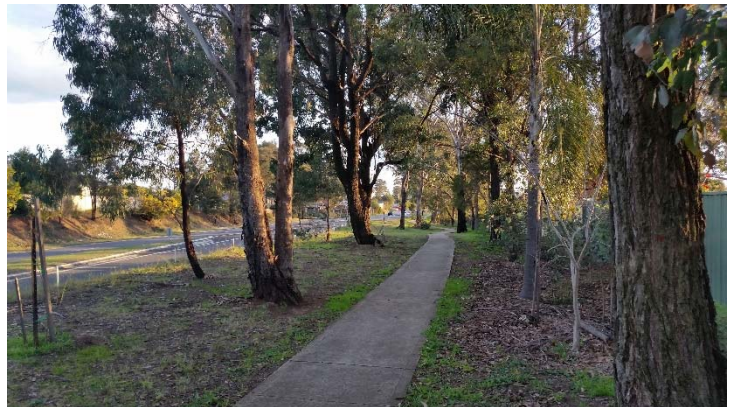


# Review of Environmental Factors

## ERSKINE PARK ROAD INTERSECTION UPGRADES



SEPTEMBER 2015



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## Document Control/Review Register



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# Executive summary

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## The proposal

Penrith City Council proposes to upgrade four intersections on Erskine Park Road, St Clair, in western Sydney. The intersections are:

- Explorers Way and Erskine Park Road
- Coonawarra Drive and Erskine Park Road
- Peppertree Drive and Erskine Park Road
- Bennett Road and Erskine Park Road.

The intersection upgrades would involve the following work:

- Road widening
- Provision of and extension of turning lanes
- Installation of traffic lights at two intersections
- Configuration of two seagull intersections
- Construction of a shared pedestrian and cyclist path
- Relocation of utilities
- Removal of vegetation.

## Need for the proposal

Substantial growth in traffic volumes in the area is predicted due to the residential and commercial developments in the South West Growth Centre, the Broader Western Sydney Employment Area (Broader WSEA) and the airport at Badgerys Creek.

The Australian Government, in partnership with the New South Wales Government, is delivering the \$3.6B Western Sydney Infrastructure Plan (WSIP). The WSIP programme includes a \$200M Local Roads Package over 10 years, allocated directly to local councils in Western Sydney to fund a range of minor works that will improve local transport connections and links to the main road arterial network. The proposal is funded by the Local Roads Package.

## Proposal objectives

The objectives of the proposal are to:

- Improve traffic flow and road network efficiency
- Improve road safety
- Minimise environmental impacts.

## Options considered

**Option 1** – Do nothing. This option would result in the existing conditions remaining in place.

### **Option 2** – Upgrade four intersection on Erskine Park Road

Option 2 is the preferred option. Option 2 would meet the objectives of the proposal:

- Improve traffic flow and road network efficiency – reduced delays and improved flow at intersections using traffic lights and seagull intersection configurations
- Improve road safety – turning lanes would reduce the risk of crashes caused by turning traffic queuing in the through lanes
- Minimise environmental impacts – retention of vegetation where practicable. Minimise impacts through implementation of safeguards.

## Statutory and planning framework

The proposal is assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*, with Penrith City Council as the proponent and the determining authority.

## Community and stakeholder consultation

Penrith City Council would develop a Consultation Strategy in consultation with Roads & Maritime Services to inform the community about the proposal. The objectives of the strategy would be to:

- Inform the community of the need for the proposal
- Provide regular and timely information to community and stakeholders on the proposal
- Provide clear and concise information about when we are seeking feedback from the community and stakeholders
- Ensure impacts on community members and stakeholders are evaluated on a continuous basis and this information is then used to inform the decision-making process.

## Environmental impacts

The main environmental impact would be:

- Biodiversity – the proposal would impact about 0.44 hectares of Cumberland Plain Woodland (CPW). CPW is listed as critically endangered under the Threatened Species Conservation Act. An Assessment of Significance (AoS) found that this impact is not likely to be significant.
- Traffic and access – the proposal would result in traffic disruptions during construction. The proposal would improve traffic flow in the longer term and provide additional capacity for future traffic growth. The proposal would have a positive impact on intersection performance in the future. Pedestrian and cycling facilities would also be improved by the proposal.
- Noise and vibration – there are likely to be construction and potentially operational noise impacts at residential receivers. A noise and vibration assessment would be carried out prior to the finalisation of design.

## Justification and conclusion

The proposal would improve traffic flow and road network efficiency, and improve road safety. The long term benefits of the proposal far outweigh any of the potential environmental impacts identified which would mostly be temporary and minimised through adequate environmental safeguards. The proposal is therefore justified.

# Contents

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Executive summary .....	i
1 Introduction .....	5
1.1 Proposal identification.....	5
1.2 Purpose of the report .....	6
2 Need and options considered .....	7
2.1 Strategic need for the proposal .....	7
2.2 Existing road and infrastructure .....	9
2.3 Proposal objectives.....	12
2.4 Alternatives and options considered .....	13
2.5 Preferred option.....	14
3 Description of the proposal.....	15
3.1 The proposal.....	15
3.2 Design .....	24
3.3 Construction activities.....	26
3.4 Ancillary facilities .....	28
3.5 Public utility adjustment .....	29
3.6 Property acquisition .....	30
4 Statutory and planning framework.....	31
4.1 State Environmental Planning Policies.....	31
4.2 Local Environmental Plans .....	32
4.3 Other relevant legislation .....	33
4.4 Commonwealth legislation .....	33
4.5 Confirmation of statutory position.....	33
5 Stakeholder and community consultation .....	34
5.1 Consultation strategy .....	34
5.2 Community involvement .....	34
5.3 Aboriginal community involvement.....	35
5.4 ISEPP consultation.....	35
5.5 Government agency and stakeholder involvement .....	35
5.6 Ongoing or future consultation.....	35
6 Environmental assessment .....	36
6.1 Biodiversity .....	36
6.2 Traffic and access .....	43
6.3 Noise and vibration.....	50
6.4 Soil, water quality and hydrology .....	54
6.5 Socio-economic.....	57
6.6 Non-Aboriginal heritage .....	59
6.7 Aboriginal heritage.....	60
6.8 Visual and landscape character.....	61
6.9 Air quality.....	65
6.10 Waste and resource management.....	66

6.11	Cumulative impacts .....	67
6.12	Summary of beneficial effects .....	68
6.13	Summary of adverse effects .....	68
7	Environmental management.....	69
7.1	Environmental management plans (or system) .....	69
7.2	Summary of safeguards and management measures .....	69
7.3	Licensing and approvals .....	76
8	Conclusion .....	77
8.1	Justification.....	77
8.2	Objects of the EP&A Act.....	77
8.3	Conclusion.....	78
9	Certification .....	79
10	References .....	80

## Appendices

Appendix A	Concept Design and Traffic Signal Plans
Appendix B	Consideration of clause 228(2) factors and matters of national environmental significance
Appendix C	Biodiversity
Appendix D	Traffic Modelling Study
Appendix E	Aboriginal heritage

# 1 Introduction

## 1.1 Proposal identification

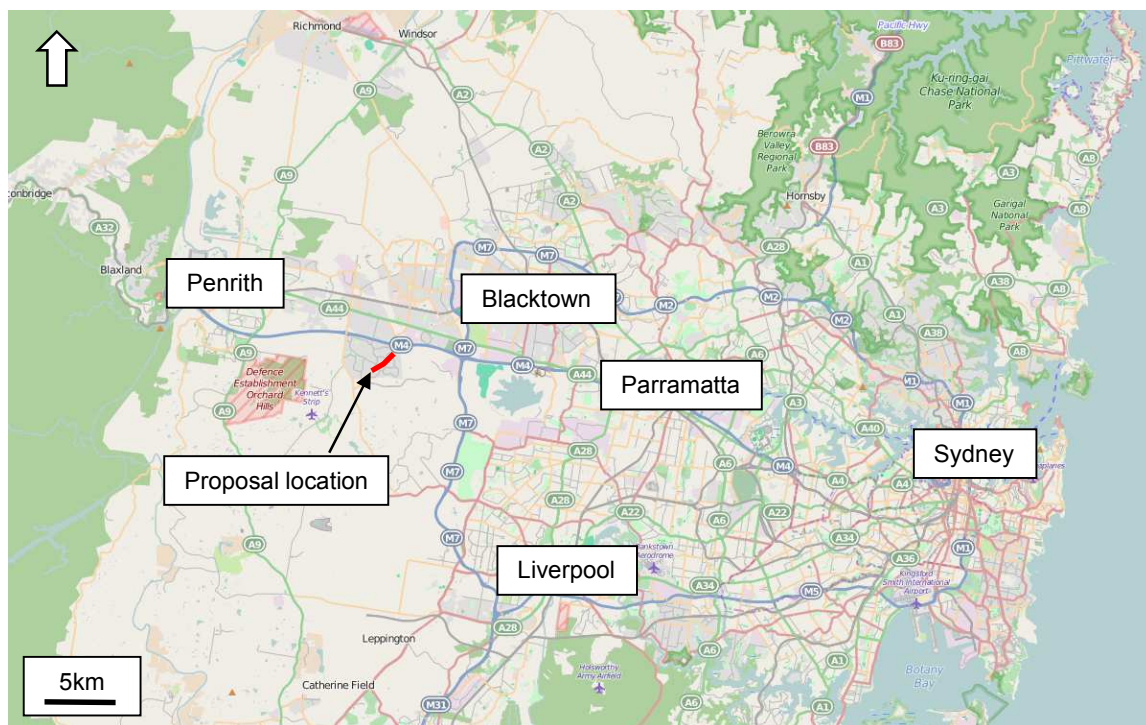
Penrith City Council proposes to upgrade four intersections on Erskine Park Road, St Clair, in western Sydney. The intersections are:

- Explorers Way and Erskine Park Road
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The intersection upgrades would involve the following work:

- Road widening
- Provision of and extension of turning lanes
- Installation of traffic lights at two intersections
- Configuration of two seagull intersections
- Construction of a shared pedestrian and cyclist path
- Relocation of utilities
- Removal of vegetation.

The proposal is located in the Penrith City Council Local Government Area (LGA) and its location is illustrated in Figure 1-1.



**Figure 1-1 Proposal location**



## 1.2 Purpose of the report

This Review of Environmental Factors (REF) has been prepared by NGH Environmental on behalf of Penrith City Council. For the purposes of the proposal, Penrith City Council is the proponent and the determining authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of the REF is to describe the proposal, to document the likely impacts of the proposal on the environment, and to detail protective measures to be implemented.

The description of the proposal and its associated environmental impacts have been undertaken in context of clause 228 of the *Environmental Planning and Assessment Regulation 2000*, the *Threatened Species Conservation Act 1995* (TSC Act), the *Fisheries Management Act 1994* (FM Act), and the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In doing so, the REF helps to fulfil the requirements of section 111 of the EP&A Act, that Roads and Maritime examines and takes into account to the fullest extent possible, all matters affecting or likely to affect the environment by reason of the activity.

The findings of the REF would be considered when assessing:

- Whether the proposal is likely to have a significant impact on the environment and therefore the necessity for an environmental impact statement to be prepared and approval to be sought from the Minister for Planning under Part 5.1 of the EP&A Act.
- The significance of any impact on threatened species as defined by the TSC Act and/or FM Act, in section 5A of the EP&A Act and therefore the requirement for a Species Impact Statement.
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Australian Government Department of the Environment for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

## 2 Need and options considered

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### 2.1 Strategic need for the proposal

In April 2014 the Australian Government announced that the site for Sydney's second airport will be at Badgerys Creek. The proposed new airport will need to be supported by a quality surface transport network to ensure the efficient movement of passengers, employees and freight.

Substantial growth in traffic volumes in the area is predicted due to the residential and commercial developments in the South West Growth Centre, the Broader Western Sydney Employment Area (Broader WSEA) and the airport at Badgerys Creek. The South West Growth Centre is about 17,000 hectares in size and includes parts of the Liverpool, Camden and Campbelltown LGAs and will contain about 110,000 new dwellings for about 300,000 residents. The Broader WSEA is an area of 6,300 hectares of new employment land, with employment mainly in freight and logistics.

The Australian Government, in partnership with the New South Wales Government, is delivering the \$3.6B Western Sydney Infrastructure Plan (WSIP). The WSIP will build/upgrade the infrastructure required to support planned growth in Western Sydney over 10 years. The WSIP programme includes a \$200M Local Roads Package over 10 years, allocated directly to local councils in Western Sydney to fund a range of minor works that will improve local transport connections and links to the main road arterial network. The proposal is funded by the Local Roads Package.

Penrith is designated as a Regional City and is targeted for both population and economic growth. The proposal is required to cater for that growth in the LGA by improving traffic flow, road safety, road network efficiency, and reducing travel times.

The following identifies State, regional and local plans relevant to the proposal.

#### **NSW 2021: A plan to make NSW number one**

The plan (DPC, 2011) sets goals and identifies actions in five key areas:

- Rebuild the economy
- Return quality services
- Renovate infrastructure
- Strengthen our local environment and communities
- Restore accountability to government.

The plan aims to deliver strategic infrastructure projects and better coordinate different transport modes to provide clean, reliable, safe, efficient and integrated transport services. The proposal is consistent with the plan.

#### **Metropolitan Strategy for Sydney to 2036**

The *Metropolitan Strategy for Sydney* (DP&I, 2013a) sets a vision for Sydney to be a more compact, networked city with improved accessibility to support jobs, homes and lifestyle opportunities. The plan sets out a long-term strategy to develop Sydney as a city of cities. Penrith is identified as a Regional City. The plan commits to managing demand on the road network through measures such as investment in strategic road upgrades. The strategy states that the Department of Planning and Environment will prepare a structure for the Broader WSEA, incorporating the Badgerys Creek Airport site, infrastructure needs, development staging and appropriate governance and resourcing. It will apply a whole of government perspective to ensure infrastructure provision is incorporated into wider agency planning and budgets (where appropriate and consistent with procurement guidelines), so that elements

like new roads, rail, water, sewer, power and telecommunications are in place to meet industry needs. The proposal is consistent with the plan.

### **NSW Long Term Master Plan**

The upgrade of major arterial roads in west and south west Sydney is identified as an action of The *NSW Long Term Transport Master Plan* (TfNSW, 2012). An objective of the plan is to support economic growth and productivity. The proposal would improve the road network in the Broader WSEA and be consistent with the plan.

### **Broader Western Sydney Employment Area Draft Structure Plan**

The *Broader Western Sydney Employment Area Draft Structure Plan* (DP&I 2013b) was developed in line with the goals and objectives identified in the NSW 2021 A Plan to Make NSW Number One and the Metropolitan Strategy for Sydney to 2036. The plan recognises the Broader WSEA as the largest new employment space in the metropolitan area (refer to Figure 2-1). The Broader WSEA includes the site of the proposed airport at Badgerys Creek. The purpose of the structure plan is to provide a framework for land use, transport and infrastructure at a strategic level. A road network is identified in the plan to address future land demand. Erskine Park Road is identified as part of a potential north-south public transport corridor linking Mt Druitt and Leppington. The proposal would improve traffic conditions on Erskine Park Road and would be consistent with the plan.

