 - Site roads

• AEC 5 – Service easements.

As these general AECs are not a point of comparison between the route options, these AECs are not discussed further in this report. Further information on these and the other AECs are in the Phase 1 Environmental Site Investigation (Appendix F).
3.8.5 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.

3.8.6 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 may also exist.

3.8.7 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 along the proposed route options 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 route options in the study area.

All of the identified bores were installed as groundwater monitoring bores. It is unknown whether any other unlicensed bores are used for domestic or abstraction purposes.

There was limited information contained within the drillers’ logs on the groundwater level present in the abovementioned groundwater bores. However, 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.

### 3.8.8 Surface water

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, Cosgroves Creek and Oaky 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
- Elizabeth Drive landfill (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
- There is also 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 draft EIS for the planned western Sydney airport at Badgerys Creek (DIRD, 2015). 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.

Modelling for the existing environment was carried out for locations on Cosgroves Creek, Badgerys Creek, South Creek as part of the draft EIS for the planned western Sydney airport at Badgerys Creek (DIRD, 2015). Most locations are within the M12 Motorway study area with the exception of the South Creek location (at the confluence with Kemps Creek), which is located around 500 metres north of the study area. All these sites are considered to be representative of water quality in the study area. The MUSIC modelling results are presented in Table 3-14, comprising total suspended solids (TSS), total phosphorous (TP) and total nitrogen (TN) and compared against ANZECC guideline default trigger values for lowland rivers.
Table 3-14 Modelling water quality results

<table>
<thead>
<tr>
<th>Location</th>
<th>Average pollutant concentrations (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TSS</td>
</tr>
<tr>
<td>Badgerys Creek (at Elizabeth Drive)</td>
<td>21.90</td>
</tr>
<tr>
<td>South Creek confluence with Kemps Creek</td>
<td>20.90</td>
</tr>
<tr>
<td>Oaky Creek (at Elizabeth Drive)</td>
<td>22.70</td>
</tr>
<tr>
<td>Cosgroves Creek (north of Elizabeth Drive)</td>
<td>22.50</td>
</tr>
<tr>
<td>ANZECC guidelines</td>
<td>&lt; 40</td>
</tr>
</tbody>
</table>

Source: Western Sydney Airport EIS Surface Water Quality Assessment (DIRD, 2015)

Table 3-14 shows that total phosphorous and total nitrogen are above the ANZECC trigger values and do not meet the ANZECC water quality objectives. However, total suspended solids were modelled at below the ANZECC trigger values and therefore meet the water quality objectives.

3.9 Hydrology and flooding

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. In the study area, the creeks in the South Creek sub-catchment generally flow from south to north. The sub-catchment area at Elizabeth Drive covers around 90 square kilometres. The major creeks in the study area are:

- 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
- Oaky Creek.

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

The areas around Badgerys Creek, South Creek and Kemps Creek are subject to localised flooding (Figure 3-7). The topography of the study area is relatively flat; however to the north of Elizabeth Drive, the land consists of undulating plains.

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.
3.9.1 Historic flood levels

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 Table 3-15). 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. Creeks flow from south to north through the study area. Table 3-15 shows flood levels are deeper to the south and shallower to the north.

<table>
<thead>
<tr>
<th>Location</th>
<th>1986 flood level</th>
<th>1988 flood level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bringelly Road – downstream</td>
<td>–</td>
<td>57.59</td>
</tr>
<tr>
<td>Overett Avenue</td>
<td>–</td>
<td>43.41</td>
</tr>
<tr>
<td>Elizabeth Drive – upstream</td>
<td>42.73</td>
<td>43.33</td>
</tr>
<tr>
<td>Elizabeth Drive – downstream</td>
<td>42.06</td>
<td>42.66</td>
</tr>
<tr>
<td>Luddenham Road</td>
<td>29.5</td>
<td>29.8</td>
</tr>
</tbody>
</table>

3.9.2 Modelled flood behaviour

The model of sub-catchment flood behaviour was updated in 2015 in the Updated South Creek Flood Study (Worley Parsons, 2015). This was due to 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 Table 3-16. 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>
<thead>
<tr>
<th>Creeks</th>
<th>Peak 100-year ARI flood level (2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak flood levels</td>
</tr>
<tr>
<td></td>
<td>Upstream of Elizabeth Drive</td>
</tr>
<tr>
<td>South Creek</td>
<td>42.9</td>
</tr>
<tr>
<td>Kemps Creek</td>
<td>47.7</td>
</tr>
<tr>
<td>Badgerys Creek</td>
<td>46.5</td>
</tr>
</tbody>
</table>

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 Table 3-17.

<table>
<thead>
<tr>
<th>Creeks</th>
<th>Depth of water on Elizabeth Drive</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Creek</td>
<td>180 mm</td>
</tr>
<tr>
<td>Kemps Creek</td>
<td>500 mm</td>
</tr>
<tr>
<td>Badgerys Creek</td>
<td>270 mm</td>
</tr>
</tbody>
</table>

### 3.9.3 Flood mitigation

The South Creek Floodplain Risk Management Study and Plan (Liverpool City Council, 2004) identified flood mitigation structures to be constructed in the South Creek sub-catchment to minimise the impact of flooding. In the study area, this took the form of a relief floodway channel and bridge crossing along Elizabeth Drive at Kemps Creek. This work involved:

- Acquiring three properties next to South Creek (western extent of Overett Avenue)
- Constructing a relief floodway to the west of Overett Avenue
- Constructing an additional bridge over Elizabeth Drive and connecting floodway upstream and downstream of the bridge.

This flood relief work was included in the Updated South Creek Flood Study (Worley Parsons, 2015) and are reflected in the flood behaviour discussed in Section 3.9.2. While difficult to quantify, the flood relief work has resulted in a reduction in flooding impact. It is estimated to have reduced the flood levels upstream of Elizabeth Drive by up to 0.3 metres for all flood events (so much so, Elizabeth Drive is no longer inundated by South Creek in a 20-year ARI flood event).
3.10 Traffic

There are a number of motorways, main arterial roads and sub-arterial roads that traverse the study area. These include:

- M7 Motorway (National network)
- A9 – The Northern Road (State road)
- Elizabeth Drive (State road)
- Mamre Road (State road)
- Wallgrove Road (State road).

Other regional roads include Badgerys Creek Road, Devonshire Road and Luddenham Road.

As part of the Western Sydney Infrastructure Plan (WSIP), Bringelly Road and The Northern Road are being upgraded. The plan has also identified the need to provide a new motorway connecting the M7 Motorway to The Northern Road (this project). Another road corridor study currently underway that may interact with the M12 Motorway is the Outer Sydney Orbital (M9 Motorway and freight rail) corridor preservation, the exact location of which is still to be determined.

3.10.1 General traffic

Existing situation

Elizabeth Drive is a two-lane arterial road in Western Sydney. There are no pedestrian or cycle paths along most of its length. The existing seven-day annual average daily traffic (AADT) volumes along Elizabeth Drive (collected by Tracsis in 2015) are shown in Figure 3-8.

Existing traffic volumes along Elizabeth Drive have been further extrapolated into eastbound, westbound and peak demands, as shown in Table 3-18. The weekend only traffic volumes are significantly less than the weekday volumes as noted by the much higher weekday five-day AADT compared to the seven day AADT.

Table 3-18 Elizabeth Drive traffic counts by direction

<table>
<thead>
<tr>
<th>Location</th>
<th>EB</th>
<th>WB</th>
<th>AM peak</th>
<th>PM peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badgerys Creek Road to Devonshire Road</td>
<td>5500</td>
<td>5700</td>
<td>6230</td>
<td>6500</td>
</tr>
<tr>
<td></td>
<td>890</td>
<td>350</td>
<td>270</td>
<td>830</td>
</tr>
<tr>
<td>Mamre Road to Wallgrove Road</td>
<td>10,200</td>
<td>10,800</td>
<td>12,300</td>
<td>13,100</td>
</tr>
<tr>
<td></td>
<td>1200</td>
<td>730</td>
<td>630</td>
<td>1400</td>
</tr>
</tbody>
</table>
While the traffic volumes in Table 3-18 highlight current traffic volumes in the study area, the main justification for a new motorway connection, the M12 Motorway, is the future development of the area. This includes the development of the proposed western Sydney airport at Badgerys Creek and urban development through the Western Sydney Priority Growth Area.

**Western Sydney Priority Growth Area**

Structure plans for the former Broader Western Sydney Employment Area and the former South West Growth Centre were released before the announcement of the amalgamation of these two areas into the Western Sydney Priority Growth Area. The Broader Western Sydney Employment Area, is to provide more than 57,000 jobs over the next 30 years, and more than 200,000 jobs when fully established. South West Growth Centre would include around 110,000 new dwellings and more than 20,000 new jobs within the area.

These structure plans for the former development areas included the road network plans and showed the plans between the two precincts were consistent. There was a proposed deviation of Mamre Road to connect to Devonshire Road at Elizabeth Drive to provide a north–south connection between Broader Western Sydney Employment Area and the South West Growth Centre.

The other main north–south connections identified were:

- Badgerys Creek Road, which would be extended north of Elizabeth Drive (identified in the WSEA Transport Planning – Preliminary Analysis, June 2013)
- Lawsons Road, which would be extended north of Elizabeth Drive (instead of Badgerys Creek Road) (identified in the SWGC Integrated Transport and Land Use Planning, July 2015).

With the development of the planned western Sydney airport and Badgerys Creek Road being located within the airport site, it is unlikely that the option to use Badgerys Creek Road as a main arterial through the Western Sydney Priority Growth Area would be feasible. As such, it is more likely that Lawsons Road would be the north–south arterial road.

The M12 Motorway forms an important piece of infrastructure for the area. Roads and Maritime is consulting with other government agencies including Department of Planning and Environment and the Greater Sydney Commission on the integration of future land use plans with the ultimate road network for the area.
Figure 3-8: Two-way, 7-day AADT along Elizabeth Drive

Legend
- M12 study area
- 11,100 7-day AADT volumes

Source: Nearmap, LPI, Aurecon

M12 Strategic Route Options Analysis Preferred corridor route report

FIGURE 3-8: Two-way, 7-day AADT along Elizabeth Drive
Planned western Sydney airport at Badgerys Creek

Based on the planned western Sydney airport draft Environmental Impact Statement (DIRD, 2015), around 42,000 daily traffic movements (to and from the airport) are anticipated. This consists of around 31,500 passenger movements, 10,000 staff movements and just under 600 freight vehicle movements.

The proposed 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. The M12 Motorway would have provision for three interchanges to cater for this traffic. These would be at:

- The Northern Road (to accommodate traffic from the Western Sydney Priority Growth Area, the M4 and M31 motorways and further afield)
- Airport access road (to accommodate airport visitors and staff, including bus services and freight vehicles)
- M7 Motorway (to accommodate traffic from further afield – such as Sydney, the M4 and M31 motorways).

In addition, planning for the M12 Motorway would not preclude an interchange at Mamre Road, should one be required in the future due to traffic numbers.

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.

3.10.2 Freight

Existing situation

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

Eighty seven per cent of vehicles travelling along the western end of Elizabeth Drive are classified as light vehicles (C1 and C2). Of the 13 per cent heavy vehicle volumes (recorded by Tracsis, July 2015), the main types of trucks using this road are classified C3 (two-axle trucks) or C9 (six-axle articulated trucks).

As with the traffic flow patterns noted in Section 3.10.1, 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 AADT for commercial vehicles is around 3500 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 1300 vehicles per day.
Future demands

Future freight demands are expected to grow considerably with the development of the WSPGA and the planned western Sydney airport which would attract major freight and logistics companies. As well as the need to provide improved road access, a freight rail line (as part of the M9 Outer Sydney Orbital) is currently being considered to the west of the study area.

3.10.3 Active transport (walking and cycling)

There are no existing dedicated walking and cycling facilities along roads within 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 study area for this project). Cycleway infrastructure in the study area is shown in Figure 3-9.

There is also a popular mountain bike trail located in the Western Sydney Parklands south of Elizabeth Drive. This is a recreational cyclist facility and does not provide any connectivity to other cycleways for commuter cyclists. Similarly there are a number of existing walking and cycling paths through the Parklands, including a path that crosses across the M7 Motorway, connecting the Parklands either side.

3.10.4 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:

- 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. All bus routes through the study area are shown in Figure 3-10. Buses only travel along the eastern end of Elizabeth Drive and there are no bus services or bus facilities along the western end.
Figure 3-9: Existing cycleways through the study area
Figure 3-10 Public transport through the study area
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.

However, with the area to be substantially developed, rail infrastructure is also being considered. This would be likely to provide a rail line through the Western Sydney Priority Growth Area and Western Sydney Employment Area, incorporating a stop at the planned western Sydney airport at Badgerys Creek.

### 3.11 Landscape character

This section outlines the landscape character of the study area. Further information on the landscape character of the study area is provided in Appendix G of this report.

#### 3.11.1 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.

Elizabeth Drive follows the undulating topography, crossing over ridgelines while avoiding the steepest slopes. The landscape is not greatly modified by cut and fill embankments, and Elizabeth Drive has a relatively narrow footprint of the road, which consists of only one lane in each direction, with occasional turning lanes and breakdown shoulders. The verge is vegetated with established remnant trees.

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 World Heritage listed Greater Blue Mountains World Heritage Area.

#### 3.11.2 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 Figure 3-11 and described in the following sections.
Legend

- M12 study area
- LCZ3 - Low lying rural/commercial
- LCZ4 - Undulating rural residential
- LCZ5 - Urban residential development
- LCZ1 - Parklands and reserves
- LCZ2 - Elevated rural residential development

Source: Map: LPI, Aurecon

Projection: QCA 1994 MGA Zone 56

FIGURE 3-11: Landscape character zones
LCZ1 – Parklands and reserves
This landscape character zone covers a section of the Western Sydney Parklands and the Kemps Creek Nature Reserve. The 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 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 Sydney Water Supply Upper Canal System 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 Elizabeth Drive Landfill Facility, 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.
3.12 Utilities

Utility assets in the study area include water and gas pipelines, overhead electrical transmission lines, substations, mobile phone towers and radar installations. These are listed in Table 3-19 and shown in Figure 3-12. As shown in Table 3-19, the utilities have been assigned a risk ranking of ‘critical’, ‘major’ or ‘minor’ should they be affected by the project. The critical and major rankings consider the risk of:

- Financial loss due to accidental damage
- Financial cost to relocate
- Number of ‘customers’ affected
- Safety incident due to accidental damage
- Age of asset
- Lead time required to relocate.

The infrastructure considered minor is expected to be easier to manage, with less risk to cause significant delay or cost to the project if affected.
<table>
<thead>
<tr>
<th>Utility authority</th>
<th>Asset</th>
<th>Location</th>
<th>Risk ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sydney Water</strong></td>
<td>General water mains</td>
<td>Many and varied</td>
<td>Minor</td>
</tr>
<tr>
<td>DN450 DICL/CICL &amp; DN300 CICL</td>
<td>Along Elizabeth Drive from Cecil Park Reservoir to Devonshire Road SyW3.1</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>DN500 CICL</td>
<td>From Cecil Park Reservoir, crossing Elizabeth Drive and along Wallgrove Road SyW3.2</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>DN450 DICL</td>
<td>Exits Cecil Park Reservoir, running in direction of M7 Motorway south SyW3.2</td>
<td>Major</td>
<td></td>
</tr>
<tr>
<td>Future plans for a 4.3 km DN1200 water main</td>
<td>From Cecil Park Reservoir, parallel to proposed M12 Motorway, up to Devonshire Road and Western Road</td>
<td>N/A (not in existence)</td>
<td></td>
</tr>
<tr>
<td>Future plans for an additional reservoir at Cecil Park Reservoir</td>
<td>South of Elizabeth Drive, in Western Sydney Parklands</td>
<td>N/A (not in existence)</td>
<td></td>
</tr>
<tr>
<td><strong>Water NSW</strong></td>
<td>Upper Canal</td>
<td>Runs north–south near M7 Motorway interchange</td>
<td>Critical</td>
</tr>
<tr>
<td><strong>Telstra</strong></td>
<td>Minor services</td>
<td>Many and varied</td>
<td>Minor</td>
</tr>
<tr>
<td>Exchanges</td>
<td>Kemps Creek (Elizabeth Drive just east of Duff Road)</td>
<td>Critical</td>
<td></td>
</tr>
<tr>
<td>Mobile towers</td>
<td>Luddenham Road</td>
<td>Critical</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Off Elizabeth Drive opposite Lawson Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mamre Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Next to Cecil Park Radio Tower</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Jemena</strong></td>
<td>Central trunk – Primary Main 5000–7000 kPa</td>
<td>North–south Wilton to Horsley Park near M7/Elizabeth Drive JG3.1</td>
<td>Critical</td>
</tr>
<tr>
<td>Utility authority</td>
<td>Asset</td>
<td>Location</td>
<td>Risk ranking</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>----------</td>
<td>--------------</td>
</tr>
<tr>
<td>Transgrid</td>
<td>150 mm diameter main 1200 kPa</td>
<td>Along Elizabeth Drive JG3.2</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>100 mm diameter main 1050 kPa</td>
<td>Along Devonshire Road JG3.3</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Possible new pipeline to supply planned western Sydney airport</td>
<td>Elizabeth Drive or M12 Motorway</td>
<td>N/A (not in existence)</td>
</tr>
<tr>
<td></td>
<td>Overhead power – 500 kV double circuit line</td>
<td>Crossing Elizabeth Drive near Mamre Road TG3.1</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Overhead power – 330 kV single circuit line</td>
<td>Crossing Elizabeth Drive near Duff Road TG3.2</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td>Overhead power – 330 kV single circuit line</td>
<td>Crossing Elizabeth Drive near Kosovitch Close TG3.3</td>
<td>Major</td>
</tr>
<tr>
<td>Endeavour Energy</td>
<td>465 – 33 kV line</td>
<td>Parallel to Elizabeth Drive</td>
<td>Major</td>
</tr>
<tr>
<td></td>
<td>93X – 132 kV line</td>
<td>Crossing east of the Elizabeth Drive / Mamre Road intersection</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>93U – 132 kV line</td>
<td>Crossing south of the M7 Motorway / Elizabeth Drive intersection</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Substations</td>
<td>Kemps Creek substation near Devonshire Road</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Future feeders eg 33 kV line (not confirmed)</td>
<td>South Western Priority Growth Area</td>
<td>N/A (not in existence)</td>
</tr>
<tr>
<td></td>
<td>Future 132 kV line</td>
<td>From Kemps Creek bulk supply north across Elizabeth Drive and connection to the planned western Sydney airport</td>
<td>N/A (not in existence)</td>
</tr>
<tr>
<td></td>
<td>Future 132 kV line</td>
<td>From Kemps Creek bulk supply to 512 Kemps Creek substation</td>
<td>N/A (not in existence)</td>
</tr>
<tr>
<td>Optus</td>
<td>General</td>
<td>Various</td>
<td>Minor</td>
</tr>
<tr>
<td></td>
<td>Cecil Park radio tower</td>
<td>South of Elizabeth Drive between Cecil Road and Duff Road</td>
<td>Critical</td>
</tr>
<tr>
<td></td>
<td>Fibre optic cable</td>
<td>Crosses the M4 Motorway at corner of The Northern Road and Homestead</td>
<td>Critical</td>
</tr>
<tr>
<td>Utility authority</td>
<td>Asset</td>
<td>Location</td>
<td>Risk ranking</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Fuel supplier, eg Caltex</td>
<td>Aviation fuel line</td>
<td>Feasibility study indicates routes either from Plumpton, Clyde, Sydney Airport or Kurnell</td>
<td>N/A (not in existence)</td>
</tr>
<tr>
<td>Sydney Trains</td>
<td>GST and high voltage provision for traction power</td>
<td>To service the extension to Sydney Metro Northwest</td>
<td>Minor</td>
</tr>
<tr>
<td>Federal Government</td>
<td>Radar installation</td>
<td>South of Elizabeth Drive between Cecil Road and Duff Road</td>
<td>Minor</td>
</tr>
</tbody>
</table>
Figure 3-12 Utilities infrastructure
4 Options identification process

4.1 Introduction

This section describes the long list of route options for the proposed M12 Motorway and the process used to identify these options.

The M12 Motorway strategic route options analysis followed the process from identification of a long list of route options, analysis of shortlisted route options to the preferred corridor route outlined in Figure 4-1. The analysis has considered the ability of a range of options to satisfy the project objectives (refer to 1.2.2), as well as:

- Social, environmental and engineering constraints
- Servicing future development including the planned western Sydney airport at Badgerys Creek and the WSPGA.

Further information on the process is contained within the M12 Motorway Strategic Route Options Analysis Options Identification Report (Roads and Maritime, 2016a) and the M12 Motorway Strategic Route Options Analysis Shortlisted Options Report (Roads and Maritime, 2016b).

4.2 Identification of long list of route options

The process for identifying a long list of route options (stage 2 in Figure 4-1) involved establishing feasible corridors that could satisfy the project objectives and design principles, including engineering standards and environmental and socio-economic issues. It took into account opportunities and constraints in the study area.

The software package, ‘Quantm’, was used to develop the range of feasible corridors by combining design standards, terrain, geological, and hydrological data, environmental sensitive areas, property ownership, and cost information.

The design standards were largely based on the AustRoads Design Guides, with Roads and Maritime supplements.

4.3 Identification of shortlisted route options

4.3.1 Value management workshop

A value management workshop, held on 7 October 2015, reviewed the route options and identified shortlisted feasible route options. The participants included a range of stakeholders including State and Australian Government agencies, local councils, Roads and Maritime and the project team.

The objectives of the workshop were to:

- Obtain a common understanding of the work carried out to date on the M12 Motorway strategic route option analysis process
- Review the long list of route options, evaluate them against key assessment criteria (refer to Table 4-1) and recommend shortlisted route options for further investigations and development.

To review the long list of route options, the project team identified draft assessment criteria. This criteria were then allocated a weighting to develop a hierarchy of importance. Workshop participants were asked to review and identify any further changes to the criteria or weighting. The assessment criteria were then updated based on the feedback. The final assessment criteria are shown in Table 4-1.
Stage 1 Identify existing study area constraints

- Review of existing information through database searches and literature reviews
- Identification of the study area
- Identification and mapping of environmental and technical constraints.

Stage 2 Identify and assess long list of route options

- Use Quantm computer software to identify long list of route options considering environmental and technical constraints
- Assess long list of route options based on constraints identified in stage one
- This stage assessment was documented in the Options Identification Report (RMS, 2015).

Stage 3 Identify and assess shortlisted route options

- Review long list route options (including input from a Value Management Workshop) to identify shortlisted route options
- Undertake further desktop and field investigations of the shortlisted route options
- This stage assessment was documented in the Shortlisted Options Report (RMS, 2016).

Stage 4 Identify preferred option

- Review shortlisted route options (including input from a Value Management Workshop) to identify the preferred route option
- This stage assessment is documented in the Preferred Corridor Route Report (this report).

Figure 4-1: Strategic route options analysis process
Table 4-1: Final assessment criteria used for evaluating options

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Prompts and measures</th>
</tr>
</thead>
</table>
| 1   | Project delivery       | • Timeliness to plan and deliver, design risks, project approvals, land acquisitions, risks, or issues  
|     |                        | • Potential for construction staging, constructability, lead time for relocations or specific items, construction risk. |
| 2   | Land use               | • Integrates (considers non-sterilising) with current land use and proposed land use. Provides for property access Consistency with BWSEA and WSPGA. |
| 3   | Community impact       | • Number of cadastral lots/ownership  
|     |                        | • Number of existing businesses directly impacted  
|     |                        | • Community severance  
|     |                        | • Number of sensitive receivers within 600 m (noise and pollution).                     |
| 4   | Environment and heritage | • Number of Aboriginal and non-Aboriginal heritage sites affected  
|     |                        | • Total area of native vegetation affected. Area of EEC / CEEC affected  
|     |                        | • Drainage lines and creek lines.                                                        |
| 5   | Functionality          | • Grades, speeds, length, interchanges, connectivity to future M9 Outer Sydney Orbital  
|     |                        | • Enabling Elizabeth Drive to operate as an arterial road in the future  
|     |                        | • Impact on M7 Motorway and the rest of the network  
|     |                        | • Active transport and public transport  
|     |                        | • Connectivity to airport for cars and freight on the road network.                     |

As the individual zone corridor options are interchangeable to create the route options, the zone corridor options were examined against the assessment criteria. Information on the assessment of each corridor option was provided to all participants before the value management workshop and was the basis for the assessment.

The assessment was carried out by five separate groups and the scoring was collated. In most cases, similar scores were derived across the different groups. In the few cases where a group’s score deviated from the median, these groups were asked to justify their scores, and either keep or reassess them. The final score for each corridor option was the average of scores from the five separate groups.

The individual zone scores were added to a spreadsheet to provide an overall performance score for each of the 15 route options.

As a result of the workshop, some route options were shortlisted for further investigation and some were discarded. These are summarised in Table 4-2.
Table 4-2: Route option recommendations

<table>
<thead>
<tr>
<th>Route option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
<th>Zone D</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A0</td>
<td>B0</td>
<td>C0</td>
<td>D1</td>
<td>Discarded due to poor overall performance against the assessment criteria and as it did not meet the objective of preserving the existing function of Elizabeth Drive.</td>
</tr>
<tr>
<td>2</td>
<td>A1</td>
<td>B1</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1 from direct property impact and social impact (passes close to Elizabeth Drive and through the Kemps Creek village shops).</td>
</tr>
<tr>
<td>3</td>
<td>A1</td>
<td>B1</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1 from direct property impact and social impact (passes close to Elizabeth Drive and through the Kemps Creek village shops).</td>
</tr>
<tr>
<td>4</td>
<td>A1</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>5</td>
<td>A1</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>6</td>
<td>A1</td>
<td>B3</td>
<td>C1</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>7</td>
<td>A1</td>
<td>B3</td>
<td>C2</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>8</td>
<td>A2</td>
<td>B1</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1 from direct property impact and social impact (passes close to Elizabeth Drive and through the Kemps Creek village shops).</td>
</tr>
<tr>
<td>9</td>
<td>A2</td>
<td>B1</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1 from direct property impact and social impact (passes close to Elizabeth Drive and through the Kemps Creek village shops).</td>
</tr>
<tr>
<td>10</td>
<td>A2</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>11</td>
<td>A2</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>12</td>
<td>A2</td>
<td>B3</td>
<td>C1</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>13</td>
<td>A2</td>
<td>B3</td>
<td>C2</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>14</td>
<td>A2</td>
<td>B4</td>
<td>C1</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
<tr>
<td>15</td>
<td>A2</td>
<td>B4</td>
<td>C2</td>
<td>D1</td>
<td>Recommended for shortlisting and further development</td>
</tr>
</tbody>
</table>

In addition, the workshop identified further work to be carried out in determining the shortlisted route options. These were:

- Two options needed to be developed further in zone A. Corridor option A1 was identified by participants to be superior to option A2, and option A0 was removed. As such, both options (or an alternative option to replace option A2 such as a modified A0) should be retained for further investigation.

- Corridor option B4 scored well against the assessment criteria, however, it only links to corridor option A2 and may not be viable unless linked to other corridor options in zone A. The project team should investigate another potential connection.

4.3.2 Post workshop

On 8 October 2015, a core project team workshop was held with the objective to identify the final shortlisted route options taking into consideration the findings of the value management workshop. The workshop was carried out in three phases:

- Design optimisation – to review an alternative corridor option in zone A and modify corridor option B4
• Assessment – to review constraints in the newly identified corridor options to the same level of
detail as was carried out for the long list corridor options before the value management
workshop
• Comparison – to test the performance of the newly identified corridor options using the
assessment criteria developed in the value management workshop.
These phases are discussed in the following sections.

Zone A
The value management workshop identified the need to progress two options in zone A.
Option A0, which had initially been discarded during the value management workshop, was
reviewed.
The following changes were made to corridor option A0:
• The corridor width was increased to 300 metres to be comparable to other options, as
recommended in the value management workshop
• A school located north of Elizabeth Drive was avoided as with the other options
• The western end of option A0 was extended to connect to the recommended options in zone B,
as recommended in the value management workshop.

This modified option was called corridor option A3.
The value management workshop recommended option A1 be progressed. Option A1 passes to
the south of Elizabeth Drive, through Western Sydney Parklands. Due to the topography and land
use north of Elizabeth Drive, it was decided a new corridor option would need to be identified near
the Elizabeth Drive alignment.
No changes were made to option A1.
Corridor option A2, which did not perform as well as option A1 in the value management workshop,
was discarded.
Corridor options A1 and A3 were then included as shortlisted options.

Zone B
The value management workshop recommended corridor options B2 and B3 be considered further
and option B4 be further reviewed to investigate alternative connection options in zone A.
To connect corridor option B4 to both of the remaining zone A options, in response to the feedback
from the value management workshop, B4 was realigned along the B3 option. This resulted in the
modified B4 sharing the majority of its length with option B3. As such, option B3 was removed and
the modified B4 became option B5.
No changes were made to corridor option B2. Option B4 was discarded due to the development of
option B5 and option B3 discarded. Options B5 and B2 were then included as shortlisted options.
Zone C
No changes were made to corridor options C1 and C2. Both options were then included as shortlisted options.
However, Roads and Maritime were in the process of undertaking further investigations in this area to ensure an integrated road network plan is developed. This plan would need to consider the future needs of the M12 Motorway, The Northern Road, Elizabeth Drive and the connection to Luddenham from the proposed The Northern Road. This area is shown on Figure 5-1.

Zone D
No changes were made to the common option in this zone. This was then included as the shortlisted option.
However, it was noted that Roads and Maritime were in the process of undertaking further investigations in this area to ensure an integrated road network plan is developed. This plan would consider the future needs of the M12 Motorway, The Northern Road, Elizabeth Drive and the connection to Luddenham from the proposed The Northern Road. This area is shown on Figure 5-1.