### **Broader Western Sydney Employment Area Draft Structure Plan – Preliminary Transport Analysis**

The *Broader Western Sydney Employment Area Draft Structure Plan – Preliminary Transport Analysis* (DP&I, 2013c) was developed to provide strategic transport planning services to develop an integrated movement network, and to assist in the spatial distribution of road, public transport and freight network as part of the Broader WSEA Structure Plan. Erskine Park Road is identified as a potential primary bus corridor. The proposal would improve bus facilities on Erskine Park Road and is consistent with the plan.

### **The Growth Centres**

The NSW Government established the North West and South West Growth Centres in 2005 to sustainably plan Sydney's growth on its urban edge. Over the next 25-30 years, the Growth Centres will become new communities for up to 500,000 people with 181,000 homes set amid employment lands, schools, shops, bushland, parks and new or upgraded infrastructure.

The Metropolitan Plan for Sydney 2036 identified a need for 770,000 additional homes in Sydney between 2006 and 2036 to accommodate an extra 1.7 million people. Up to 30 per cent of these new homes will be in new release or 'greenfield' areas, with the majority in the North West and South West Growth Centres. The aim of the Growth Centres is to create attractive, sustainable new communities by supplying land linked to key infrastructure, employment areas, parks, health and education facilities, shops, services and public transport.

Through precinct planning the delivery of services, including roads will be delivered in time to service new developments. Erskine Park Road is identified as a potential transport between Leppington in the growth centre and Mt Druitt. The proposal would assist in servicing the increase in population in the South West Growth Centre.

### **Local strategies, plans and studies**

- *Penrith Regional City Community Strategic Plan 2031* (Penrith City Council). The plan identifies the need for improvements to relieve congestion on the main arterial roads across the Penrith LGA and the region. The proposal is consistent with the plan.
- *The Penrith Regional City Infrastructure Strategy* (Penrith City Council, 2008). The strategic plan identifies the critical infrastructure required to support future population growth in the Penrith LGA. The proposal is consistent with the strategy.

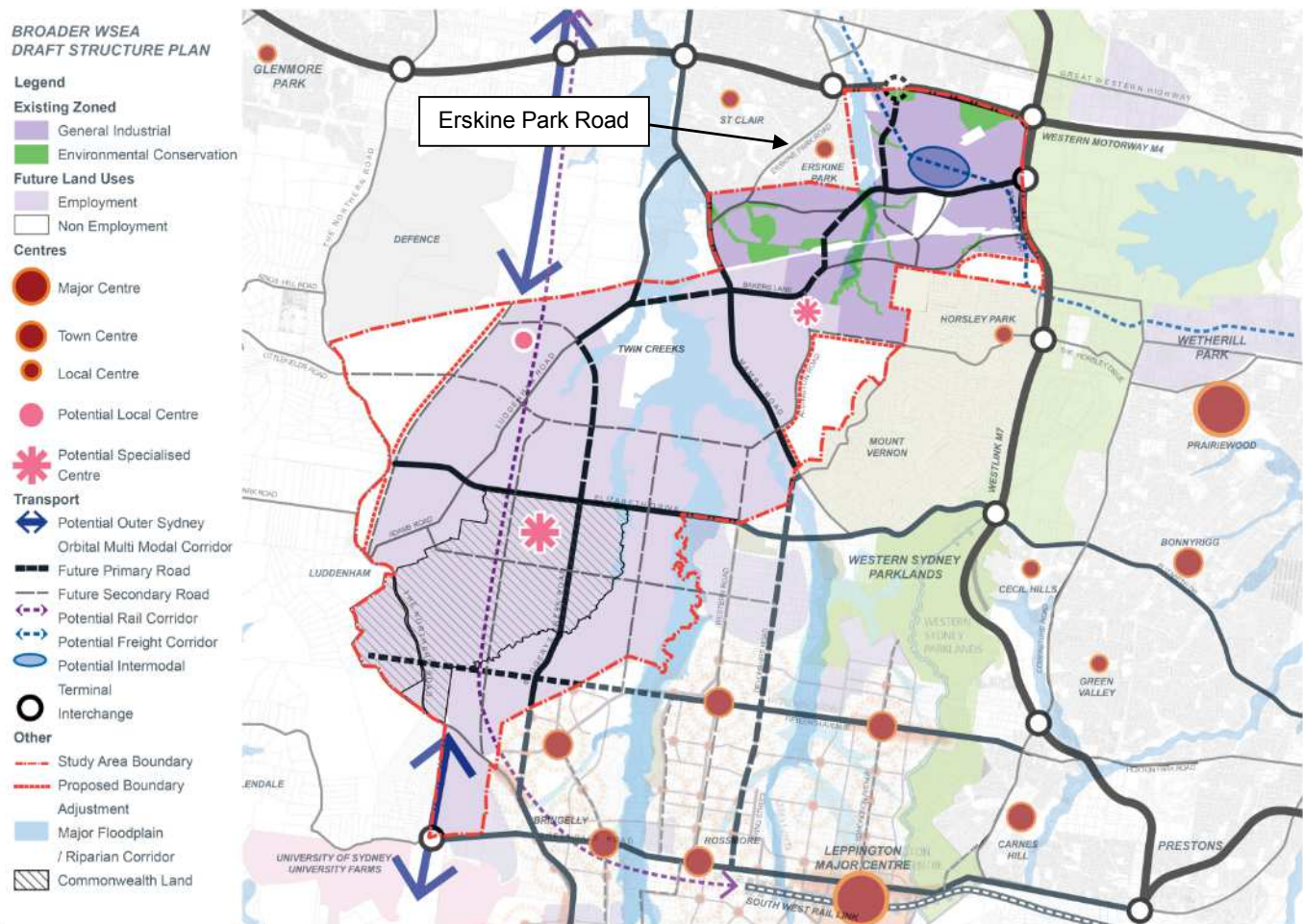


Figure 2-1 Western Sydney Employment Area (source: Dept of Planning and Infrastructure)

## 2.2 Existing road and infrastructure

### Road description

Erskine Park Road runs north-south and connects the M4 Motorway to Mamre Road and provides access to the suburbs of St Clair and Erskine Park. The M4 Motorway is located about 280 metres north of the proposal. The road has two north bound lanes and two south bound lanes from north of Explorers Way to around Coonawarra Drive. South of Coonawarra Road the road has one lane in each direction. The area around the proposal site is residential. A culvert under the road carries stormwater to Byrnes Creek, which meets South Creek about 4.5 kilometres north west of the proposal. Ropes Creek is located about 430 metres east of the proposal.

Where there are two lanes in each direction, a raised median separates the northbound and southbound carriageway. The width of the existing lanes is three metres.

### Explorers Way intersection

Explorers Way forms an unsignalised intersection with Erskine Park Road. The following left and right turns to and from Explorers Way are permitted:

- There is a 120 metre long right turn lane on the southbound carriageway on Erskine Park Road. This lane is three metres wide
- Left turns from Erskine Park Road are permitted from the northbound carriageway. No dedicated left turn lane is provided
- There are dedicated left and right turning lanes on Explorers way

- There is an acceleration lane, about 30 metres long, for vehicles turning right onto Erskine Park Road
- There is a gap in the median of about 22 metres for turning vehicles.

The median north of the intersection has a maximum width of about seven metres and is about four metres wide adjacent to the southbound right turn lane. The road reserve on the southbound carriageway varies from about 10 metres from the edge line of the lane to about 28 metres. The road reserve, on the northbound carriageway is about three metres from the edge line.

### **Coonawarra Drive intersection**

Coonawarra Drive forms an unsignalised intersection with Erskine Park Road. The following left and right turns to and from Coonawarra Drive are permitted:

- There is a 120 metre long right turn lane on the southbound carriageway on Erskine Park Road. This lane is three metres wide
- Left turns from Erskine Park Road are permitted from the northbound carriageway. No dedicated left turn lane is provided
- There are dedicated left and right turning lanes on Coonawarra Drive
- There is a gap in the median of about 26 metres for turning vehicles.

The median north of the intersection has a maximum width of about five metres and is about three metres wide adjacent to the southbound right turn lane. The road reserve on the southbound carriageway is about 10 metres wide from the edge line of the lane. The road reserve on the northbound carriageway varies from about four metres from the edge line of the lane to about 12 metres.

### **Peppertree Drive intersection**

Peppertree Drive forms an unsignalised intersection with Erskine Park Road. The following left and right turns to and from Peppertree Drive are permitted:

- There is a 120 metre long right turn lane on the northbound carriageway on Erskine Park Road. This lane is three metres wide
- Left turns from Erskine Park Road are permitted from the southbound carriageway. No dedicated left turn lane is provided
- There are dedicated left and right turning lanes on Peppertree Drive
- There is a 100 metre long merging lane for traffic turning left from Peppertree Drive onto Erskine Park Road
- There is a 150 metre long painted median on Erskine Park Road, north of Peppertree Drive. There is no median on Erskine Park Road immediately south of the intersection.

### **Bennett Road intersection**

Bennett Road forms an unsignalised intersection with Erskine Park Road. The following left and right turns to and from Bennett Road are permitted:

- There is a 100 metre long right turn lane on the southbound carriageway on Erskine Park Road. This lane is three metres wide
- Left turns from Erskine Park Road are permitted from the northbound lane. No dedicated left turn lane is provided
- There are dedicated left and right turning lanes on Bennett Road.

The northbound and southbound lanes on Erskine Park Road are separated by a centre line. The road reserve on the southbound carriageway varies from about two metres from the edge line of the lane to about 19 metres. The road reserve on the northbound carriageway varies from about 15 metres from the edge line of the lane to about 25 metres.



### **Pedestrian path**

There is a pedestrian path on Erskine Park Road from the southern extent of the proposal site to Coonawarra Road to the Bennett Road. The path is located on the western side of the road and is about one metre wide. The path is located to the west of Erskine Park Road and provides access to a number of reserves and cul-de-sacs as follows:

- Ashford Grove – concrete path
- Reserve around Byrnes Creek – concrete path
- Javelin Row – gap between properties, grassed surface
- Omega Place - gap between properties, grassed surface
- Reserve at culvert – informal paths to reserve.

### **Culvert**

There is a culvert under Erskine Park Road, near the southern extent of the proposal (refer to Figure 2-2). The four-cell pipe culvert carries water from east to west. Water from the culvert flows into an underground drain, about eight metres from the culvert, and flows north west.



**Figure 2-2 Culvert, south of Bennett Road**

### **Utilities**

There are numerous services in and around the road reserve including:

- Electricity
- Water
- Wastewater
- Gas
- Telecommunications
- Stormwater.

Maps showing the location of utilities is provided in Appendix A.

#### *Electricity*

The majority of electrical services in the proposal area are underground. Services are located on either side of the road and in the median strip. Underground electricity cables in the median are providing power to street lights. There are four underground crossings of Erskine Park Road.

There are overhead electricity wires on the western side of Erskine Park Road, south of Peppertree Drive to the extent of the proposal.

#### *Water*

There are water mains located on:

- Erskine Park Road, around Explorers Way – east side
- Explorers Way – north side
- Coonawarra Drive – south side
- Peppertree Drive – north side
- Bennett Road – north side
- Erskine Park Road, around Bennett Road – both sides of the road. The water mains cross Erskine Park Road twice in the vicinity of Bennett Road.

#### *Wastewater*

Sections of wastewater lines are located on both sides of Erskine Park Road. Wastewater lines cross Erskine Park Road at Five locations.

#### *Gas*

A high pressure gas main runs through the western road reserve for the entire length of the proposal. High pressure gas main also run on:

- Explorers Way – north side, connects to the main on Erskine Park Road
- Bennett Road – north and south side. The main on the north side terminates near the intersection. The main on the south side connects to the main on Erskine Park Road
- Erskine Park Road – west side. A second main starts south of Bennett Road and runs parallel to the other gas main.

#### *Telecommunications*

There are underground telecommunications services located on Explorers Way and Coonawarra Drive. Underground telecommunications services run on the western side of Erskine Park Road from the southern extent of the proposal site and cross Erskine Park Road to Peppertree Drive.

#### *Wastewater*

There is extensive stormwater drainage in the proposal site. Stormwater pipes are located on both sides of Erskine Park Road and in the median. Stormwater pipes range in size from 300 millimetres to 1500 millimetres. There is a culvert under Erskine Park Road, south of Bennett Road, carrying stormwater from east to west. The culvert has four 900 millimetre pipes. A 1050 millimetre culvert carries stormwater from east to west at Byrnes Creek.

## 2.3 Proposal objectives

The objectives of the proposal are to:

- Improve traffic flow and road network efficiency
- Improve road safety
- Minimise environmental impacts.

## 2.4 Alternatives and options considered

### 2.4.1 Methodology for selection of preferred option

All options were assessed against the proposal objectives.

The Ecologically Sustainable Development (ESD) principle of 'integration', as identified in the EPBC Act, was used in the decision making process. The integration principle states that decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations. In selecting options, Penrith City Council considered existing and future traffic demand, potential impacts on local residents and potential impacts on endangered ecological communities in the area.

### 2.4.2 Identified options

#### Option 1 – Do nothing

This option would result in the existing conditions remaining in place.

#### Option 2 – Upgrade four intersections on Erskine Park Road

This option would:

- Widen Erskine Park Road to provide two 3.5 metre wide lanes in each direction
- Extend existing right-turn storage lanes on Erskine Park Road
- Install traffic signals at Explorers Way and Bennett Road intersections
- Configure seagull intersections at Coonawarra Drive and Peppertree Drive
- Construct a shared pedestrian and cyclist path
- Relocate utilities
- Remove of vegetation.

### 2.4.3 Analysis of options

#### Option 1 – Do nothing

Proposal objectives	Analysis
Improve traffic flow and road network efficiency	Option 1 would not improve traffic flow or improve the road network efficiency
Improve road safety	Option 1 would not improve road safety
Minimise environmental impacts	There would be no environmental impacts associated with the construction of this option



## Option 2 – Upgrade four intersections on Erskine Park Road

Proposal objectives	Analysis
Improve traffic flow and road network efficiency	<p>Option 2 would improve traffic flow and network efficiency. The proposal would install signals at Explorers Way and at Bennett Road to improve traffic flow at these intersections. The seagull junctions at Coonawarra Drive and Peppertree Drive would improve traffic flow by providing an acceleration for traffic turning right onto Erskine Park Road.</p> <p>The extension of existing turning lanes and the provision of new turning lanes at the four intersections would provide additional traffic capacity and improve traffic flow.</p>
Improve road safety	<p>The extension of right turning lanes on Erskine Park Road would provide additional capacity and reduce the risk of the queue of turning vehicles extending into through lanes. This would reduce the risk of crashes in the through lane.</p> <p>The installation of pedestrian/cyclist crossings at Explorers Way and Bennett Road would improve safety for pedestrians and cyclists.</p>
Minimise environmental impacts.	<p>Vegetation removal would be required for Option 2. The detailed design would be refined to minimise impacts on existing vegetation. The proposal would also be likely to result in traffic and noise impacts. Potential impacts would be minimised by implementation of the safeguards identified in section 6.</p>

### 2.5 Preferred option

Option 2 is the preferred option. Option 2 would meet the objectives of the proposal:

- Improve traffic flow and road network efficiency – reduced delays and improved flow at intersections using traffic lights and seagull intersection configurations
- Improve road safety – turning lanes would reduce the risk of crashes caused by turning traffic queuing in the through lanes
- Minimise environmental impacts – retention of vegetation where practicable. Minimise impacts through implementation of safeguards in section 6.