Updated shortlisted route options
As a result of the above design modifications, there were a number of changes to the shortlisted options identified in the value management workshop. These changes are detailed in Table 4-3.
The shortlisted route options were assessed in the same manner as the long list of route options in the value management workshop against the same assessment criteria (refer to Table 4-1).
The resultant assessment identified that these route options were comparable with the better performing long list of route options in the value management workshop. As such, no further options were discarded.
In summary, there are eight shortlisted route options:
- Options 4 and 5 – these are unchanged from the long list of options
- Options 16 and 17 – these are options 6 and 7 incorporating corridor option B5 instead of B2
- Options 18 and 19 – these are options 10 and 11 incorporating corridor option A3 instead of A2
- Option 20 – this comprises corridor options A3, B5, C1, D1 and is a new route option
- Option 21 – this comprises corridor options A3, B5, C2, D1 and is a new route option.
<table>
<thead>
<tr>
<th>Route Option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
<th>Zone D</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A0</td>
<td>B0</td>
<td>C0</td>
<td>D1</td>
<td>Discarded due to poor overall performance</td>
</tr>
<tr>
<td>2</td>
<td>A1</td>
<td>B1</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1</td>
</tr>
<tr>
<td>3</td>
<td>A1</td>
<td>B1</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1</td>
</tr>
<tr>
<td>4</td>
<td>A1</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>5</td>
<td>A1</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>6</td>
<td>A1</td>
<td>B3</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to removal of B3 and inclusion of B5 – New option 16</td>
</tr>
<tr>
<td>7</td>
<td>A1</td>
<td>B3</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to removal of B3 and inclusion of B5 – New option 16</td>
</tr>
<tr>
<td>8</td>
<td>A2</td>
<td>B1</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1</td>
</tr>
<tr>
<td>9</td>
<td>A2</td>
<td>B1</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to poor performance of option B1</td>
</tr>
<tr>
<td>10</td>
<td>A2</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to removal of A2 and inclusion of A3 – New option 18</td>
</tr>
<tr>
<td>11</td>
<td>A2</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to removal of A2 and inclusion of A3 – New option 19</td>
</tr>
<tr>
<td>12</td>
<td>A2</td>
<td>B3</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to removal of A2 and B3</td>
</tr>
<tr>
<td>13</td>
<td>A2</td>
<td>B3</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to removal of A2 and B3</td>
</tr>
<tr>
<td>14</td>
<td>A2</td>
<td>B4</td>
<td>C1</td>
<td>D1</td>
<td>Discarded due to removal of A2 and B4</td>
</tr>
<tr>
<td>15</td>
<td>A2</td>
<td>B4</td>
<td>C2</td>
<td>D1</td>
<td>Discarded due to removal of A2 and B4</td>
</tr>
<tr>
<td>16</td>
<td>A1</td>
<td>B5</td>
<td>C1</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>17</td>
<td>A1</td>
<td>B5</td>
<td>C2</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>18</td>
<td>A3</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>19</td>
<td>A3</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>20</td>
<td>A3</td>
<td>B5</td>
<td>C1</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
<tr>
<td>21</td>
<td>A3</td>
<td>B5</td>
<td>C2</td>
<td>D1</td>
<td>Recommended as a shortlisted route option</td>
</tr>
</tbody>
</table>
5 Shortlisted route options

5.1 Description of shortlisted route options

There are eight shortlisted route options, consisting of two corridor options in each of zones A, B and C, and one option in zone D (that is, D1 is common to all route options).

These zone corridor options are shown in Figure 5-1. The eight shortlisted route options and their zone corridor option components are identified in Table 5-1. Each route option consists of a corridor 300 metres wide. Each route option is described in the following sections. To provide a point of differentiation from the long list of route options, the shortlisted route options are identified by colour. Table 5-1 identifies the colour and the former route option number. Details on the route options are in Table 5-2.

### Table 5-1: Shortlisted route options

<table>
<thead>
<tr>
<th>Route option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
<th>Zone D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqua (4)</td>
<td>A1</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
</tr>
<tr>
<td>Blue (5)</td>
<td>A1</td>
<td>B2</td>
<td>C2</td>
<td>D1</td>
</tr>
<tr>
<td>Green (16)</td>
<td>A1</td>
<td>B5</td>
<td>C1</td>
<td>D1</td>
</tr>
<tr>
<td>Orange (17)</td>
<td>A1</td>
<td>B5</td>
<td>C2</td>
<td>D1</td>
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<td>A3</td>
<td>B2</td>
<td>C1</td>
<td>D1</td>
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<td>Purple (19)</td>
<td>A3</td>
<td>B5</td>
<td>C1</td>
<td>D1</td>
</tr>
<tr>
<td>White (20)</td>
<td>A3</td>
<td>B5</td>
<td>C2</td>
<td>D1</td>
</tr>
<tr>
<td>Yellow (21)</td>
<td>A3</td>
<td>B5</td>
<td>C2</td>
<td>D1</td>
</tr>
</tbody>
</table>

### Table 5-2 Description of the shortlisted route options

<table>
<thead>
<tr>
<th>Route option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aqua option</td>
<td>The aqua option is 15 kilometres long, connecting to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location. It passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi Quality Group property and Kemps Creek Sporting and Bowling Club. This option then travels around the north of the Kemps Creek village north of Elizabeth Drive, crossing Kemps Creek and passing through rural agricultural and residential properties. It also passes through some larger industries include a quarry site and Andreasens Nursery. It crosses South Creek and skirts to the south of the landfill site and crosses Badgerys Creek before connecting to the planned western Sydney airport site through an interchange. The distance between the option and Elizabeth Drive through this section varies, and at its furthest, is 700 metres. This option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
</tr>
<tr>
<td>Blue option</td>
<td></td>
</tr>
<tr>
<td>Green option</td>
<td></td>
</tr>
<tr>
<td>Orange option</td>
<td></td>
</tr>
<tr>
<td>Pink option</td>
<td></td>
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<tr>
<td>Purple option</td>
<td></td>
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<tr>
<td>White option</td>
<td></td>
</tr>
<tr>
<td>Yellow option</td>
<td></td>
</tr>
<tr>
<td>Route option</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Blue option</strong></td>
<td>The blue option is 15 kilometres long, connecting to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location. The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi Quality Group property and Kemps Creek Sporting and Bowling Club. This option then skirts around the north of the Kemps Creek village north of Elizabeth Drive, crossing Kemps Creek and passing through rural agricultural and residential properties. It also passes through some larger industries include a quarry site and Andreasens Nursery. It crosses South Creek and skirts to the south of the landfill site and crosses Badgerys Creek before connecting to the airport site through an interchange. The distance between the option and Elizabeth Drive through this section varies, and at its furthest, is 700 metres. This option then crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.1 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
</tr>
<tr>
<td><strong>Green option</strong></td>
<td>The green option is 16 kilometres long, connecting to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location. It passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi Quality Group property and Kemps Creek Sporting and Bowling Club. This option then crosses Kemps Creek and travels in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange. The distance between the option and Elizabeth Drive varies, at its furthest, greatest separation it is 1750 metres away. This option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
</tr>
<tr>
<td><strong>Orange option</strong></td>
<td>The orange option is 16 kilometres long, connecting to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location. The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi Quality Group property and Kemps Creek Sporting and Bowling Club. This option then crosses Kemps Creek and travels in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange. The distance between the option and Elizabeth Drive varies, at its furthest, is 1750 metres. This option then crosses Cosgroves Creek and passes through rural and agricultural properties. It then crosses Luddenham Road about 1.1 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It connects with The</td>
</tr>
<tr>
<td>Route option</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
<td></td>
</tr>
<tr>
<td><strong>Pink option</strong></td>
<td>The pink option is about 16 kilometres long, connecting to the M7 Motorway at the same location as the existing Elizabeth Drive interchange. It travels, in general along the same alignment of Elizabeth Drive to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As the M12 Motorway would be constructed in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway. It passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road including the Hi Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it travels in a north-west direction, crossing Kemps Creek. This option then travels around the north of the Kemps Creek village north of Elizabeth Drive, passing through rural agricultural and residential properties. It also passes through some larger industries including a quarry site and Andreasens Nursery. It crosses South Creek and travels to the south of the landfill site and crosses Badgerys Creek. It then connects to the airport site through an interchange. The distance between this section varies, and at its furthest, is 700 metres. This option then crosses Cosgroves Creek and passes through rural and agricultural properties. It then crosses Luddenham Road about 1.1 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
</tr>
<tr>
<td><strong>Purple option</strong></td>
<td>The purple option is about 16 kilometres long, connecting to the M7 Motorway at the same location as the existing Elizabeth Drive interchange. It travels, in general, along the same alignment of Elizabeth Drive to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As the M12 Motorway would be constructed in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway. It passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road, including the Hi Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it traverses in a north-west direction, crossing Kemps Creek. This option then travels around the north of the Kemps Creek village north of Elizabeth Drive, passing through rural agricultural and residential properties. It also passes through some larger industries including a quarry site and Andreasens Nursery. It crosses South Creek, skirting south of the landfill site and crossing Badgerys Creek. It then connects to the airport site through an interchange. The distance between this section varies, and at its furthest, is 700 metres. This option then crosses Cosgroves Creek and passes through rural and agricultural properties. It then crosses Luddenham Road about 1.1 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
</tr>
<tr>
<td><strong>White option</strong></td>
<td>The white option is about 17 kilometres long, connecting to the M7 Motorway at the same location as the existing Elizabeth Drive interchange. It travels, in general, along the same alignment of Elizabeth Drive to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As the M12 Motorway would be constructed in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway. The option passes</td>
</tr>
<tr>
<td>Route option</td>
<td>Description</td>
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<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road including the Hi Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it traverses in a north-west direction, crossing Kemps Creek.</strong></td>
<td></td>
</tr>
<tr>
<td>This option then traverses in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange. The distance between the option and Elizabeth Drive varies, at its furthest, is 1750 metres.</td>
<td></td>
</tr>
<tr>
<td>This option then travels to the south-west, crossing Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes over rural residential, agricultural and other uses such as the Model Park. It then connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital.</td>
<td></td>
</tr>
</tbody>
</table>

| **Yellow option** | The yellow option is about 16 kilometres long, connecting to the M7 Motorway at the same location as the existing Elizabeth Drive interchange. This option travels, in general, along the same alignment of Elizabeth Drive to the Mamre Road intersection. This alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As the M12 Motorway would be constructed in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway. The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail). This option crosses over a number of commercial properties fronting onto Elizabeth Drive or Mamre Road including the Hi Quality Group property and the CSR Brickworks. Around the existing intersection with Mamre Road, the option traverses in a north-west direction, crossing Kemps Creek. |
| This option then travels in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange. The distance between the option and Elizabeth Drive through this section varies, and at its furthest, is 700 metres. |
| This option then crosses Cosgroves Creek and passes through rural and agricultural properties. It then crosses Luddenham Road about 1.1 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It connects with The Northern Road about 500 metres north of the existing Elizabeth Drive roundabout before connecting to the future Outer Sydney Orbital. |
Figure 5-1: M12 Motorway shortlisted route options
5.2 Modifications to the shortlisted route options

In February 2016, the eight shortlisted route options for the M12 Motorway were placed on public display. However, an area comprising half of zone C and all of zone D were identified as being subject to further investigation in regards to the future road network in the area. In particular, further investigation was required to find the most appropriate location for the intersection with The Northern Road to support the ongoing operation of road network.

During the public display 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, modifications were made to the shortlisted route options in zones C and D. The changes to the shortlisted route options were:

- Options C1 and C2 were replaced with options C3 and C4
- Zone D was removed from the project as a future connection to the M9 Outer Sydney Orbital is possible for all options.

The new zone C options were:

- C3 – This corridor option connects with both options in zone B. It crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses. The option terminates at Elizabeth Drive via ramps, with Elizabeth Drive upgraded to a principal arterial road and connecting with The Northern Road. A future connection to the M9 Outer Sydney Orbital is possible.
- C4 – This corridor option connects with both options in zone B. It crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It passes through rural residential, agricultural and other land uses. It connects with The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout. A future connection to the M9 Outer Sydney Orbital is possible.

The modified shortlisted route options and their zone components are detailed in Table 5-3 and shown in Figure 5-2. Further details on the modified options are provided in the following sections.

<table>
<thead>
<tr>
<th>Route option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>A1</td>
<td>B2</td>
<td>C3</td>
</tr>
<tr>
<td>Modified blue</td>
<td>A1</td>
<td>B2</td>
<td>C4</td>
</tr>
<tr>
<td>Modified green</td>
<td>A1</td>
<td>B5</td>
<td>C3</td>
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<tr>
<td>Modified orange</td>
<td>A1</td>
<td>B5</td>
<td>C4</td>
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<td>A3</td>
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<tr>
<td>Modified purple</td>
<td>A3</td>
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<td>C4</td>
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<tr>
<td>Modified white</td>
<td>A3</td>
<td>B5</td>
<td>C3</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>A3</td>
<td>B5</td>
<td>C4</td>
</tr>
</tbody>
</table>
Figure 5-2: Modified shortlisted route options
5.3 Modified shortlisted route options

This section provides a description of the modified shortlisted route options. The modified route options are shown in Figure 5-3 to Figure 5-6.

These modified route options are the options that are assessed in this report and were presented at the value management workshop in April 2016 to identify the preferred corridor route for the M12 Motorway.

5.3.1 Modified aqua

The modified aqua option is 15 kilometres long. It connects to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi-Quality Group property and Kemps Creek Sporting and Bowling Club.

The option then travels around the north of the Kemps Creek village north of Elizabeth Drive, crossing Kemps Creek and passing through rural agricultural and residential properties. It also passes through some larger businesses including a quarry site and Andreasens Nursery. It crosses South Creek and skirts to the south of the landfill site and crosses Badgerys Creek before connecting to the planned western Sydney airport site through an interchange. The distance between the option and Elizabeth Drive in this area varies; at its furthest, the corridor is 700 metres away.

The option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park in Luddenham.

The option connects to Elizabeth Drive via ramps, with Elizabeth Drive upgraded to a principal arterial road, and connects with The Northern Road.

5.3.2 Modified blue

The modified blue option is 15 kilometres long. It connects to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi-Quality Group property and Kemps Creek Sporting and Bowling Club.
Figure 5-3: Modified aqua and modified blue options
The option then skirts around the north of Kemps Creek village north of Elizabeth Drive, crossing Kemps Creek and passing through rural agricultural and residential properties. It also passes through some larger businesses including a quarry site and Andreasens Nursery. It crosses South Creek and skirts to the south of the landfill site and crosses Badgerys Creek before connecting to the planned western Sydney airport site through an interchange. The distance between the option and Elizabeth Drive in this area varies; at its furthest, the corridor is 700 metres away.

The option crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Luddenham Raceway.

The option connects to The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout.

### 5.3.3 Modified green

The modified green option is 16 kilometres long. It connects to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi-Quality Group property and Kemps Creek Sporting and Bowling Club.

The option then crosses Kemps Creek and travels north-west, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the planned western Sydney airport site via an interchange. The distance between the option and Elizabeth Drive varies; at its furthest, the corridor is around 1750 metres away.

The option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park.

The option connects to Elizabeth Drive via ramps, with Elizabeth Drive upgraded to a principal arterial road, and connects with The Northern Road.

### 5.3.4 Modified orange

The modified orange option is 16 kilometres long. It connects to the M7 Motorway more than one kilometre south of the Elizabeth Drive interchange at a new interchange location.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road, including the Hi-Quality Group property and Kemps Creek Sporting and Bowling Club.
M12 Strategic Route Options Analysis Preferred corridor route report

FIGURE 5-4: Modified green and modified orange options
The option then crosses Kemps Creek and travels north-west, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the planned western Sydney airport site via an interchange. The distance between the option and Elizabeth Drive varies; at its furthest, the corridor is around 1750 metres away.

The option then crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Luddenham Raceway.

The option connects to The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout.

5.3.5 Modified pink

The modified pink option is about 16 kilometres long. It connects to the M7 Motorway at the same location as the existing Elizabeth Drive interchange.

The option generally follows the Elizabeth Drive alignment to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As this option would be built in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road including the Hi-Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it travels north-west, crossing Kemps Creek.

The option then travels around the north of Kemps Creek village north of Elizabeth Drive, passing through rural agricultural and residential properties. It also passes through some larger businesses including a quarry site and Andreasens Nursery. It crosses South Creek and travels to the south of the landfill site and crosses Badgerys Creek. It then connects to the planned western Sydney airport site through an interchange. The distance between the option and Elizabeth Drive in this area varies; at its furthest, the corridor is 700 metres away.

The option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park.

The option connects to Elizabeth Drive via ramps, with Elizabeth Drive upgraded to a principal arterial road, and connects with The Northern Road.
5.3.6 Modified purple
The modified purple option is about 16 kilometres long. It connects to the M7 Motorway at the same location as the existing Elizabeth Drive interchange.

The option generally follows the Elizabeth Drive alignment to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As this option would be built in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road, including the Hi-Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it traverses north-west, crossing Kemps Creek.

The option then travels around the north of Kemps Creek village north of Elizabeth Drive, passing through rural agricultural and residential properties. It also passes through some larger businesses including a quarry site and Andreasens Nursery. It crosses South Creek, skirting south of the landfill site and crossing Badgerys Creek. It then connects to the planned western Sydney airport site through an interchange. The distance between the option and Elizabeth Drive in this area varies; at its furthest, the corridor is 700 metres away.

The option then crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Luddenham Raceway.

The option connects to The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout.

5.3.7 Modified white
The modified white option is about 17 kilometres long. It connects to the M7 Motorway at the same location as the existing Elizabeth Drive interchange.

The option generally follows the Elizabeth Drive alignment to the Mamre Road intersection. The alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As this option would be built in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) and a number of commercial properties fronting Elizabeth Drive or Mamre Road including the Hi-Quality Group property and CSR Brickworks. Around the existing intersection with Mamre Road, it traverses north-west, crossing Kemps Creek.

The option then traverses north-west, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the planned western Sydney airport site via an interchange. The distance between the option and Elizabeth Drive varies; at its furthest, the corridor is around 1750 metres away.
FIGURE 5-5: Modified pink and modified purple options
The option then crosses Cosgroves and Oaky creeks near the confluence of the creeks, before crossing Luddenham Road just north of the intersection with Elizabeth Drive and south of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Model Park.

The option connects to Elizabeth Drive via ramps, with Elizabeth Drive upgraded to a principal arterial road, and connects with The Northern Road.

5.3.8 Modified yellow

The modified yellow option is about 16 kilometres long. It connects to the M7 Motorway at the same location as the existing Elizabeth Drive interchange.

The option generally follows the Elizabeth Drive alignment to the Mamre Road intersection. This alignment is on a more direct route than Elizabeth Drive to meet current design standards and to avoid the steep topography to the north of Elizabeth Drive. As this option would be built in the existing Elizabeth Drive corridor as much as possible, Elizabeth Drive would need to be reconstructed around the motorway.

The option passes through Western Sydney Parklands (including a section of the Wylde Mountain Bike Trail) as well as a number of commercial properties fronting onto Elizabeth Drive or Mamre Road including the Hi-Quality Group property and the CSR Brickworks. Around the existing intersection with Mamre Road, it traverses north-west, crossing Kemps Creek.

The option then travels north-west, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the landfill site, crossing Badgerys Creek before connecting to the planned western Sydney airport site via an interchange. The distance between the option and Elizabeth Drive in this area varies; at its furthest, the corridor is 1750 metres away.

The option then crosses Cosgroves Creek and passes through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill. It passes through rural residential, agricultural and other uses such as the Luddenham Raceway.

The option connects to The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout.
Figure 5-6: Modified white and modified yellow options.
6 Community consultation

6.1 Communication and engagement objectives

The communication and engagement objectives for the project are to:

- Provide regular and targeted information to build awareness about the new motorway and the likely impact and benefits of the project
- Provide clear direction to the community and stakeholders about whether we are providing information or seeking feedback so expectations are clear at all stages
- Ensure community and stakeholder views are continuously fed into the project’s development and used to understand and effectively assess impacts
- Collaborate with government agencies and local councils to ensure a whole-of-government approach and consistent key messages.

6.2 Consultation activities

The shortlisted route options for the M12 Motorway were placed on exhibition for community feedback between Monday 8 February and Friday 11 March 2016. This consultation was carried out at the same time as consultation on the proposed The Northern Road Upgrade between Mersey Road, Bringelly and Eaton Road, Luddenham (refer to Table 6-1).

A number of activities were conducted during the consultation period to give the community a chance to learn more about the project, meet the Western Sydney Infrastructure Plan (WSIP) project team and provide feedback on the shortlisted route options.

Community members were encouraged to provide their feedback, leave comments and make submissions at the information sessions or via mail, email, website and interactive portal or phone the project team.

Table 6-1 Consultation tools and activities

<table>
<thead>
<tr>
<th>Tool/activity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community update newsletters (2)</td>
<td>Community update newsletters were produced for both the M12 Motorway and The Northern Road Upgrade, between Mersey Road and Eaton Road. Each newsletter included a general overview of WSIP, key features of the specific proposal and further information on providing feedback (including the information sessions). The newsletters were delivered to a total of 4400 properties across the two projects – 2100 for the M12 Motorway and 2300 for The Northern Road Upgrade between Mersey Road and Eaton Road. They were also available on the Roads and Maritime website and made available at community information sessions.</td>
</tr>
<tr>
<td>Door knock</td>
<td>At the beginning of the consultation period, 160 properties were door knocked for the proposed M12 Motorway. The purpose was to notify potentially impacted owners/occupants of the next stage of the M12 Motorway project and promote the upcoming community information sessions. The M12 Motorway community update newsletter was provided to each property owner/occupant. Where the property</td>
</tr>
<tr>
<td>Tool/activity</td>
<td>Details</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>owner/occupant was not home, a ‘Sorry we missed you’ flyer was also left (see below for details).</td>
<td></td>
</tr>
<tr>
<td>‘Sorry we missed you’ flyer</td>
<td>Where the property owner/occupant was door knocked but not at home a ‘Sorry we missed you’ flyer was left informing the property owner/occupant that someone from the project team had tried to make contact. These flyers were left at 87 properties.</td>
</tr>
<tr>
<td>Media release</td>
<td>A media release was distributed to all major Sydney metropolitan and western Sydney media publications on 15 February 2016. It was titled <em>Shortlisted route options for M12 Motorway</em> and encouraged local community members and stakeholders to get involved in the consultation process. This resulted in coverage in <em>The Daily Telegraph</em> on 27 February 2016 and the <em>Penrith City Gazette</em> on 2 March 2016.</td>
</tr>
</tbody>
</table>
| Newspaper advertisement              | A total of 11 newspaper advertisements appeared in local papers between 17 and 26 February to raise awareness of the consultation and information sessions. Publications included:  
  - *Liverpool Leader* (17 and 24 February 2016)  
  - *Liverpool Champion* (17 and 24 February 2016)  
  - *Penrith Press* (18 and 25 February 2016)  
  - *Penrith Gazette* (18 and 25 February 2016)  
  - *Penrith Western Weekender* (19 and 26 February 2016)  
| Email                                | Direct emails were sent from Roads and Maritime to 963 stakeholders (community members and groups), local Members of Parliament and other government stakeholders to raise awareness of the consultation and information sessions for both projects. A reminder email noting the closing date for consultation was sent to stakeholders before the closing date. |
| SMS                                  | A reminder SMS was sent to stakeholders on the stakeholder and community database at the start of the consultation period and on the day before each information session. |
| Webpage                              | The project webpage was updated on 15 February 2016 with the latest project information including the community update newsletters and information on how to submit feedback. There were 1906 unique page visitors during the consultation period.  
| Western Sydney Infrastructure Plan (WSIP) portal | An interactive web portal covering all aspects of the WSIP was launched in July 2015. For this consultation period, two new videos were developed for the proposed M12 Motorway and The Northern Road Upgrade between Mersey Road and Eaton Road. The web portal includes nine videos about the projects and provides a space for viewers to leave feedback. There were 1674 unique visitors to the M12 Motorway pages and 548 unique visitors to The Northern Road Upgrade between Mersey Road and Eaton Road pages during the consultation period. A banner directing people to the portal was placed on the Roads and Maritime home page.  
| Community information sessions       | Four community information sessions were held between 24 February and 5 March 2016 to give the community an opportunity to view all display materials, talk with project team members and submit feedback in person. Project teams from Sydney Water, Department of Planning and Environment, and Department of |
The following sessions were held:

**Wednesday 24 February 2016, 5–8pm**
Holy Family Primary School
Lot 32, Willowdene Avenue, Luddenham

**Saturday 27 February 2016, 10am–1pm**
Kemps Creek Public School
100 Cross Street, Kemps Creek

**Wednesday 2 March 2016, 3–6pm**
Kemps Creek Public School
100 Cross Street, Kemps Creek

**Saturday 5 March 2016, 10am–1pm**
Holy Family Primary School
Lot 32, Willowdene Avenue, Luddenham

A total of 220 people were recorded as attending the community information sessions, as follows:

- 77 attendees on 24 February 2016
- 65 attendees on 27 February 2016
- 45 attendees on 2 March 2016
- 33 attendees on 5 March 2016.

However, total attendance was greater as not all attendees signed in individually; about 90 stakeholders did not register their individual attendance at the information sessions.

Seven variable message signs were displayed across The Northern Road, Elizabeth Drive and Bringelly Road during the consultation period to notify the community about upcoming information sessions.

A digital advertisement was placed on News Local online (western and southern regions). This included the *Penrith Press* and *Macarthur Chronicle*. The advertisement ran from 15 February until 14 March 2016.

### 6.3 Stakeholder consultation

Briefings with government agencies and key stakeholders were held during the consultation period.
Government agency briefings were held with:
- State and Federal MPs
- Fairfield City Council
- Liverpool City Council
- Penrith City Council.

Stakeholder briefings were held with:
- M7 Motorway
- Western Sydney Parklands Trust
- University of Sydney.

These 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
- M7 Motorway
- Transport Management Centre
- Transport for NSW
- Penrith City Council
- Fairfield City Council
- Liverpool City Council.

### 6.4 Written submissions

There were a total of 122 submissions for the proposed M12 Motorway during the consultation period, as follows:
- 53 submissions from residents
- 15 submissions from business owners
- 19 submissions from community groups
- 35 submissions from councils, government agencies, educational institutions and members of the public from outside of the project area.

The most common issues raised in these submissions were:
- 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 future land use, plans and access
• Impact on air quality
• Noise
• Impact on traffic
• Impact on flora and fauna
• Impact on dams and other water sources.

6.5 Community input into the preferred route

During the consultation period, the community and stakeholders were asked to comment on their preferred corridor route option. Based on the submissions received, the overall preference was the orange route option. While there were many reasons given for this preference, the most often cited reason was that respondents believed it would impact on the fewest number of properties.

In terms of the individual corridor options in the zones, the options favoured by the community were:
• Option A1 in zone A
• Option B5 in zone B
• Option C2 in zone C.

As zone D was identified as being subject to further investigation, a preference on this zone was not sought from the community.

6.6 Future consultation

Future consultation activities will comprise:
• Newsletters to progressively update the community on the project (this will occur regularly during the development of the project)
• Community information sessions and a ‘have your say’ period for the preliminary road design and access strategy
• Community information sessions and stakeholder briefings to provide the community with the opportunity to give feedback and comment on the release of the Environmental Impact Statement
• Regular updates to the project webpage at rms.nsw.gov.au/wsip (this will occur throughout the development of the project)
• New animations added to the WSIP interactive portal to support project milestones.
7 Assessment of shortlisted route options

7.1 Introduction

This chapter presents an assessment of the modified shortlisted corridor options in zones A, B and C against the key environmental and socio-economic criteria. These corridor options are:

- Zone A – A1 and A3
- Zone B – B2 and B5
- Zone C – C3 and C4.

The key environmental and socio-economic criteria include:

- Biodiversity
- Aboriginal and non-Aboriginal heritage
- Land use and planning
- Socio-economic
- Noise
- Soils and contamination
- Hydrology and flooding
- Landscape character
- Utilities.

Details for each of the assessments are:

- Biodiversity – desktop assessment and field investigation. Desktop assessment involved a review of relevant databases and previous reports in the study area. The biodiversity assessment is provided in Appendix A
- Aboriginal and non-Aboriginal heritage assessment – desktop assessment and field investigation. Desktop assessment involved a review of relevant databases and previous reports in the study area. The heritage assessment is provided in Appendix B
- Land use and planning – a desktop assessment based on review of relevant LEPs and other documents including regional strategies; GIS analysis of land use. The land use and planning assessment is provided in Appendix C
- Socio-economic (including local business and agribusiness assessment) – a desktop assessment, including GIS analysis and field inspection. The socio-economic assessment is provided in Appendix D
- Noise – a comparative noise assessment based on noise modelling. This is provided in Appendix E
- Soils and contamination – desktop assessment based on database review, aerial photography review and previous reports in the study area. A site inspection was also carried out for contamination. The Phase 1 environmental site assessment is provided in Appendix F
- Hydrology and flooding – desktop assessment involving flood modelling
• Landscape character – desktop assessment and field inspection. The landscape character assessment is provided in Appendix G
• Utilities – desktop assessment and mapping, including consultation with utility authorities.

These assessments have been considered in the selection of the preferred corridor route for the project and feed into the five assessment criteria used at the value management workshop (for further details see Chapter 8).

7.2 Zone A

7.2.1 Biodiversity

A biodiversity assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following section. The full assessment is provided at Appendix A. Figure 7-1 shows the biodiversity features against the zone A shortlisted options.

Corridor option A1

About 26 hectares of threatened vegetation occurs in varying condition throughout corridor option A1 (refer to Table 7-1). This vegetation is listed as either endangered ecological community (EEC) or critically endangered ecological community (CEEC) under the NSW Threatened Species Conservation Act 1995 (TSC Act).

The majority of the extant native vegetation across the corridor was found to be in poor condition and does not meet the critically endangered criteria under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). In particular, the understory is in poor condition and is mostly made up of exotic species. However, up to five hectares do meet the critically endangered criteria under the Act.