## 3 Description of the proposal

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### 3.1 The proposal

The proposal generally involves providing two lanes in each direction on Erskine Park Road between Explorers Way and Bennett Road. The proposal includes upgrading four intersections with Erskine Park Road and improving turning lanes from Erskine Park Road. A shared pedestrian/cyclist path would be provided between Bennett Road and Explorers Way.

The concept design, including traffic signal arrangement, is provided in Appendix A. The proposal area is shown in Figure 3-1, Figure 3-2 and Figure 3-3.



Figure 3-1 Proposal site near Explorers Way





**Figure 3-2 Proposal site from Coonawarra Road to Peppertree Drive**





**Figure 3-3 Proposal site from Peppertree Drive to Bennett Road**

## **Explorers Way intersection**

### *Road widening*

Erskine Park Road would be widened within the existing road reserve. Part of the existing median would be removed to accommodate turning lanes. About 1,750 square metres of new pavement would be constructed. The existing pavement, about 6,225 square metres, would be milled and paved with a new asphaltic concrete surface.

### *Traffic lanes and signals*

The intersection at Erskine Park Road and Explorers Way would be signalised. A section of the median on Erskine Park Road would be removed to extend the existing right turn lane by 130 metres and to provide a second right turn lane. This would result in dual right turn lanes from Erskine Park Road into Explorers Way. A 70 metre long, left turn lane from Erskine Park Road into Explorers Way would be provided. The turning lanes on Explorers Way would be adjusted to provide a left turn lane and a shared left/right turn lane. The existing left turn lane on Explorers Way would be extended to be 100 metres long. A pedestrian refuge would be removed to allow for lane adjustment on Explorers Way.

The lanes on Erskine Park Road would be widened as follows:

- Southbound kerbside lane – 3.5 metres
- Southbound through lane – 3.5 metres
- Southbound right turn lanes – 3.5 metres
- Northbound kerbside lane – 3.5 metres.
- Northbound through lane – 3.5 metres
- Northbound left turn lane – 4 metres.

The lanes on Explorers Way would be widened as follows:

- Eastbound kerbside left turn lane – 3.7 metres
- Eastbound left/right turn lane – 3.5 metres
- Westbound kerbside lane – 3.3 metres
- Westbound through lane – 3.3 metres.

A cross section of the lanes on Erskine Park Road is provided in Figure 3-4.

### *Medians*

The existing grass median on Erskine Park Road, to the north of Explorers Way, would be removed. A new concrete median would be constructed. A small section, about 15 metres in length, of the median on the south side of Explorers Way would be removed. In total about 560 square metres of concrete median would be constructed.

### *Pedestrian/cyclist facilities*

A new shared pedestrian/cyclist path would be constructed on the west side of Erskine Park Road, south of Explorers Way. The path would be three metres wide. A 1.2 metres wide pedestrian path on Explorers Way would connect to the shared path.

Three signalised pedestrian crossings would be provided at the intersection, two across Erskine Park Road and one across Explorers Way. The two crossings on Erskine Park Road would connect to a new 40 metre long, three metre wide path on the east side of the road.

### *Retaining structures*

A retaining wall would be constructed on the eastern side of Erskine Park Road to support the 40 metre long pedestrian path. A 2:1 batter would be constructed on Erskine Park Road, north of the proposed retaining wall.



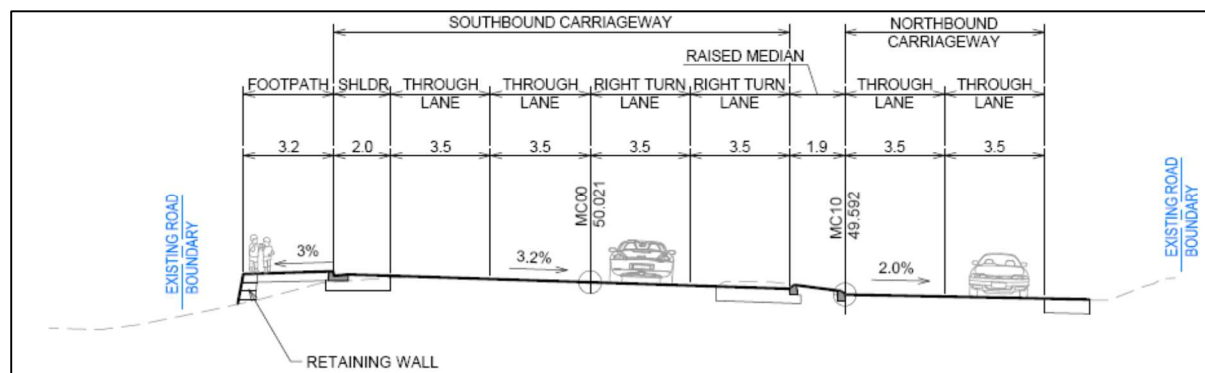
A small 4:1 batter in the reserve beside the shared path on the west side of Erskine Park Road, would be required.

### *Stormwater*

New stormwater drainage pits and pipes would be required:

- In the new concrete median, north of Explorers Way
- Along the west side of Erskine Park Road, south of Explorers Way
- Along the south side of Explorers Way.

Adjustment to existing drainage pit levels may also be required.



**Figure 3-4 Cross section of Erskine Park Road showing the right turn lanes into Explorers Way**

### **Coonawarra Drive**

#### *Road widening*

Erskine Park Road would be reconstructed and widened within the existing road reserve. Part of the existing median would be removed to accommodate turning lanes and to accommodate a seagull junction.

#### *Traffic lanes*

A section of the median on Erskine Park Road would be removed to extend the existing right turn lane to 150 metres long. A 180 metre long acceleration lane would be constructed for traffic turning right from Coonawarra Drive onto Erskine Park Road. Dedicated left and right turn lanes would be provided on Coonawarra Drive. The existing left turn lane would be extended to be 100 metres long.

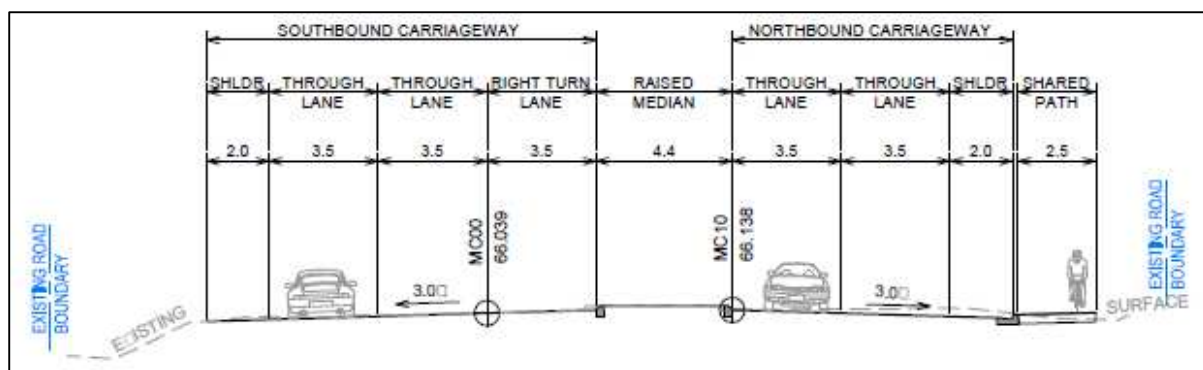
The lanes on Erskine Park Road would be widened as follows:

- Southbound kerbside lane – 3.5 metres
- Southbound through lane – 3.5 metres
- Southbound right turn lane – 3.5 metres
- Southbound acceleration lane – 3.5 metres
- Northbound kerbside lane – 3.5 metres.
- Northbound through lane – 3.5 metres.

The lanes on Coonawarra Drive would be widened as follows:

- Eastbound kerbside left turn lane – 3.4 metres
- Eastbound right turn lane – 3 metres
- Westbound kerbside lane – 3.4 metres
- Westbound through lane – 3 metres.

A cross section of the lanes on Erskine Park Road is provided in Figure 3-5.



**Figure 3-5 Cross section of Erskine Park Road showing the right turn lanes into Coonawarra Drive**

### *Medians*

About 25 metres of the existing median on Erskine Park Road, north of intersection, would be removed and a new concrete median constructed. A concrete median section would be constructed to form the seagull intersection. A new concrete median, of varying width, would be constructed from Coonawarra Drive to Peppertree Drive.

### *Pedestrian/cyclist facilities*

The existing path would be widened to three metres wide and become a shared path, connecting to the shared path at Explorers Way. No pedestrian crossings would be provided at this intersection.

### *Retaining structures*

A retaining wall would be constructed on the western side of Erskine Park Road, starting about 20 metres south of the intersection. The retaining wall would be about 130 metres long and would be located between the path and the road (eastern side of the path). South of the retaining wall a 4:1 batter would be constructed on the western side of the path.

### *Stormwater*

New stormwater drainage pits and pipes would be required:

- In the new concrete median, south of Coonawarra Drive
- Along the west side of Erskine Park Road, south of Coonawarra Drive.

New kerb and gutter would be constructed along the west side of Erskine Park Road. Adjustment to existing drainage pit levels may also be required.

## **Peppertree Drive**

### *Road widening*

Erskine Park Road would be reconstructed and widened within the existing road reserve. The widening would be to the west. The intersection would be reconfigured to a seagull junction.

### *Traffic lanes*

A new 150 metre long right turn lane would be constructed on Erskine Park Road. A 180 metre long acceleration lane for right turning traffic from Peppertree Drive onto Erskine Park Road would be constructed. Existing dedicated left and right turn lanes would be retained on Peppertree Drive.

The lanes on Erskine Park Road would be widened as follows:

- Southbound kerbside lane – 3.5 metres
- Southbound through lane – 3.5 metres
- Southbound right turn lane – 3.5 metres
- Southbound acceleration lane – 3.5 metres



- Northbound kerbside lane – 3.5 metres
- Northbound through lane – 3.5 metres.

The lanes on Peppertree Drive would be widened as follows:

- Eastbound kerbside left turn lane – 3.2 metres
- Eastbound right turn lane – 3.5 metres
- Westbound kerbside lane – 3.4 metres
- Westbound through lane – 3.8 metres.

A cross section of the lanes on Erskine Park Road is provided in Figure 3-6.

### *Medians*

There is an existing painted median at the Peppertree Drive intersection. The concrete median from Coonawarra Drive would be extended to Peppertree Drive. A concrete median section would be constructed to form the seagull intersection. A new concrete median, of varying width, would be constructed from Peppertree Drive to Bennett Road.

### *Pedestrian/cyclist facilities*

The existing path would be widened to three metres wide and become a shared path, connecting to the shared path along the western side of Erskine Park Road. No pedestrian crossings would be provided at this intersection.

### *Retaining structures*

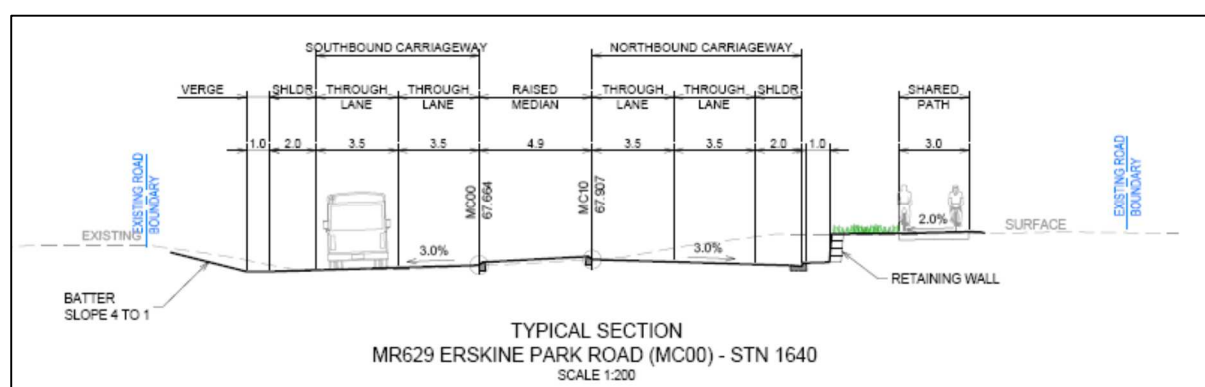
Batters would be constructed along the western side of Erskine Park Road. The batters would have slopes of 4:1.

### *Stormwater*

New stormwater drainage pits and pipes would be required:

- In the new concrete median forming the seagull junction
- Along the west side of Erskine Park Road
- Along the east side of Erskine Park Road.

New kerb and gutter would be constructed along the west side of Erskine Park Road. Adjustment to existing drainage pit levels may also be required.



**Figure 3-6 Cross section of Erskine Park Road south of Peppertree Drive**

## **Bennett Road**

### *Road widening*

Erskine Park Road would be reconstructed and widened within the existing road reserve. The existing guard fence would be adjusted to allow the widening. The widening would mainly occur to the west of the existing alignment.

### *Traffic lanes and signals*

The intersection between Erskine Park Road and Bennett Road would be signalised. A new 150 metre long right turn lane would be constructed on Erskine Park Road.

A 100 metre long, left turn lane from Erskine Park Road into Bennett Road would be provided. Existing dedicated left and right turn lanes would be retained on Bennett Road. The left turn would be extended to be 60 metres long.

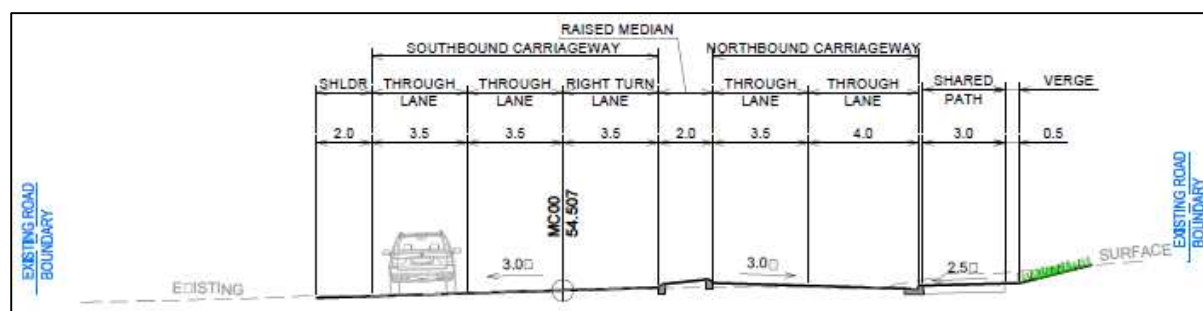
The lanes on Erskine Park Road would be widened as follows:

- Southbound kerbside lane – 3.5 metres
- Southbound through lane – 3.5 metres
- Southbound right turn lane – 3.5 metres
- Northbound kerbside lane – 3.5 metres
- Northbound through lane – 3.5 metres
- Northbound left turn lane – 4 metres.

The lanes on Erskine Park Road would be widened as follows:

- Eastbound kerbside left turn lane – 3.5 metres
- Eastbound left/right turn lane – 3.2 metres
- Westbound lane (including shoulder) – 6.6 metres.

A cross section of the lanes on Erskine Park Road is provided in Figure 3-7.



**Figure 3-7 Cross section of Erskine Park Road showing the right turn lanes into Bennett Road**

### *Medians*

There is an existing painted median at the Bennett Road intersection. The concrete median from Peppertree Drive would be extended to Bennett Road. A new 200 metre long, concrete median would be constructed south of Bennett Road.

### *Pedestrian/cyclist facilities*

A new shared pedestrian/cyclist path would be constructed on the west side of Erskine Road, south of Explorers Way. The path would be three metres wide.

Three signalised pedestrian crossings would be provided at the intersection, two across and one across Bennett Road. The two crossings on Erskine Park Road would connect to a new 40 metre long, three metre wide path on the east side of the road. This path would connect with the existing path, providing access to the reserve.

### *Retaining structures*

Batters would be constructed along the western side of Erskine Park Road. The batters would have slopes of 4:1.

### *Stormwater*

New stormwater drainage pits and pipes would be required:

- Along the west side of Erskine Park Road, north of Bennett Road

- Along the east side of Erskine Park Road, south of Bennett Road.

The culvert, located about 100 metres south of the intersection, would be extended to accommodate the wider alignment.

#### **Pavement work on Erskine Park Road from Coonawarra Drive to Bennett Drive**

The pavement on Erskine Park Road from Coonawarra Road to the south extent would be replaced with new pavement. About 29,840 square metres of new pavement would be constructed. An area of about 2,110 square metres would be milled and paved. The total area of concrete median to be constructed from around Coonawarra Drive to Bennett Road would be about 4,230 square metres.

#### **Bus bays**

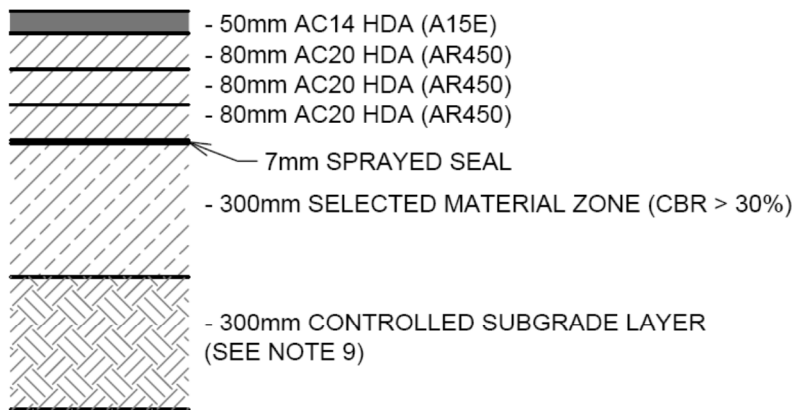
Two bus bays would be created as part of the proposal. The bays would be about 320 metres south of Peppertree Drive, one northbound and one southbound. The proposed bus bays would be about 40 metres long.

## **3.2 Design**

### **3.2.1 Design criteria**

The following design criteria would be used:

- Austroads Guide to Road Design and Roads and Maritime design supplements
- Posted speed limit would be 70km/h and a Design speed of 80 kilometres per hour
- Lanes would be 3.5 metres wide
- The shared path would be three metres wide
- All pavement markings, chevrons and reflectors would be in accordance with Roads and Maritime QA Specification R141 and R142
- Road signs would be in accordance with Australian Standard AS1743 Road Signs.
- There are two options for the new pavement design (refer to Figure 3-8):
  - Full depth asphalt
  - Thick asphalt over cemented layer
- The pavement design for milling and repaving is provided in Figure 3-9.

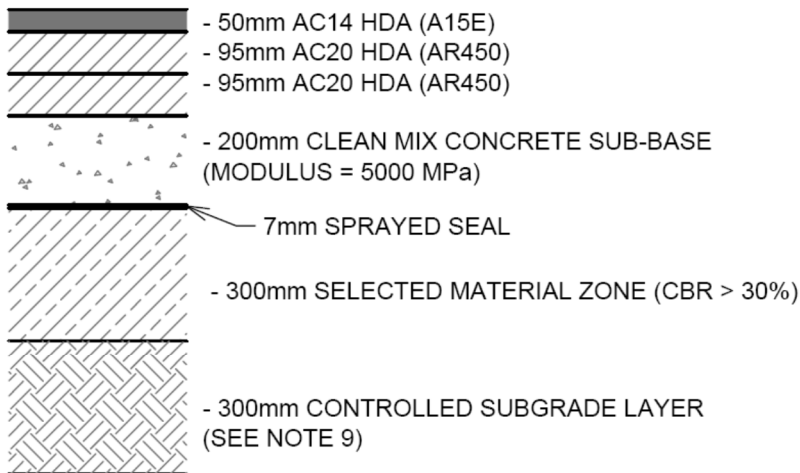


## PAVEMENT TYPE 1

NEW PAVEMENT - OPTION 1

FULL DEPTH ASPHALT

SCALE 1:20



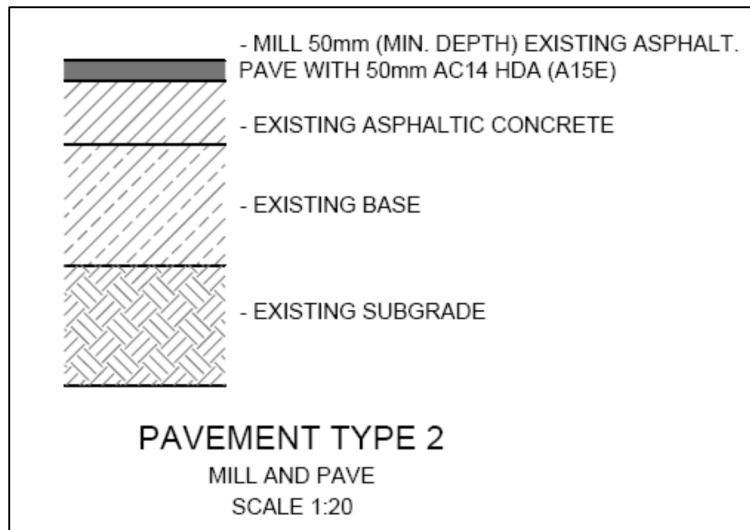
## PAVEMENT TYPE 1

NEW PAVEMENT - OPTION 2

THICK ASPHALT OVER CEMENTED LAYER

SCALE 1:20

Figure 3-8 New pavement types



**Figure 3-9 Mill and pave design**

### 3.2.2 Engineering constraints

The extensive utilities in the proposal area would be a constraint to construction. Utilities would have to be protected or relocated. The culvert, located south of Bennett Road, would be extended as part of the proposal. This would require blocking any flow through the upstream stormwater pipes.

## 3.3 Construction activities

### 3.3.1 Work methodology

Construction staging would be decided during detailed design. Pavement work is likely to be carried out outside standard hours to avoid impacts on traffic flow during peak periods.

#### **Pre-construction**

- Install erosion and sediment controls
- Establish site compound (refer to section 3.4). This would contain the site office, toilet, bunded area for fuel/chemical storage, stockpile areas and plant parking
- Mark areas where vegetation would be cleared
- Clear about 0.44 hectares of street trees
- Relocation or protection of gas main
- Relocate underground electrical services.

#### **Construction**

- Install erosion and sediment controls
- Removal of existing medians
- Remove existing lane markings
- Close kerbside lanes to traffic and install barrier along work areas to isolate the area from traffic
- Shift traffic across to maintain traffic flow
- Install temporary signage to alert motorists to changed traffic conditions
- Strip topsoil
- Relocate services
- Earthworks to establish:
  - Road formation
  - Batters

- Areas for retaining walls
- Drainage infrastructure
- Install road base
- Install new stormwater pipes
- Construct retaining walls and batters
- Construction of new pavement
- Construct shared pathways
- Construct new kerb and gutter
- Construct new medians
- Close other kerbside lane to traffic and install barrier along work area to isolate the area from traffic
- Shift traffic across to maintain traffic flow
- Carry out work on other side of road
- Line mark new pavement
- Install signals at Explorers Way and Burnett Road
- Install road signs.

#### **Culvert work**

- Remove vegetation for the culvert outlet
- Block stormwater pipes upstream of culvert
- Dewater the culvert outlet
- Install culvert extension.

### **3.3.2 Construction hours and duration**

The start of the work depends on the receipt of Federal funding. The work is expected to take about two years to complete. The works would be carried out during and out of standard hours.

Standard hours:

Monday to Friday – 7am to 6pm

Saturday- 8am to 1pm (if required)

Sundays and Public Holidays- No work

To minimise disruption to minimise disruption to traffic and potential safety risks to construction personnel and road users it will be necessary to carry out some work outside standard hours.

Any work undertaken outside standard working hours would be in accordance with the *Interim Construction Noise Guidelines (DECC, 2009)* and the *Environmental Noise Management Manual (RTA, 2001): Practice note vii – Road works outside normal working hours*.

### **3.3.3 Plant and equipment**

A variety of plant and equipment will be required for the construction. The final plant and equipment will be determined by the construction contractors however an indicative list is provided below.

- Delivery trucks
- Chainsaw
- Jack hammer
- Excavators
- Dewatering pumps and equipment
- Concrete agitator
- Concrete pump
- Roller

- Crane
- Concrete saw
- Pavement laying machine
- Profiler
- Water cart
- Line marking machine.

### 3.3.4 Earthworks

Earthworks would be required to widen Erskine Park Road and would be carried out as follows:

- Profiling for the widened alignment
- Application of road base
- Construction of batters and retaining walls.

A maximum of about 19,023 cubic metres would be cut to waste and about 4,418 cubic metres of material would be removed from the existing pavement and medians. About 135 cubic metres of fill would be required to make up levels.

### 3.3.5 Source and quantity of materials

All materials would be sourced from the Sydney Region. Table 3-1 provides estimated quantities of materials required for the proposal.

**Table 3-1 Material quantities**

Material	Quantity
Asphalt	33,818 square metres
Signposts	36
Concrete paving	10,331 square metres
Kerb and gutter	5,408 metres
Stormwater pipes	2,253 metres
Street lighting – poles and lamps	15
Fencing	350 metres

### 3.3.6 Traffic management and access

Traffic management would be required during construction. The work would be staged to minimise traffic impacts. At this stage detailed traffic management planning has not taken place. However, it is anticipated that all lanes would be open during peak periods and a single lane may be closed at other times. This would depend on approval from the Transport Management Centre (TMC) to close lanes. No intersections would be closed during the construction works. Property access would not be impacted by the construction works.

## 3.4 Ancillary facilities

A compound site would be located in the reserve at one of Penrith City Council's reserves (refer to Figure 3-10):

- Arundle Park Drive – near Peppertree Drive
- Chameleon Drive Reserve – near Bennett Road

No vegetation clearing or earthworks would be required for compound site set up.

The compound site would contain the following:

- Site office
- Toilets
- Temporary stockpiles



- Chemical/fuel storage
- Plant and equipment storage.



Figure 3-10 Potential compound site locations

### 3.5 Public utility adjustment

Sections of the gas main located on the western side of Erskine Park Road would be impacted by the proposed stormwater drainage. These sections of gas main would be relocated west of their current position and still remain within the road reserve.

The following lights would be adjusted:

- Three lights in the median at the Explorers Way intersection. The section of median that they are located in would be removed to provide additional turning lanes
- Two lights in the median at the Coonawarra Drive intersection. The section of median that they are located in would be removed to provide a longer turning lanes and form the seagull intersection
- Two lights in the road reserve at the Peppertree Drive intersection. The lights would be removed for road widening

The location of adjusted lights would be decided following a lighting assessment during detailed design.

Underground electricity currently in the medians would be adjusted to provide power to the new lights that would be installed in the new concrete medians. The adjustment would be done during the pavement work. Above ground electricity wires on the western side of Erskine Park Road, south of Coonawarra Drive would be required to be relocated for road widening and the construction of the shared path. The wires would remain within the road reserve and be located further west of their current position.



### 3.6 Property acquisition

The proposal would require the acquisition of 15 square metres of land from 158 Explorers Way (SP 84166) (refer to Figure 3-11). Penrith City Council is dedicating 680 square metres of the reserve (Lot 358 DP 708572) on the south side of Explorers Way for the shared pedestrian/cyclists path.

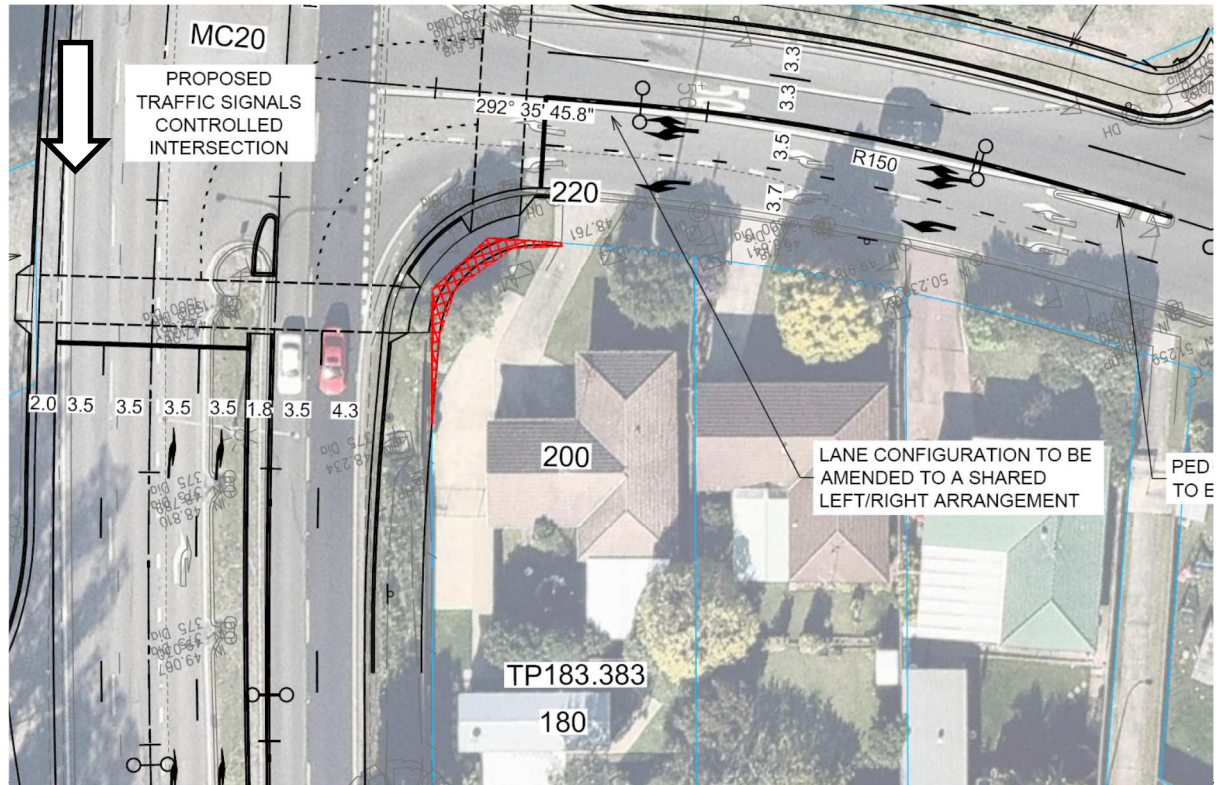


Figure 3-11 Area of property acquisition

## 4 Statutory and planning framework

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### 4.1 State Environmental Planning Policies

#### 4.1.1 State Environmental Planning Policy (Infrastructure) 2007

*State Environmental Planning Policy (Infrastructure) 2007* (ISEPP) aims to facilitate the effective delivery of infrastructure across the State.