Table 7-1: Significant vegetation within corridor option A1

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumberland Plain Woodland in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>4.6</td>
<td>20.5</td>
</tr>
<tr>
<td>River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>-</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>4.6</td>
<td>26</td>
</tr>
</tbody>
</table>

Fauna habitat along this option includes a number of old dead trees (stags) with hollows.
Corridor option A1 passes through:

- Areas of the Western Sydney Priority Growth Area (WSPGA) at its north-eastern extent, including about 134 hectares of land classified as non-certified lands as part of the biocertification order for State Environment Planning Policy (SEPP) (Sydney Region Growth Centres) 2006
- About four hectares identified as priority conservation lands as part of the Cumberland Plain Recovery Plan
- Two identified regional corridors that link priority conservation lands. The option would potentially impact 56 hectares of mapped lands within these corridors. All of this land is identified for management as bushland corridor within Western Sydney Parklands
- The middle of Western Sydney Parklands, severing the section of Parklands in the study area into two separate areas. The area of impact would be similar to that in corridor option A3 but this fragmentation would have a greater impact.

Corridor option A1 would also potentially impact:

- About 55 hectares of land that have been subject to active bush regeneration since 1997 to support the enhancement of the identified bushland corridor within Western Sydney Parklands
- About six hectares of the M7 West biobanking agreement site (ID number 119). There may also be impact on the Cecil Park South-East biobanking agreement site (ID number 70) made under the Threatened Species Conservation Act for Western Sydney Parklands Trust, as the very south-eastern end of this option is immediately next to this site.

Corridor option A3

About 51 hectares of threatened vegetation listed as either EEC or CEEC under the TSC Act occurs throughout corridor option A3 in varying condition (refer to Table 7-2).

The extant native vegetation across the option is in varying condition but site validation identified that up to 31 hectares across the corridor meet the critically endangered criteria under the EPBC Act. For example, the native vegetation at the corner of Wallgrove Road and Elizabeth Drive is an area of very good condition, intact native habitat, and meets the criteria as critically endangered.

Table 7-2: Significant vegetation within corridor option A3

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumberland Plain Woodland in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>29.0</td>
<td>44.3</td>
</tr>
<tr>
<td>Moist Shale Woodland in the Sydney Basin Bioregion</td>
<td>EEC</td>
<td>1.6</td>
<td>1.7</td>
</tr>
<tr>
<td>River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>-</td>
<td>4.4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>30.6</td>
</tr>
</tbody>
</table>
Some areas of vegetation within the Western Sydney Parklands are undergoing bush regeneration.

Fauna habitat areas to the south of Elizabeth Drive within the option include a number of large remnant native trees, including hollows.

One threatened fauna species, the Varied Sittella, has either been previously recorded within the extent of corridor option A3 or is known to occur nearby in the Western Sydney Parklands, to the east of the corridor near the M7 Motorway.

Corridor option A3 passes through:

- Areas of the WSPGA at its north-eastern extent, including about 67 hectares of land classified as non-certified lands as part of the biocertification order for SEPP (Sydney Region Growth Centres) 2006
- About 38 hectares identified as priority conservation lands as part of the Cumberland Plain Recovery Plan
- Two identified regional corridors that are either contained within or link priority conservation lands. The option would potentially impact 28 hectares of mapped lands within these corridors. The majority of this land is identified for management as bushland corridor within Western Sydney Parklands
- The Western Sydney Parklands alongside the Elizabeth Drive alignment. This would result in an edge effect to the bushland corridor (as opposed to corridor option A1, which would bisect the bushland corridor)
- About 36 hectares of land subject to active bush regeneration activities since 1997 to support the enhancement of the bushland corridor within Western Sydney Parklands.

Corridor option A3 would also potentially impact about three hectares of the M7 West biobanking agreement site (ID number 119).

7.2.2 Aboriginal heritage

A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-2 shows the heritage features against the zone A shortlisted options.

**Corridor option A1**

Corridor option A1 includes six Aboriginal heritage sites:

- Modified tree site CH-ST-1
- Artefact scatter 2008-4
- One area of Aboriginal potential archaeological deposit – PAD 2054-6
- Three sub-surface artefact scatters – PAD-OS-5, PAD-OS-6, and CP-OS-4.

Corridor option A1 passes through almost 6000 metres of land with predicted Aboriginal archaeological sensitivity – mainly around the creek lines of Kemps Creek and Hinchinbrook Creek, and undeveloped areas south of Elizabeth Drive to the east of Mamre Road.
Site CH-ST-1 (modified tree site) has high significance due to the rarity of this site type on the Cumberland Plain. This site could not be found during the field investigation and is assumed to be located within a constructed water body. As such, the status of this site has yet to be verified in the context of the project. However, the potential for the site in the corridor makes this the less preferred option in terms of Aboriginal heritage in this zone.

**Corridor option A3**
Corridor option A3 includes eight Aboriginal heritage sites:
- Two isolated finds – M12 A5, IF10
- Six artefact scatters – KC/ED2, P-CP8, CP AS1, P-CP9, DLC2, P-CP14.

This option passes through around 3000 metres of land with predicted Aboriginal archaeological sensitivity – mainly around the creek lines of Kemps Creek and Ropes Creek, and undeveloped areas south of Elizabeth Drive to the east of Mamre Road.

### 7.2.3 Non-Aboriginal heritage

A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-2 shows the heritage features against the zone A shortlisted options.

**Corridor option A1**
There is one non-Aboriginal heritage site within corridor option A1, being the Upper Canal System (tunnel). This item is of State significance. No other heritage sites or potential heritage sites are within the corridor.

Corridor option A1 also passes through two potential heritage landscapes:
- KC-1 – South Creek basin landscape – undulating hills with remnant vegetation
- L23 – Kemps Creek remnant vegetation corridor.

**Corridor option A3**
There are three non-Aboriginal heritage sites within corridor option A3:
- Upper Canal System (tunnel and open canal)
- The Big Chook (egg farm in Mount Vernon)
- M12 H2 Cecil Park Public School.
FIGURE 7-2: Heritage features in Zone A
The Upper Canal System is of State significance and the other two sites are of local significance.

There are also two potential non-Aboriginal heritage items within this corridor: ID 9 (standing structure) and ID 10 (structure). Access to these sites during the field investigations was not available but views from the adjoining road did not indicate the presence of any standing historical structures on the site. However, there is the possibility of archaeological evidence of the structures.

Corridor option A3 also passes through the same potential heritage landscapes as option A1:
- KC-1 – South Creek basin landscape – undulating hills with remnant vegetation
- L23 – Kemps Creek remnant vegetation corridor.

7.2.4 Land use and planning
A land use and planning assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix C. Figure 7-3 shows the land use features against the zone A shortlisted options.

Corridor option A1
Corridor option A1 includes the following land use zones: RU4 Rural small holdings, and Western Sydney Parklands. The main land use activities that are within the corridor include:
- Recreational land uses (55.4 per cent of the corridor) including: Western Sydney Parklands (including Sydney International Shooting Centre, Wylde Mountain Bike Trail and passive recreational areas such as walking and cycling paths), and the Kemps Creek Sporting and Bowling Club
- Industrial land uses (2.3 per cent of the corridor) including quarrying and mechanical/construction services
- Agricultural land uses (20.5 per cent of the corridor) including herb produce activities
- Rural residential and urban residential land uses (2.5 per cent of the corridor), with urban residential confined to the eastern side of the M7 Motorway
- Transport and other (utilities) corridors (15.5 per cent of the corridor) including Elizabeth Drive and the M7 Motorway.

Through the Western Sydney Parklands, this corridor option would pass through 109.18 hectares of Parklands, and could impact on:
- The northern extent of the Sydney International Shooting Centre
- The south west corner of the Wylde Mountain Bike Trail
- A length of the M7 West Biobanking site along the M7 Motorway
- The bushland corridor, bisecting the area used for passive recreation
- Utilities (including the Upper Canal System and TransGrid high voltage lines).
The loss of land from the Western Sydney Parklands could be a substantial impact. Although the option would bisect the existing land use, there would be the opportunities to consider offsetting the impact. In terms of future development, this option could impact on the future plans of Western Sydney Parklands including upgrading and augmenting the existing walking and cyclist tracks. Maintaining connectivity should be considered in the future design of the corridor.

The affected land uses are in ready supply in the study area (within and outside zone A). The corridor would pass through a property of currently undeveloped land that is proposed to be developed into a business park. This option would pass through the majority of the property, and may reduce the feasibility of the proposed business park. As such, alternative development sites within the area would need to be investigated by the developer.

West of Mamre Road, this option would pass through the Western Sydney Priority Growth Area (WSPGA). This option, at this location, would be around 400 metres north of Elizabeth Drive. This has the potential to affect WSPGA zoning, as Department of Planning and Environment has indicated that the minimum distance from Elizabeth Drive should be at least 600 metres to provide a viable lot for development. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be accurately assessed. However, should the zoning become commercial and industrial, there would be a change in land use for some of the existing land uses. This would increase the opportunities for business parks being able to be developed in the study area. The corridor option would not constrain this type of development.

The option would also interface with the new road hierarchy for the WSPGA, including the proposed extension of Devonshire Road to Mamre Road. As both options in zone A pass through the WSPGA, this is not a differentiator between the two options.

**Corridor option A3**

Corridor option A3 includes the following land use zones: RU1 Primary production, RU4 Rural small holdings, E4 Environmental living and the Western Sydney Parklands. This option would need to be partially constructed within the existing Elizabeth Drive corridor.

The main land use activities that are within the corridor include:

- Recreational land uses (33.9 per cent of the corridor) including: Western Sydney Parklands (Sydney International Shooting Centre (access only), Wylde Mountain Bike Trail and passive recreational areas such as walking and cycling paths) and the Kemps Creek Sporting and Bowling Club
- Industrial land uses (2.8 per cent of the corridor) including brick making and mechanical/ construction services
- Agricultural land uses (26.7 per cent of the corridor) including herb produce activities
- Rural residential land uses (0.1 per cent of the corridor)
- Transport and other (utilities) corridors (15.5 per cent of the corridor) including Elizabeth Drive and the M7 Motorway.
Through the Western Sydney Parklands, this corridor option would pass through 102.35 hectares of Parklands, including a:

- Length of Wylde Mountain Bike Trail, south of the Elizabeth Drive alignment
- Section of the Biobanking site M7 West along the M7 Motorway
- Registered carbon credit site
- Bushland corridor area, along the Elizabeth Drive and M7 Motorway
- Part of the proposed Wallgrove Road and Elizabeth Drive business hubs.

The area of Western Sydney Parklands to be impacted is located north and south along Elizabeth Drive. To the south of Elizabeth Drive, this would create an edge effect to the Parklands and would not create a severance effect. There would be limited opportunities to relocate the land use impact on the Western Sydney Parklands. The corridor would have a large impact on the existing bike trails in the Wylde Mountain Bike Trail facility that would require some redevelopment to create shorter trails or may require increasing the size of the overall facility across neighbouring land.

In terms of future land use, the corridor would impact on the future development of the Western Sydney Parklands, particularly the proposed locations of the Wallgrove Road and Elizabeth Drive business hubs. These commercial activities located in the Parklands are used as a source of income for the Parklands. The disturbance of these sites would remove a potential source of income for the Parklands and if required, would need to be relocated elsewhere in the remaining Parklands.

The affected land uses are in ready supply in the study area. The corridor would pass through a property of currently undeveloped land that is proposed to be developed into a business park. This option would pass through the northern extent of the property, reducing its frontage to Elizabeth Drive. While it passes through less of the property than option A1, it could still reduce the developmental yield potential of the property.

West of Mamre Road, this option would also pass through the WSPGA. This option, at this location, would be around 400 metres north of Elizabeth Drive. This has the potential to affect WSPGA zoning, as the Department of Planning and Environment has indicated that the minimum distance from Elizabeth Drive should be at least 600 metres for development to provide a viable lot. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be accurately assessed. However, should the zoning become commercial and industrial, there would be a change in land use for some of the existing land uses. This would increase the opportunities for business parks being able to be developed in the study area. The corridor would not constrain this type of development.

The option would also interface with the new road hierarchy for WSPGA, including the proposed extension of Devonshire Road to Mamre Road.

As both options in zone A pass through the WSPGA, this is not a differentiator between the two options.
FIGURE 7-3: Land use features in Zone A

M12 Strategic Route Options Analysis Preferred corridor route report
7.2.5 Socio-economic

A socio-economic assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix D.

Corridor option A1

The socio-economic aspects relevant to corridor option A1 are detailed in Table 7-3.

Table 7-3 Socio-economic aspects of corridor option A1

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community cohesion</td>
<td>Corridor option A1 passes through a portion of Western Sydney Parklands, creating a barrier and altering the sense of place for community users and volunteers of the Parklands. Option A1 would also pass over Range Road which provides access to the Sydney International Shooting Centre, and the Wylde Mountain Bike Trail. This option passes through part of these properties, affecting internal access to the shooting centre and bike trails. These properties are identified as having a high community value and impact on them could affect the communities that gather at these locations. The project would also create a perceived barrier between communities (particularly Mount Vernon and Cecil Park) and recreational facilities. This includes changes to movement patterns in the Parklands, and services and facilities in Kemps Creek. These facilities in Kemps Creek include retail shops, community facilities like the Kemps Creek post office, other recreational activities including horse riding and the Kemps Creek Sporting and Bowling Club. Option A1 passes through the Kemps Creek Sporting and Bowling Club clubhouse and some of the sporting fields. This could affect the operation of the club.</td>
</tr>
<tr>
<td>Amenity effects</td>
<td>Option A1 has around 578 sensitive receivers within 600 metres, which would be subject to visual and noise impacts. Few of these receivers are located within 100 metres of the option, with the majority located in Cecil Hills, to the east of the M7 Motorway. Corridor option A1 would cross through areas of rural or industrial land and the Western Sydney Parklands. The main visual impact through this area would be to the users of the Parklands and other facilities. A new motorway would be visually intrusive to users, changing the character of the area. This would be more pronounced as the option would need to bridge the Upper Canal system and include above ground ramps to join to the M7 Motorway. However visual impact to parkland users would be temporary for the duration of their stay. There would be similar impact to the Wylde Mountain Bike Trail. The motorway would also cross Elizabeth Drive near the Mamre Road intersection. This would result in high visibility of the option with a large number of transient travellers on Elizabeth Drive and Mamre Road. This would introduce a large piece of infrastructure into a relatively quiet rural and rural residential area changing the identity of the area. Some sensitive receivers to the north of Elizabeth Drive would be able to view corridor option A1. Those most impacted would be situated on Elizabeth Drive or Mamre Road. As the corridor options pass predominantly through rural and rural residential land, there would be a noticeable change in road traffic noise near the new corridor option.</td>
</tr>
</tbody>
</table>
### Aspect Description and Impact

As option A1 passes mostly through the Western Sydney Parklands, there would be less impact on permanent receivers than option A3. Receivers located to the east of the M7 Motorway, are unlikely to experience changes in noise amenity as they already experience noise from the M7 Motorway.

Sensitive receivers located on Elizabeth Drive, Mamre Road and near the M7 Motorway are already impacted by main road noise so the degree of change in noise level would not be as great as areas currently unaffected by road traffic noise.

<table>
<thead>
<tr>
<th>Access and movement patterns</th>
<th>Movement patterns within and out of the study area are via Elizabeth Drive, Cecil Road, Duff Road, Range Road and Mamre Road in zone A. Elizabeth Drive, Range Road and Mamre Road would be affected by corridor option A1, and the option would need to pass over or under these roads to maintain connectivity. This would then maintain the existing access and movement patterns within and outside the study area. Public transport would continue on their current routes, with no existing services to divert to the M12 Motorway. Corridor option A1 would connect to the M7 Motorway at a location south of the existing Elizabeth Drive intersection. The Elizabeth Drive intersection would be used to access local roads, residents, businesses and community and educational facilities in the study area. The introduction of the M12 Motorway could result in a reduction of through traffic on Elizabeth Drive (ie traffic from the M7 Motorway to The Northern Road) that could improve access and traffic conditions for local traffic. There are a number of property accesses that would require changes as a result of corridor option A1. Access to the Sydney International Shooting Centre, Wylde Mountain Bike Trail and Brandown Quarry, Waste and Recycling Services may be affected. Access to some properties on Elizabeth Drive may be interrupted or changed. Corridor option A1 traverses the Western Sydney Parklands and could impact on existing pedestrian and cyclist pathways through the Parklands. The inclusion of a shared user path as part of the M12 Motorway would provide opportunities to connect into the M7 Motorway and Western Sydney Parklands trails.</th>
</tr>
</thead>
</table>
| Property impact | Corridor A1 passes through 53 property lots, of which:
- There are nine residences
- There are 49 privately owned lots and four publicly owned lots. |
| Business impact | Corridor option A1 intersects eight local businesses:
- Three arts and recreation services including the Kemps Creek Sporting and Bowling Club and the Sydney International Shooting Centre with associated clubs on premises
- Two construction services including VAC Group and Western Sydney Fences
- Two quarrying and waste services including Brandown Quarrying, Recycling and Waste Services and the head office of High Quality Group
- One agricultural producer. |
| Agribusiness impact | In corridor option A1, grazing land is the dominant agricultural land use directly intersected, accounting for 39.1 hectares. This is followed by farm infrastructure, horticulture and intensive animal production which together accounts for 4.6 hectares. |
Aspect | Description and impact
--- | ---
In total, the agricultural land use is 43.7 hectares in corridor option A1.

Corridor option A1 passes through properties that make up around 166 hectares of agricultural land. The area of these properties directly impacted is around 44 hectares. As such, the indirect impact to agribusinesses is estimated to be around 122 hectares.

Overall, the remaining agricultural land area is estimated to be 74 per cent of the original agricultural land parcel area for corridor options A1.

Option A1 would cross access to a few agricultural properties south of Elizabeth Drive, landlocking a few properties. This access would need to be reinstated to avoid this impact. Option A1 would also potentially sever land on smaller agricultural lots north of Elizabeth Drive.

**Corridor option A3**
The socio-economic aspects relevant to corridor option A3 are detailed in Table 7-4.

<p>| Table 7-4 Socio-economic aspects of corridor option A3 |</p>
<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community cohesion</td>
<td>Corridor option A3 would widen the Elizabeth Drive road corridor and limit movement across the corridor separating the community from facilities. This would be most pronounced for Mount Vernon and Cecil Park residents accessing social infrastructure such as Ifran College and the Kemps Creek Sporting and Bowling Club. This perceived barrier for the local community would be a greater impact to the local community than option A1 as it would be more visible to residents. The corridor would also pass over Range Road which provides access to the Sydney International Shooting Centre and the Wylde Mountain Bike Trail. This could affect the sense of place and community value of the facility. Corridor option A3 would have an edge effect to the Western Sydney Parklands, which would be less disruptive than option A1 for passive recreational users of the Parklands. However, it would have a greater impact on the Wylde Mountain Bike Trail as the corridor is located over the bike trails near Elizabeth Drive. Option A3 (similar to option A1) passes over the Kemps Creek Sporting and Bowling Club clubhouse and some of the sporting fields, this could affect the operation of the club.</td>
</tr>
<tr>
<td>Amenity effects</td>
<td>There are around 418 sensitive receivers within 600 metres of corridor option A3 that would be subject to visual and noise impacts. While some of these receivers are located east of the M7 Motorway, the majority of the receivers are located to the north of Elizabeth Drive, associated with Kemps Creek, Mount Vernon and Cecil Park. Corridor option A3 is situated along the existing Elizabeth Drive road corridor. There would be increased visibility to travellers along Elizabeth Drive, and side roads: Cecil Road, Duff Road and Mamre Road. However, the viewers would be transient with no long term impact. As with option A1, this corridor option would introduce a large piece of infrastructure into a relatively quiet rural and rural residential area changing the identity of the area. Due to the closeness of some sensitive receivers to the option, particularly north of Elizabeth Drive, this would have a greater visual impact on residences than option A1. As the option traverses along the edge of the Parklands, it may have a lesser effect on the passive recreation areas than option A1. However, it passes</td>
</tr>
</tbody>
</table>
Aspect | Description and impact
--- | ---
 | along the length of the Wylde Mountain Bike Trail compared to option A1, which crosses a corner of the trail. There would be greater visual impact on users of the facility associated with option A3.

As the corridor options pass predominantly through rural and rural residential land, there would be a noticeable change in road traffic noise near the new corridor options.

Sensitive receivers located on Elizabeth Drive, Mamre Road and near the M7 Motorway are already impacted by main road noise so the degree of change in noise level would not be as great as areas currently unaffected by road traffic noise.

| Access and movement patterns | Corridor option A3 would not result in a change to access to the M7 Motorway from the study area. However it would result in the one interchange for both Elizabeth Drive and M12 Motorway. This arrangement could result in some confusion to travellers wanting to access the local area or through traffic wanting to access the airport and The Northern Road.

Elizabeth Drive, Cecil Road, Duff Road, Range Road and Mamre Road would be affected by option A3. Option A3 would need to pass over or under these roads to maintain connectivity. This would then maintain the existing access and movement patterns within and outside the study area. Public transport would continue on their current routes, with no existing services to divert to the M12 Motorway.

As corridor option A3 would be constructed alongside Elizabeth Drive, property access for properties and local roads that front onto Elizabeth Drive may be cut off. As the M12 Motorway would not have any connecting property accesses, a separate local access road may need to be constructed to maintain access to properties from Elizabeth Drive.

The interface with Elizabeth Drive/M12 Motorway and Mamre Road could result in permanent changes to how Elizabeth Drive connects to Mamre Road.

The introduction of the M12 Motorway could result in a reduction of through traffic on Elizabeth Drive (ie traffic from the M7 Motorway to The Northern Road) that could improve access and traffic conditions for local traffic.

Similar to option A1, the inclusion of a shared user path as part of the M12 Motorway would provide opportunities to connect into the M7 Motorway and Western Sydney Parklands trails.

| Property impact | Corridor A3 passes through 137 property lots, of which:

- There are 18 residences
- There are 112 privately owned lots and 25 publicly owned lots.

| Business impact | Corridor option A3 intersects nine local businesses and one arts and recreation services, being the Kemps Creek Sporting and Bowling Club
- Three construction services including VAC Group and Cecil Park CSR Bricks & Roofing
- One quarrying and waste services - head office of High Quality Group
- Four agricultural producers including the Big Chook.

| Agribusiness impact | Grazing land is the dominant agricultural land use directly intersected by corridor option A3, accounting for 58.9 hectares. This is followed by farm infrastructure, horticulture and intensive animal production which together account for 8.4 hectares.

In total, the agricultural land use is 67.4 hectares in corridor option A3.

Corridor option A3 passes through properties that make up around 419 hectares of agricultural land. The area of these properties directly impacted
is around 67 hectares. As such, the indirect impact to agribusinesses is estimated to be around 352 hectares.
Overall, the remaining agricultural land area is estimated to be 84 per cent of the original agricultural land parcel area.
Option A3 both would potentially sever land on smaller agricultural lots north of Elizabeth Drive.

7.2.6 Noise
A noise assessment has been carried out to assess the impact of the shortlisted route options. The full assessment is provided at Appendix E.
The results of the modelling (noise nuisance rating) for the options in zone A is provided in the following sections. The noise nuisance rating is a measure of the difference between the future base noise level (ie without the M12 Motorway – identified as 0) and the future noise level with the M12 Motorway.

Corridor option A1
The noise nuisance rating of corridor option A1 would be worse than the base noise level, with a benefit ratio of between -3.42 and -3.55.

Corridor option A3
The nuisance rating of corridor option A3 is similar to option A1, with a benefit ratio of between -3.47 and -3.50.

7.2.7 Soils
An assessment of the shortlisted route options was carried out against the known geological composition of the study area. The findings for the options in zone A are provided in the following sections.

Corridor option A1
Corridor option A1 traverses the Luddenham soil landscapes and Bringelly Shale. The Luddenham soils are highly erodible with mass movement (slump) hazard. They contain some impermeable, highly plastic subsoils and are moderately reactive.
Due to these soils, embankments would require batters with a ratio of 2.5H:1V for stability (slope is calculated as horizontal run (H) to vertical rise (V)).
This option crosses 11 drainage lines that would require bridge crossings or culverts as transverse drainage structures. Soft ground and alluvium deposits could be present in areas closer to creeks. Embankment foundations over the soft soils may require foundation treatment depending on the thickness of compressible material encountered below the embankment.

Corridor option A3
Corridor option A3 traverses the Luddenham and Picton soil landscapes and Bringelly Shales.
It would require large fill embankments due to abrupt topographic changes to the west of Duff Road. Due to the Luddenham soil landscapes and Bringelly shale, embankments would require 2.5H:1V batters for stability (slope is calculated as horizontal run (H) to vertical rise (V)). This is due to the soils are highly erodible with mass movement (slump) hazard and contain some impermeable and highly plastic subsoils. However, the Picton soil landscapes could allow steeper embankment slopes.

This option crosses eight drainage lines that would require bridge crossings or culverts as transverse drainage structures. Soft ground alluvium is possible at the areas closer to the creek. Embankment foundations over the soft soils may require treatment depending on the thickness of compressible material encountered below the embankments.

7.2.8 Contamination
A Phase 1 environmental site assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix F.

Corridor option A1
There are four key areas of environmental concern (AEC) for corridor option A1. One of these (Brandown quarry and waste recovery and recycling centre) was evaluated as having a very high risk. The AECs, contaminants of potential concern (CoPCs) and further details are provided in Table 7-5. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor.

Table 7-5 Areas of environmental concern in corridor option A1

<table>
<thead>
<tr>
<th>AEC A1</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandown Class II Landfill</td>
<td>Asbestos, hydrocarbons (TPH/BTEX, PAH), phenols, pesticides (OCP/OPP), metals and PCBs</td>
<td>Very high risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The landfill is licensed to receive general solid waste, asbestos waste, waste tyres and any waste below the POEO Schedule 1 licensing thresholds. Given the age of the facility (it was operating before 2000 – when environment protection licences (EPLs) were issued – the uncontrolled nature of historical activities (including use of asbestos) could impact human health.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Brandown landfill has truck machinery storage areas, metal recycling/storage, numerous stockpiles (not inspected) and the active landfill and supporting infrastructure/structures. Numerous metal tanks of unknown usage were observed in the central portions of the site (although an on-site inspection was not carried out).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The licence would require control of runoff from the landfill area, including older capped areas, into a detention basin, the content of which would be treated or removed offsite to an appropriate treatment facility. Impact are expected from older parts of the landfill, which is unlikely to be lined and, as such, would have no barrier for downward</td>
</tr>
<tr>
<td>AEC A1</td>
<td>Contaminants of concern</td>
<td>Assessment of risk</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------</td>
<td>--------------------</td>
</tr>
</tbody>
</table>
|        | migration of leachate (the landfill is upslope of the corridor option).  
An approximate 300 m² scalded/bare patch of ground was observed to the north of the truck turning bay associated with the landfill site.  
Landfill is upslope of the corridor option, so leachate from landfill could impact on services. |
| Hi-Quality Group Landscaping Supplies Yard | Hydrocarbons (TPH/BTEX, PAH), phenols and lead. | Moderate risk of contamination  
Hydrocarbon storage could impact on human health, surface water, flora and fauna and underground services if the tank/supply line has leaked into surrounding soils that may be excavated. There is a risk of explosion impacting on human health although this is considered unlikely. Without a site inspection, it could not be determined if the tanks were bunded and/or double skinned. |
| Notified service station | Hydrocarbons (TPH/BTEX, PAH), phenols and lead. | Low risk of contamination  
This notified service station site is used for commercial purposes and has the infrastructure for large truck refuelling. Depending on the age of the service station (unknown) and its underground infrastructure (unknown), potential contamination of soils and groundwater could have occurred. In addition to the distance from the corridor (400 m), the service station is downslope and hydrologically separated from the corridor by a waterway. However, given the presence of potential preferential pathways (service easements) within the study area, there is potential (albeit low) for impacted groundwater to enter the corridor footprint. |
| Soil stockpiles | Metals, hydrocarbons (TPH/BTEX, PAH), asbestos. | Moderate risk of contamination  
An approximate 100 m³ soil and rock stockpile was observed to the north of the Upper Canal System Pheasants Nest Weir to Prospect Reservoir. The stockpile was vegetated and appeared to be aged. Several tyres were observed within the stockpile materials.  
Several soil stockpiles were also observed on private property consisting of soil, metal sheeting materials and possibly construction and demolition waste. Another stockpile of aggregate was evident in another area. These stockpiles could contain asbestos, which could impact on human health. Runoff from the stockpiles could also impact surface waters and groundwater. |
Corridor option A3
There are five key areas of environmental concern (AEC) for corridor option A3. One of these was evaluated as having a high risk (CSR Brickworks). The AECs, contaminants of potential concern (CoPCs) and further details are provided in Table 7-6. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor option.