Clause 94 of ISEPP permits development on any land for the purpose of a road or road infrastructure facilities to be carried out by or on behalf of a public authority without consent.

As the proposal is for a widening of a road and is to be carried out by Penrith City Council on behalf of Roads and Maritime, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not affect land or development regulated by *State Environmental Planning Policy No. 14 - Coastal Wetlands*, *State Environmental Planning Policy No. 26 - Littoral Rainforests*, *State Environmental Planning Policy (State and Regional Development) 2011* or *State Environmental Planning Policy (Major Development) 2005*.

Part 2 of the ISEPP contains provisions for public authorities to consult with local councils and other public authorities prior to the commencement of certain types of development. Consultation, including consultation as required by ISEPP (where applicable), is discussed in chapter 5 of this REF.

#### 4.1.2 State Environmental Planning Policy No 19—Bushland in Urban Areas

Penrith LGA is listed as an area to which this Policy applies.

The general aim of this Policy is to protect and preserve bushland within the urban areas referred to in Schedule 1 because of:

- (a) its value to the community as part of the natural heritage,
- (b) its aesthetic value, and
- (c) its value as a recreational, educational and scientific resource.

The specific aims of this policy are:

- (a) to protect the remnants of plant communities which were once characteristic of land now within an urban area,
- (b) to retain bushland in parcels of a size and configuration which will enable the existing plant and animal communities to survive in the long term,
- (c) to protect rare and endangered flora and fauna species,
- (d) to protect habitats for native flora and fauna,
- (e) to protect wildlife corridors and vegetation links with other nearby bushland,
- (f) to protect bushland as a natural stabiliser of the soil surface,
- (g) to protect bushland for its scenic values, and to retain the unique visual identity of the landscape,
- (h) to protect significant geological features,
- (i) to protect existing landforms, such as natural drainage lines, watercourses and foreshores,
- (j) to protect archaeological relics,
- (k) to protect the recreational potential of bushland,
- (l) to protect the educational potential of bushland,

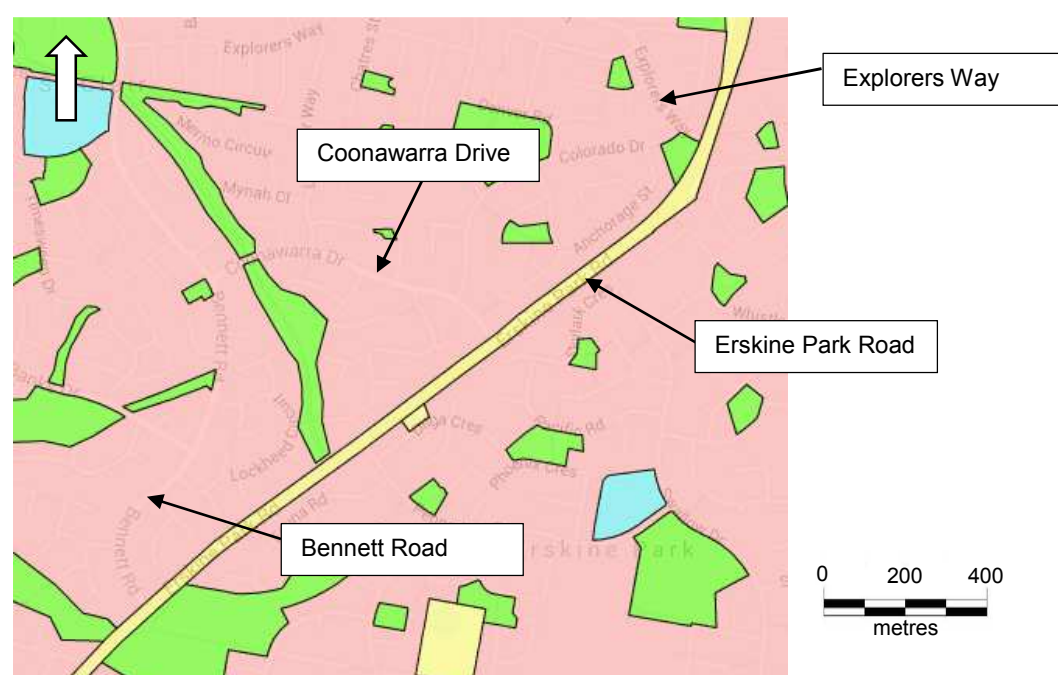
- (m) to maintain bushland in locations which are readily accessible to the community, and
- (n) to promote the management of bushland in a manner which protects and enhances the quality of the bushland and facilitates public enjoyment of the bushland compatible with its conservation.

ISEPP removes the requirement for consent for the development of roads on any land, therefore, consent is not required under the SEPP.

## 4.2 Local Environmental Plans

### 4.2.1 Penrith Local Environmental Plan 2010

The Penrith Local Environment Plan (LEP) establishes the development controls for the Penrith LGA. Erskine Park Road is zoned SP2 Infrastructure. South of Explorers Way, the road widening will encroach on an area zoned RE1 Public Recreation (refer to Figure 4-1).



**Figure 4-1 Land use zoning of Erskine Park Road and vicinity (Source: Department of Planning and Environment Planning Viewer)**

The objectives of zone SP2 Infrastructure are:

- To provide for infrastructure and related uses
- To prevent development that is not compatible with or that may detract from the provision of infrastructure

The development of roads is permitted with consent in this zone

The objectives of zone RE1 Public Recreation are:

- To enable land to be used for public open space or recreational purposes
- To provide a range of recreational settings and activities and compatible land uses
- To protect and enhance the natural environment for recreational purposes
- To ensure that development is secondary and complementary to the use of land as public open space, and enhances public use, and access to, the open space
- To provide land for the development of services and facilities by public authorities for the benefit of the community

The development of roads is permitted with consent in this zone. ISEPP removes the need for consent for the development of roads.

## 4.3 Other relevant legislation

### 4.3.1 Threatened Species Conservation Act 1995

The TSC Act aims to conserve and protect certain classes of threatened, endangered and vulnerable species, populations and ecological communities.

Section 5A of the EPA&A Act lists a number of factors to be taken into account when deciding if there is the likelihood of a significant impact on threatened species, populations and their habitat or on ecological communities. If there is a chance of an impact, then an Assessment of Significance would be required to determine the significance of the impact. If there is likelihood for a significant impact on threatened species, populations and their habitat or on ecological communities then a Species Impact Statement is required. There is potential for the proposal to impact a stand of Cumberland Plain Woodland, which is listed as critically endangered under the act. An Assessment of Significance for the impact on the Cumberland Plain Woodland concluded that the proposal would not have a significant impact on this community. More information about threatened species and communities is available in Section 6.1.

## 4.4 Commonwealth legislation

### 4.4.1 *Environment Protection and Biodiversity Conservation Act 1999*

Under the EPBC Act a referral is required to the Australian Government for proposed 'actions that have the potential to significantly impact on matters of national environmental significance or the environment of Commonwealth land. These are considered in Appendix B and chapter 6 of the REF.

The assessment of the proposal's impact on matters of national environmental significance and the environment of Commonwealth land found that there is unlikely to be a significant impact on relevant matters of national environmental significance. Accordingly, the proposal has not been referred to the Australian Government Department of the Environment.

## 4.5 Confirmation of statutory position

Penrith City Council is the proponent and the determining authority for the proposed works. ISEPP removes consent requirements and the proposal is subject to an environmental impact assessment under Part 5 of the EP&A Act.

## 5 Stakeholder and community consultation

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### 5.1 Consultation strategy

Penrith City Council would develop a Consultation Strategy in consultation with Roads and Maritime to inform the community about the proposal. The objectives of the strategy would be to:

- Inform the community of the need for the proposal
- Provide regular and timely information to community and stakeholders on the proposal
- Provide clear and concise information about when we are seeking feedback from the community and stakeholders
- Ensure impacts on community members and stakeholders are evaluated on a continuous basis and this information is then used to inform the decision-making process.

Key stakeholders include:

- Government:
  - Minister for Roads and Freight, Duncan Gay
  - Federal Government
  - Transport for NSW
  - UrbanGrowth NSW
- State MP:
  - Member for Mulgoa, Tanya Davis
- Federal MP:
  - Member for McMahon, Chris Bowen
- Residents and businesses near the project area
- Road users
- Community groups
- Transport groups including active transport
- Media.

The following tools would be likely to be used to keep the community informed about the proposal:

- Project email address
- Project phone number
- Project webpage
- Media releases and traffic alerts
- Letterbox drops
- Briefings
- Print advertisements
- Doorknocks
- Temporary variable message signs (VMS)
- LiveTraffic website.

### 5.2 Community involvement

To date no community consultation has taken place.

### 5.3 Aboriginal community involvement

A search of the Aboriginal Heritage Information Management System (AHIMS) was carried out on 18 August 2015, in accordance with the Roads and Maritime *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) Stage 1. There are no registered Aboriginal heritage sites in the vicinity of the proposal and no consultation with the Aboriginal community was required.

### 5.4 ISEPP consultation

Clauses 13 to 16 of the ISEPP include consultation requirements and matters that need to be taken into consideration for works undertaken under Part 5 of the EP&A Act. However clauses 13 to 16 do not apply if notice of a development is to be given to a council or public authority that is carrying out the development or on whose behalf it is being carried out. Penrith City Council is carrying out the development, therefore notification under clauses 13 to 15 is not required. Clause 16 relates to consultation with public authorities other than councils and is applicable to the proposal. Refer to Table 5-1 for the assessment of the relevance of these clauses to this proposal. Consultation under clause 16 is not required for the proposal.

**Table 5-1 Assessment of items of Clause 13-16 of the ISEPP**

Item	Impact
Clause 16: Development adjacent to land reserved under the <i>National Parks and Wildlife Act 1974</i> .	The works would be undertaken within the Roads and Maritime road reserve.

### 5.5 Government agency and stakeholder involvement

Penrith City Council is consulting with Roads and Maritime to ensure that the proposal is constructed to Roads and Maritime specifications. A design workshop was held on 30 July 2015.

Consultation with service providers would be required to avoid impacting services:

- Jemena – consultation would be required about the proposed relocation of the high pressure gas main
- Endeavour Energy – consultation about adjustment of overhead power lines
- Telecommunications providers – consultation about potential relocation of underground telecommunications lines
- Sydney Water – consultation about protection of water and wastewater pipelines.

### 5.6 Ongoing or future consultation

Penrith City Council would continue to consult with Roads and Maritime throughout the proposal. The Communications Strategy would identify key stakeholders and communications methods prior to and during construction of the proposal.

Penrith City Council would consult with the property owner of 158 Explorers Way about the acquisition of about 15 square metres of that property.

## 6 Environmental assessment

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This section of the REF provides a detailed description of the potential environmental impacts associated with the construction and operation of the proposal. All aspects of the environment potentially impacted upon by the proposal are considered. This includes consideration of the factors specified in the guidelines *Is an EIS required?* (DUAP 1999) and *Roads and Related Facilities* (DUAP 1996) as required under clause 228(1)(b) of the *Environmental Planning and Assessment Regulation 2000*. The factors specified in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000* are also considered in Appendix B. Site-specific safeguards are provided to ameliorate the identified potential impacts.

### 6.1 Biodiversity

#### 6.1.1 Methodology

Background searches of existing information in order to identify potential biodiversity constraints along the proposal site were undertaken. This included a search of relevant databases, including but not limited to:

- Searches of Commonwealth and State databases to determine whether any threatened flora and fauna species, populations, ecological communities, migratory species and critical habitats as detailed in State and Commonwealth legislation occur or are likely to occur within a 10km radius of the study area. Specifically, a search of the Office of Environment and Heritage (OEH) Bionet database and the Department of the Environment Protected Matters database within a 5km search radius were undertaken in July 2015.
- A search of the Department of Primary Industries noxious weed declarations (searches undertaken in July 2015).

In conjunction with the database searches, a field survey was conducted by an ecologist on 28<sup>th</sup> July 2015 to evaluate vegetation communities, composition, and the habitat value of the vegetation for fauna occurring at the sites. Searches were also conducted for threatened species for which there were records near the proposal site, and where potential habitat was present within the proposal area.

#### 6.1.2 Existing environment

##### **Flora**

The proposal sites (refer to Figure 6-1, Figure 6-2 and Figure 6-3) encompassed a park with a mixture of exotic understorey species and native overstorey species and degraded road-side vegetation with the understorey dominated by exotic species and native overstorey species. Dominant tree species that were recorded in the park and along the roadside were indicative of Shale Plains Woodland, one of two forms of the Cumberland Plain Woodland which is classed as a critically endangered ecological community (CEEC) under the TCS Act. However, the communities in the study area did not meet the key diagnostic features and condition thresholds under the EPBC Act. This was due to one of two reasons:

- The patch size was less than 0.5 ha in size and lacked the presence of 50 % native understorey cover, or
- The patch size was greater than 0.5 ha in size but it was not contiguous with other native vegetation greater than 5 ha and did not contain any trees with DBH of greater  $\geq 80$  cm and lacked the presence of 30 % native understorey cover.