Table 7-6 Areas of environmental concern in corridor option A3

<table>
<thead>
<tr>
<th>AEC A3</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brandown Class II Landfill</td>
<td>Asbestos, hydrocarbons (TPH/BTEX, PAH), phenols, pesticides (OCP/OPP), metals and PCBs</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td>The landfill licensed to receive general solid waste, asbestos waste, waste tyres and any waste below the Protection of the Environment Operations Act 1997 Schedule 1 licensing thresholds. Given the age of the facility (it was operating before 2000 – when environment protection licences (EPLs) started – the uncontrolled nature of historical activities (including use of asbestos) could impact human health. The Brandown landfill comprises truck machinery storage areas, metal recycling/storage, numerous stockpiles (not inspected) and the active landfill and supporting infrastructure/structures. Numerous metal tanks of unknown usage were observed in the central portions of the Brandown site (although an on-site inspection was not carried out). The licence would require control the runoff from the landfill area, including older capped areas, into a detention basin, the content of which would be treated or removed offsite to an appropriate treatment facility. Impact are expected from older parts of the landfill, which is unlikely to be lined and, as such, would have no barrier for downward migration of leachate (the landfill is upslope of the corridor option). An approximate 300 m² scalded/bare patch of ground was observed to the north of the truck turning bay associated with the landfill site. Landfill is 200 m upslope of the corridor option, so leachate from the landfill could impact on services.</td>
<td></td>
</tr>
<tr>
<td>Hi-Quality Group Landscaping Supplies Yard</td>
<td>Hydrocarbons (TPH/BTEX, PAH), phenols and lead.</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td>Hydrocarbon storage could impact on human health, surface water, flora and fauna and underground services, if the tank/supply line has leaked into surrounding soils that may be excavated. There is a risk of explosion impacting on human health although this is considered unlikely. Without a site inspection, it could not be determined if the bulk hydrocarbon storage was being carried out and thus the presence of aboveground and underground contaminants (ASTs and USTs) has been assumed based on land usage.</td>
<td></td>
</tr>
<tr>
<td>AEC A3</td>
<td>Contaminants of concern</td>
<td>Assessment of risk</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Notified Service Station</td>
<td>Hydrocarbons (TPH/BTEX, PAH), phenols and lead.</td>
<td>Low risk of contamination</td>
</tr>
<tr>
<td></td>
<td>This notified service station site is used for commercial purposes and has the infrastructure for large truck refuelling. Depending on the age of the service station (unknown) and its underground infrastructure (unknown), potential contamination of soils and groundwater could likely have occurred. In addition to the distance from the corridor, the service station is downslope and hydrologically separated from the corridor by a waterway. However, given the presence of potential preferential pathways (service easements) within the study area, there is potential (albeit low) for impacted groundwater to enter the corridor footprint.</td>
<td></td>
</tr>
<tr>
<td>Soil stockpiles</td>
<td>Metals, hydrocarbons (TPH/BTEX, PAH), asbestos</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td>Several soil stockpiles were observed in the land portion bounded by Range Road to the east, Elizabeth Drive to the north, Kemps Creek Sporting and Bowling Club to the west and Brandown Solid Waste Landfill to the south. Stockpiles ranged in size from about 5 m³ to 30 m³ and were observed to comprise soil, metal sheeting materials and possibly construction and demolition waste (stockpiles were located on private property and direct inspection was not possible). These stockpiles could contain asbestos, which could impact on human health and runoff could also impact surface waters. The unknown quality of stockpiles has the potential to impact surface soils, subsoils, groundwater and surface water via preferential flow paths (such as drainage gullies, soil percolation, etc).</td>
<td></td>
</tr>
<tr>
<td>CSR Brickworks and ceramic processing</td>
<td>Heavy metals and hydrocarbons (TRH/BTEX, PAH, phenols), PCBs, pH, faecal coliforms, Chlorine, anions / cations, ammonia, hexavalent chromium</td>
<td>High risk of contamination</td>
</tr>
<tr>
<td></td>
<td>Activities on the property have the potential to contaminate soil, air and groundwater. Legacy land use practices may have included leaks/spills, waste emplacement/disposal and historic building materials. Further, mining and extractive industries are listed in Planning Guidelines SEPP 55 – Remediation of Land as an activity that may cause contamination. During field investigations, extraction and processing of raw materials appeared to be taking place and three large smoke stacks were observed, as well as several earthen dams. Notably, a moderate sized earthen dam is downslope of the CSR Bricks and Roofing Quarry/Plant within an ephemeral drainage line. Given the presence of vegetative buffers and gravels, runoff is unlikely to be a significant transport mechanism for impacted soils.</td>
<td></td>
</tr>
</tbody>
</table>
7.2.9 Hydrology and flooding

A flooding assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone A are provided in the following sections. Figure 3-7 shows the major creek lines and the 100 year ARI flood extents.

Corridor option A1

Corridor option A1 passes through 11 substantial drainage lines including Kemps Creek and Hinchinbrook Creek and the associated Kemps Creek floodplain. This corridor traverses 525 metres of the floodplain (for the 300 metre corridor, this equates to a 138,331 square metre area of floodplain). Flood modelling was carried out to identify indicative bridge lengths while minimising flooding impact on nearby land. The modelling indicates that the minimum opening (ie structure length) across the Kemps Creek floodplain should be 188 metres.

The corridor also crosses a number of other minor drainage lines (in some cases these are associated with farm dams) and 10 farm dams.

The corridor also passes over the Sydney Water Upper Canal system.

Corridor option A3

Corridor option A3 crosses eight substantial drainage lines including Kemps Creek and Ropes Creek and the associated Kemps Creek floodplain. This corridor traverses 525 metres of the floodplain (for the 300 metre corridor, this equates to a 134,529 square metre area of floodplain). Flood modelling was carried out to identify indicative bridge lengths while minimising flooding impact on nearby land. The modelling indicates that the minimum structure length across the Kemps Creek floodplain should be 215 metres.

The corridor also crosses a number of minor drainage lines (in some cases these are associated with farm dams) and five farm dams.

The corridor also crosses the Sydney Water Upper Canal system.

While passing across fewer drainage lines, Option A3 requires a longer bridge structure across the Kemps Creek floodplain than Option A1.

7.2.10 Landscape character

A landscape character and visual assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone A is provided in the following sections. The full assessment is provided at Appendix G.

Corridor option A1

The landscape character impact of option A1 were assessed in terms of impact on sensitivity to environments, accessibility and connectivity, and the public domain.

In terms of impact on sensitivity to environments:

- Option A1 would be potentially visible to residents of a smaller number of properties in the urban residential development zone of Cecil Hills (landscape character zone 5 (LCZ 5))
- Option A1 (and A3) would require a bridge over Kemps Creek and its floodplain
Option A1 would require bridges over the Sydney Water Supply Upper Canal and over Elizabeth Drive, which would increase the road corridor’s visibility from adjoining areas.

Options A1 (and A3) would require extensive clearing of native vegetation as the proposed route passes through Western Sydney Parklands (LCZ1). Retained vegetation would provide a visual screen on both sides in option A1.

Option A1 would pass through the Kemps Creek Sporting and Bowling Club and a section of the Wylde Mountain Bike Trail.

In terms of impact on accessibility and connectivity:

- Option A1 could impact the visual connection to Western Sydney Parklands from Cecil Hills urban residential development (LCZ5).
- Option A1 could impact the pedestrian and cycling connections within Western Sydney Parklands and create a distinct division in the northern and southern areas of the Parklands.
- Option A1 could impact access to the Sydney International Shooting Centre, and on the Kemps Creek Sporting and Bowling Club, which is also within the A1 corridor.

In terms of impact on the public domain:

- Option A1 would have the lowest impact on the public domain as it would be almost entirely within the Western Sydney Parklands (LCZ1).
- Option A1 would have greater impact on the uses of Western Sydney Parklands and its character (LCZ1) than option A3.
- Option A1 could provide views toward the Blue Mountains through the South Catchment when travelling over the ridge line in Western Sydney Parklands.
- Option A1 corridor runs close to the Kemps Creek Nature Reserve, a Cumberland Plain Priority Conservation Land.

The following aspects would determine the visibility and change in landscape character of corridor option A1:

- A large section of the corridor runs through Western Sydney Parklands and would be highly visible to users of the Parklands and those with distant views to the Parklands. However, this would also make the corridor visible to only a few residential and commercial properties north of Elizabeth Drive.
- A new bridge would be required to cross the Sydney Water Supply Upper Canal, resulting in a potential increase in the visibility of the corridor from neighbouring parkland areas.
- A new bridge would be needed to cross Kemps Creek and the associated floodplain, resulting in a potential increase in the visibility of the corridor from neighbouring areas.
- Native vegetation would potentially be cleared, especially where the corridor passes through Western Sydney Parklands. Any retained vegetation should be an effective visual screen to reduce the visibility of the corridor.
- The corridor crosses Elizabeth Drive immediately west after the roundabout to Mamre Road. Elizabeth Drive would cross over the corridor, making the motorway
visible for motorists driving in both westbound and eastbound. The remainder of the corridor, to the east, would be mostly screened by vegetation in Western Sydney Parklands

- The corridor would be highly visible from the southern end of Mamre Road where this road currently connects to Elizabeth Drive at a roundabout.

In summary, corridor option A1 would have less impact on views from surrounding residential development than option A3 because a large section of corridor option A1 runs through Western Sydney Parklands (the existing tree coverage in the Parklands would help to screen the corridor) and because it crosses less undulating land.

Overall, corridor option A1 would have a high to moderate impact on landscape character.

Corridor option A3
The landscape character impact were assessed in terms of impact on sensitivity to environments, accessibility and connectivity, and the public domain.

In terms of impact on sensitivity to environments:

- Option A3 generally follows the Elizabeth Drive alignment but crosses over it at three points as it takes a more direct alignment that avoids steep topography. Realignment of Elizabeth Drive would be required in this section.

- Option A3 would affect a higher number of properties where the landscape pattern is varied and the road corridor traverses both the Western Sydney Parklands (LCZ1) and elevated rural residential areas (LCZ2).

- Option A3 has more potential sensitive viewers (than option A1) as it runs along the boundary of residential and commercial properties of the elevated rural residential development (LCZ2) and the Western Sydney Parklands (LCZ1).

- Option A3 (and option A1) would require a bridge over Kemps Creek and its floodplain.

- Option A3 (and option A1) would require extensive clearing of native vegetation as the corridor passes through the Western Sydney Parklands (LCZ1). Retained vegetation would provide a visual screen from the south in option A3.

- The interchange to the M7 Motorway could require more critical vegetation clearing (than option A1) and disconnect the native vegetation system where the Western Sydney Parklands is relatively narrow.

- Option A3 would require a redesign of the Wylde Mountain Bike Trail in order to retain the facility. The corridor also runs through several large established commercial properties (CSR Bricks and Hi Quality Group).

In terms of impact on accessibility and connectivity:

- The proximity of option A3 to Elizabeth Drive would make it harder to create meaningful parkland use. This option could also impact on existing access to the Wylde Mountain Bike Trail.

- The proximity of option A3 to Elizabeth Drive would create a wider barrier to cross, cutting the residential areas in the north (LCZ2) from Western Sydney Parklands in the south (LCZ1).
Option A3 could affect access to the residential, commercial and rural properties of LCZ2.

Corridor option A3 could impact access to Western Sydney Parklands for residents of elevated rural residential areas (LCZ2).

In terms of impact on the public domain:

- The location of option A3 at the intersection of three landscape character zones around the Elizabeth Drive / Mamre Road roundabout may create an awkward infrastructure solution and make it harder to create meaningful land use patterns.

The following aspects would determine the visibility and change to landscape character of option A3:

- The number of sensitive receivers. Option A3 has more potential sensitive viewers (than option A1) as it runs along the boundary of residential and commercial properties of the elevated rural residential development (LCZ2) and the Western Sydney Parklands (LCZ1).
- The clearing of native vegetation along the southern side of Elizabeth Drive. However, any retained vegetation should be an effective visual screen to reduce the visibility of the proposed motorway.
- The new bridge to cross Kemps Creek and the associated floodplain, which would potentially increase the visibility of the corridor from neighbouring areas.
- The proximity of corridor option A3 to Elizabeth Drive, which would require realignment and some crossing points, and result in a high visual impact on travellers and adjoining properties between the M7 Motorway and Mamre Road.
- The corridor’s high visibility from the southern end of Mamre Road, where this road currently connects to Elizabeth Drive at a roundabout.
- The connection of option A3 to the M7 Motorway, which would result in a wider cleared footprint, which is particularly important as it is at a point where Western Sydney Parklands is at its narrowest and crosses the M7 Motorway. This could result in a disconnection of the vegetation system within the Parklands.
- The alignment of option A3, which generally follows the Elizabeth Drive alignment but crosses over it at three points as it takes a more direct alignment that avoids steep topography. Realignment of Elizabeth Drive would be required in this section.
- The location of option A3 on the boundary of Western Sydney Parklands (LCZ1) which would affect the elevated rural residential development (LCZ2), resulting in visual exposure to a larger number of sensitive viewers than option A1. However, option A3 would be developed in an area of existing road infrastructure so the degree of change would not be as marked as with option A1. This would also result in option A3 having a greater impact on patterns of settlement than option A1.

In summary, option A3 would have a greater degree of visual exposure than option A1 as it traverses undulating ridgelines that would require more cut and fill than option A1.

Overall, option A3 would have a high impact on landscape character.
7.2.11 Utilities

A utilities assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone A are provided in the following sections. Figure 7-4 shows the critical utilities against the zone A shortlisted options.

**Corridor option A1**

Corridor option A1 crosses the following utilities (including critical utilities):

- Sydney Water upper canal system (critical)
- Jemena gas main trunk (critical)
- Jemena 150 millimetre gas main (critical)
- Telstra optical fibre assets (critical)
- Telstra services
- Sydney Water mains – 300 cast iron cement lined (CICL), 375 ductile iron cement lined (DICL), 450 DICL
- TransGrid 330 kilovolt (kV) overhead electricity line
- TransGrid 500 kV overhead electricity line (critical)
- Endeavour Energy 132 kV electricity line.

**Corridor option A3**

Corridor option A3 crosses the following utilities (including critical utilities):

- Sydney Water upper canal system (critical)
- Jemena gas main trunk (critical)
- Jemena 150 mm gas main (critical)
- Telstra and Optus optical fibre assets (critical)
- Sydney Water mains –100 CICL, 150 CICL, 250 CICL/DICL/SCL, 300 CICL, 375 DICL, 450 DICL/CICL, 500 CICL/DICL
- TransGrid 330 kV overhead electricity line
- TransGrid 500 kV overhead electricity line (critical)
- Endeavour Energy 132 kV electricity line
- Telstra services
- Optus services.

While there are more utilities within corridor option A3, both options in zone A cross the same number of critical utilities that could result in timing delays or cost implications for the project. Careful design could avoid impact to these critical utilities and minimise any resultant project risks.
Figure 7-4 Critical utilities in Zone A
7.3 Zone B

7.3.1 Biodiversity

A biodiversity assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix A. Figure 7-5 shows the biodiversity features against the zone B shortlisted options.

Corridor option B2

About 34 hectares of threatened vegetation listed as either endangered ecological community (EEC) or critically endangered ecological community (CEEC) under the TSC Act occurs throughout corridor option B2. This vegetation occurs in varying condition (refer to Table 7-7).

Site validation identified that up to 23 hectares may meet the critically endangered criteria under the EPBC Act.

Table 7-7: Significant vegetation within corridor option B2

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion</td>
<td>VEC</td>
<td>11.2</td>
<td>11.2</td>
</tr>
<tr>
<td>Cooks River / Castlereagh Ironbark Forest in the Sydney Basin Bioregion</td>
<td>EEC</td>
<td>5.2</td>
<td>5.2</td>
</tr>
<tr>
<td>Cumberland Plain Woodland in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>-</td>
<td>11.1</td>
</tr>
<tr>
<td>Castlereagh Shale Gravel Transition Forest in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>23.0</td>
</tr>
</tbody>
</table>

Corridor option B2 includes one threatened flora species that has been previously recorded at two sites within the corridor. This species is *Dillwynia tenuifolia*, recorded near the priority conservation lands.

Corridor option B2 passes through:

- About four hectares identified as priority conservation lands as part of the Cumberland Plain Recovery Plan
- Two identified regional corridors that link priority conservation lands, primarily associated with drainage lines. The corridor would potentially impact 38 hectares of mapped land within these corridors. Any impact on native vegetation within these regional corridors should be avoided or minimised where possible.
Figure 7-5: Biodiversity features in Zone B
Corridor option B5
About 30 hectares of threatened vegetation listed as either EEC or CEEC under the TSC Act occurs throughout corridor option B5 in varying condition (refer to Table 7-8).

Site validation identified that up to 21 hectares may meet critically endangered or endangered criteria under the EPBC Act.

Table 7-8: Significant vegetation within corridor option B5

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castlereagh Scribbly Gum Woodland in the Sydney Basin Bioregion</td>
<td>VEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cumberland Plain Woodland in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>6.5</td>
<td>6.7</td>
</tr>
<tr>
<td>Castlereagh Shale Gravel Transition Forest in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>7.7</td>
<td>7.7</td>
</tr>
</tbody>
</table>

This corridor includes one threatened flora species (*Dillwynia tenuifolia*) that has been previously recorded in two locations within the regional corridor to the east and to the west of Clifton Avenue.

The corridor includes two migratory bird species that have either been previously recorded within its extent or are known to occur nearby. These are:

- White-bellied Sea-Eagle
- Cattle Egret.

The corridor crosses two identified regional corridors that link priority conservation lands primarily associated with drainage lines (regional corridors are primary landscape connections between larger important areas of habitat). It would potentially impact 38 hectares of mapped land within these regional corridors. Any impact on native vegetation within these regional corridors should be avoided or minimised where possible.

7.3.2 Aboriginal heritage
A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-6 shows the heritage features against the zone B shortlisted options.
Figure 7-6 Heritage features in Zone B

Legend
- M12 study area
- Aboriginal heritage
  - Aboriginal site
  - Cultural landscapes
  - Archaeological sensitivity
- Non-Aboriginal heritage
  - Non-Aboriginal site (unlisted)
  - Non-Aboriginal area (unlisted)
- Non-Aboriginal cultural landscapes

Note: Aboriginal heritage site locations are general in nature to protect exact locations.

Source: Navin Officer, Nearmap, LPI, Aurecon
Projection: GDA 1994 MGA Zone 56

M12 Strategic Route Options Analysis Preferred route report

FIGURE 7-6: Heritage features in Zone B
**Corridor option B2**

Corridor option B2 includes one Aboriginal heritage site, the artefact scatter BC/ED1. This corridor passes through around 2500 metres of land with predicted Aboriginal archaeological sensitivity, mainly around the creeklines of Kemps Creek, South Creek and Badgerys Creek.

**Corridor option B5**

Corridor option B5 includes six Aboriginal heritage sites. All these sites are artefact scatters:

- M12 A1
- M12 A2
- M12 A3
- M12 A4
- Fleurs 1
- Fleurs 2.

It would therefore affect five more sites than corridor option B2. This corridor passes through around 3600 metres of land with predicted Aboriginal archaeological sensitivity, mainly around the creeklines of Kemps Creek, South Creek and Badgerys Creek.

### 7.3.3 Non-Aboriginal heritage

A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-6 shows the heritage features against the zone B shortlisted options.

**Corridor option B2**

There are five non-Aboriginal heritage sites within corridor option B2:

- McGarvie-Smith Farm
- Iron shed on McGarvie-Smith Farm
- Fibro building on McGarvie-Smith Farm
- M12 H4 McMaster Farm
- M12 H5 Exeter Farm Estate House.

These sites have a local significance, but further investigation is required at the McGarvie-Smith Farm and new findings there could potentially change the significance of this item.
Corridor option B2 passes through six potential non-Aboriginal heritage landscapes:
- KC-1 – South Creek basin landscape – undulating hills with remnant vegetation
- L1 – South Creek remnant native vegetation corridor
- L13 – Badgerys Creek remnant native vegetation corridor
- L29 – Vegetation Community, Clifton Avenue, Kemps Creek
- L30 – McMaster Field Station Scenic landscape, Elizabeth Drive, Badgerys Creek
- L54 – Remnant vegetation along Elizabeth Drive.

**Corridor option B5**

There are five non-Aboriginal heritage sites within corridor option B2:
- Fleurs radio telescope site
- McGarvie-Smith farm
- M12 H1 South Creek bridge
- M12 H3 WW2 era airstrip
- M12 H4 McMaster farm.

These sites have a local significance, but further investigation is required at the McGarvie-Smith Farm and the Fleurs radio telescope site; new findings there could change the significance of these items.

Corridor option B5 passes through six potential non-Aboriginal heritage landscapes:
- KC-1 – South Creek basin landscape – undulating hills with remnant vegetation
- L1 – South Creek remnant native vegetation corridor
- L13 – Badgerys Creek remnant native vegetation corridor
- L29 – Vegetation Community, Clifton Avenue, Kemps Creek
- L30 – McMaster Field Station Scenic landscape, Elizabeth Drive, Badgerys Creek
- L54 – Remnant vegetation along Elizabeth Drive.

Corridor option B5 is less preferred than option B2 because it contains more potentially State or nationally significant heritage sites (the Fleurs radio telescope complex, the McGarvie-Smith Farm and M12 H4).

### 7.3.4 Land use and planning

A land use and planning assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix C. Figure 7-7 shows the land use features against the zone B shortlisted options.
Corridor option B2
Corridor option B2 includes the following land use zones: RU4 Rural small holdings, E2 Environmental conservation (around creeklines) and RU2 Rural landscape.

The main land use activities that are within the corridor include:

- Horticultural/agricultural land uses (87 per cent of the corridor) including nurseries and market gardens
- Industrial and commercial land uses (3.0 per cent of the corridor) including quarries and landfill facilities
- Rural residential land uses (0.9 per cent of the corridor).

The affected land uses are in ready supply in the study area and disturbed land uses could be accommodated in existing land. As such, a substantial impact would not be likely.

Corridor option B2 could constrain some land use development as it would result in some land not having road access. The future development of nearby land would then be dependent on the construction of new roads to provide access.

An approved development application for a mosque is situated on a property located wholly in the corridor. This is on a property of rural residential land use, which is in ready supply in the study area. An alternative site could be available in the surrounding area.

The option also passes through land that has been identified as the WSPGA. The Department of Planning and Environment has indicated that the minimum distance from Elizabeth Drive should be at least 600 metres for development to provide a viable lot. This option would not achieve the minimum depth for land on Elizabeth Drive along the majority of its length, which could affect the potential for rezoning. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be accurately assessed. However, should the zoning become commercial and industrial, there would be a substantial change in land use in the zone. The corridor would not constrain this type of development.

Option B2 would require a shorter access road to the western Sydney airport at Badgerys Creek. The access road to the airport could facilitate support services being established along the route. However, this would be in direct response to the operation of an airport, rather than the M12 Motorway and would be dependent on the zoning of the WSPGA.

In relation to the connection with the airport, this option would also need to consider the potential South West Rail Link Extension as it traverses north from the airport site. This is similar to option B5 and is not a differentiator.
Figure 7-7: Land use features in Zone B
Corridor option B5
Corridor option B5 includes the following land use zones: E4 Environmental living, RU4 Rural small holdings, E2 Environmental conservation (around creeklines) and RU2 Rural landscape.

The main land use activities that are within the corridor include:

- Horticultural/agricultural land uses (93.1 per cent of the corridor) including market gardens
- Industrial and commercial land uses (0.2 per cent of the corridor) including quarries.

The affected land uses are in ready supply in the study area and disturbed land uses could be accommodated in existing land. As such, a substantial impact would not be likely.

The corridor could also constrain some land use development as it would result in some land not having road access. The future development of these sites would then be dependent on the construction of new roads to provide access. This impact is of a lesser extent than corridor B2, due to its distance away from Elizabeth Drive.

This option passes to the north of the Elizabeth Drive landfill site, but south of the Twin Creeks Golf and Country Club residential estate. This provides a beneficial outcome by forming a barrier between the two incompatible land uses.

The option also passes through land that has been identified as the WSPGA. The Department of Planning and Environment has indicated for property lots to be viable for the growth area, a minimum depth of 600 metres is required from Elizabeth Drive. This option passes in excess of 900 metres north of Elizabeth Drive and would not constrain any rezoning proposal for the WSPGA. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be determined fully. However, should the zoning become commercial and industrial, there would be a substantial change in land use in the zone.

Option B5 would require a longer access road to the western Sydney airport at Badgerys Creek. The access road to the airport could facilitate support services being established along the route. However, this would be in direct response to the operation of an airport, rather than the M12 Motorway and would be dependent on the zoning of the WSPGA.

In relation to the connection with the airport, this option would need to consider the potential South West Rail Link Extension as it travels north from the airport site. This is similar to option B2 and is not a differentiator.

7.3.5 Socio-economic
A socio-economic assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix D.

Corridor option B2
Socio-economic aspects relevant to corridor option B2 are detailed in Table 7-9.
### Table 7-9 Socio-economic aspects of corridor option B2

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community cohesion</strong></td>
<td>Corridor option B2 travels to the north of the Kemps Creek village shops. The corridor option would create a perceived barrier between rural properties north of the corridor and Kemps Creek village, affecting the sense of cohesion. There are very few recreational or community facilities that would be affected by the option. However, a site for a mosque (approved development application) is situated within option B2. There are few items of high community value (other than properties) that would be affected, with the exception for native riparian vegetation along creek lines.</td>
</tr>
</tbody>
</table>
| **Amenity effects**       | Corridor option B2 is located north of Elizabeth Drive, with 64 sensitive receivers within 600 metres that could be subject to visual and noise impacts. These sensitive receivers are mostly related to Kemps Creek and receivers along Mamre Road. As the land use gets progressively more rural to the west, there are fewer sensitive receivers. 
Corridor option B2, is situated near Elizabeth Drive, and is screened by topography and vegetation, particularly native vegetation along creek lines. As such, this would help in minimising visual impact to surrounding areas, particularly Elizabeth Drive. However, the option would need to bridge across cleared floodplain areas that would increase the visibility of the motorway. This increased visibility would be noticed by a high number of transient travellers along the Elizabeth Drive and other local roads as well as surrounding land uses. One of the main features of the option is the interchange with the planned airport site, this would be a large grade separated interchange, having a noticeable visual impact in the landscape. However, there would be few permanent receivers that would view this, with the main receives located west of Luddenham Road. 
Corridor option B2 would introduce an additional road traffic noise source to the area, already subject to noise from Elizabeth Drive. |
| **Access and movements patterns** | Movement patterns out of the study area in this zone, are via Elizabeth Drive, Salisbury Avenue, Clifton Avenue and Western Road. These roads would be affected by corridor option B2 and the option would need to pass over or under these roads to maintain connectivity. This would maintain the existing access and movement patterns around the study area. 
Corridor option B2 also truncates some large landholdings. Movement and access to isolated parcels of land would need to be provided. There are a number of property accesses that would also need to be maintained. Corridor option B2 would pass through a higher number of such properties than corridor option B5. 
For both corridor option B2 and B5, the provision of a shared user path could provide continuous pedestrian and cyclist facilities across the study area. Public transport would also continue on their current routes, with no existing services to divert to the M12 Motorway. |
| **Property impact**       | Corridor B2 passes through 34 property lots, of which:
  - There are 11 residences
  - There are 31 privately owned lots and 3 publicly owned lots. |
| **Business impact**       | Corridor B2 passes through seven local businesses:
  - Two quarrying and waste services being Elizabeth Drive Landfill Site and High Quality Group operational site
  - Animal Welfare League
  - One retailer
  - Three agricultural producers (two market gardens and Andreasens Green wholesale nurseries). |
Agribusiness impact

For corridor option B2, grazing land, horticulture, intensive animal production and farm infrastructure are the agricultural land use directly intersected, accounting for 74.2 hectares, 17.6 hectares, 15.9 hectares and 1.8 hectares respectively.

In total, corridor option B2 would intersect 109 hectares of agricultural land.

Corridor option B2 could sever part of the Andreasens Green wholesale nurseries and potentially impact the operation of the business.

There are a number of large agricultural lots which would be severed as a result of either corridor option B2. In some cases, this would result in some lots becoming land locked, with no access to local roads.

Corridor option B2 passes through properties that make up around 519 hectares of agricultural land. The area of these properties directly impacted is around 109 hectares. As such, the indirect impact to agribusinesses is estimated to be around 410 hectares.

On the whole, the remaining agricultural land area is about 79 per cent of the original agricultural land parcel area.

Corridor option B5

Socio-economic aspects relevant to corridor option B5 are detailed in Table 7-10.

Table 7-10 Socio-economic aspects of corridor option B5

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community cohesion</td>
<td>Corridor option B5 is located further away from Elizabeth Drive than corridor option B2. There are few actively used properties north of B5 where there would be a perceived barrier effect from the introduction of the M12 Motorway. There are no recreational or community facilities that would be affected by the option. No areas of community value would be impacted, with the exception of native riparian vegetation around creek lines. The impact from corridor option B2 is similar to option B5. Corridor option B5 creates a barrier around the northern extent of the Elizabeth Drive landfill site, which would physically separate the landfill from the Twin Creeks residential development, two incompatible land uses.</td>
</tr>
<tr>
<td>Amenity effects</td>
<td>Corridor option B5 is the furthest away from Elizabeth Drive, with 45 sensitive receivers within 600 metres that could be subject to visual and noise impacts. These are rural residential receivers north and west of Kemps Creek. As the land use gets progressively more rural to the west, there are fewer sensitive receivers. Corridor option B5 is located in a mostly rural agricultural area with little vegetation and cleared floodplains. A motorway in corridor option B5 would be a distinct change to the existing environment, however, as the sensitive receivers are sparsely located and there are few roads crossed, there are few viewers to view the change. The eastern extent of the option has the highest number of sensitive receivers along Mamre Road. A motorway in this corridor would also be highly visible around the Kemps Creek floodplain. The interchange with the planned airport site would be a large grade separated interchange and would have a big presence in the landscape. Unlike option B2, due to its proximity to Elizabeth Drive, there would be higher number of permanent receivers that would view this, located to the west on Luddenham Road and along Elizabeth Drive.</td>
</tr>
</tbody>
</table>
### 7.3.6 Noise

A noise assessment has been carried out to assess the impact of the shortlisted route options. The full assessment is provided at Appendix E.