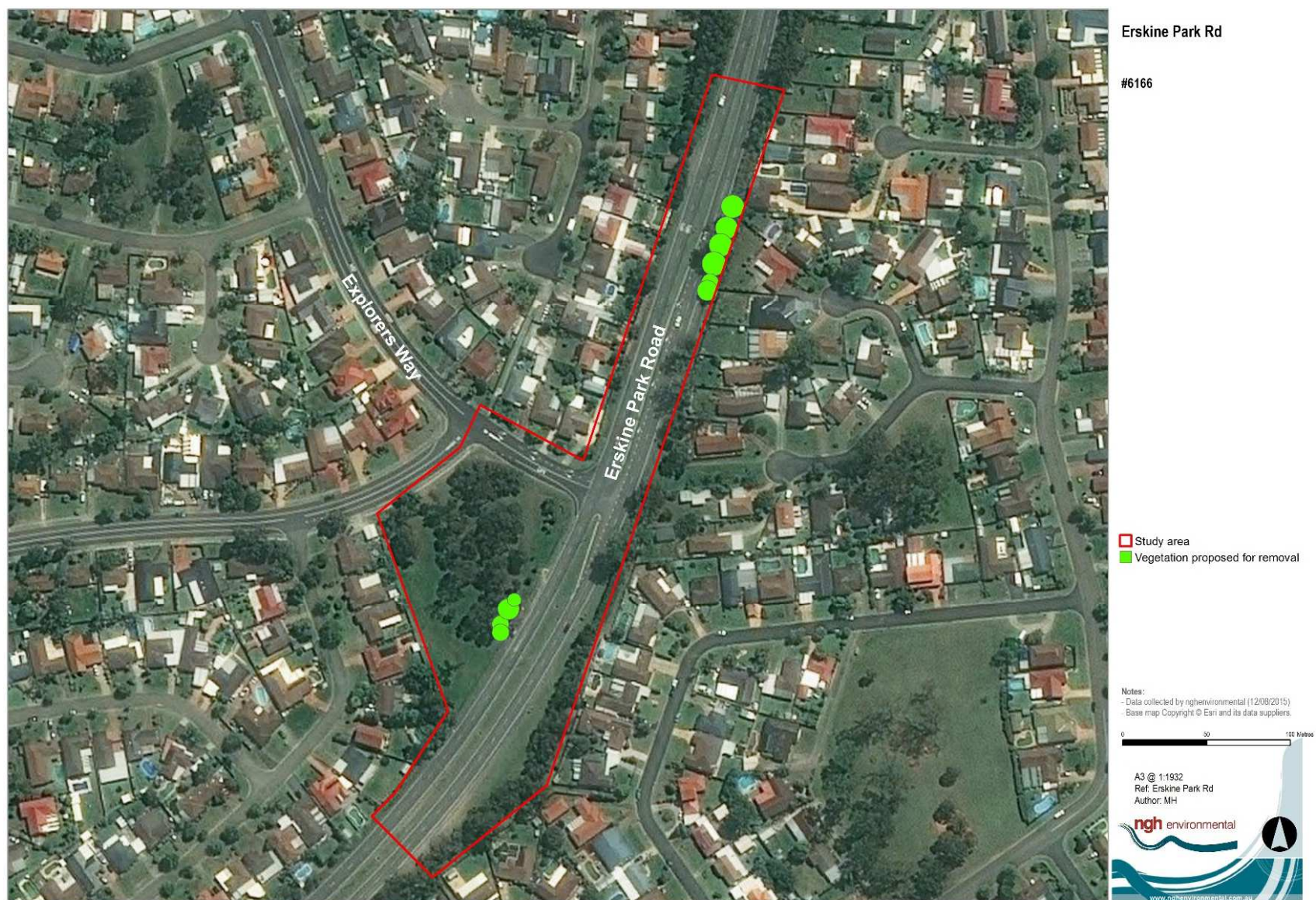


Figure 6-1 Study area at the corner of Erskine Park Road and Explorers Way





**Figure 6-2 Study area from Coonawarra Drive to Peppertree Drive**



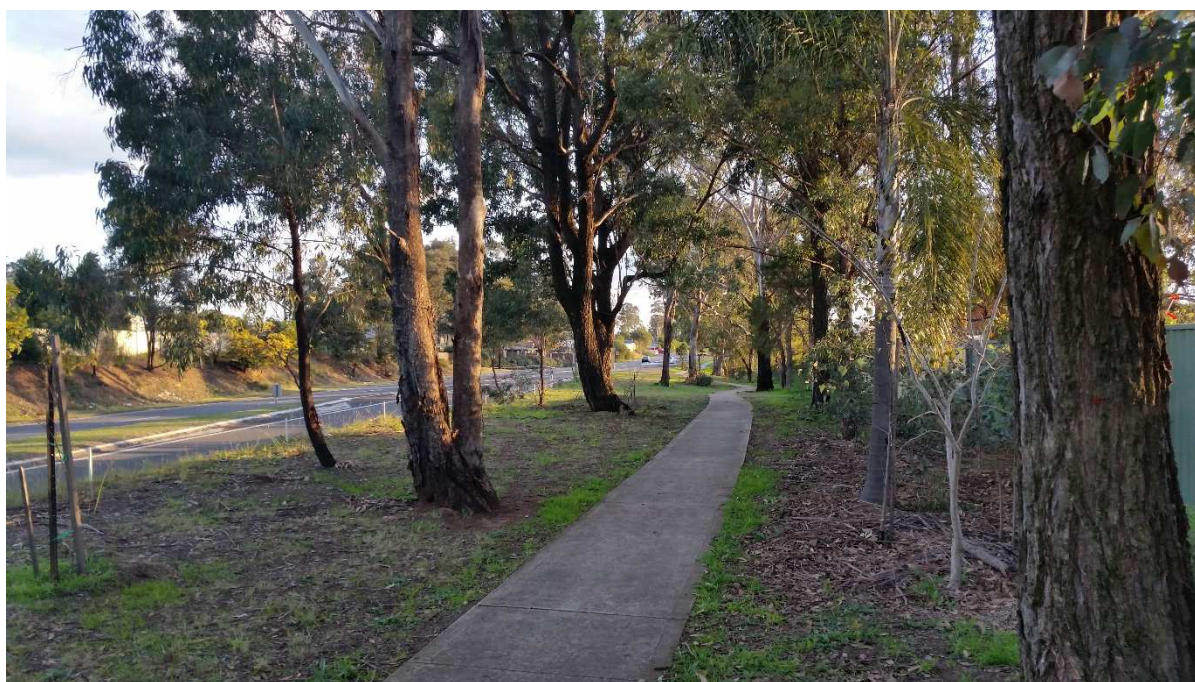


**Figure 6-3 Study area from Peppertree Drive to Bennett Road**



The over-storey was dominated by *Eucalyptus molacana* (Grey Box), *E. fibrosa* (Broad-leaved Ironbark) and *E. tereticornis* (Forest Red Gum). The mid-storey was dominated by a mixture of exotic garden species *Photinia glabra* 'Rubens' (Photinia), *Murraya paniculata* (Murraya) and native shrubs *Melaluca quinquinervia* (Broad-leaved Paperbark). The understorey was almost exclusively dominated by exotic grasses *Pennisetum clandestinum* (Kikuyu), *Paspalum dilatatum* (Paspalum) and *Trifolium repens* (White Clover) (Appendix C). Of the other exotic weed species observed at the proposal sites, only Creeping Lantana (*Lantana montevidensis*) (Class 4) is listed as a Noxious Weed in Penrith City Council (Appendix C).

Sections of vegetation along the proposal area varied in their quality and composition. One section of the Cumberland Plain woodland, was of substantially better quality than the other sections of the proposal area (refer to Figure 6-2 and Figure 6-4).



**Figure 6-4 Better quality Cumberland Plain woodland area**

Database searches identified a total of ten threatened flora species and 15 Endangered Ecological Communities (EECs) previously recorded within a 10 km radius of the study sites listed under the TSC Act (OEH Bionet search, Appendix C). The EPBC protected Matters database searches identified 15 threatened flora species and four EECs within a 5km radius of the study sites (Appendix C). The closest threatened species to the proposal site is a Juniper-leaf Grevillea (*Grevillea juniperina*) located on Swallow Drive, about 300 metres south east of Erskine Park Road (TSC Act).

One threatened flora species has been recorded in the vicinity of the study area in high abundance but is unlikely to occur within the proposal area due to lack of suitable habitat. There have been 159 records of *Grevillea juniperina* subsp. *Juniperina* (Juniper-leaved Grevillea) (TSC Act) occurring within 10 km of the study area. The species was not recorded during the field survey. The species grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium, typically containing lateric gravels.

## Fauna

Several common bird species were observed in the study area including *Psephotus haematonotus* (Red-rumped Parrot), *Corvus coronoides* (Australian Raven), *Cacatua galerita* (Suphur-crested Cockatoo), *cacatua sanguinea* (Little corella) and *Cracticus torquatus* (Grey Butcherbird).

Database searches identified a total of 15 threatened fauna species previously recorded within a 10 kilometres radius of the study site listed under the TSC Act (Bionet search, Appendix C).

One threatened fauna species has been recorded in high abundance in the vicinity of the study area but is unlikely to occur within the proposal area due to lack of suitable habitat. There have been 141 records of *Meridolum corneovirens* (Cumberland Plain Land Snail) occurring within 10 kilometres of the study area. The species was not recorded during the field survey. This species primarily inhabits Cumberland Plain Woodland, living under bark litter, leaves and logs, or shelters in loose soil around grass clumps.

## Fauna habitat

During the surveys fauna habitat features were also assessed on their habitat qualities for fauna usage. Habitat features used by fauna include tree hollows, loose bark, canopy coverage and excavated holes in the termite nests. Other habitat features include coarse woody debris such as fallen logs that provide habitat for ground dwelling mammals and reptiles.

Even though the study area was typical of a residential/urbanised landscape, which lacked a structured native mid-storey component, the canopy cover of the dominant tree species of the study area does provide some shelter, roosting and foraging habitat for avian fauna, especially during flowering seasons. Larger areas of Cumberland Plain Woodland to the east of the study area would provide better quality foraging and roosting habitat for birds, reptiles and mammals. No hollow bearing trees were located in the study area during the site survey. However one nest was identified in a single tree on the corner of Bennett Road (refer to Table 6-1).

**Table 6-1 Habitat tree location**

GPS ID	Easting	Northing	Tree Species	DBH (m)	Height (m)	Habitat type
331	295459	6257097	<i>Eucalyptus molacana</i>	0.6	12	nest

### 6.1.3 Potential impacts

## Flora

The proposal would require the removal of approximately 0.44 hectares of street trees belonging to the Cumberland Plain Woodland CEEC (under the TSC Act), including the removal of noxious weed species. There is potential for the works to result in the spread of weeds including noxious weed species.

Due to the extensive dominance of exotic groundcover and the degraded condition of the vegetation community at the proposal site, the likelihood of occurrence for threatened flora species is considered low.

The trees which would be removed as a result of the proposal belong to the Cumberland Plain Woodland CEEC, therefore an assessment of significance is required under Section 5A of the (EP&A Act. The assessment of significance is

provided in Appendix C and concluded that impacts to the CEEC would not be significant as the proposal would be unlikely to:

- Reduce the long-term viability of Cumberland Plains Woodland CEEC in the locality; or
- Significantly fragment Cumberland Plains Woodland CEEC in the locality.

### Fauna

The proposal would remove areas of street trees that belong to the Cumberland Plain Woodland which have the potential to be used as foraging habitat by avian fauna. Impacts to fauna species are considered to be minor as better quality habitat occurs in areas to the east of the proposal site. No hollow-bearing trees are located in the study area.

One habitat tree would require removal as part of the proposal. The removal of street trees belonging to the Cumberland Plain Woodland are considered to have minimal impact on habitat availability and connectivity as only a small portion of street trees will be removed and more substantial and better quality habitat occurs in other areas of land adjacent to the proposal site.

### 6.1.4 Mitigation measures

Impact	Environmental safeguards	Responsibility	Timing
Vegetation removal	<ul style="list-style-type: none"> <li>• Vegetation removal should be minimised where possible.</li> </ul>	Penrith Council	City
	<ul style="list-style-type: none"> <li>• The construction concept plan should minimise vegetation removal in the section of better quality Cumberland Plain Woodland as a matter of priority.</li> </ul>	Penrith Council	City
	<ul style="list-style-type: none"> <li>• Prior to the start of any clearing a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects. Guide 2: exclusion zones (Roads and Maritime, 2011).</li> </ul>	Contractor	Pre-construction
	<ul style="list-style-type: none"> <li>• Use areas already impacted by previous clearing or disturbance for access purposes during construction or the establishment of compound sites.</li> </ul>	Contractor	Pre-construction
	<ul style="list-style-type: none"> <li>• All vegetation removal including habitat tree removal is to be done in accordance with the Roads and Maritime Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects. Guide 4: Clearing of vegetation and removal of bushrock (Roads and Maritime, 2011).</li> </ul>	Contractor	Pre-construction
Noxious weeds	<ul style="list-style-type: none"> <li>• Declared noxious weeds will be managed according to the requirements stipulated by the Noxious Weeds Act 1993, and any weed removal activities will follow</li> </ul>	Contractor	Pre-construction

Impact	Environmental safeguards	Responsibility	Timing
	Guide 6 (Weed Management) in the Biodiversity Guidelines (RTA 2011).		
Revegetation	<ul style="list-style-type: none"> <li>Revegetation of any bare soil or cleared areas with locally-occurring native flora species typical of the original habitat will be undertaken to improve habitat for both native and threatened species that have the potential to occur in the area.</li> </ul>	Contractor	Construction

## 6.2 Traffic and access

SMEC Australia Pty Ltd (SMEC) carried out a traffic modelling study of the four intersections on Erskine Park Road to assess the impacts of projected population and economic growth in the study area; and to identify potential intersection upgrade solutions suitable for the future traffic conditions. The Traffic Modelling Study report is provided in Appendix D.

### 6.2.1 Existing environment

Erskine Park Road runs north-south and connects Mamre Road with Roper Road and the M4. The M4 Motorway is located about 280 metres north of the proposal site. Erskine Park Road provides access from Erskine Park industrial area and the suburbs of Erskine Park and St Clair to the M4 and the Great Western Highway (A44).

Erskine Park Road has two lanes in each direction from the M4 exit ramp to about 150 metres south of Coonawarra Road, where the road has one northbound lane. About 470 metres south of Coonawarra Road the road has one lane in each direction.

Erskine Park Road forms unsignalised intersections with Explorers Way, Coonawarra Drive and Bennet Road, with left and right turns to and from Erskine Park Road permitted. There are right turn lanes on the southbound carriageway on Erskine Park Lane for vehicles turning into each of the above side streets. There are no dedicated left turn lanes on the northbound carriageway on Erskine Park Road. There are dedicated left and right turning lanes on Explorers Way, Coonawarra Drive and Bennet Road. There is an acceleration lane for vehicles turning right onto Erskine Park Road from Explorers Way.

#### **Pedestrian access**

There is a pedestrian path from the southern extent of the proposal to Coonawarra Road. The path is located on the western side of the road and is about one metre wide. The path provides access to a number of reserves and cul-de-sacs located to the west of Erskine Road:

- Ashford Grove – concrete path
- Reserve around Byrnes Creek – concrete path
- Javelin Row – gap between properties, grassed surface
- Omega Place – gap between properties, grassed surface
- Reserve at culvert – informal paths to reserve.

### Traffic conditions

The total traffic volumes passing through all four intersections in six peak hours on different days are:

- Tuesday: 136,682 vehicles
- Wednesday: 132,031 vehicles
- Thursday: 138,260
- Friday: 127,957 vehicles
- Saturday: 102,892 vehicles.

Residential areas west and east of Erskine Park Road have typical commuter trip patterns with the high demand outbound trips in AM Peak and high demand inbound trips in PM peak.

### Crash data

The crash data for the four year period from January 2009 to December 2013 inclusive is provided in Table 6-2. The data covers crashes reported to the Police, and includes fatal, injury or vehicle damage only accidents. A total of 43 crashes were recorded in the five year period within the study area. There was no fatality and 51.2 per cent of the total crashes involved people injury. A total of 31 people were injured over the five years period. About 81.4 per cent of all crashes occurred at intersections. Heavy vehicles were involved in about 7 per cent of all crashes which occurred in the study area.

**Table 6-2 Crash data (Source: Roads and Maritime)**

Statistic	Explorers Way	Coonawarra Drive	Peppertree Drive	Bennett Road
Number of crashes	10	7	7	7
Injury crashes	3	2	3	6
Dominant crash types	Rear end northbound on Erskine Park Road and right turn from Erskine Park Road	Right turn from Erskine Park Road	Right turn from Peppertree Drive	Right turn from Erskine Park Road

### 6.2.2 Traffic study method

The objectives of the study were:

- Traffic modelling of the four intersection in the “current” traffic conditions (2014/15), and future “projected” traffic conditions in 10 years (2025) and 15 years (2031)
- Determining the intersection Level of Service (LoS) and impact of proposed growth to intersection operations taking into account both traffic travelling along the main route (Erskine Park Road) and local traffic entering/crossing main road from minor (local) roads
- To investigate potential intersection upgrade options in order to improve intersection Level of Service, road network efficiency and traffic safety.



The traffic assessment method was:

- Review of Background Information and Data Collection
- Site Visit (Weekday, AM and PM Peak)
- Traffic Data, Surveys and Analysis
- Existing Base Case SIDRA Model Development
- Existing Intersection Performance Assessments
- Future Traffic Growth Analysis and Assumptions
- Future Year Base Case SIDRA Model Development
- Future Intersection Performance Assessments.

The performance at each of the four intersections was assessed as part of the modelling study. The intersections were assessed in terms of average delays, LoS and queue length. LoS criteria are provided in Table 6-3.

**Table 6-3 Los criteria**

LoS	Average delay/vehicle (sec/veh)	Traffic signals, roundabout	Give Way and Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity & accident study required
E	57 to 70	At capacity, at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Unsatisfactory with excessive queueing	Unsatisfactory with excessive queueing

The intersection performance was predicted for the following scenarios:

- Base case (do nothing) conditions in 2026
- Base case (do nothing) conditions in 2031
- Intersection upgrade (the proposal) in 2026
- Intersection upgrade (the proposal) in 2031.

### 6.2.3 Potential impacts

#### **Construction – traffic impacts**

The proposal has the potential to cause traffic congestion on Erskine Park Road and on the surrounding streets. Construction work on the west and east sides of Erskine Park Road would be carried out in separate stages to allow the remaining traffic lanes to remain open. A safety barrier would be installed to isolate the construction area from the remaining traffic lanes on Erskine Park Road. Speed limits would be reduced and this may temporarily increase travel time along Erskine Park Road. Construction would occur during the day and the night. Night works would be used to minimise traffic impacts where possible.

### **Construction – access impacts**

No full road closures would be required for the proposal. Access to the side streets on Erskine Park Road would be maintained during the construction work, or detours would be provided if required. There are no residences with access from Erskine Park Road. Access to private properties would not be impacted.

### **Construction – parking impacts**

There is no parking available on Erskine Park Road, within the proposal site. During upgrading of intersections there will be temporary loss of parking spaces on some side streets:

- Four spaces on Explorers Way
- Four spaces on Coonawarra Drive
- Two spaces on Peppertree Drive
- Four spaces on Bennet Road.

### **Construction – pedestrian and cyclist impacts**

There are currently no dedicated cyclist lanes along Erskine Park Road. Cyclists would not be directly impacted by construction works. There would be temporary impacts to pedestrians during construction. There would be no access to the existing pedestrian path on the west side of Erskine Park Road during widening of the northbound carriage on Erskine Park Road and construction of the shared pedestrian and cyclist path.

### **Construction – bus and heavy vehicle impacts**

There are two bus routes operating through the proposal site:

- 775 (Penrith to Mt Druitt via St Marys & Erskine Park) – uses the intersection of Explorers Way and Erskine Park Road, and Erskine Park Road north of Explorers Way
- 776 (Penrith to Mt Druitt via St Marys & St Clair) – uses the intersection of Bennet Road and Erskine Park Road, Erskine Park Road between Bennet Road and Peppertree Drive, the intersection of Peppertree Drive and Erskine Park Road, and Erskine Park Drive north of Swallow Drive

Travel times on these bus routes may increase.

There are five bus stops within the proposal site which may be relocated during construction of the proposal:

- Bennet Road near Erskine Park Road (north and south sides)
- Erskine Park Road – 300m north from Bennet Road (east side)
- Peppertree Drive near Dilga Crescent (north and south sides).

### **Operation – traffic impacts**

Erskine Park Road has been identified in the Broader Western Sydney Employment Area Draft Structure Plan as part of a potential north-south public transport corridor linking Mt Druitt and Leppington. Traffic volumes along this corridor are predicted to grow substantially due to the residential and commercial developments in the South West Growth Centre, the Broader WSEA and the airport at Badgerys Creek. The proposed works would improve traffic conditions on Erskine Park Road and would address future road demand.

The following future traffic growth is predicted:

- Future 2026 traffic volumes estimate:
  - 1.0% per annum growth from existing 2014 (counts) to 2026 on local traffic component (local roads in/out) and increase existing 2014 (counts) through traffic component on Erskine Park Road by 165 to 220 vehicles per hour in each direction in peak period
- Future 2036 traffic volumes estimate:
  - Carry forward above estimated 2026 traffic volumes
  - 0.7%% per annum growth from 2026 to 2031 on local traffic component (local roads in/out) and increase future 2026 through traffic component on Erskine Park Road by 135 to 160 vehicles per hour in each direction in peak period.

The results of the traffic modelling are provided in Table 6-4. The modelling suggested that the intersection upgrade at Erskine Park Road/Explorers Way and Erskine Park Road/Bennet Road intersections (new signals) would operate with spare capacity and good LoS B by 2031. The model also indicated that proposed intersection upgrades (seagull intersection) at Erskine Park Road/Coonawarra Drive and Erskine Park Road/Peppertree Drive intersections may start to experience capacity issues in 2031. These capacity issues are associated with the lack of available traffic gap opportunities for the right turning vehicles to/from Erskine Park Road from/to local roads. However, it can be expected that some of the right turning demand at Coonawarra Drive and Peppertree Drive may shift to adjacent signals at Explorers Way, Swallow Drive and Bennett Road (future network “self-adjustments”).

**Table 6-4 Modelled traffic conditions at each intersection**

Road	AM Peak			PM Peak		
	Ave delays (s)	LoS	Queue length (m)	Ave delays	LoS	Queue length (m)
Erskine Park Road/ Explorers Way	Existing conditions (2014)					
	51	D	98	57	E	136
	Base case (do nothing) 2026					
	176	F	315	277	F	577
	Base case (do nothing) 2031					
	326	F	525	379	F	750
	Intersection upgrade (the proposal) 2026					
	16	B	189	23	B	205
Erskine Park Road/ Coonawarra Drive	Existing conditions (2014)					
	49	D	18	45	D	58
	Base case (do nothing) 2026					
	130	F	41	342	F	417
	Base case (do nothing) 2031					
	231	F	83	411	F	489
	Intersection upgrade (the proposal) 2026					
	16	B	23	53	D	84
Erskine Park Road/ Peppertree Drive	Intersection upgrade (the proposal) 2031					
	22	B	31	276	F	368
Erskine Park Road/ Bennet Road	Existing conditions (2014)					
	66	E	37	31	C	15

Road	AM Peak			PM Peak		
	Ave delays (s)	LoS	Queue length (m)	Ave delays	LoS	Queue length (m)
Peppertree Drive	Base case (do nothing) 2026					
	393	F	247	85	F	29
	Base case (do nothing) 2031					
	488	F	523	263	F	104
	Intersection upgrade (the proposal) 2026					
	44	D	61	15	B	16
	Intersection upgrade (the proposal) 2031					
	152	F	213	21	B	25
Erskine Park Road/ Bennett Road	Existing conditions (2014)					
	103	F	73	61	E	82
	Base case (do nothing) 2026					
	252	F	203	500	F	571
	Base case (do nothing) 2031					
	349	F	274	672	F	990
	Intersection upgrade (the proposal) 2026					
	16	B	71	21	B	119
	Intersection upgrade (the proposal) 2031					
	18	B	112	21	B	155

#### Operation – parking impacts

Intersection upgrades would result in permanent loss of four parking spaces on Explorers Way.

#### Operation – pedestrian and cyclist impacts

Construction of a three metre wide shared pedestrian and cyclist path on the west side of Erskine Park Road from south of Explorers Way to the south limit of works would improve connectivity for pedestrians and cyclists in the area. The path would provide connectivity for pedestrians and cyclists to roads, footpaths, reserves and cul-de-sacs located to the west of Erskine Park Road. A 1.2 metre wide pedestrian path on the south side of Explorers Way would provide access for pedestrians from the shared path to existing pedestrian paths beside Colorado Drive and Explorers Way. At the south limit of the works, the shared path would connect to an existing pedestrian path.

#### Operation – bus and heavy vehicle impacts

A reduction in travel time for vehicles on Erskine Park Road would improve public transport routes and benefit heavy vehicles. Erskine Park Road is identified as a potential primary bus corridor in the Broader Western Sydney Employment Area Draft Structure Plan. The proposed intersection upgrades would assist in the spatial distribution of road, public transport and freight network as part of the plan. The construction of indented bus bays would improve traffic conditions and provide additional bus stops along Erskine Park Road.

## 6.2.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Traffic	<ul style="list-style-type: none"> <li>A Traffic Management Plan would be developed for the construction work including: <ul style="list-style-type: none"> <li>Staging plans, including temporary traffic arrangements</li> <li>Construction Traffic Control Plans</li> <li>Signpost layout plan showing location, size and legend of all temporary signs; temporary regulatory signs and temporary speed zones; and all traffic control devices including temporary traffic signals, road marking, pavement reflectors, guideposts, safety barrier systems and barrier boards</li> <li>Communication details for personnel nominated for contact outside normal working hours to arrange for adjustments or maintenance of traffic control devices and temporary roadways. Details must also be supplied to the New South Wales Police Service.</li> </ul> </li> </ul>	Contractor	Pre-construction
Traffic	<ul style="list-style-type: none"> <li>Traffic controls would be established at the site in accordance with Roads and Maritime's <i>Traffic Controls at Work Sites</i>.</li> </ul>	Contractor	Pre-construction
Traffic	<ul style="list-style-type: none"> <li>Safety barriers would be used to isolate the construction area from the existing travel lane.</li> </ul>	Contractor	Pre-construction and construction
Traffic	<ul style="list-style-type: none"> <li>Variable message signs (VMS) would be used to warn approaching road users of the works.</li> </ul>	Contractor	Pre-construction and construction
Traffic	<ul style="list-style-type: none"> <li>Access to residences would be maintained during the works.</li> </ul>	Contractor	Construction

## 6.3 Noise and vibration

### 6.3.1 Existing environment

The area around the proposal site is suburban. Sensitive residential receivers are located to the east and west of Erskine Park Road, with the nearest sensitive receivers located within about eight metres of the road. Background noise in the area is dominated by traffic noise from Erskine Park Road. Most receivers have some screening from boundary fences (refer to Figure 6-5).

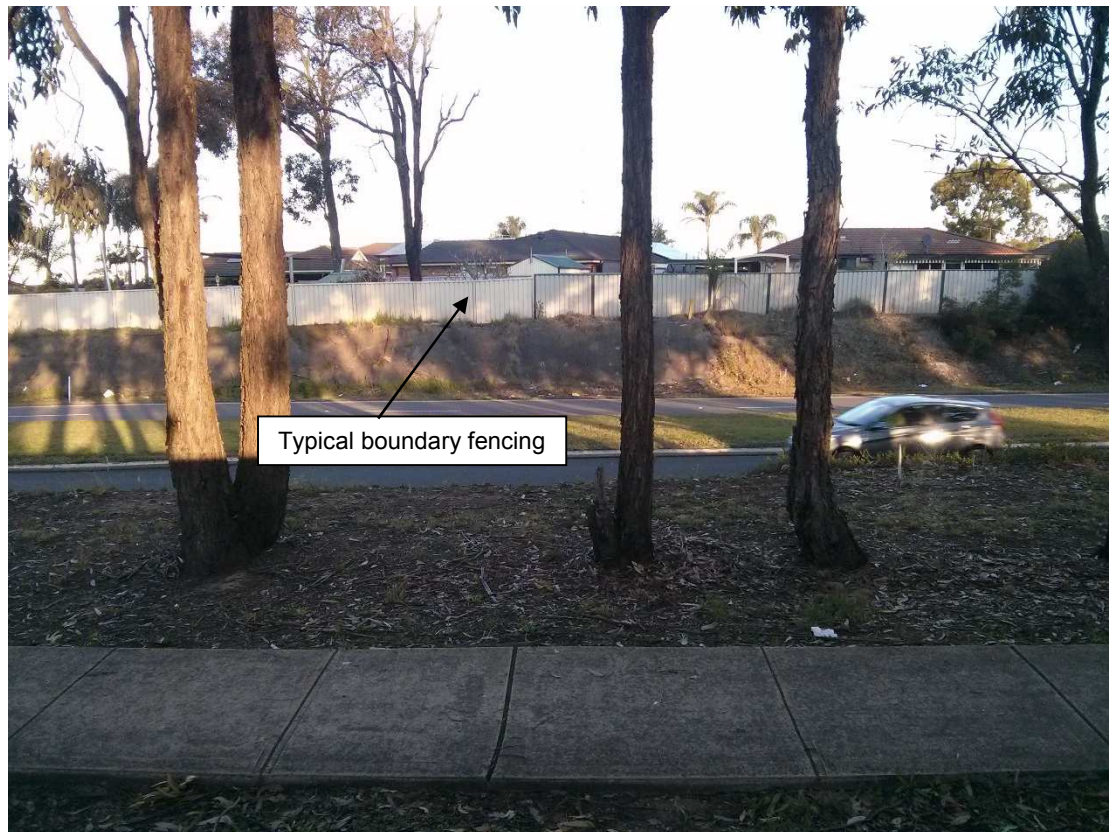


Figure 6-5 Noise screening

### 6.3.2 Potential impacts

#### **Construction noise**

The proposal site is located close to sensitive residential receivers that would be impacted by the construction work. Works outside standard hours are likely to be required to reduce the impact on traffic. Construction work has the potential to result in noise impacts, including sleep disturbance. Road works have the potential to result in vibration impacts if vibrating intensive plant is required. This has the potential to result in human discomfort and structural damage to buildings.