The results of the modelling (noise nuisance rating) for the options in zone B is provided in the following sections. The noise nuisance rating is a measure of the difference between the future base noise level (i.e., without the M12 Motorway – identified as 0) and the future noise level with the M12 Motorway.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access and movements patterns</strong></td>
<td>Corridor option B5 would have minimal impact on the access and movement patterns within and out of the study area as it crosses two local roads (Salisbury Avenue and Clifton Avenue), as well as two substantial property accesses. The option would need to pass over or under these roads to maintain connectivity. Changes to access would be less than corridor option B2. Corridor option B5 would also have a severance effect on some large landholdings and movement and access to isolated parcels of land would need to be provided. Corridor option B5 would pass through fewer large landholdings, however they are some larger properties than the properties passed through by corridor option B2. For both corridor option B2 and B5, the provision of a shared user path could provide continuous pedestrian and cyclist facilities across the study area. Public transport would also continue on their current routes, with no existing services to divert to the M12 Motorway.</td>
</tr>
</tbody>
</table>
| **Property impact**           | Corridor B5 passes through 30 property lots, of which:  
  - There are eight residences  
  - There are 29 privately owned lots and one publicly owned lot. |
| **Business impact**           | Option B5 passes through six local businesses:  
  - Two quarrying and waste services being Elizabeth Drive Landfill Site and unknown quarry  
  - Four agricultural producers (market gardens). |
| **Agribusiness impact**       | For corridor option B5, grazing land is the dominant agricultural land use directly intersected, accounting for 40.2 hectares, followed by horticulture, intensive animal production and farm infrastructure, which together account for 9.5 hectares. In total, corridor option B5 would intersect 50 hectares of agricultural land. There are a number of large agricultural lots which would be severed as a result of either corridor option B5. In some cases, this would result in some lots becoming land locked, with no access to local roads. Corridor option B5 passes through properties that make up around 383 hectares of agricultural land. The area of these properties directly impacted is around 49 hectares. As such, the indirect impact to agribusinesses is estimated to be around 334 hectares. On the whole, the remaining agricultural land area is about 87 per cent of the original agricultural land parcel area. |
Corridor option B2
The noise nuisance rating for corridor option B2 is greater than the benefit ratio of option B5, with a benefit ratio of between -0.96 and -1.31.

Corridor option B5
The noise nuisance rating of corridor option B5 is lower than the benefit ratio of option B2, with a benefit ratio of between -0.41 and -0.60. Option B5, therefore has a better noise outcome than option B2.

7.3.7 Soils
An assessment of the shortlisted route options was carried out against the known geological composition of the study area. The findings for the options in zone B are provided in the following section.

Corridor option B2
Corridor option B2 traverses the Blacktown and South Creek soil landscapes. The Blacktown soil landscape is moderately reactive highly plastic subsoil with poor soil drainage. The South Creek soil landscape is present along the valley flats and drainage depressions of the channels. It is subject to erosion hazard and frequent flooding. Due to the soil landscape, 2.5H:1V batters are required on embankments (slope is calculated as horizontal run (H) to vertical rise (V)).

The corridor crosses Badgerys Creek, South Creek and Kemps Creek as well as five other drainage lines. Soft ground and alluvium could be present in areas closer to the creek. Embankment foundations over the alluvial landscape may require foundation treatment depending on the thickness of compressible material encountered below the embankments.

Corridor option B2 crosses a greater length of floodplain that could result in increased potential for soft ground and alluvium compared to corridor option B5.

Corridor option B5
Corridor option B5 traverses the Blacktown and South Creek soil landscapes. The Blacktown soil landscape is moderately reactive highly plastic subsoil with poor soil drainage. The South Creek soil landscape is present along the valley flats and drainage depressions of the channels. It is subject to erosion hazard and frequent flooding. Due to the soil landscape, 2.5H:1V batters are required on embankments (slope is calculated as horizontal run (H) to vertical rise (V)).

The corridor crosses Badgerys Creek, South Creek and Kemps Creek as well as five other drainage lines. Soft ground and alluvium could be present in areas closer to the creek. Embankment foundations over the alluvial landscape may require foundation treatment depending on the thickness of compressible material encountered below the embankments.

Corridor option B5 crosses a smaller length of floodplain that could result in a lower potential for soft ground and alluvium compared to corridor option B2.
7.3.8 Contamination

A Phase 1 environmental site assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix F.

Corridor option B2

There are five key areas of environmental concern (AEC) for corridor option B2. Three of these (Elizabeth Drive landfill facility, Andreasens Green Wholesale Nursery and asbestos) were evaluated as having high risk. The AECs, contaminants of potential concern (CoPCs) and further details are provided in Table 7-11. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor option.

<table>
<thead>
<tr>
<th>AEC B2</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth Drive landfill facility</td>
<td>Asbestos, hydrocarbons (TPH/BTEX, PAH), phenols, pesticides (OCP/OPP), metals, PCBs, ammonia, alkanes and sulphides</td>
<td>High risk of contamination</td>
</tr>
</tbody>
</table>
<pre><code>                                                             |                                                                                       | Elizabeth Drive landfill facility (Clifton Avenue, Kemps Creek) was observed to comprise deep excavations used for waste emplacement in the southern portion of the site and raised landfill cells to the north. Site signage indicated that the landfill was used for the disposal of General Solid Waste. Evidence of concrete recycling was observed. Activities relating to non-thermal treatment of waste, waste disposal by application to land, waste storage and land-based extraction have potential to contaminate soil, air and groundwater. The property has been progressively developed since at least 1961 and has been subject to both extractive and waste emplacement / storage activities. The EPA has issued a clean notice under s50 of the Contaminated Lands Management Act, which indicates that there has been an impact on the environment. The impact resulting from the migration of contaminants through dissolution pathways is considered possible or unlikely as site activities are carried out in accordance with an Environmental Protection Licence which requires groundwater monitoring and reporting. The fact that the site is not on the NSW Environment Protection Authority Contaminated Sites Register indicates that no groundwater impact has been reported. Further, phytotoxic effects are considered unlikely due to the highly disturbed nature of the site and limited flora and fauna. |
</code></pre>
## AEC B2

<table>
<thead>
<tr>
<th>Location</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hi-Quality Group Quarry/Yard</td>
<td>Hydrocarbons (TPH/BTEX, PAH), phenols and lead.</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Hi-Quality Group quarry and yard is located next to the western boundary of Elizabeth Drive landfill facility and appears to be used for stockpiling landscaping material (soils, aggregates and mulch). Evidence of significant ground disturbance possibly associated with extractive land use activities (quarrying) was also observed. Hydrocarbon storage could impact on human health, surface water, groundwater, flora and fauna and buried services if the tank and supply line have leaked into surrounding soils that may be excavated. The risk of explosion impacting on human health is considered unlikely. Without a site inspection, it could not be determined if bulk hydrocarbon storage was being carried out and thus the presence of aboveground and underground contaminants (ASTs and USTs) has been assumed based on land usage.</td>
</tr>
<tr>
<td>Kemps Creek Resource Recovery Park</td>
<td>Asbestos, hydrocarbons (TPH/BTEX, PAH), chlorinated hydrocarbons, phenols, pesticides (OCP/OPP), metals, PCBs, ammonia, alkanes and sulphides</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The site is licensed as a waste facility and displays evidence of significant ground disturbance since at least 1970. Though it is unclear as to the exact time that waste emplacement started at the site there is potential for historic land use practices to have impacted the site with a variety of contaminants. However, the facility does not occur within corridor option B2 and given this separation distance (with consideration on the site EPL requirements) the risks posed by the site are considered moderate as no intrusive work would be carried out within the landfill footprint. Although the corridor does not intersect the site, construction activities for the M12 Motorway would occur on a significant area of land immediately to the north, and upslope of the site, meaning that construction workers for the M12 Motorway would be unlikely to be exposed to contaminants from the site.</td>
</tr>
<tr>
<td>Asbestos</td>
<td>Asbestos</td>
<td>High risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multiple fragments of ACM sheeting were observed in a shoulder area of Clifton Road (within the corridor). The fragments were noted to be in poor condition, less than 10 cm² in size and at an approximate density of less than 100 cm² per metre.</td>
</tr>
</tbody>
</table>
High risk of contamination

This is a commercial nursery, producing landscaping trees, with commercial sales only. A car park is located within the site. A 1000 L and 2000 L aboveground storage tank (AST) were observed within the site on the western side of Western Road. Two large dams were observed along the eastern boundary of Western Road within the northern portion of the site.

In addition to likely fertiliser contamination, storage of hydrocarbons in the active ASTs for refuelling plant and vehicles could impact on human health and the environment. Without a site inspection, it could not be determined if the tanks were bunded and/or double skinned.

**Option B5**

There are four key areas of concern (AEC) for corridor option B5. Two of these were evaluated as having a high risk (a car wrecking yard on Clifton Avenue and asbestos). The AECs, contaminants of potential concern (CoPCs) and further details are provided in Table 7-12. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor option.

**Table 7-12 Areas of environmental concern in corridor option B5**

<table>
<thead>
<tr>
<th>AEC B5</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elizabeth Drive landfill facility</td>
<td>Asbestos, hydrocarbons (TPH/BTEX, PAH), chlorinated hydrocarbons, phenols, pesticides, (OCP/OPP), metals, PCBs, ammonia, alkanes and sulphides</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td>The site is licensed as a waste facility and displays evidence of significant ground disturbance since at least 1970. Though it is unclear as to the exact time that waste emplacement started at the site there is potential for historic land use practices to have impacted the site with a variety of contaminants. Although the landfill facility does not intersect corridor option B5, landfill activities are carried out on a significant area of land immediately to the south of the corridor. However, it is up gradient meaning that impact on the environment at the site are likely and construction workers could be exposed to these during excavation work. The site is operated in accordance with the requirements of an EPL, which requires groundwater monitoring and environmental reporting.</td>
<td></td>
</tr>
<tr>
<td>CSIRO Access Road – quarry and wood stockpile area</td>
<td>Hydrocarbons (TRH/BTEX, PAH), phenols and metals,</td>
<td>Moderate risk of contamination</td>
</tr>
<tr>
<td></td>
<td>An area of bulk earthworks possibly associated with quarrying activities was observed at the end of the CSIRO/University of Sydney Research Station</td>
<td></td>
</tr>
</tbody>
</table>
arsenic, copper, chromium, OCPs, PCP, antisapstain, TBT, creosote

access road. The site was operational at the time of observation with evidence of plant and truck movements associated with earthmoving observed.

Limited information was available on activities at the site (other than its use as a research station for cattle). An assumption based on reasonable worst-case scenarios has been used. A review of aerial photographs provides some indication of activities that have taken place at the site, including storage of wood, which may have been treated.

Likely activities include storage of hydrocarbons for refuelling of plant and vehicles and/or general machinery maintenance activities, extractive land use and wood stockpiling.

Clifton Avenue car wrecking yard
Asbestos, pesticides (OCP/OPP), hydrocarbons (TPH/BTEX) and metals
High risk of contamination
Stockpiles of soil materials of unknown composition were observed within the site. Further, the site was associated with vehicle storage/wrecking with potential liberation of lead from car batteries and paint, hydrocarbons and asbestos.

Asbestos
Asbestos
High risk of contamination
Multiple fragments of ACM sheeting were observed outside the car wrecking yard in a shoulder area associated with Clifton Road (within the site). The fragments were noted to be in poor condition, less than 10 cm² in size and at an approximate density of less than 100 cm² per metre.

7.3.9 Hydrology and flooding
A flooding assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone B are provided in the following section. Figure 3-7 shows the major creek lines and the 100 year ARI flood extents.

Corridor option B2
Corridor option B2 crosses five substantial drainage lines including Kemps Creek, Badgerys Creek and South Creek and their associated floodplains. The length of floodplain crossed is:

- Kemps Creek – 0 metres (crossing length has been accounted for in zone A, refer to Section 7.2.9)
- South Creek – 740 metres
- Badgerys Creek – 285 metres.
The corridor crosses a total floodplain area of 384,994 square metres. Flood modelling was carried out to identify indicative bridge lengths while minimising flooding impact on nearby land. The modelling indicates the following openings would be required:

- Kemps Creek – 0 metres (crossing length has been accounted for in zone A, refer to Section 7.2.9)
- South Creek – 730 metres
- Badgerys Creek – 203 metres.

The corridor also crosses a number of other minor drainage lines (in some cases these are associated with farm dams) and 17 farm dams.

**Corridor option B5**

Corridor option B5 crosses four substantial drainage lines including Kemps Creek, South Creek and Badgerys Creek and their associated floodplains. The length of floodplain crossed is:

- Kemps Creek – 0 metres (crossing length has been accounted for in zone A, refer to Section 7.2.9)
- Badgerys Creek – 215 metres
- South Creek – 490 metres.

The corridor crosses a total floodplain area of 274,113 square metres. Flood modelling was carried out to identify indicative bridge lengths while minimising flooding impact on nearby land. The modelling indicates the following openings:

- Kemps Creek – 0 metres (in addition to the crossing identified in zone A)
- Badgerys Creek – 255 metres
- South Creek – 478 metres.

The corridor also crosses a number of other minor drainage lines (in some cases these are associated with farm dams) and nine farm dams.

**7.3.10 Landscape character**

A landscape character and visual assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone B is provided in the following sections. The full assessment is provided at Appendix G.

**Corridor option B2**

Corridor option B2 crosses an area with little native vegetation and large areas of open landscape, making it highly visible.

The landscape character impact were assessed in terms of impact on sensitivity to environments, accessibility and connectivity and the public domain.
In terms of impact on sensitivity to environments:

- Option B2 would require bridges over South Creek and Badgerys Creek and floodplains, increasing the visibility of the project; the bridges would be larger than those in option B5, and would therefore have a greater visual impact.

- Option B2 (and B5) would include the western Sydney airport interchange and its associated structures, which would have a high impact on LCZ4 (Undulating rural residential).

- Option B2 would be closer (700 metres at its furthest point) to Elizabeth Drive than option B5 and would therefore affect a number of types of development in LCZ3 and LCZ4 and have a higher number of potential sensitive viewers.

- Option B2 would traverse large established commercial sites including Andreasans Nursery.

In terms of impact on accessibility and connectivity:

- Options B2 and B5 would be similar in terms of linear connectivity.

- Option B2 would be closer to Elizabeth Drive than option B5, making it more difficult to create meaningful land use patterns and potentially creating a greater north–south barrier.

In terms of impact on the public domain, options B2 and B5 would have a similar impact and create similar opportunities to develop the motorway interchange as a gateway to the planned western Sydney airport.

The following aspects would determine the visibility of option B2:

- The visibility of option B2 from only a few residential and commercial properties in the eastern part of the zone.

- The loss of native vegetation north of the Hi-Quality Group property.

- The new bridge to cross South Creek, Badgerys Creek and the associated floodplains, which would increase the visibility of the project.

- The need for fill embankments on low-lying floodplains, which could potentially increase the visibility of the project from adjoining areas.

- Retention of wildlife corridors, which should be considered along the creek corridors to reduce the visibility of the project.

- The location in LCZ3 (Low lying rural/commercial) and LCZ4 (Undulating rural residential).

- The location of option B2 more than 300 metres from Elizabeth Drive, so there would be low visual exposure to the project for travellers on Elizabeth Drive, with the exception of those using the interchange to the planned western Sydney airport.

In summary, option B2 would affect a higher number and more types of development, and a higher number of potential sensitive viewers than option B5 as it would be closer to Elizabeth Drive.

Overall, option B2 would have a high to moderate impact on landscape character.
Corridor option B5
Similar to corridor option B2, option B5 crosses an area with little native vegetation and large areas of open landscape, making it highly visible.

The landscape character impact were assessed in terms of impact on sensitivity to environments, accessibility and connectivity and the public domain.

In terms of impact on sensitivity to environments:

- Option B5 would require bridges over South Creek and Badgerys Creek and floodplains, increasing the visibility of the project; the bridges would not be as large as those in option B5
- Option B5 (and B2) would include the western Sydney airport interchange and its associated structures, which would have a high impact on LCZ4 (Undulating rural residential). The impact would possibly be greater in option B5 as it would be in an elevated location while option B2 would be in a low-lying location
- Option B5 is less likely to be more screened by existing tree cover than option B2, although both options would be highly exposed due to the open landscape.

In terms of impact on accessibility and connectivity, while linear connectivity is similar for both options, the closer proximity of option B2 to Elizabeth Drive makes it more difficult to create meaningful land use patterns. This could also create a greater north–south barrier.

In terms of impact on the public domain, options B2 and B5 would have a similar impact and create a similar opportunity to develop the motorway interchange as a gateway to the planned western Sydney airport. Option B5 could provide scenic views to the Blue Mountains from the elevated location of the interchange to the airport in LCZ4.

The following aspects would determine the visibility of option B5:

- The low visibility of the corridor, which would impact only a small number of rural residential and commercial properties
- Retention of wildlife corridors, which should be considered along the creek corridors to reduce the visibility of the project
- The location in LCZ3 (Low lying rural/commercial) and LCZ4 (Undulating rural residential)
- The high exposure of the corridor to the open landscape (option B5 is less likely to be screened by existing tree coverage than option B2)
- The location of option B5 more than one kilometre north of Elizabeth Drive, which would give it a low visual exposure for travellers on Elizabeth Drive, with the exception of those using the interchange to the planned western Sydney airport.

In summary, corridor option B5 would have a lower impact on types of development and numbers of sensitive viewers than option B2 due to its location further away from Elizabeth Drive.

Overall, corridor option B5 would have a moderate impact on landscape character.
7.3.11 Utilities
A utilities assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone B are provided in the following sections. Figure 7-8 shows the critical utilities against the zone B shortlisted options.

Corridor option B2
Corridor option B2 crosses the following utilities (including critical utilities):

- Telstra optical fibre assets (critical)
- Telstra services
- Sydney Water mains 100 DICL, 150 CICL, 200 DICL
- TransGrid 500 kV overhead electricity line (critical)
- Endeavour Energy 33 kV electricity line.

Corridor option B5
Corridor option B5 crosses the following utilities (including critical utilities):

- Telstra optical fibre assets (critical)
- Telstra services
- Sydney Water mains 100 DICL, 150 CICL, 200 DICL
- TransGrid 500 kV overhead electricity line (critical)
- Endeavour Energy 33 kV electricity line.

The two options cross the same utilities, including the critical items of the 500kV electricity line and the optic fibre. There is no differentiation between the options.
Figure 7-8: Critical utilities in Zone B
7.4 Zone C

7.4.1 Biodiversity

A biodiversity assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix A. Figure 7-9 shows the biodiversity features against the zone C shortlisted options.

Corridor option C3

About four hectares of threatened vegetation listed as endangered ecological community (EEC) under the TSC Act occurs throughout corridor option C3 in good condition (refer to Table 7-13). This vegetation type is not listed under the EPBC Act.

Table 7-13: Significant vegetation within corridor option C3

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>–</td>
<td>3.6</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td></td>
<td>3.6</td>
</tr>
</tbody>
</table>

The corridor option includes three threatened flora species that have been previously recorded within the option:

- *Dillwynia tenuifolia* – to the west of Luddenham Road
- *Pimelea spicata* – to the west of Luddenham Road
- *Pultenaea parviflora* – to the south of Elizabeth Drive.

Corridor option C4

About three hectares of threatened vegetation listed as either EEC or critically endangered ecological community (CEEC) under the TSC Act occurs throughout corridor option C4 in varying condition (refer to Table 7-14). This vegetation type is either not listed or is not consistent with the critically endangered criteria under the EPBC Act.

Table 7-14: Significant vegetation within corridor option C4

<table>
<thead>
<tr>
<th>Vegetation community</th>
<th>Status (TSC Act)</th>
<th>Critically endangered (EPBC Act)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions</td>
<td>EEC</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Cumberland Plain Woodland in the Sydney Basin Bioregion</td>
<td>CEEC</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Total</td>
<td>0.1</td>
<td>2.6</td>
<td></td>
</tr>
</tbody>
</table>
No threatened flora or fauna species have been recorded or are known to occur within corridor option C4.

### 7.4.2 Aboriginal heritage

A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-10 shows the heritage features against the zone C shortlisted options.

**Corridor option C3**

There are no known Aboriginal heritage sites within corridor option C3. This corridor passes through a length of 2400 metres of predicted Aboriginal archaeological sensitivity – mainly around the creek line of Cosgroves Creek and associated dams. Although corridor option C3 would impact a longer length of archaeologically sensitive area than option C4, there is an absence of any known Aboriginal heritage sites.

**Corridor option C4**

There is one Aboriginal heritage site within corridor option C4:
- Isolated Artefact 4.

This corridor passes through a length of about 1900 metres of predicted Aboriginal archaeological sensitivity, associated with Cosgroves Creek.

### 7.4.3 Non-Aboriginal heritage

A heritage assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix B. Figure 7-10 shows the heritage features against the zone C shortlisted options.

**Corridor option C3**

Corridor option C3 passes through two non-Aboriginal heritage sites:
- Luddenham Road alignment
- M12 H4 (McMaster Farm).

These heritage items have local significance. The option passes through a longer length of the Luddenham Road alignment compared to option C4, as it crosses the road at an oblique angle. Option C4 crosses the road perpendicular.

Corridor option C3 also passes through three potential non-Aboriginal heritage landscapes:
- KC-1 – South Creek basin landscape- undulating hills with remnant vegetation
- L30 – McMaster Field Station Scenic landscape, Elizabeth Drive, Badgerys Creek
- L45 – Cosgroves Creek remnant native vegetation corridor.
Figure 7-10: Heritage features in Zone C
Corridor option C4
Corridor option C4 passes through two non-Aboriginal heritage sites:
- Luddenham Road alignment
- M12 H4 (McMaster Farm).

These heritage items have local significance.
Corridor option C4 also passes through three potential non-Aboriginal heritage landscapes:
- KC-1 – South Creek basin landscape – undulating hills with remnant vegetation
- L30 – McMaster Field Station Scenic landscape, Elizabeth Drive, Badgerys Creek
- L45 – Cosgroves Creek remnant native vegetation corridor.

7.4.4 Land use and planning
A land use and planning assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix C. Figure 7-11 shows the heritage features against the zone C shortlisted options.

Corridor option C3
Corridor option C3 includes the following land use zones: RU2 Rural landscape, E2 Environmental conservation (along creek lines) and RU1 Primary production.

The main land use activities that are within the corridor include:
- Horticultural and agricultural land uses (81.3 per cent of the corridor)
- Recreational land uses (2.5 per cent of the corridor) including Sydney Society of Model Engineers Model Park
- Transport and other (utilities) corridors (7.4 per cent of the corridor).

The affected land uses are in ready supply in the study area and disturbed land uses could be accommodated in existing land. However it is noted that the Sydney Society of Model Engineers Model Park, while it could move, would take time to re-establish the improvements made to the land to facilitate recreational purposes.

The corridor could also constrain some land use development by potentially removing road access to a number of properties along Elizabeth Drive and by severing some large properties. Maintaining existing land uses at these properties would be dependent on the construction of new roads to provide access.

An approved development application for a cemetery exists at a property located partially in the corridor, and access may be affected by corridor option C3. This is on a property of rural residential land use, which is in ready supply in the study area. An alternative site could be present in the surrounding area. Or should it continue at the present location, access would need to be maintained.

Option C3 passes through land that has been identified as the WSPGA. The corridor joins back into Elizabeth Drive for half of its length. However, it would still have the potential to affect rezoning, as it does not allow for a 600 metre minimum distance.
from Elizabeth Drive. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be accurately assessed. If the zoning becomes commercial and industrial, there would be a substantial change in land use in the zone.

In terms of current and future infrastructure projects in the study area, both options in zone C would need to consider the interaction with The Northern Road project and the M9 Outer Sydney Orbital.

**Corridor option C4**

Corridor option C4 includes the following land use zones: RU2 Rural landscape and E2 Environmental conservation (along creek lines).

The main land use activities that are within the corridor include:

- Horticultural and agricultural land uses (96.6 per cent of the corridor)
- Rural residential land uses (0.16 per cent of the corridor)
- Transport and other (utilities) corridors (1.5 per cent of the corridor).

The affected land uses are in ready supply in the study area and disturbed land uses could be accommodated in existing land. However it is noted that while the Luddenham Raceway could move to another rural-residential property, it would take time to re-establish the improvements made to the land to facilitate recreational purposes.

The corridor could also constrain some land use development as it would result in some land not having road access. The future development of these sites would then be dependent on the construction of new roads to provide access.

An approved development application for a cemetery exists at a property located partially in the corridor, and may be affected by corridor option C4. This is on a property of rural residential land use, which is in ready supply in the study area. Should the site be no longer viable, alternative sites could be present in the surrounding area.

Option C4 passes through land that has been identified as the WSPGA. This option is in excess of 900 metres away from Elizabeth Drive. This would meet the recommendation of the Department of Planning and Environment of a minimum distance of 600 metres from Elizabeth Drive to provide a viable area for rezoning as part of the WSPGA. As such, the corridor would not impact on the potential rezoning. At the time of writing this report, there was no structure or zoning plan available for the WSPGA and as such potential impact cannot be accurately assessed. However, should zoning be commercial and industrial, there would be a substantial change in land use in the zone.

In terms of current and future infrastructure projects in the study area, both options in zone C would need to consider the interaction with The Northern Road project and the M9 Outer Sydney Orbital.
Figure 7-11: Land use features in Zone C
7.4.5 Socio-economic

A socio-economic assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix D.

Corridor option C3

Socio-economic aspects which are relevant to corridor option C3 are detailed in Table 7-15.

Table 7-15 Socio-economic aspects of corridor option C3

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community cohesion</td>
<td>Corridor option C3 is located along the Elizabeth Drive alignment for part of its length, creating a much wider road corridor that could result in a perceived barrier for the local community of Luddenham. This could also result in a loss in sense of cohesion. There are few properties of high community value that would be affected by corridor option C3. These properties are the Sydney Society of Model Engineers Model Park and native vegetation. The Sydney Society of Model Engineers Model Park, is a prominent recreational feature of the area. The society has operated at its current location since at least the 1980s, being the oldest model engineering club in Australia and is likely to have a strong sense of place with its members. The society is open to members all year round and to the public once a month, and caters for families. Native riparian vegetation that remains along the creek lines through the study area would be impacted by the corridor option. However, the impact from corridor option C3 is similar to option C4.</td>
</tr>
<tr>
<td>Amenity effects</td>
<td>There are 38 sensitive receivers within 600 metres of corridor option C3 that could be subject to visual and noise impacts. Corridor option C3 would introduce a large piece of infrastructure into a relatively quiet rural and rural residential area for part of its length. The remainder of the option is to be developed next to the existing Elizabeth Drive road corridor. This corridor option would be quite visible through floodplain and rural areas, with few viewers. However, when the option joins and runs alongside Elizabeth Drive, this would create a large visual impact to both permanent receivers and transient travellers along Elizabeth Drive and The Northern Road. Due to the proximity of corridor option C3 to Elizabeth Drive, the sensitive receivers are currently exposed to traffic noise from Elizabeth Drive and Luddenham Road. Therefore the change would be lesser than corridor option C4.</td>
</tr>
<tr>
<td>Access and movement patterns</td>
<td>Movement patterns within and out of the study area are via Elizabeth Drive, Luddenham Road and The Northern Road in zone C. Corridor option C3 would merge with Elizabeth Drive west of Luddenham Road. To maintain the local road network, the option would need to pass over or under Luddenham Road to maintain connectivity. As part of option C3 would be constructed along the Elizabeth Drive alignment, property access for properties and local roads that connect to Elizabeth Drive would be severed. As such, a separate local access road would need to be constructed to maintain access to properties that front...</td>
</tr>
</tbody>
</table>
For both corridor option C3 and C4, the provision of a shared user path could provide opportunities to connect to existing road cyclist facilities on The Northern Road. Public transport would also continue on their current routes, with no existing services to divert to the M12 Motorway.

Property impact

Corridor C3 passes through 22 property lots, of which:

- There are 12 residences
- There are 19 privately owned lots and four publicly owned lots.

Business impact

Option C3 passes through five local businesses:

- Three agricultural producers including a poultry farm, nursery and market garden
- One professional, scientific and technical services, Sydney Society of Model Engineers
- One arts and recreational service, Karingal horse stables and training facilities.

Agribusiness impact

For corridor option C3, grazing land, horticulture, intensive animal production and farm infrastructure are the agricultural land use directly intersected. This accounts for 48.1 hectares, 1.9 hectares, 10.4 hectares and 1.7 hectares respectively.

In total, the agricultural land use is 62.1 hectares in corridor option C3, comprising 55 per cent of the corridor option.

Corridor option C3 would only pass through one property with the potential to sever a portion of the property. However, it would pass through a number of properties where half of the property is within the corridor that could affect the operation of these properties.

Corridor option C3 passes through properties that make up around 694 hectares of agricultural land. The area of these properties directly impacted is around 62 hectares. As such, the indirect impact to agribusinesses is estimated to be around 632 hectares.

On the whole, about 91 per cent of agricultural land parcel area would remain from corridor option C3.

Corridor option C4

Socio-economic aspects which are relevant to corridor option C4 are detailed in Table 7-16.

Table 7-16 Socio-economic aspects of corridor option C4

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Description and impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community cohesion</td>
<td>Corridor option C4 would impact large rural properties that are located further away from Elizabeth Drive. There are few community services or properties of high community value that would be likely to be affected. These include the Luddenham Raceway, which has recently opened and horsing riding/stabling facilities. Native riparian vegetation associated with Cosgroves Creek would also be affected.</td>
</tr>
<tr>
<td>Amenity effects</td>
<td>Corridor option C4 is located further north than corridor option C3 with a low number (19) of sensitive receivers within 600 metres that could be subject to visual and noise impacts. Corridor option C4 would introduce a large piece of infrastructure into a relatively quiet rural and rural residential area. As such, the visibility of the</td>
</tr>
</tbody>
</table>
## Aspect Description and impact

corridor option through the rural landscape would be high, however there would be few viewers, with most being transient travellers on surrounding roads.

Sensitive receivers to Corridor option C4, are located in a more rural environment with no existing main road traffic noise, resulting in a higher impact to receivers.

| Access and movements patterns | Corridor option C4 would have minimal impact on the existing access and movement patterns within and out of the study area. To maintain the local road network, the option would need to pass over or under Luddenham Road. This option would connect to The Northern Road north of the existing Elizabeth Drive/The Northern Road intersection. The corridor option would affect one substantial property access, potentially landlocking a parcel of land. However, this access would be maintained.
|                               | For both corridor option C3 and C4, the provision of a shared user path could provide opportunities to connect to existing on road cyclist facilities on The Northern Road. Public transport would also continue on their current routes, with no existing services to divert to the M12 Motorway.

| Property impact | Corridor C4 passes through 16 property lots, of which:
|                 | • There are three residences
|                 | • All lots are privately owned.

| Business impact | Option C4 passes through two local businesses
|                 | • Two arts and recreational businesses: Karingal horse stables and training facilities and Luddenham Raceway.

| Agribusiness impact | For corridor option C4, grazing land, horticulture, intensive animal production and farm infrastructure are the agricultural land use directly intersected, accounting for 88.3 hectares, 3.3 hectares, 10.6 hectares and 0.2 hectares.
|                    | In total, the agricultural land use is 102.4 hectares in corridor option C4, making up 77 per cent of the corridor option.
|                    | Corridor option C4 passes through a number of large agricultural properties that would result in severance of property and landlocking properties through the removal of local road access.
|                    | Corridor option C4 passes through properties that make up around 639 hectares of agricultural land. The area of these properties directly impacted is around 102 hectares. As such, the indirect impact to agribusinesses is estimated to be around 537 hectares.
|                    | On the whole, about 84 per cent of agricultural land parcel area would remain from corridor option C4.

### 7.4.6 Noise

A noise assessment has been carried out to assess the impact of the shortlisted route options. The full assessment is provided at Appendix E.

The results of the modelling (noise nuisance rating) for the options in zone C is provided in the following sections. The noise nuisance rating is a measure of the difference between the future base noise level (ie without the M12 Motorway – identified as 0) and the future noise level with the M12 Motorway.
Corridor option C3
The noise nuisance rating benefit ratio of the corridor option C3 is between -2.12 and -2.13, being in a higher range than option C4.

Corridor option C4
The nuisance rating benefit ratio of the corridor option C4 is between -1.34 and -1.56. Option C4 has a better noise outcome than option C3.

7.4.7 Soils
An assessment of the shortlisted route options was carried out against the known geological composition of the study area. The findings for the options in zone C are provided in the following sections.

Corridor option C3
Corridor option C3 passes through the Luddenham and South Creek soil landscapes. The Luddenham soils are highly erodible with mass movement (slump) hazard. They contain some impermeable, highly plastic subsoils, while the South Creek landscape is typically alluvial at drainage lines.

This corridor crosses Cosgroves Creek and Oaky Creek and seven other drainage lines. Soft ground and alluvium could be present in the areas closer to the creek. Embankment foundations over the alluvial landscape may require foundation treatment depending on the thickness of compressible material encountered below the embankments.

Corridor option C4
Corridor option C4 crosses three different soil landscapes: the moderately reactive, highly plastic Blacktown soil landscape, the highly erodible Luddenham landscape, and alluvial soil from the South Creek landscape along the drainage lines. Due to the soil landscape, embankment stability would require a 2.5H: 1V slope.

This option crosses Cosgroves Creek as well as nine other drainage lines. Soft ground and alluvium could be present in areas closer to the creek. Embankment subgrades over the soft soils may require foundation treatment depending on the thickness of compressible material encountered below the embankment.

7.4.8 Contamination
A Phase 1 environmental site assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix F.

Corridor option C3
There are two key areas of concern (AECs) for corridor option C3. One of these AECs was evaluated as having a high risk (CSIRO / University of Sydney research station). The AECs, contaminants of potential concern (CoPCs) and further details
are provided in Table 7-17. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor option.

**Table 7-17 Areas of environmental concern in corridor option C3**

<table>
<thead>
<tr>
<th>AEC C3</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSIRO/University of Sydney Research Station</td>
<td>Metals, pesticides (OCP, OPP), hydrocarbons</td>
<td>High risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited information available on activities at the site (other than its use as a research station for cattle). An assumption based on reasonable worst-case scenarios has been used. A review of aerial photographs provides some indication of activities that have taken place at the site, including storage of wood, which may have been treated. Likely activities include storage of hydrocarbons for refuelling of plant and vehicles and/or general machinery maintenance activities, extractive land use and wood stockpiling.</td>
</tr>
<tr>
<td>Steam and diesel model train park</td>
<td>Potential for asbestos, metals, hydrocarbons (TPH/BTEX, PAH, phenols, pesticides (OCP/OPP) and PCBs.</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Based on review of aerial photographs and historical land use at the site.</td>
</tr>
</tbody>
</table>

**Corridor option C4**

There is one key area of concern for corridor option C4. This AEC was evaluated as having a high risk (CSIRO / University of Sydney research station). The AECs, contaminants of potential concern (CoPCs) and further details are provided in Table 7-18. The AECs and CoPCs were included in a conceptual site model to complete a risk assessment for each corridor option.

**Table 7-18 Areas of environmental concern in corridor option C4**

<table>
<thead>
<tr>
<th>AEC C4</th>
<th>Contaminants of concern</th>
<th>Assessment of risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSIRO/University of Sydney Research Station</td>
<td>Metals, pesticides (OCP, OPP), hydrocarbons</td>
<td>High risk of contamination</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited information available on activities at the site (other than its use as a research station for cattle). An assumption based on reasonable worst-case scenarios has been used. A review of aerial photographs provides some indication of activities that have taken place at the site, including storage of wood, which may have been treated. Likely activities include storage of hydrocarbons for refuelling of plant and vehicles and/or general machinery maintenance activities, extractive land use and wood stockpiling.</td>
</tr>
</tbody>
</table>
7.4.9 Hydrology and flooding

A flooding assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone C are provided in the following sections. Figure 3-7 shows the major creek lines and the 100 year ARI flood extents.

**Corridor option C3**

Corridor option C3 passes through eight substantial drainage lines including Cosgroves Creek. These drainage lines are associated with farm dams. The corridor intersects 10 farm dams.

This option does not pass through a floodplain.

Hydrology modelling identified that a bridge about 200 metres long would be required to cross Cosgroves Creek.

**Corridor option C4**

Corridor option C4 passes through 10 substantial drainage lines including Cosgroves Creek. These drainage lines are associated with farm dams. The corridor intersects 10 farm dams.

This option does not pass through a floodplain.

Hydrology modelling identified that a bridge about 270 metres long would be required to cross Cosgroves Creek.

7.4.10 Landscape character

A landscape character and visual assessment has been carried out to assess the impact of the shortlisted route options. A summary of the assessment for the options in zone C is provided in the following sections. The full assessment is provided at Appendix G.

**Corridor option C3**

Corridor option C3 traverses the southern side of an existing ridge before merging with Elizabeth Drive. This would result in a lower elevation and potential visibility from surrounding areas. The corridor would traverse open landscape and be highly visible.

The landscape character impact were assessed in terms of impact on sensitivity to environments, accessibility and connectivity and the public domain.

In terms of impact on sensitivity to environments:

- Option C3 would require a new bridge to cross Cosgroves and Oaky creeks at the confluence of the watercourses.
- Option C3 (and C4) would traverse the open landscape of zone C, resulting in the greatest visibility
- Option C3 would require an oblique crossing over Luddenham Road, which would affect a higher number of properties and sensitive viewers, and result in a higher visibility and moderate impact on the types of development
- Option C3 would affect the majority of properties along Luddenham Road and Elizabeth Drive after crossing the creeks
Option C3 would change considerably the rural character (LCZ4) of Elizabeth Drive where the roads merge; as ramps would be required and The Northern Road would require upgrading to a principal arterial road.

In terms of impact on accessibility and connectivity:
- Option C3 (and C4) would have a similar impact on linear connectivity
- Option C3 would be close to Elizabeth Drive, thereby creating a wider barrier to cross and a greater north–south barrier
- Option C3 would affect current access to adjoining properties where it merges with Elizabeth Drive
- Option C3 (and C4) would allow for possible future connections to the M9 Outer Sydney Orbital.

In terms of impact on the public domain:
- Option C3 (and C4) would affect some remnant vegetation where the road crosses over Cosgroves and Oaky creeks
- Option C3 would require the clearing of a substantial number of the few trees within zone C
- Option C3 (and C4) would traverse LCZ4, much of which is cleared agricultural land; there would therefore be little to no screening provided by existing vegetation
- Option C3 would be close to Elizabeth Drive, which could make it more difficult to create meaningful land use patterns.

The following aspects would determine the visibility and change in landscape character of option C3:
- The impact on remnant native vegetation where the project crosses Cosgroves and Oaky creeks
- The new bridge to cross Cosgroves and Oaky creeks, which could increase the project's visibility from adjoining areas
- The retention of wildlife corridors along the creek corridors, which should be considered to reduce the visibility of the project
- The loss of a substantial number of roadside trees alongside Elizabeth Drive
- The upgrading of the existing roundabout that connects The Northern Road to Elizabeth Drive to accommodate the connection with this corridor
- The visibility of the road corridor to travellers on Luddenham Road
- The high visual impact on travellers on Elizabeth Drive where option C3 merges with the road.

Overall, option C3 would have a high to moderate impact on landscape character.
Corridor option C4

Corridor option C4 is located north of the existing ridge, through more undulating landscape than option C3. This could make it more visible due to the need to incorporate fill embankments. Option C4 would traverse open landscape and be highly visible. The corridor would not be visible from Elizabeth Drive as it is located more than one kilometre to the north.

The landscape character impact was assessed in terms of impact on sensitivity to environments, accessibility and connectivity and the public domain.

In terms of impact on sensitivity to environments:

- Option C4 may require more extensive earthworks and a larger footprint than option C3 so as not to appear out of scale with the surrounds
- Option C4 would be located in a more elevated and steeper position that would make it more visible than option C3
- Option C4 would require a new bridge to cross Cosgroves Creek
- Option C4 (and C3) would traverse the open landscape of zone C, where the project would be highly visible.

In terms of impact on accessibility and connectivity, linear connectivity would be similar for options C3 and C4 as is the possible future connection to the M9 Outer Sydney Orbital.

In terms of impact on the public domain:

- Option C4 (and C3) would affect some remnant vegetation where the road crosses over Cosgroves and Oaky creeks
- Option C4 (and C3) would traverse LCZ4, much of which is cleared agricultural land; there would therefore be little to no screening provided by existing vegetation.

The following aspects would determine the visibility of option C4:

- The impact on remnant native vegetation near Cosgroves Creek
- A new bridge to cross Cosgroves Creek, which could increase the project’s visibility from adjoining areas
- Retention of wildlife corridors, which should be considered along the creek corridors to reduce the visibility of the project
- The visibility of the road corridor to travellers on Luddenham Road
- The high visibility of the project from a local stables and local recreational centre
- The more elevated and steeper position of option C4, which would result in a higher level of visibility than option C3.

Overall, option C4 would have a moderate impact on landscape character.
7.4.11 Utilities
A utilities assessment has been carried out to assess the impact of the shortlisted route options. The findings for the options in zone C are provided in the following sections.

Corridor option C3
Corridor option C3 crosses a number of utilities (none of these are critical utilities):
- Telstra services
- TransGrid 330 kV overhead electricity line
- Endeavour Energy 33 kV electricity line.

Corridor option C4
Corridor option C4 crosses a number of utilities (none of these are critical utilities):
- Telstra services
- TransGrid 330 kV overhead electricity line
- Endeavour Energy 33 kV electricity line.
There is no differentiation between the two options as they cross same utilities.

7.5 Route options summary
This section provides an analysis of the modified shortlisted listed options (as described in section 5.3). This is based on the information provided in sections 7.2 to section 7.4 for each of the corridor options and summarised for each shortlisted route option.

7.5.1 Biodiversity
A summary of the comparative analysis is shown in Table 7-19. The purpose of this summary is to analyse each route option relative to other route options.

There are four overall metrics that have been assessed for each of the route options. These include Threatened Ecological Communities (area and quality), Priority conservation areas (PCLs) which are viable significant habitat within the Cumberland Plain, regional corridors and the number of threatened flora and fauna species.

A total value has been included in the table which can be used as a comparative number between shortlisted route options; however, it is important to note that this number does not relate to total impact area of any criteria. A review of this criteria has identified that the modified green and modified orange options have the lowest comparative number for biodiversity.
Table 7-19: Comparative assessment – biodiversity

<table>
<thead>
<tr>
<th>Route option</th>
<th>Total area of TECs (ha)</th>
<th>TECs in good condition (ha)</th>
<th>TECs potentially listed on EPBC Act (ha)</th>
<th>Area of Cumberland Plain PCLs (ha)</th>
<th>No of PCLs fragmented</th>
<th>Area of mapped regional corridor (ha)</th>
<th>Bushland corridor in Western Sydney Parklands (ha)</th>
<th>No. of threatened flora / fauna species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>63.7</td>
<td>19.8</td>
<td>27.6</td>
<td>8</td>
<td>1</td>
<td>90</td>
<td>55</td>
<td>4 / 0</td>
</tr>
<tr>
<td>Modified blue</td>
<td>62.7</td>
<td>18.7</td>
<td>27.6</td>
<td>8</td>
<td>1</td>
<td>90</td>
<td>55</td>
<td>1 / 0</td>
</tr>
<tr>
<td>Modified green</td>
<td>59.1</td>
<td>13.3</td>
<td>25.5</td>
<td>4</td>
<td>1</td>
<td>90</td>
<td>55</td>
<td>4 / 2</td>
</tr>
<tr>
<td>Modified orange</td>
<td>58.1</td>
<td>12.2</td>
<td>25.5</td>
<td>4</td>
<td>1</td>
<td>90</td>
<td>55</td>
<td>1 / 2</td>
</tr>
<tr>
<td>Modified pink</td>
<td>88.2</td>
<td>40.5</td>
<td>53.6</td>
<td>42</td>
<td>0</td>
<td>66</td>
<td>36</td>
<td>4 / 1</td>
</tr>
<tr>
<td>Modified purple</td>
<td>87.2</td>
<td>39.4</td>
<td>53.6</td>
<td>42</td>
<td>0</td>
<td>66</td>
<td>36</td>
<td>1 / 1</td>
</tr>
<tr>
<td>Modified white</td>
<td>83.6</td>
<td>34</td>
<td>51.5</td>
<td>38</td>
<td>0</td>
<td>66</td>
<td>36</td>
<td>4 / 3</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>82.6</td>
<td>32.9</td>
<td>51.1</td>
<td>38</td>
<td>0</td>
<td>66</td>
<td>36</td>
<td>1 / 3</td>
</tr>
</tbody>
</table>
7.5.2 Aboriginal heritage

The Aboriginal heritage constraints across the shortlisted route options are summarised in Table 7-20. These include a summary of known heritage sites and length of the route option that passes through an area of Aboriginal heritage sensitivity. The modified aqua and modified blue options have the lowest number of Aboriginal heritage sites within the corridor, however, one of these sites is modified tree, which is assessed as having moderate to high significance. This site could not be re-found during the field investigations, but if present, the road footprint could avoid the site.

The modified pink and modified purple options have the lowest length passing through areas of Aboriginal heritage sensitivity, with modified green and orange options having the longest length.

Table 7-20: Comparative assessment – Aboriginal heritage

<table>
<thead>
<tr>
<th>Route option</th>
<th>No. of Aboriginal heritage sites</th>
<th>Length of Aboriginal heritage sensitivity (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>7</td>
<td>10,880</td>
</tr>
<tr>
<td>Modified blue</td>
<td>8</td>
<td>10,205</td>
</tr>
<tr>
<td>Modified green</td>
<td>12</td>
<td>11,987</td>
</tr>
<tr>
<td>Modified orange</td>
<td>13</td>
<td>11,312</td>
</tr>
<tr>
<td>Modified pink</td>
<td>9</td>
<td>7978</td>
</tr>
<tr>
<td>Modified purple</td>
<td>10</td>
<td>7303</td>
</tr>
<tr>
<td>Modified white</td>
<td>14</td>
<td>9085</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>15</td>
<td>8410</td>
</tr>
</tbody>
</table>

7.5.3 Non-Aboriginal heritage

The non-Aboriginal heritage constraints across the shortlisted route options are summarised in Table 7-21. The impact is the number of known or potential non-Aboriginal heritage items and the number of potential non-Aboriginal heritage landscapes. In all shortlisted options, the highest significance of any known or potential non-Aboriginal heritage item is State significance. The modified aqua and modified blue options both have the least number of known or potential non-Aboriginal heritage items and potential non-Aboriginal heritage landscapes.

Table 7-21: Comparative assessment – non-Aboriginal heritage

<table>
<thead>
<tr>
<th>Route option</th>
<th>No. of known or potential heritage sites</th>
<th>No. of potential heritage landscapes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Modified blue</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Modified green</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Modified orange</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Modified pink</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Modified purple</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Modified white</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>
### 7.5.4 Land use and planning

The land use and planning constraints across the shortlisted route options are summarised in Table 7-22: Comparative assessment – land use. This provides a summary of the main land uses within each of the shortlisted route options, including existing and future land use development that may occur in the study area through WSPGA and the planned western Sydney airport.

<table>
<thead>
<tr>
<th>Route option</th>
<th>Crosses what land use</th>
<th>Western Sydney Parklands impact</th>
<th>Future development impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>• Recreational land uses (22 per cent)</td>
<td>• Severance</td>
<td>• Severance impact on the site of a proposed business park</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (1.5 per cent)</td>
<td>• Bushland areas</td>
<td>• Passes through WSPGA</td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (60.7 per cent)</td>
<td>• Walking tracks</td>
<td>• Is within 600 metres of Elizabeth Drive in WSPGA (A1, B2, C3)</td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential land uses (1.5 per cent)</td>
<td>• Wylde Mountain Bike Trail (corner impact)</td>
<td>• Site of an approved mosque</td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (7.6 per cent).</td>
<td>• Sydney International Shooting Centre</td>
<td>• Shorter airport access road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Biobanking site</td>
<td>• Need to consider SWRL connection into the airport site</td>
</tr>
<tr>
<td>Modified blue</td>
<td>• Recreational land uses (20.6 per cent)</td>
<td>• Severance</td>
<td>• Severance impact on the site of a proposed business park</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (1.4 per cent)</td>
<td>• Bushland areas</td>
<td>• Passes through WSPGA</td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (65.3 per cent)</td>
<td>• Walking tracks</td>
<td>• Is within 600 metres of Elizabeth Drive in WSPGA (A1, B2)</td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential land uses (1.4 per cent)</td>
<td>• Wylde Mountain Bike Trail (corner impact)</td>
<td>• Site of an approved mosque</td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (6.1 per cent).</td>
<td>• Sydney International Shooting Centre</td>
<td>• Shorter airport access road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Biobanking site</td>
<td>• Need to consider SWRL connection into the airport site</td>
</tr>
<tr>
<td>Modified green</td>
<td>• Recreational land uses (20.4 per cent)</td>
<td>• Severance</td>
<td>• Severance impact on the site of a proposed business park</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (0.4 per cent)</td>
<td>• Bushland areas</td>
<td>• Passes through WSPGA</td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (64.3 per cent)</td>
<td>• Walking tracks</td>
<td>• Is within 600 metres of Elizabeth Drive in WSPGA (A1, C3)</td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential</td>
<td>• Wylde Mountain Bike</td>
<td>• Need to consider SWRL connection into the airport site</td>
</tr>
<tr>
<td>Route option</td>
<td>Crosses what land use</td>
<td>Western Sydney Parklands impact</td>
<td>Future development impact</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------</td>
<td>---------------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td></td>
<td>land uses (1.1 per cent)</td>
<td>Trail (corner impact)</td>
<td>Forms barrier between Twin Creeks estate and landfill facility</td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (39.0 per cent).</td>
<td>Sydney International Shooting Centre</td>
<td>Longer airport access road.</td>
</tr>
<tr>
<td>Modified orange</td>
<td>• Recreational land uses (19.2 per cent)</td>
<td>Bushland areas</td>
<td>Need to consider SWRL connection into the airport site.</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (0.3 per cent)</td>
<td>Walking tracks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (68.5 per cent)</td>
<td>Wylde Mountain Bike Trail (corner impact)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential land uses (1.0 per cent)</td>
<td>Sydney International Shooting Centre</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (5.7 per cent).</td>
<td>Biobanking site.</td>
<td></td>
</tr>
<tr>
<td>Modified pink</td>
<td>• Recreational land uses (14.5 per cent)</td>
<td>Edge effect</td>
<td>Edge impact on a site of a proposed business park</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (2.3 per cent)</td>
<td>Bushland areas</td>
<td>Passes through WSPGA</td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (61.8 per cent)</td>
<td>Wylde Mountain Bike Trail (strip impact)</td>
<td>Is within 600 metres of Elizabeth Drive in WSPGA (A3, B2, C3)</td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential land uses (3.7 per cent)</td>
<td>Proposed business hubs</td>
<td>Site of an approved mosque</td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (11.5 per cent).</td>
<td>Biobanking site.</td>
<td>Shorter airport access road.</td>
</tr>
<tr>
<td>Modified purple</td>
<td>• Recreational land uses (13.5 per cent)</td>
<td>Edge effect</td>
<td>Need to consider SWRL connection into the airport site.</td>
</tr>
<tr>
<td></td>
<td>• Industrial land uses (2.2 per cent)</td>
<td>Bushland areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Agricultural land uses (66.1 per cent)</td>
<td>Wylde Mountain Bike Trail (strip impact)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Rural residential and urban residential land uses (1.5 per cent)</td>
<td>Proposed business hubs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Transport and other (utilities) options (9.9 per cent).</td>
<td>Biobanking site.</td>
<td></td>
</tr>
<tr>
<td>Modified white</td>
<td>• Recreational land uses (13.6 per cent)</td>
<td>Edge effect</td>
<td>Edge impact on a site of a proposed business park</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Passes through WSPGA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is within 600 metres of Elizabeth Drive in WSPGA (A3, B2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Site of an approved mosque</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shorter airport access road.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Need to consider SWRL connection into the airport site.</td>
</tr>
</tbody>
</table>
Route option | Crosses what land use | Western Sydney Parklands impact | Future development impact
--- | --- | --- | ---
| • Industrial land uses (1.1 per cent) • Agricultural land uses (65.1 per cent) • Rural residential and urban residential land uses (3.1 per cent) • Transport and other (utilities) options (10.7 per cent). | • Bushland areas • Wylde Mountain Bike Trail (strip impact) • Proposed business hubs • Biobanking site. | • Passes through WSPGA • Is within 600 metres of Elizabeth Drive in WSPGA (A3, C3) • Forms barrier between Twin Creeks estate and landfill facility • Longer airport access road. • Need to consider SWRL connection into the airport site. |
| **Modified yellow** | • Recreational land uses (12.6 per cent) • Industrial land uses (1.1 per cent) • Agricultural land uses (69.1 per cent) • Rural residential and urban residential land uses (3.1 per cent) • Transport and other (utilities) options (9.3 per cent). | • Edge effect • Bushland areas • Wylde Mountain Bike Trail (strip impact) • Proposed business hubs • Biobanking site. | • Edge impact on a site of a proposed business park • Passes through WSPGA • Is within 600 metres of Elizabeth Drive in WSPGA (A3) • Forms barrier between Twin Creeks estate and landfill facility • Longer airport access road. • Need to consider SWRL connection into the airport site. |

**7.5.5 Socio-economic**

The socio-economic effects of the shortlisted route options are summarised in Table 7-23. This table comprises the assessment areas of community cohesion, amenity impact, access and movement patterns, business impact and business/agribusiness impact.

**Table 7-23: Comparative assessment – socio-economic**

<table>
<thead>
<tr>
<th>Route option</th>
<th>Community cohesion</th>
<th>Amenity impact</th>
<th>Access and movement patterns</th>
<th>Property impact</th>
<th>Business / agribusiness impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>Creates a barrier and alters sense of place: • Through Western Sydney</td>
<td>680 sensitive receivers within 600 metres. Many</td>
<td>Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road</td>
<td>Passes through 109 individual</td>
<td>Passes through 20 local businesses.</td>
</tr>
<tr>
<td>Route option</td>
<td>Community cohesion</td>
<td>Amenity impact</td>
<td>Access and movement patterns</td>
<td>Property impact</td>
<td>Business / agribusiness impact</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Parklands for community and users of the Parklands.</td>
<td>located to the east of the M7 Motorway.</td>
<td>and four other substantial property accesses.</td>
<td>property lots including 32 residences.</td>
<td>Passes through 215 hectares of agricultural land.</td>
</tr>
<tr>
<td></td>
<td>• For rural properties north of the corridor and from Mount Vernon to the Kemps Creek village shops.</td>
<td>Quite visible through floodplain and rural areas, with few viewers.</td>
<td>Could impact on existing pedestrian and cyclist paths through the Parklands.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Merging into Elizabeth Drive would create a much wider road corridor and a perceived barrier north and south of Elizabeth Drive.</td>
<td>Merging into Elizabeth Drive would create a large visual impact on both permanent receivers and transient travellers along Elizabeth Drive and The Northern Road.</td>
<td>Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified blue</td>
<td>Creates a barrier and alters sense of place:</td>
<td>661 sensitive receivers within 600 metres.</td>
<td>Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and five other substantial property accesses.</td>
<td>Passes through 103 individual property lots including 23 residences.</td>
<td>Passes through 17 local businesses.</td>
</tr>
<tr>
<td></td>
<td>• Through Western Sydney Parklands for community and users of the Parklands.</td>
<td>A number is located to the east of the M7 Motorway)</td>
<td>Could impact on existing pedestrian and cyclist pathways through the Parklands.</td>
<td></td>
<td>Passes through 256 hectares of agricultural land.</td>
</tr>
<tr>
<td></td>
<td>• For rural properties north of the corridor and from Mount Vernon to the Kemps Creek village shops.</td>
<td>Quite visible through floodplain and rural areas, with few viewers.</td>
<td>Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modified green</td>
<td>Creates a barrier and alters sense of place:</td>
<td>661 sensitive receivers within 600 metres.</td>
<td>Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Luddenham</td>
<td>Passes through 105 individual property lots</td>
<td>Passes through 19 local businesses.</td>
</tr>
<tr>
<td></td>
<td>• Through Western Sydney Parklands for community and</td>
<td>A number is located to the east of the M7 Motorway)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Route option</td>
<td>Community cohesion</td>
<td>Amenity impact</td>
<td>Access and movement patterns</td>
<td>Property impact</td>
<td>Business / agribusiness impact</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>-----------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
</tbody>
</table>
| Modified orange | Creates a barrier and alters sense of place:  
  - Through Western Sydney Parklands for community and users of the Parklands.  
  - For rural properties north of the corridor and from Mount Vernon to the Kemps Creek village shops.  
  Would create a barrier between Elizabeth Drive landfill facility and the Twin Creeks residential development.  
  Crosses Luddenham Road, which could result in a perceived barrier to  
  642 sensitive receivers within 600 metres. A number is located further away (to the east of the M7 Motorway).  
  Quite visible through floodplain and rural areas, with few viewers. | Quite visible through floodplain and rural areas, with few viewers. | Road, The Northern Road and two other substantial property accesses.  
Could impact on existing pedestrian and cyclist pathways through the Parklands.  
Truncates some large landholdings and movement and access to isolated parcels of land would need to be considered.  
Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required. | Property impact including 29 residences. | Passes through 155 hectares of agricultural land. |
<p>| | | | | | |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |
|               |                    |               |                             |                |                                |</p>
<table>
<thead>
<tr>
<th>Route option</th>
<th>Community cohesion</th>
<th>Amenity impact</th>
<th>Access and movement patterns</th>
<th>Property impact</th>
<th>Business / agribusiness impact</th>
</tr>
</thead>
</table>
| Modified pink | When next to Elizabeth Drive, creates a much wider road corridor that could result in a perceived barrier for the local community. Affects the sense of place and community value at:  
- Wylde Mountain Bike Trail.  
- Kemps Creek village shops for rural properties north of the corridor. | 520 sensitive receivers within 600 metres. Quite visible through floodplain and rural areas, with few viewers. Merging into Elizabeth Drive would create a large visual impact on both permanent receivers and transient travellers along Elizabeth Drive and The Northern Road. | One interchange for Elizabeth Drive and M12 Motorway, which could confuse travellers. Roads affected: Elizabeth Drive, Cecil Road, Duff Road, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses. Truncates some large landholdings and movement and access to isolated parcels of land would need to be considered. Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required. | Passes through 193 individual property lots including 41 residences. | Passes through 21 local businesses. Passes through 239 hectares of agricultural land. |
| Modified purple | When next to Elizabeth Drive, this option creates a much wider road corridor that could result in a perceived barrier for the local community. Affects the sense of place and community value at:  
- Wylde Mountain Bike Trail.  
- Kemps Creek village shops for rural properties north of the corridor. | 501 sensitive receivers within 600 metres. Quite visible through floodplain and rural areas, with few viewers. | One interchange for Elizabeth Drive and M12 Motorway, which could confuse travellers. Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses. | Passes through 187 individual property lots including 32 residences. | Passes through 18 local businesses. Passes through 279 hectares of agricultural land. |
<table>
<thead>
<tr>
<th>Route option</th>
<th>Community cohesion</th>
<th>Amenity impact</th>
<th>Access and movement patterns</th>
<th>Property impact</th>
<th>Business / agribusiness impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>corridor. Crosses Luddenham Road, which could result in a perceived barrier to Elizabeth Drive for properties north of the corridor option.</td>
<td>501 sensitive receivers within 600 metres. Quite visible through floodplain and rural areas, with few viewers. Merging into Elizabeth Drive would create a large visual impact on both permanent receivers and transient travellers along Elizabeth Drive and The Northern Road.</td>
<td>One interchange for Elizabeth Drive and M12 Motorway, which could confuse travellers. Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses. Truncates some large landholdings and movement and access to isolated parcels of land would need to be considered. Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required.</td>
<td>Passes through 189 individual property lots including 38 residences.</td>
<td>Passes through 20 local businesses. Passes through 179 hectares of agricultural land.</td>
</tr>
<tr>
<td>Modified white</td>
<td>When next to Elizabeth Drive, creates a much wider road corridor that could result in a perceived barrier for the local community. Affects the sense of place and community value at: • Wylde Mountain Bike Trail. • Kemps Creek village shops for rural properties north of the corridor. Would create a barrier between Elizabeth Drive landfill facility and the Twin Creeks residential development.</td>
<td>482 sensitive receivers within 600 metres.</td>
<td>One interchange for Elizabeth Drive and M12 Motorway, which could confuse travellers. Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses.</td>
<td>Passes through 183 individual property lots</td>
<td>Passes through 17 local businesses. Passes through 219 hectares of agricultural land.</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>When next to Elizabeth Drive, would create a much wider road corridor that could result in a perceived barrier for the local community.</td>
<td>501 sensitive receivers within 600 metres. Quite visible through floodplain and rural areas, with few viewers. Merging into Elizabeth Drive would create a large visual impact on both permanent receivers and transient travellers along Elizabeth Drive and The Northern Road.</td>
<td>One interchange for Elizabeth Drive and M12 Motorway, which could confuse travellers. Roads affected include Elizabeth Drive, Range Road, Mamre Road, Salisbury Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses. Truncates some large landholdings and movement and access to isolated parcels of land would need to be considered. Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required.</td>
<td>Passes through 189 individual property lots including 38 residences.</td>
<td>Passes through 20 local businesses. Passes through 179 hectares of agricultural land.</td>
</tr>
<tr>
<td>Route option</td>
<td>Community cohesion</td>
<td>Amenity impact</td>
<td>Access and movement patterns</td>
<td>Property impact</td>
<td>Business / agribusiness impact</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>-------------------------------</td>
<td>----------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Affects the sense of place and community value at:</td>
<td>Quite visible through floodplain and rural areas, with few viewers.</td>
<td>Avenue, Clifton Avenue, Western Road, Luddenham Road, The Northern Road and four other substantial property accesses.</td>
<td>including 29 residences.</td>
<td>agricultural land.</td>
</tr>
<tr>
<td></td>
<td>• Wylde Mountain Bike Trail.</td>
<td></td>
<td>Truncates some large landholdings and movement and access to isolated parcels of land would need to be considered.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Kemps Creek village shops for rural properties north of the corridor.</td>
<td></td>
<td>Property and local road access that front onto Elizabeth Drive could be affected. A separate local access road may be required.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Would create a barrier between Elizabeth Drive landfill facility and the Twin Creeks residential development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crosses Luddenham Road, which could result in a perceived barrier to Elizabeth Drive for properties north of the corridor option.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Quite visible through floodplain and rural areas, with few viewers.
7.5.6 Noise
The noise nuisance rating benefit ratio of the shortlisted route options are identified in Table 7-24. The noise nuisance rating benefit ratio is a measure of the difference between the future base noise level (ie without the M12 Motorway) and with the future noise level of the M12 Motorway. The benefit ratio is measured from 0 (being the future base noise level) – the bigger the number, the greater impact may be. As such, the options with the lower noise nuisance ratings are modified orange and modified yellow. The modified pink route would have the greatest noise impact.

Table 7-24: Noise nuisance rating for shortlisted route options

<table>
<thead>
<tr>
<th>Route option</th>
<th>Noise nuisance rating benefit ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>-3.17</td>
</tr>
<tr>
<td>Modified blue</td>
<td>-3.07</td>
</tr>
<tr>
<td>Modified green</td>
<td>-3.10</td>
</tr>
<tr>
<td>Modified orange</td>
<td>-2.98</td>
</tr>
<tr>
<td>Modified pink</td>
<td>-3.24</td>
</tr>
<tr>
<td>Modified purple</td>
<td>-3.12</td>
</tr>
<tr>
<td>Modified white</td>
<td>-3.11</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>-3.05</td>
</tr>
</tbody>
</table>

7.5.7 Soils and contamination
In terms of soil profiles, the soil profiles are similar, with the soil landscapes of Luddenham, Bringelly Shale, Blacktown and South Creek being present in all shortlisted route options. However the modified pink, purple, white and yellow options also intersects the Picton soil landscape.

The specific areas of contamination concern for the shortlisted route options are summarised in Table 7-25.

Table 7-25: Comparative assessment – contamination

<table>
<thead>
<tr>
<th>Corridor option</th>
<th>Specific AECs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>Brandown Class II Landfill (very high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (moderate)</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group quarry and yard (moderate)</td>
</tr>
<tr>
<td></td>
<td>Kemps Creek Resource Recovery (moderate)</td>
</tr>
<tr>
<td></td>
<td>Asbestos (high)</td>
</tr>
<tr>
<td></td>
<td>Andreasans Green Wholesale Nursery (high)</td>
</tr>
<tr>
<td></td>
<td>CSIRO / University of Sydney Research Station (high)</td>
</tr>
<tr>
<td></td>
<td>Steam and diesel model train park (moderate)</td>
</tr>
<tr>
<td>Modified blue</td>
<td>Brandown Class II Landfill (very high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (moderate)</td>
</tr>
<tr>
<td></td>
<td>Kemps Creek Resource Recovery (moderate)</td>
</tr>
<tr>
<td></td>
<td>Asbestos (high)</td>
</tr>
<tr>
<td>Corridor option</td>
<td>Specific AECs</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (high)</td>
</tr>
<tr>
<td>Modified green</td>
<td>Brandown Class II Landfill (very high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (moderate)</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (moderate)</td>
</tr>
<tr>
<td>Modified orange</td>
<td>Brandown Class II Landfill (very high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (moderate)</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (moderate)</td>
</tr>
<tr>
<td>Modified pink</td>
<td>Brandown Class II Landfill (moderate)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (low)</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>CSR brickworks and ceramic processing (high)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (high)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group quarry and yard (moderate)</td>
</tr>
<tr>
<td>Modified purple</td>
<td>Brandown Class II Landfill (moderate)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (low)</td>
</tr>
<tr>
<td></td>
<td>Notified Service Station (low)</td>
</tr>
<tr>
<td></td>
<td>Soil stockpiles (moderate)</td>
</tr>
<tr>
<td></td>
<td>CSR brickworks and ceramic processing (high)</td>
</tr>
<tr>
<td></td>
<td>Elizabeth Drive landfill facility (high)</td>
</tr>
<tr>
<td>Modified white</td>
<td>Brandown Class II Landfill (moderate)</td>
</tr>
<tr>
<td></td>
<td>Hi-Quality Group landscaping supplies yard (low)</td>
</tr>
</tbody>
</table>
7.5.8 Hydrology and flooding

The hydrology and flooding constraints across the shortlisted route options are summarised in Table 7-26. As well as identifying the areas and length through floodplains, the number of drainage lines and farm dams have also been considered. Every option crosses the same length through Kemps Creek floodplains as it crosses at the same location. Lengths across the South and Badgerys creek floodplains vary due to the different crossing locations. Overall, the modified white option and modified yellow options have the smallest floodplain area.

The modified yellow and modified orange options impact on fewer dams, with the modified aqua option affecting the highest number of farm dams. There are a similar number of drainage lines across each of the route options, between 24 and 27.

<table>
<thead>
<tr>
<th>Corridor option</th>
<th>Specific AECs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notified Service Station (low)</td>
<td>Asbestos (high)</td>
</tr>
<tr>
<td>Soil stockpiles (moderate)</td>
<td>CSIRO / University of Sydney Research Station (high)</td>
</tr>
<tr>
<td>CSR brickworks and ceramic processing (high)</td>
<td>Steam and diesel model train park (moderate)</td>
</tr>
<tr>
<td>Elizabeth Drive landfill facility (moderate)</td>
<td></td>
</tr>
<tr>
<td>Modified yellow</td>
<td>Brandown Class II Landfill (moderate)</td>
</tr>
<tr>
<td>Hi-Quality Group landscaping supplies yard (low)</td>
<td>Elizabeth Drive landfill facility (moderate)</td>
</tr>
<tr>
<td>Notified Service Station (low)</td>
<td>CSIRO Access Road – quarry and wood stockpile area (moderate)</td>
</tr>
<tr>
<td>Soil stockpiles (moderate)</td>
<td>Clifton Avenue car wrecking yard (high)</td>
</tr>
<tr>
<td>CSR brickworks and ceramic processing (high)</td>
<td>Asbestos (high)</td>
</tr>
<tr>
<td></td>
<td>CSIRO / University of Sydney Research Station (high)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Route option</th>
<th>No. of farm dams</th>
<th>No. of drainage lines</th>
<th>Floodplain length (m)</th>
<th>Floodplain area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>35</td>
<td>25</td>
<td>Kemps Creek 525 m</td>
<td>523,325</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>South Creek 740 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 285 m</td>
<td></td>
</tr>
<tr>
<td>Modified blue</td>
<td>29</td>
<td>27</td>
<td>Kemps Creek 525 m</td>
<td>523,325</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>South Creek 740 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 285 m</td>
<td></td>
</tr>
<tr>
<td>Modified green</td>
<td>27</td>
<td>24</td>
<td>Kemps Creek 525 m</td>
<td>412,443</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>South Creek 490 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 215 m</td>
<td></td>
</tr>
<tr>
<td>Modified orange</td>
<td>21</td>
<td>26</td>
<td>Kemps Creek 525 m</td>
<td>412,443</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>South Creek 490 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 215 m</td>
<td></td>
</tr>
</tbody>
</table>
### Table 7-27: Comparative assessment – landscape character

<table>
<thead>
<tr>
<th>Route option</th>
<th>No. of farm dams</th>
<th>No. of drainage lines</th>
<th>Floodplain length (m)</th>
<th>Floodplain area (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified pink</td>
<td>30</td>
<td>25</td>
<td>Kemps Creek 525 m</td>
<td>South Creek 740 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 285 m</td>
</tr>
<tr>
<td>Modified purple</td>
<td>24</td>
<td>27</td>
<td>Kemps Creek 525 m</td>
<td>South Creek 740 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 285 m</td>
</tr>
<tr>
<td>Modified white</td>
<td>22</td>
<td>24</td>
<td>Kemps Creek 525 m</td>
<td>South Creek 490 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 215 m</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>16</td>
<td>26</td>
<td>Kemps Creek 525 m</td>
<td>South Creek 490 m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Badgerys Creek 215 m</td>
</tr>
</tbody>
</table>

#### 7.5.9 Landscape character

Table 7-27 provides a grading of the visual and landscape character impact based on the Roads and Maritime’s Guideline for Landscape Character and Visual Impact Assessment. The grading is based on the expected magnitude of change to the existing landscape character and the sensitivity of the area’s built, natural and cultural character and sense of place to the proposal (as discussed in sections 7.2.10, 7.3.10 and 7.4.10).

The modified orange and yellow option had the least impact on landscape character, while the modified aqua and pink options had the greatest impact.

#### 7.5.10 Utilities

The utilities constraints across the shortlisted route options are summarised in Table 7-28. There is little difference between the options for critical or other utilities infrastructure.
Table 7-28: Comparative assessment – utilities

<table>
<thead>
<tr>
<th>Route option</th>
<th>Critical</th>
<th>Other</th>
</tr>
</thead>
</table>
| **Modified aqua** | Sydney Water upper canal system  
Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra optical fibre assets  
TransGrid 500 kV overhead electricity line. | Telstra services  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line  
Endeavour Energy 33 kV electricity line. |
| **Modified blue** | Sydney Water upper canal system  
Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra optical fibre assets  
TransGrid 500 kV overhead electricity line. | Telstra services  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line  
Endeavour Energy 33 kV electricity line. |
| **Modified green** | Sydney Water upper canal system  
Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra optical fibre assets  
TransGrid 500 kV overhead electricity line. | Telstra services  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line  
Endeavour Energy 33 kV electricity line. |
| **Modified orange** | Sydney Water upper canal system  
Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra optical fibre assets  
TransGrid 500 kV overhead electricity line. | Telstra services  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line  
Endeavour Energy 33 kV electricity line. |
| **Modified pink** | Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra and Optus optical fibre assets  
Telstra exchange  
TransGrid 500 kV overhead electricity line. | Sydney Water upper canal system  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line  
Telstra services  
Optus services  
Endeavour Energy 33 kV electricity line. |
| **Modified purple** | Jemena gas main trunk  
Jemena 150 mm gas main  
Telstra and Optus optical fibre assets | Sydney Water upper canal system  
Sydney Water mains  
TransGrid 330 kV overhead electricity line  
Endeavour Energy 132 kV electricity line |
<table>
<thead>
<tr>
<th>Route option</th>
<th>Critical</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Telstra exchange</td>
<td>Telstra services</td>
</tr>
<tr>
<td></td>
<td>TransGrid 500 kV overhead electricity line.</td>
<td>Optus services</td>
</tr>
<tr>
<td>Modified white</td>
<td>Jemena gas main trunk</td>
<td>Sydney Water upper canal system</td>
</tr>
<tr>
<td></td>
<td>Jemena 150 mm gas main</td>
<td>Sydney Water mains</td>
</tr>
<tr>
<td></td>
<td>Telstra and Optus optical fibre assets</td>
<td>TransGrid 330 kV overhead electricity line</td>
</tr>
<tr>
<td></td>
<td>Telstra exchange</td>
<td>Endeavour Energy 132 kV electricity line</td>
</tr>
<tr>
<td></td>
<td>TransGrid 500 kV overhead electricity line.</td>
<td>Telstra services</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>Jemena gas main trunk</td>
<td>Sydney Water upper canal system</td>
</tr>
<tr>
<td></td>
<td>Jemena 150 mm gas main</td>
<td>Sydney Water mains</td>
</tr>
<tr>
<td></td>
<td>Telstra and Optus optical fibre assets</td>
<td>TransGrid 330 kV overhead electricity line</td>
</tr>
<tr>
<td></td>
<td>Telstra exchange</td>
<td>Endeavour Energy 132 kV electricity line</td>
</tr>
<tr>
<td></td>
<td>TransGrid 500 kV overhead electricity line.</td>
<td>Telstra services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Optus services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Endeavour Energy 33 kV electricity line.</td>
</tr>
</tbody>
</table>
8 Selection of the preferred corridor route

8.1 Introduction

The shortlisted options were placed on exhibition for community feedback between February and March 2016.

The options were then modified in light of:

- The findings from work done to integrate the project with other transport projects at the western end of the study area during the consultation period
- Consideration of community feedback received.

These modified shortlisted options were assessed at a value management workshop to recommend the preferred corridor route for the M12 Motorway.

This chapter details the process carried out to select the preferred corridor route.

8.2 Preferred corridor route value management workshop

Roads and Maritime held a value management workshop on 7 April 2016 with the purpose of recommending a preferred corridor route for the M12 Motorway. The participants included a range of stakeholders including NSW and Australian government agencies, local councils and the project team.

The objectives of the workshop were to:

- Obtain a common understanding of the work carried out in the development of the M12 Motorway strategic route option analysis process
- Review the shortlisted route options, evaluate them against key assessment criteria and recommend a preferred option for further investigation and development.

8.2.1 Review of assessment criteria

The workshop group reviewed and updated the assessment criteria that had been developed during the October 2015 (Shortlisting) value management workshop. This was done to maintain consistency in the assessment approach and was carried out to guide the assessment of the shortlisted route options. The assessment criteria were revised in terms of the weighting assigned to each of the criteria. Land use, community and environment and heritage were weighted equally, while project delivery was weighted lower and functionality was weighted higher. The revised assessment criteria are shown in Table 8-1.
Table 8-1: Revised assessment criteria used to select the preferred route

<table>
<thead>
<tr>
<th>No.</th>
<th>Criteria</th>
<th>Prompts/ measures</th>
</tr>
</thead>
</table>
| 1   | Project delivery         | • Timeliness to plan and deliver, design risks, project approvals, land acquisitions, risks or issues  
                                 • Potential for staging, constructability, lead time for relocations or specific items, construction risks |
|     |                          | • Integrates (considers non-sterilising) with current and proposed land uses      |
|     |                          | • Provides for property access                                                   |
|     |                          | • Consistency with Western Sydney Priority Growth Area                           |
|     |                          | • Location of interchanges affecting future land use                              |
| 2   | Land use                 | • Number of cadastral lots/ownership                                              |
|     |                          | • Number of existing businesses directly impacted                                |
|     |                          | • Community severance                                                            |
|     |                          | • Feedback on preference from community consultation                              |
|     |                          | • Number of sensitive receivers within 600m (noise and pollution)                 |
| 3   | Community                | • Number of Aboriginal and non-Aboriginal heritage sites affected                  |
|     |                          | • Total area of native vegetation affected. Area of EEC/CEEC affected             |
|     |                          | • Drainage lines and creek lines                                                 |
| 4   | Environment/heritage     | • Grades, speeds, lengths, interchanges, connectivity to future M9 Outer Sydney Orbital |
|     |                          | • Enabling Elizabeth Drive to operate as an arterial road in the future            |
|     |                          | • Impact on M7 Motorway and the rest of the network                               |
|     |                          | • Active and public transport                                                     |
|     |                          | • Relative airport connectivity for cars and freight on the road network           |
| 5   | Functionality            | • Number of cadastral lots/ownership                                              |
|     |                          | • Number of existing businesses directly impacted                                |
|     |                          | • Community severance                                                            |
|     |                          | • Feedback on preference from community consultation                              |
|     |                          | • Number of sensitive receivers within 600m (noise and pollution)                 |

8.2.2 Comparative assessment of zone corridor options

Information on the assessment of each route option was provided to all participants as a background paper before the value management workshop and formed the basis of the assessment. A summary of the assessment is provided in Table 8-2.
<table>
<thead>
<tr>
<th>Corridor option</th>
<th>A1</th>
<th>A3</th>
<th>B2</th>
<th>B5</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of farm dams</td>
<td>10</td>
<td>5</td>
<td>17</td>
<td>9</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>No. of cadastral lots</td>
<td>53</td>
<td>137</td>
<td>34</td>
<td>30</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Floodplain length (m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemps Creek (475 m)</td>
<td></td>
<td></td>
<td>Kemps Creek (50 m)</td>
<td>Kemps Creek (50 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemps Creek (475 m)</td>
<td></td>
<td></td>
<td>South Creek (740 m)</td>
<td>South Creek (490 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemps Creek (50 m)</td>
<td></td>
<td></td>
<td>Badgerys Creek (285 m)</td>
<td>Badgerys Creek (215 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemps Creek (50 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemps Creek (50 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Creek (740 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Creek (490 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badgerys Creek (285 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badgerys Creek (215 m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floodplain area (m²)</td>
<td>138,331</td>
<td>134,529</td>
<td>384,994</td>
<td>274,112</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No. of drainage lines</td>
<td>11</td>
<td>11</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Traverses existing road reserves</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Working under or near live traffic</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Construction staging at Elizabeth Drive / M7 Motorway interchange</td>
<td>N</td>
<td>Y</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Parkland users interface</td>
<td>Y</td>
<td>Y</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Traverses extractive industries</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Utility interface</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Significant temporary construction works to interface with The Northern Road</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Bridge across Sydney Water canal</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Bridge over Elizabeth Drive</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Passes through Kemps Creek village</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Corridor option</td>
<td>A1</td>
<td>A3</td>
<td>B2</td>
<td>B5</td>
<td>C3</td>
<td>C4</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Relative ease of construction</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Small (1 km) airport access road from M12 Motorway</td>
<td>N/A</td>
<td>N/A</td>
<td>Y</td>
<td>N</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Impact on existing Elizabeth Drive businesses</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

### Land use

<table>
<thead>
<tr>
<th>Crosses what land use zone</th>
<th>RU4 Rural small holdings</th>
<th>E2 Environmental conservation</th>
<th>RU4 Rural small holdings</th>
<th>E2 Environmental conservation</th>
<th>RU1 Primary production</th>
<th>RU2 Rural landscape</th>
<th>E2 Environmental conservation</th>
<th>RU2 Rural landscape</th>
<th>RU4 Rural small holdings</th>
<th>SP1 Special activities</th>
<th>RU2 Rural landscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Sydney Parklands</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation (around creek lines)</td>
<td>RU2 Rural landscape</td>
<td>E2 Environmental conservation</td>
<td>RU2 Rural landscape</td>
<td>E2 Environmental conservation</td>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>SP2 Infrastructure</td>
</tr>
<tr>
<td>RU1 Primary production</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation</td>
<td>RU1 Primary production</td>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
</tr>
<tr>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation (along creek lines)</td>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
</tr>
<tr>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
</tr>
<tr>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation</td>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
</tr>
<tr>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>E2 Environmental conservation</td>
<td>RU2 Rural landscape</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
<td>RU4 Rural small holdings</td>
</tr>
</tbody>
</table>

### Community

<table>
<thead>
<tr>
<th>Sensitive receivers within 600 m</th>
<th>577</th>
<th>417</th>
<th>64</th>
<th>45</th>
<th>37</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicative sensitive receivers in excess of the daytime noise criteria (55 dbA)</td>
<td>45</td>
<td>62</td>
<td>23</td>
<td>15</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>Indicative sensitive receivers in excess of the nighttime noise criteria (50 dbA)</td>
<td>55</td>
<td>100</td>
<td>34</td>
<td>22</td>
<td>35</td>
<td>15</td>
</tr>
<tr>
<td>Corridor option</td>
<td>A1</td>
<td>A3</td>
<td>B2</td>
<td>B5</td>
<td>C3</td>
<td>C4</td>
</tr>
<tr>
<td>-----------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td><strong>Environment and heritage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of EEC (ha)</td>
<td>26</td>
<td>51</td>
<td>34</td>
<td>30</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>Area (ha) of potential critically endangered ecological communities (EPBC Act)</td>
<td>5</td>
<td>31</td>
<td>23</td>
<td>21</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. of threatened flora species</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>No. of threatened fauna species</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2 (migratory)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area of non-certified lands (ha)</td>
<td>134</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area of Cumberland Plain priority conservation land (ha)</td>
<td>4</td>
<td>38</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area of mapped regional corridor (ha)</td>
<td>56</td>
<td>28</td>
<td>38</td>
<td>38</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. of regional corridors</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Area in biobanking agreement site (ha)</td>
<td>6</td>
<td>3</td>
<td>NA</td>
<td>NA</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Area of bushland regeneration in Western Sydney Parklands (ha)</td>
<td>55</td>
<td>36</td>
<td>NA</td>
<td>NA</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>No. of Aboriginal heritage sites</td>
<td>6</td>
<td>8</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Length of Aboriginal heritage sensitivity (m)</td>
<td>5967</td>
<td>3065</td>
<td>2538</td>
<td>3645</td>
<td>2375</td>
<td>1700</td>
</tr>
<tr>
<td>No. of known or potential non-Aboriginal heritage sites (and significance)</td>
<td>1 (State)</td>
<td>5 (State)</td>
<td>5 (local)</td>
<td>5 (local but poss. State or national)</td>
<td>2 (local)</td>
<td>2 (local)</td>
</tr>
<tr>
<td>No. of non-Aboriginal heritage landscapes</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Functionality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Would preserve functionality of Elizabeth Drive</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Connectivity to the future M9 Outer Sydney Orbital</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Relative impact on the M7 Motorway traffic flow</td>
<td>High</td>
<td>Moderate</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
8.2.3 Analysis of zone corridor options

The workshop participants were divided into five groups, and each group was assigned the task of assessing each of the six zone options against one of the five assessment criteria. Each zone option was assessed because they are interchangeable to create the route options. The relative performance of the corridor options within each zone was compared, and the better performing option was identified. The key observations of each groups are detailed in the following sections.

Zone A

The assessment of options in zone A against the assessment criteria is presented in Table 8-6.

Table 8-3: Comparative assessment of corridor options in zone A

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project delivery</strong></td>
<td>Option A3 was ranked lower than option A1 due to:</td>
</tr>
<tr>
<td></td>
<td>• Increased construction time, due to the need to realign Elizabeth Drive and increased impact on utilities</td>
</tr>
<tr>
<td></td>
<td>• Perceived construction complexity from the interface with the existing road network and topography</td>
</tr>
<tr>
<td></td>
<td>• Safety issues around the construction of the M7 interchange over the top of the existing M7 Motorway / Elizabeth Drive</td>
</tr>
<tr>
<td></td>
<td>• Longer acquisition times due to the number of affected properties</td>
</tr>
<tr>
<td></td>
<td>• Option A1 ranked higher with construction perceived to be easier due to flatter terrain traverses and most construction could be carried out away from live traffic.</td>
</tr>
<tr>
<td></td>
<td>Option A1 would need to consider how construction access to the site would be obtained.</td>
</tr>
<tr>
<td></td>
<td>Overall, option A1 was ranked higher due to the impact of option A3.</td>
</tr>
<tr>
<td><strong>Land use</strong></td>
<td>Option A3 was ranked higher than option A1 as it was perceived to only have edge effects on Western Sydney Parklands (and associated facilities) and would upgrade part of Elizabeth Drive, improving local and property access for local residents. However Option A3 is located closer to residences and these impacts would need to be mitigated.</td>
</tr>
<tr>
<td></td>
<td>Option A3 would directly impact the location of two potential business hubs in Western Sydney Parklands that would provide an income stream for the Parklands. However, the impact of option A1 severing the Parklands was considered to have a greater impact on the future land use of the Parklands.</td>
</tr>
<tr>
<td></td>
<td>Option A1 would have a large impact on land use, particularly through the severance of the Western Sydney Parklands. Should option A1 be selected, ongoing design would need to mitigate this severance impact.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Option A1 was ranked higher than option A3 as it would have less amenity impact (the biggest differences between the two options would be amenity impact and the closeness to receivers). It was acknowledged that some receivers would already be impacted by road traffic noise from the M7 Motorway.</td>
</tr>
<tr>
<td></td>
<td>Both options would impact on businesses within the study area, to varying degrees.</td>
</tr>
</tbody>
</table>
Community feedback included more than 110 residents in favour of option A1, as there would be fewer impacts than from option A3; three submissions were received that sought protection for the Western Sydney Parklands; and one from a cycling club that uses the Wyldle Mountain Bike Trail. However, in addition to consultation feedback, the broader community that use facilities within the study area were also considered as part of the assessment.

Overall, option A1 was ranked higher than option A3 due to amenity impact as a result of option A3.

Aboriginal heritage impacts were lower for option A1, which impacted only six sites, compared to eight recorded sites for option A3. However, the Aboriginal significance was higher for option A1 with a higher potential for significant new finds. While there was one additional non-Aboriginal heritage item (assessed as local significance) in option A3 than option A1, the impact between the options were negligible. Overall, option A3 was ranked higher overall for heritage.

In terms of biodiversity, option A3 was found to have higher clearing amounts of TSC Act and EPBC Act listed communities and threatened species habitat. While option A1 would impact on greater area of the M7 biobanking site (six hectares compared to three hectares for option A3), remnant endangered ecological communities in good condition was valued higher. In this regard, option A1 ranked higher than option A3.

It was acknowledged and considered that option A1 may affect connectivity for both fauna and park users through Western Sydney Parklands and this would need to be considered in the ongoing design of the option.

Overall, option A1 was ranked higher than option A3 due to lower heritage and biodiversity impacts.

The location of an option A1 interchange with the M7 Motorway could provide better grades for truck speeds and less length of climb. Although option A3 could be better in terms of interchange spacing, providing a greater distance from the Cowpasture Road interchange, the distance from option A1 interchange would still likely be in line with relevant guidelines.

While option A3 interchange could be more complex, due to being placed directly over the existing Elizabeth Drive interchange, it would function similarly to the option A1 interchange.

Overall, option A1 was ranked higher.

## Zone B

The assessment of options in zone B against the assessment criteria is presented in Table 8-4.

### Table 8-4: Comparative assessment of corridor options in zone B

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project delivery</td>
<td>Option B2 was ranked lower than option B5 due to:</td>
</tr>
<tr>
<td></td>
<td>• The increased construction time and perceived complexity with and increased length across floodplain resulting in increased bridge structure length and potential ground treatment in floodplain.</td>
</tr>
<tr>
<td></td>
<td>• A greater impact on local roads.</td>
</tr>
<tr>
<td>Assessment criteria</td>
<td>Discussion</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Discussion</strong></td>
<td>Option B2 would have better construction access via local roads, but this would be a minor benefit as access tracks could be constructed where local roads would not be suitable for option B5. Option B5 is located near fewer noise receivers and as a result, may be viable for longer construction hours if needed, subject to consultation and approval.</td>
</tr>
<tr>
<td><strong>Land use</strong></td>
<td>Option B5 was ranked higher due to a greater distance from Elizabeth Drive to support existing land uses and also planning aspirations, the future enterprise corridor and maximise land use development opportunities of WSPGA. Option B5 also provided a buffer between residential development to the north and the Elizabeth Drive landfill facility B5 offered more clearance for the airport and developable area for airport support services.</td>
</tr>
</tbody>
</table>
| **Community**       | Option B5 was ranked higher than option B2 because:  
• It would directly impact less properties and businesses. Option B2 would also impact a significantly greater number of established businesses such as a nursery, egg farms, a quarry and landfill.  
• Option B2 would have a greater severance impact on large properties north of Elizabeth Drive and would impact on properties that identify as Kemps Creek. Option B2 could also indirectly affect Kemps Creek village and on the future development of the WSPGA.  
• Community feedback was generally in favour of option B5 due to the proximity of option B2 to the Kemps Creek community and sensitive receivers. However, property owners under the Option B5 corridor were concerned about direct property and business impacts. |
| **Environment/heritage** | Option B2 had a lesser impact on Aboriginal heritage than option B5 but the sites identified to date are not categorised as significant. Option B5 would also have a greater impact on non-Aboriginal heritage. Biodiversity impacts would be similar for both options, but option B5 was ranked slightly higher due to impact on EEC (34 hectares for Option B2 and 30 hectares for option B5). There is no perceived difference in impact on connectivity. Option B5 would impact less drainage lines and creek lines. Overall, Option B5 was ranked slightly higher due to the lesser impact on biodiversity. |
| **Functionality**   | Option B5 was ranked higher than option B2 because:  
• It would provide greater opportunity in terms of road grades and airport interchange connectivity. The longer access road to the planned western Sydney airport would be a benefit in terms of traffic management through storage of vehicles, particularly buses, and would provide better a outcome for potential ramp metering  
• It would have less impact on active and public transport in the east – west corridor. |
Zone C
The assessment of options in zone C against the assessment criteria is presented in Table 8-5.

Table 8-5: Comparative assessment of corridor options in zone C

<table>
<thead>
<tr>
<th>Assessment criteria</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project delivery</strong></td>
<td>Option C4 was ranked higher than option C3 because:</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would have greater adverse construction impact due to its location on Elizabeth Drive. This would result in significant staging, greater utility impact and greater disruption to traffic</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would impact a greater number of dams</td>
</tr>
<tr>
<td></td>
<td>• Option C4 would have fewer noise receivers and, as a result may be viable for longer hours of work during construction, if needed, subject to consultation and approval.</td>
</tr>
<tr>
<td><strong>Land use</strong></td>
<td>Option C4 was ranked higher than option C3 due to its location at a greater distance from Elizabeth Drive that would support current and future land uses and planning aspirations. The future enterprise corridor would maximise the potential land use opportunities of the WSPGA.</td>
</tr>
<tr>
<td></td>
<td>Option C3 could make access to future development south of Elizabeth Drive more difficult due to the combined corridor of the M12 Motorway and Elizabeth Drive</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Option C4 was ranked higher than option C3 because:</td>
</tr>
<tr>
<td></td>
<td>Most properties in zone C rely on water from dams, as there is no town water, and option C3 would have twice the impact on dams</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would impact a greater number of properties including chicken farms, market gardens and sensitive receivers</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would also have a greater property severance impact</td>
</tr>
<tr>
<td></td>
<td>• Option C4 would only impact one market garden and an olive grove</td>
</tr>
<tr>
<td></td>
<td>• The footprint width of option C3 would be significantly greater due to the inclusion of the realignment of Elizabeth Drive.</td>
</tr>
<tr>
<td></td>
<td>The community was not consulted on either option C3 or C4 but was consulted on similar options (C1 and C2), with option C2 being the preferred option.</td>
</tr>
<tr>
<td></td>
<td>Twenty eight submissions were received from people wanting the M12 Motorway to avoid impact on the Sydney Society of Model Engineers Model Park.</td>
</tr>
<tr>
<td></td>
<td>Overall, option C4 was ranked higher.</td>
</tr>
<tr>
<td><strong>Environment/heritage</strong></td>
<td>Both options were ranked equally because:</td>
</tr>
<tr>
<td></td>
<td>• The impact on Aboriginal and non-Aboriginal heritage, and connectivity would be similar</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would impact slightly more vegetation</td>
</tr>
<tr>
<td></td>
<td>• Option C3 would have a greater impact on dams and drainage lines (10 for option C4 compared to option C3 which impacted 8).</td>
</tr>
<tr>
<td><strong>Functionality</strong></td>
<td>Option C4 was ranked higher than option C3 as it provided greater distance on The Northern Road to the other nearest existing and proposed intersections (being Elizabeth Drive and Littlefield’s Road).</td>
</tr>
<tr>
<td></td>
<td>Additional bridges could adversely impact grades for option C3 between Luddenham Road and Elizabeth Drive.</td>
</tr>
</tbody>
</table>
8.2.4 Recommended preferred corridor options

The participants at the value management workshop selected the following corridor options as the preferred corridor option in each zone:

- Zone A – Corridor option A1, subject to a number of design refinements
- Zone B – Corridor option B5
- Zone C – Corridor option C4.

The key reasons for selecting these options are detailed below.

Zone A
The workshop participants identified corridor option A1 as the preferred corridor option in zone A because:

- It would have fewer risks associated with project delivery. The delivery of the project would be significantly better than option A3 due to a simpler interface with the M7 Motorway and reduced impact on Elizabeth Drive in an area that would be subject to significant engineering treatment and traffic staging.
- Improved constructability would provide:
  - A greater level of safety during construction
  - Less impact on the existing transport network and no significant re-alignment of existing heavily used roads, like Wallgrove Road and Elizabeth Drive
  - A shorter construction time because it is away from live traffic
  - Less land acquisition time / fewer property owners, residents and road users affected
  - Less impact on utilities
- It would be significantly less costly to build and would therefore ‘demonstrate public value’ (refer to section 8.2.5)
- It would have less impact on amenity as it would be further from residential areas
- Feedback from the community supports option A1 more than option A3 as it would impact fewer properties and be further away from residential areas
- It would have a reduced impact to listed threatened ecological communities.

While option A1 was recommended, this recommendation was subject to a number of design refinements being investigated (refer to Section 8.2.7).

Zone B
The workshop participants identified option B5 as the preferred corridor option in zone B due to a number of key factors. It would:

- Have fewer risks associated with project delivery. The delivery of the project would be simpler due to reduced local road improvements required, reduced length of floodplain to be crossed, and potential for increased working hours due to the distance from residential properties
- Potentially improve traffic network management
• Allow greater flexibility for future land use development along and north of Elizabeth Drive
• Be easier and safer to construct
• Be consistent with the WSPGA planning
• Have less impact on business and community as there would be less severance
• Provide better functionality for airport traffic as it would allow for more and safer storage for traffic and buses inbound and outbound from the planned western Sydney airport due to the longer spur road.

Overall, corridor option B5 was recommended as it would have fewer impacts on current and future land uses and provide greater capacity for airport traffic due to the longer access road.

Zone C
The workshop participants identified option C4 as the preferred option in zone C because it would:

• Have less impact on community and business
• Have less impact on stakeholders
• Require fewer parcels of land to be acquired
• Integrate better with current and future land use including WSPGA, which would allow for larger lots
• Enable easier, greenfield construction
• Cause less disruption to traffic and utilities
• Have a better outcome for servicing the planned western Sydney airport
• Maintain the integrity of local road networks
• Avoid impact on Elizabeth Drive.

Overall, corridor option C4 was recommended as it would have fewer impacts on current and future land use and the local community.

8.2.5 Value for money comparison
After all zone corridor options were scored against the non-price assessment criteria, the cost of the options in each zone was compared to find the best value for money option. Costings were developed for options within each zone and expressed as ‘X’ for the cheapest and X+Y% for comparison. Indicative costings were developed using the approved Roads and Maritime project estimating guidelines with strategic proof of concept designs and known project information at the time.

The relative costings for the zone A options were:
• Option A1: X
• Option A3: X+25%.
Therefore, option A1 is the best value for money option in zone A. However, the increased cost of option A3 also includes upgrading part of Elizabeth Drive. This was considered to therefore also provide additional benefits that were not present in option A1. Overall, the non-price and price criteria balance out, and further assessment was required at the workshop to distinguish a preferred option.

The relative costings for the zone B options were:
- Option B2: Y
- Option B5: Y+10%.

Therefore, option B2 is the better value for money option in zone B. However, the risks associated with the non-price criteria of option B2 could result in an increase in cost. Option B5 has few sensitive receivers, which would reduce the cost of any noise mitigation required and could provide opportunity to lengthen construction work hours, reducing the overall construction cost. As such, option B5 was the preferred option.

The relative costings for the zone C options were:
- Option C3: Z+15%
- Option C4: Z.

Therefore, option C4 is the better value for money option in zone C. As this finding aligns with the non-price criteria (against which option C4 is preferred), option C4 is the preferred option in zone C.

8.2.6 Shortlisted route options

As a result of the selection of the preferred corridor options in each zone, six of the shortlisted route options were discarded, leaving two route options:
- Modified orange (which contains corridors A1, B5 and C4)
- Modified yellow (which contains corridors A3, B5 and C4).

These route options remained in consideration, pending further investigation of corridor option A1. These results are shown in Table 8-6.

<table>
<thead>
<tr>
<th>Route option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified aqua</td>
<td>A1</td>
<td>B2</td>
<td>C3</td>
<td>Discarded, due to corridor options B2 and C3. These corridors performed worst against the other options in terms of land use and functionality.</td>
</tr>
<tr>
<td>Modified blue</td>
<td>A1</td>
<td>B2</td>
<td>C4</td>
<td>Discarded, due to corridor option B2. This corridor performed worst against option B5 in terms of land use and functionality.</td>
</tr>
</tbody>
</table>
## Route Options Analysis

<table>
<thead>
<tr>
<th>Route option</th>
<th>Zone A</th>
<th>Zone B</th>
<th>Zone C</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modified green</td>
<td>A1</td>
<td>B5</td>
<td>C3</td>
<td>Discarded, due to corridor option C3. This corridor performed worst against option C4 in terms of land use.</td>
</tr>
<tr>
<td>Modified orange</td>
<td>A1</td>
<td>B5</td>
<td>C4</td>
<td>Retained, pending further design investigation of corridor option A1.</td>
</tr>
<tr>
<td>Modified pink</td>
<td>A3</td>
<td>B2</td>
<td>C3</td>
<td>Discarded, due to corridor options B2 and C3. These corridors performed worst against the other options in terms of land use and functionality.</td>
</tr>
<tr>
<td>Modified purple</td>
<td>A3</td>
<td>B2</td>
<td>C4</td>
<td>Discarded, due to corridor option B2. This corridor performed worst against option B5 in terms of land use and functionality.</td>
</tr>
<tr>
<td>Modified white</td>
<td>A3</td>
<td>B5</td>
<td>C3</td>
<td>Discarded, due to corridor option C3. This corridor performed worst against option C4 in terms of land use.</td>
</tr>
<tr>
<td>Modified yellow</td>
<td>A3</td>
<td>B5</td>
<td>C4</td>
<td>Retained, pending further design investigation of corridor option A3.</td>
</tr>
</tbody>
</table>

### 8.2.7 Issues for further consideration

The value management workshop identified the following issues for consideration by the M12 Motorway project team:

- Improvements to option A1 to minimise connectivity impact and reduce severance implications in Western Sydney Parklands
- Confirmation of the approvals process for constructing option A1 given the potential impact on Western Sydney Parklands
- Improvement in the confidence with the cost estimates, particularly for zone A and the interchanges
- Further consideration of the quality of the impact on Western Sydney Parklands and confirmation of the type and cost of mitigating and offsetting the impact. This includes consideration of current and future connectivity requirements
- Investigation of the impact on local roads and major intersections in all zones
- Consideration of the deferral of the M12 Motorway and instead upgrading Elizabeth Drive in the interim. The M12 Motorway would then be constructed when traffic volumes require it.

### 8.3 Follow-up recommendations

On 8 April 2016, the project team met to analyse the findings and issues resulting from the value management workshop. The project team recommended that:

- Traffic modelling be carried out to assess the performance of upgrading Elizabeth Drive to four lanes (with no M12 Motorway), to determine whether the upgrade alone would provide sufficient capacity for future traffic conditions (that is, assuming traffic generated by the planned western Sydney airport and planned regional development)
• The alignment of option A1 be reviewed and refined to consider bridge structures to minimise impact on existing and potential connectivity within Western Sydney Parklands (a tunnel had been discussed as a potential option but was not considered feasible due to the required interchange at the M7 Motorway and the presence of the Upper Sydney Canal)

• The alignment of option A3 be reviewed to minimise its interface with Elizabeth Drive, and that the need to upgrade Elizabeth Drive be removed so that costs could be compared like-for-like with option A1

• Further costing be carried out for the modified options.

8.4 Upgrade of Elizabeth Drive

In response to recommendations from the value management workshop, traffic modelling was carried out for an upgrade of Elizabeth Drive to a principal arterial road (three lanes in each direction). As Elizabeth Drive would cater for traffic from the planned airport and surrounding development, existing intersections would need to be upgraded, including installing traffic lights to increase capacity. Under this scenario, there would be no M12 Motorway.

Traffic modelling was carried out considering the upgrade of Elizabeth Drive both with and without the Western Sydney Infrastructure Plan road upgrades. This modelling assessed the performance of the road and generated a Level of Service rating based on traffic flows and speeds. The modelling showed that the upgrade of Elizabeth Drive would operate at a Level of Service of C (satisfactory) in 2026 and Level of Service E (at capacity) by 2036 during the AM and PM peak periods.

Roads and Maritime requires any road upgrade to operate at a Level of Service C 10 years after opening (assumed to be 2036). As such, upgrading Elizabeth Drive to a principal arterial road rather than constructing the M12 Motorway was not considered to be feasible and additional road infrastructure is therefore required to meet the forecast traffic demand.

8.5 Selection of a preferred option in Zone A

On 27 April 2016, the core project team met to identify the preferred corridor route by assessing the revised corridor options A1 and A3 against the same criteria as used in the value management workshops. The corridor options were modified as such:

• The option A1 corridor was partially realigned between south of Elizabeth Drive and near the Sydney Water Canal (refer to Figure 8-1). This realignment shifts the boundary south so it is closer to the boundary of the Sydney International Shooting Centre. This would minimise connectivity issues for park users and biodiversity, and reduce sterilisation of land between the M12 Motorway and the shooting centre. As the assessment of the options were for a surface road, the realignment was also a surface road, with a long bridge spanning the Sydney Water Canal to provide connectivity for park users and fauna

• The upgrade of Elizabeth Drive was removed from corridor option A3 to enable a like-for-like cost comparison (resulting in a reduction in the cost for option A3). However, this did not result in a change in the corridor alignment as the M12 Motorway could be designed within the existing option. Due to this refinement, the cost of the modified option was reduced.
### 8.5.1 Comparative assessment of zone A options

A comparative assessment of the new corridor options A1 and A3 was carried out. The assessment considered the differences in the revised option A1, while due to no change in the corridor for option A3, the assessment was the same as at the value management workshop. The comparative assessment is provided in Table 8-7.

**Table 8-7: Comparative assessment of the corridor options A1 and A3**

<table>
<thead>
<tr>
<th>Corridor option</th>
<th>A1</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project delivery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of farm dams</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>No. of cadastral lots</td>
<td>53</td>
<td>137</td>
</tr>
<tr>
<td>Floodplain length (m)</td>
<td>Kemps Creek 475 m</td>
<td>Kemps Creek 475 m</td>
</tr>
<tr>
<td>Floodplain area (m²)</td>
<td>138,331</td>
<td>134,529</td>
</tr>
<tr>
<td>No. of drainage lines</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Traverses existing road reserves</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Working under or near live traffic</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Construction staging at Elizabeth Drive/ M7 Motorway interchange</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Parkland users interface</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Traverses extractive industries</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Utility interface</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Significant temporary works with The Northern Road</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Bridge across Sydney Water canal</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Bridge over Elizabeth Drive</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Passes through Kemps Creek village</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Relative ease of construction</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Small (1 km) airport spur</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Impact on existing Elizabeth Drive businesses</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

| Land use |
|-----------------|----|----|
| Crosses what land use zone | RU4 Rural small holdings | E2 Environmental conservation |
| | Western Sydney Parklands | E4 Environmental living |
| | | R2 Low density residential |
| | | RE1 Public recreation |
| | | RU1 Primary production |
| | | RU4 Rural small holdings |
| | | SP2 Infrastructure |

| Crosses Western Sydney Priority Growth Area | Y | Y |
### Corridor option

<table>
<thead>
<tr>
<th>Community</th>
<th>A1</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitive receivers within 600 m</td>
<td>577</td>
<td>417</td>
</tr>
<tr>
<td>Indicative sensitive receivers in excess of the daytime criteria (55 dbA)</td>
<td>45</td>
<td>62</td>
</tr>
<tr>
<td>Indicative sensitive receivers in excess of the night time criteria (50 dbA)</td>
<td>55</td>
<td>100</td>
</tr>
</tbody>
</table>

### Environment and heritage

<table>
<thead>
<tr>
<th>Environment and heritage</th>
<th>A1</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of threatened vegetation (ha)</td>
<td>26</td>
<td>51</td>
</tr>
<tr>
<td>Area (ha) of potential critically endangered vegetation (EPBC Act)</td>
<td>5</td>
<td>31</td>
</tr>
<tr>
<td>No. of threatened flora species</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>No. of threatened fauna species</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Area of non-certified lands (ha)</td>
<td>134</td>
<td>67</td>
</tr>
<tr>
<td>Area of Cumberland Plain priority conservation land (ha)</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td>Area of mapped regional corridor (ha)</td>
<td>56</td>
<td>28</td>
</tr>
<tr>
<td>No. of regional corridors</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Area in biobanking agreement site (ha)</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Area of bushland regeneration in Western Sydney Parklands (ha)</td>
<td>55</td>
<td>36</td>
</tr>
<tr>
<td>No. of Aboriginal heritage sites</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Length in Aboriginal heritage sensitive areas (m)</td>
<td>5967</td>
<td>3220</td>
</tr>
<tr>
<td>No. of known or potential non-Aboriginal heritage sites</td>
<td>1 (State)</td>
<td>2 (State)</td>
</tr>
<tr>
<td>No. of non-Aboriginal heritage landscapes</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

### Functionality

<table>
<thead>
<tr>
<th>Functionality</th>
<th>A1</th>
<th>A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would preserve Elizabeth Drive functionality</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Connectivity to the future M9 Outer Sydney Orbital</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Relative impact on the M7 traffic flow</td>
<td>High</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

### Analysis of zone corridor options

The project team assessed the two corridor options against the criteria used at the value management workshops.

In terms of project delivery, option A3 would be challenging from an EPBC Act perspective, requiring further approvals and potential delays due to the good quality of intact critically endangered vegetation. The construction timeframe of option A1 would be shorter than option A3, as there would be less interaction with live traffic. Option A1 would also have the potential to maintain a high speed along the M7 Motorway during construction.
Figure 8-1: Change in corridor option A1
For land use criteria, while option A3 was still considered to be the best performing option as per the value management workshop, changes to option A1 saw its ranking improve. This was due to the realignment that would minimise severance and connectivity issues between Western Sydney Parklands and the Sydney International Shooting Centre boundary. The realignment would also improve ongoing management of the Parklands compared to the previous zone A1 option.

Option A1 was still considered to be the best performing option to the community criteria due to lesser impact to existing community living in the study area. However, it was considered that the change to option A3 (removal of the upgrade of Elizabeth Drive) could result in the motorway being aligned to minimise impact on communities.

Option A3 would have the greater impact on environment due to the unavoidable impact on an intact patch of critically endangered EPBC Act listed vegetation.

In terms of functionality criteria, option A1 was considered to have a slightly better impact on Elizabeth Drive operating as an arterial road (and ability to upgrade it separately in the future). Option A3 may be required to have steeper road grades over a long length on the ramps from the M7 Motorway, which could reduce heavy vehicle speeds. In addition, as Elizabeth Drive would not be upgraded as part of option A3, some of the benefit of the option had been lost.

Option A3 was ranked slightly lower as the benefits of upgrading Elizabeth Drive were lost and the impact on EPBC Act listed threatened vegetation were still present.

8.5.3 Value for money comparison

After the corridor options had been assessed, the relative cost of each option was identified. The cost of option A3 decreased through the removal of the upgrade of Elizabeth Drive. However, it was only a moderate reduction in the overall cost of the option. The relative costing was as follows:

- Corridor option A1 $X
- Corridor option A3 $X + 20%.

Overall, the cost of corridor option A3 delivers less benefits as Elizabeth Drive would not be upgraded. As corridor option A1 had been amended to minimise connectivity issues through Western Sydney Parklands, this option provides greater value for money.

8.5.4 Selection of the preferred zone corridor option

As such, corridor option A1 was recommended as the preferred option in zone A. This results in the preferred corridor route being the modified orange option.
9 Preferred corridor route

9.1 Introduction

The preferred corridor route for the M12 Motorway is the modified orange option comprising a combination of route options A1, B5 and C4. The preferred corridor route is shown in Figure 9-1).

The preferred corridor route is 16 kilometres long and at its eastern extent, connects to the M7 Motorway more than one kilometre south of Elizabeth Drive at a new interchange location.

The preferred corridor route is currently a 300 metre wide corridor; however, further design development of the motorway would reduce this footprint to about 100-150 metres wide.

The preferred corridor route passes through the Western Sydney Parklands in a north-westerly direction before crossing Elizabeth Drive near the existing Mamre Road intersection. It passes through a number of commercial properties fronting Elizabeth Drive and Mamre Road.

The preferred corridor route then crosses Kemps Creek and travels in a north-westerly direction, parallel to Clifton Avenue, before heading west and passing through the former Fleurs radio telescope site and crossing South Creek. It passes to the north of the Elizabeth Drive landfill site, crossing Badgerys Creek before connecting to the airport site via an interchange and a north-south access road to the airport about two kilometres long.

The preferred corridor route continues west, crossing Cosgroves Creek and passing through rural and agricultural properties before crossing Luddenham Road about 1.2 kilometres north of the intersection with Elizabeth Drive and north of Blackford Hill.

At its western extent, the preferred corridor route connects with The Northern Road about 900 metres north of the existing Elizabeth Drive roundabout and one kilometre south of Littlefields Road.

9.2 Key features of the preferred corridor route

Key features of the preferred corridor route are:

- Three interchanges:
  - M7 Motorway
  - Access to the planned western Sydney airport at Badgerys Creek
  - The Northern Road

(Ongoing project development would consider an additional interchange near Mamre and Devonshire roads)

- Road crossings (either over or under) of:
  - Elizabeth Drive
  - Clifton Avenue
  - Luddenham Road
  - A number of local unpaved roads / property accesses

- Crossings of the following creeks:
• Kemps Creek
• South Creek
• Badgerys Creek
• Cosgroves Creek.

9.3 Benefits of the preferred route

The benefits of the preferred corridor route include:

• Provides for optimal interchange locations and traffic flow
• Avoids an area of high value critically endangered ecological community near the M7 Motorway
• Minimises community impact to the Kemps Creek suburb and avoids direct impact to the Kemps Creek village shops
• Minimises the number of sensitive receivers in close proximity to the route to minimise noise and visual impacts
• Creates a boundary between the Elizabeth Drive landfill facility and the Twin Creeks residential development
• Minimises impact to community and recreational facilities including the Wylde Mountain Bike Trail, Kemps Creek Sporting and Bowling Club, Luddenham Raceway and avoids the Sydney Society of Model Engineers Model Park
• Maximises opportunity for land to be developed as part of the Western Sydney Priority Growth Area (WSPGA)
• Facilitates access to the airport, while offering flexibility to interact with other transport projects
• Considers the future WSPGA road hierarchy
• Meets the program and the project objectives (see section 9.3.1).

9.3.1 How the preferred corridor route meets the project objectives

The preferred corridor route meets the project objectives by providing a direct east–west motorway connection between the M7 Motorway and the planned western Sydney airport. The preferred corridor route facilitates future connections with the WSPGA road network as well as other transport projects including the M9 Outer Sydney Orbital.

The route has sufficient space to incorporate active transport along the east–west corridor and has considered an integrated regional and local public transport system.
10 Future actions

Roads and Maritime Services will develop a concept design for the M12 Motorway project based on the preferred corridor route presented in this report, and taking into consideration community feedback on the report.

The concept design will then be the subject of a comprehensive environmental impact statement (EIS) under the Environmental Planning and Assessment Act 1979 to obtain project approval for construction of the project.

As part of this process, further environmental and technical investigations will be carried out to minimise impacts and refine the project design. The investigations will also respond to assessment requirements issued by the Department of Planning and Environment (known as the Secretary’s Environmental Assessment Requirements).

The EIS will provide details on the project and the findings of these investigations. It will be placed on exhibition and community feedback on the project will be invited for consideration during design development.

If the M12 Motorway proposal is approved, it would proceed to detailed design and construction.

Throughout this process, Roads and Maritime will continue to consult with government agencies, key stakeholders and the community.
11 References

11.1 Reports/documents

- ABS Australia; Analysis of Population Census and Agriculture Census Data in Sydney Statistical Division; Canberra; 2010
- Brayshaw, H. and E. Rich, Western Sydney Orbital; Prestons to Cecil Park EIS: Aboriginal Archaeology; Sydney, 1995
- Brayshaw H; Intersection Upgrade Mamre Road/Erskine Park Road Erskine Park Heritage Assessment; Report to Penrith City Council through GHD; Sydney; 2005
- Dallas M; Preliminary archaeological study: Luddenham Equestrian Centre, Luddenham Road, Erskine Park, NSW; Report to Douglas Sanger Pty Ltd for The Signature Corporation Australia; Sydney; 1988
- Department of Infrastructure and Regional Development (DIRD); Western Sydney Airport EIS Surface Water Quality Assessment; Canberra; 2015
- Fox & Associates; Heritage Study of the City of Penrith; Prepared on behalf of Penrith City Council (3 vols); Sydney; 1991
- Jo McDonald Cultural Heritage Management (JMCHM); Interim Heritage Management Report: ADI Site St. Marys. Volume 1: Text. Report to Lend Lease-ADI Joint Venture in Response to the Section 22 Committee Interim Report; Sydney; Sydney; 1997
- Jo McDonald Cultural Heritage Management Pty Ltd; Archaeological salvage excavation of eight archaeological landscapes in the Second Ponds Creek Valley, Rouse Hill Development Area, NSW; Report to RHI and Landcom. Three Volumes; Sydney; 2005
- Navin Officer Heritage Consultants (NOHC); Archaeological Subsurface Testing Program for Proposed Access Road, Erskine Park, NSW. Addendum to ‘CSR Lands at Erskine Park: Archaeological Subsurface Testing Program’. Report to Brown Consulting (NSW) Pty Limited for CSR Limited; Canberra; 2005
- NSW Department of Water Resources, Flood Study Report, South Creek; Sydney, 1990
- Perumal Murphy; The South Creek Valley Heritage Study; Prepared for the NSW Dept of Planning; Sydney; 1990
- Roads and Maritime; Western Sydney Infrastructure Plan Project Executive Committee, WSIP Project and Programme Objectives; Sydney; July 2015
• St Marys & District Historical Society Inc. (SM&DHS) 2009 The Early History of the South Creek – St Marys Area. St Marys & District Historical Society Inc. St Marys


• Total Earth Care Pty Ltd; Erskine Central Industrial Park; Archaeological excavation of Site EC1 and surrounds (AHIMS# 37-2-1851), Lenore Lane, Erskine Park; Report to Valad Property Group Pty Ltd; Sydney; 2007

• Western Sydney Parklands Trust; Western Sydney Parklands Plan of Management 2020; Parramatta; 2010

• Western Sydney Parklands Trust; The Western Sydney Parklands Biodiversity Strategy 2012-2020; Parramatta; 2013

• Worley Parsons; Updated South Creek Flood Study; Sydney; 2015.

11.2 Legislation and government plans

• SEPP (Sydney Region Growth Centres) 2006

• Threatened Species Conservation Act 1995

• Environment Protection and Biodiversity Conservation Act 1999

• Penrith Local Environmental Plan 2010

• Penrith Local Environmental Plan (Glenmore Park Stage 2) 2009

• Liverpool Local Environmental Plan 2008

• Fairfield Local Environmental Plan 2013

• Protection of the Environment Operations Act 1997

• Department of Planning and Environment; A Plan for Growing Sydney; Sydney; 2014

• Infrastructure NSW; 2014; State Infrastructure Strategy Update 2014; Sydney; 2014

• NSW Government; South west subregion, draft subregional strategy, Metropolitan strategy; Sydney; 2007.

• NSW Government; State Infrastructure Strategy 2012 – 2032; Sydney; 2012

• NSW Government; State Priorities (NSW Make It Happen); Sydney 2015

• Transport and Infrastructure Council; NSW Key Freight Routes Road Expenditure and Investment Plan; Canberra; 2016

• Transport for NSW; NSW Long Term Transport Master Plan; Sydney; 2012

• Transport for NSW; Sydney’s Cycling Future - Cycling for everyday transport; Sydney; 2013.
11.3 Databases

- NSW Environment Protection Authority (EPA) Contaminated Land records register search carried out on 11 August 2015
- Office of Environment and Heritage (OEH); Atlas of NSW Wildlife database – searched in 2014
- OEH; Aboriginal Heritage Information Management System – searched on 29 July 2015
- Soils Landscapes Map (Penrith Sheet 9030).
## Terms and acronyms used in this document

<table>
<thead>
<tr>
<th>Term / acronyms</th>
<th>Definitions</th>
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<tbody>
<tr>
<td>AADT</td>
<td>Annual average daily traffic</td>
</tr>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<tr>
<td>AHIMS</td>
<td>Aboriginal Heritage Information Management System</td>
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<tr>
<td>ARI</td>
<td>Annual recurrence interval</td>
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<tr>
<td>CEEC</td>
<td>Critically endangered ecological community</td>
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<tr>
<td>EEC</td>
<td>Endangered ecological community</td>
</tr>
<tr>
<td>ENV</td>
<td>Extant native vegetation</td>
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<tr>
<td>EPA</td>
<td>Environment Protection Authority</td>
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<td>EP&amp;A Act</td>
<td>Environmental Planning and Assessment Act 1979 (NSW). Provides the legislative framework for land use planning and development assessment in NSW</td>
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<td>Fisheries Management Act 1994 (NSW)</td>
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<td>Heritage Act 1977 (NSW)</td>
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<td>ISEPP</td>
<td>State Environmental Planning Policy (Infrastructure) 2007</td>
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<tr>
<td>LIDAR</td>
<td>Light Detection and Ranging. A remote sensing method used to examine the surface of the Earth.</td>
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<td>LALC</td>
<td>Local Aboriginal Land Council</td>
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<td>LGA</td>
<td>Local government area</td>
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<tr>
<td>LoS</td>
<td>Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.</td>
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<td>NPW Act</td>
<td>National Parks and Wildlife Act 1974 (NSW)</td>
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<td>OEH</td>
<td>Office of Environment and Heritage</td>
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<tr>
<td>PAD</td>
<td>Potential Archaeological Deposit</td>
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<td>Roads and Maritime</td>
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<td>SWPLRA</td>
<td>South West Priority Land Release Area</td>
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<td>The strategic route options analysis for the M12 Motorway between the M7 Motorway, Cecil Park and The Northern Road, Luddenham</td>
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<td>TSC Act</td>
<td>Threatened Species Conservation Act 1995 (NSW)</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>VEC</td>
<td>Vulnerable Ecological Community</td>
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<td>Western Sydney Priority Growth Area</td>
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<td>Western Sydney Infrastructure Plan</td>
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<td>Western Sydney Parklands Trust</td>
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Appendix A

Biodiversity assessment
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Heritage assessment
Appendix C

Land use and planning assessment
Appendix D

Socio-economic assessment
Appendix E

Noise assessment
Appendix F

Contamination phase 1 environmental site investigation assessment
Appendix G

Landscape character assessment