#### **Operational noise**

The proposal would move the road closer to residential receivers, particularly on the western side of Erskine Park Road. The addition of lanes to the road would increase the traffic capacity of the road. There is potential for the proposal to increase operational noise for nearby residential receivers.

### 6.3.3 Noise and vibration assessment

#### **Construction noise**

A construction noise assessment would be carried out for the proposal in accordance with the *Interim Construction Noise Guideline* (ICNG) (DECC, 2009). The assessment would compare predicted noise levels during construction to construction noise management levels. This would provide the predicted noise impact on residential receivers.

Construction noise management levels are determined by the ICNG (refer to Table 6-5). The rating background level is used to determine the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours).

**Table 6-5 Noise Management Levels at Residential Receivers**

Time of Day	Management Level	How to Apply
	$L_{Aeq} (15 \text{ min})$	
Recommended standard hours: Monday to Friday 7am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	Noise affected $RBL^* + 10\text{dB(A)}$	The noise affected level represents the point above which there may be some community reaction to noise.  Where the predicted or measured $L_{Aeq} (15 \text{ min})$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.  The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected $75\text{dB(A)}$	The highly noise affected level represents the point above which there may be strong community reaction to noise.  Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ul style="list-style-type: none"> <li>• times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences)</li> <li>• if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ul>



Time of Day	Management Level	How to Apply
	$L_{Aeq} (15 \text{ min})$	
Outside recommended standard hours	Noise affected RBL * + 5dB(A)	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community.</p> <p>For guidance on negotiating agreements see section 7.2.2 of the ICNG.</p>

\*Rating background noise level ( $LA_{90}$ )

Residential receivers are considered 'noise affected' where construction noise levels are greater than the noise management levels identified in Table 6-5. The noise affected level represents the point above which there may be some community reaction to noise. Where predicted and/or measured construction noise levels exceed noise management levels, all feasible and reasonable work practices will be applied to meet the management levels. Furthermore, during standard construction hours a highly affected noise objective of  $L_{Aeq(15min)} 75 \text{ dB(A)}$  applies at all receivers.

The proposal would be likely to require out of hours work (10pm to 7am), therefore, an assessment of sleep disturbance would be required. The ICNG recommends that where construction works are planned to extend over two or more consecutive nights, the assessment should consider maximum noise levels and the extent and frequency of maximum noise level events exceeding the RBL. Sleep disturbance criteria for the period between 10pm to 7am are:

- $L_{A90(15min)} + 15\text{dB(A)}$
- Upper limit  $L_{A1, 1\text{minute}}: 65\text{dB(A)}$ .

### Construction vibration

The Environmental Protection Authority's (EPA) *Assessing Vibration: a technical guideline* (DEC, 2006) provides the basis for the assessment of construction vibration impacts on building occupants. Vibration sources are defined as Continuous, Impulsive or Intermittent. When applying the criteria, it is important to note that the three directional axes are referenced to the human body, i.e. x-axis (back to chest), y-axis (right side to left side) or z-axis (foot to head). Vibration may enter the body along different orthogonal axes and affect it in different ways. Therefore, application of the criteria requires consideration of the position of the people being assessed. For example, vibration measured in the horizontal plane is compared with x- and y-axis criteria if the concern is for people in an upright position, or with the y- and z- axis criteria if the concern is for people in the lateral position. Preferred and maximum values for continuous, impulsive and intermittent vibration are provided in Table 6-6.

**Table 6-6 Preferred and maximum levels for human comfort**

Table 6-6-1 Preferred and maximum levels for human comfort					
Location	Assessment period	Preferred values		Maximum values	
		z axis	x and y axis	z axis	x and y axis
Continuous vibration (weighted RMS acceleration, m/s <sup>2</sup> , 1-80Hz)					
Residences	Daytime	0.01	0.0071	0.02	0.014

	Night time	0.007	0.005	0.014	0.01
Impulsive vibration (weighted RMS acceleration, m/s <sup>2</sup> , 1-80Hz)					
Residences	Daytime	0.3	0.21	0.6	0.42
	Night time	0.1	0.071	0.2	0.14
Intermittent vibration (vibration dose values VDV, m/s <sup>1.75</sup> , 1-80Hz)					
Residences	Daytime	0.2		0.4	
	Night time	0.13		0.26	

Potential structural damage of buildings as a result of vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as German Standard DIN4150-3. The vibration generated from construction works will vary depending on the level and type of activity carried out at the site during the construction works. Safe limits for construction generated vibration have been determined using the vibration limits set out in the German Standard DIN 4150 Part 3-1999 'Structural Vibration in Buildings – Effects on Structures' (refer to Table 6-7).

**Table 6-7 DIN 4150-3 structural damage criteria**

Type of structure	Vibration velocity mm/s At foundation at frequency of			Plane of floor uppermost storey All frequencies
	Less than 10Hz	10Hz to 50Hz	50Hz to 100Hz	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that because of their particular sensitivity to vibration, do not correspond to those listed above and have intrinsic value (eg buildings under a preservation order)	3	3 to 8	8 to 10	8

### Operational noise

The NSW *Road Noise Policy* (RNP) (DECCW, 2011) contains strategies to address road traffic noise. The proposal would be classed as a 'road redevelopment' under the policy because it would increase the traffic carrying capacity of the road while not substantially altering the alignment. The policy defines criteria to be used in assessing the impact of road traffic noise for this type of road projects.

The noise criteria to assess potential operational noise impacts due to the proposal would be identified in accordance with the RNP and the *Noise Criteria Guideline* (Roads and Maritime, 2015a). Following the assessment of impacts the *Noise Mitigation Guideline* (Roads and Maritime, 2015b) would be used to evaluation, selectin and design of any feasible and reasonable noise mitigation required

#### 6.3.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Noise and vibration impacts	<ul style="list-style-type: none"><li>A Noise and Vibration Impact Assessment would be carried out prior to detailed design. The assessment would assess both construction and operational impacts.</li></ul>	Penrith Council City	Pre Construction –

### 6.4 Soil, water quality and hydrology

#### 6.4.1 Existing environment

##### Geology

The geology of the proposal site consists of Bringelly Shale of the Wianamatta Group (Clark and Jones, 1991). It is classified as a formation of a Mid-Triassic age with lithologies that comprise claystone, siltstone, laminate, sandstone and tuff.

##### Soil

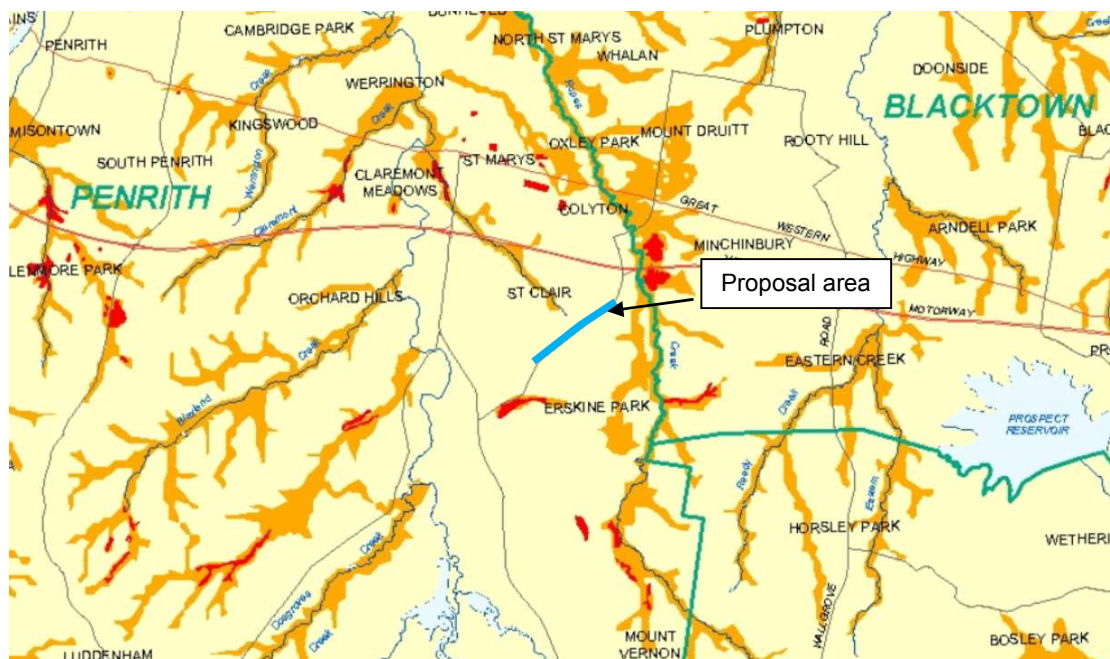
The soil in the proposal area is Blacktown soil (Bannerman and Hazelton 1990). Blacktown soils are characterised by moderate erodibility, poor drainage and expansive subsoils. These soils are finely grained and are defined by Landcom's *Soils and Construction* (2004) manual as dispersible type D. This means that on average more than 33% of the soils have relatively small particle sizes finer than 20 µm.

##### Acid sulphate soil

The proposal is located in an area where acid sulphate soils have a low probability of occurring.

##### Salinity

The proposal area is mapped as having moderate potential for salinity (DIPNR, 2002) (refer to Figure 6-6). Areas of moderate salinity potential have scatted areas of scalding and indicator vegetation but no concentrations have been mapped. Saline areas may occur in this area, which have not been identified or may occur if risk factors change.



**Figure 6-6 Salinity potential within the study area** Green: LGA boundaries. Yellow: low potential for salinity. Orange: moderate potential for salinity. Red: known salinity. (Source: DIPNR 2002)

### Contaminated lands

A search of the EPA Contaminated Land Record for the Penrith LGA on 19 August 2015 found that the nearest recorded contaminated site is about 2.4 kilometres north of the proposal site.

### Water

There are no above ground creeks around the proposal area. There is an extensive stormwater network around Erskine Park Road that drains to the north west of the proposal site. There are two culverts under Erskine Park Road:

- Culvert 100 metres south of Bennet Road
- Byrnes Creek (drainage pipe) 100 metres south of Peppertree Drive.

Byrnes Creek, which meets South Creek about 4.5 kilometres north west of the proposal site. Ropes Creek is located about 430 metres east of the proposal.

Drainage from Erskine Park Road and surrounding residential areas consists of drainage pits and pipes:

- Explorers Way intersection – drainage pits on Erskine Park Road median strip and east and west roadsides of Erskine Park Road
- East roadside of Erskine Park Road – drainage pits with 100 to 500 metre spacing.

Erskine Park Road and the surrounding area are not within a Flood Planning Area.

## 6.4.2 Potential impacts

### Construction impacts

Earthworks would be required for the construction of the road base, batters and retaining walls. The batters would have slopes of 4:1 or 2:1, depending on the surrounding road levels. Soils would mainly be exposed on the western side of Erskine Park Road.

The potential impacts on soils would be mainly due to erosion of soils exposed during the earthwork activities described above and stockpiling. Erosion has the potential to result in the release of sediment to drainage lines resulting in sedimentation of the stormwater system. Substantial areas of cut are unlikely to be required because the road levels would match the existing ground levels.

Construction of the proposal has the potential to impact soil and water quality through accidental spills. This risk is increased at site compounds where vehicle, machinery and other equipment may be stored. Contaminated runoff from accidental hydrocarbon or chemical spills could also impact water quality in drainage lines.

The extension of the culvert, south of Bennett Road, has the potential to impact water quality. Construction works would require excavation of the drainage line bed, exposing soil that has the potential to be eroded. Erosion of soil may occur during rain at the site or due to rain in another part of the catchment resulting in increased flow in the waterway. Sedimentation in the waterways has the potential to reduce the effectiveness of the system.

### Operational impacts

The operation of the proposal would be unlikely to impact soils. Exposed areas would be revegetated, minimising the risk of erosion.

The additional hard surface associated with the road widening would result in increased runoff after rain. The existing stormwater infrastructure that would receive the proposal area runoff is considered to have adequate capacity.

### 6.4.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Erosion and sedimentation	<ul style="list-style-type: none"> <li>A Soil and Water Management Plan (SWMP) will be prepared as part of the Construction Environmental Management Plan (CEMP) in accordance with the requirements of Roads and Maritime contract specification G38 prior to the commencement of construction. The SWMP will also address the following: <ul style="list-style-type: none"> <li>Roads and Maritime Code of Practice for Water Management</li> <li>Roads and Maritime Erosion and Sedimentation Procedure</li> <li>The NSW Soils and Construction – Managing Urban Stormwater Volume 1 “the Blue Book” (Landcom, 2004) and Volume 2 (DECC, 2008).</li> <li>Roads and Maritime Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011.</li> <li>Roads and Maritime Technical Guideline: Environmental</li> </ul> </li> </ul>	Contractor	Pre-construction and construction



Impact	Environmental safeguards	Responsibility	Timing
	Management of Construction Site Dewatering, 2011.		
	<ul style="list-style-type: none"> <li>Environmental safeguards (e.g. sediment fences etc.) are to be installed consistent with "Managing Urban Stormwater: Soils and Construction" (4<sup>th</sup> Edition Landcom, 2004, aka the Blue Book (see <a href="http://www.landcom.com.au/whats-new/the-blue-book.aspx">http://www.landcom.com.au/whats-new/the-blue-book.aspx</a>)) to ensure that there is no escape of turbid plumes into the adjacent aquatic environment.</li> </ul>	Contractor	Construction
	<ul style="list-style-type: none"> <li>Exposed batters are to be progressively stabilised and within two weeks of completion.</li> </ul>	Contractor	Construction
	<ul style="list-style-type: none"> <li>During rehabilitation, stabilise the exposed areas to minimise erosion.</li> </ul>	Contractor	Construction
Degradation of waterway from spills	<ul style="list-style-type: none"> <li>The compound site would be not be located near any waterway</li> </ul>		
	<ul style="list-style-type: none"> <li>Spill kits are to be kept on site, with staff trained with how to use them.</li> </ul>	Contractor	Construction
	<ul style="list-style-type: none"> <li>Response to spills to be discussed during toolbox meetings.</li> </ul>	Contractor	Construction
	<ul style="list-style-type: none"> <li>All re-fuelling of vehicles and equipment would be undertaken in an impervious bunded area.</li> </ul>	Contractor	Construction

## 6.5 Socio-economic

### 6.5.1 Existing environment

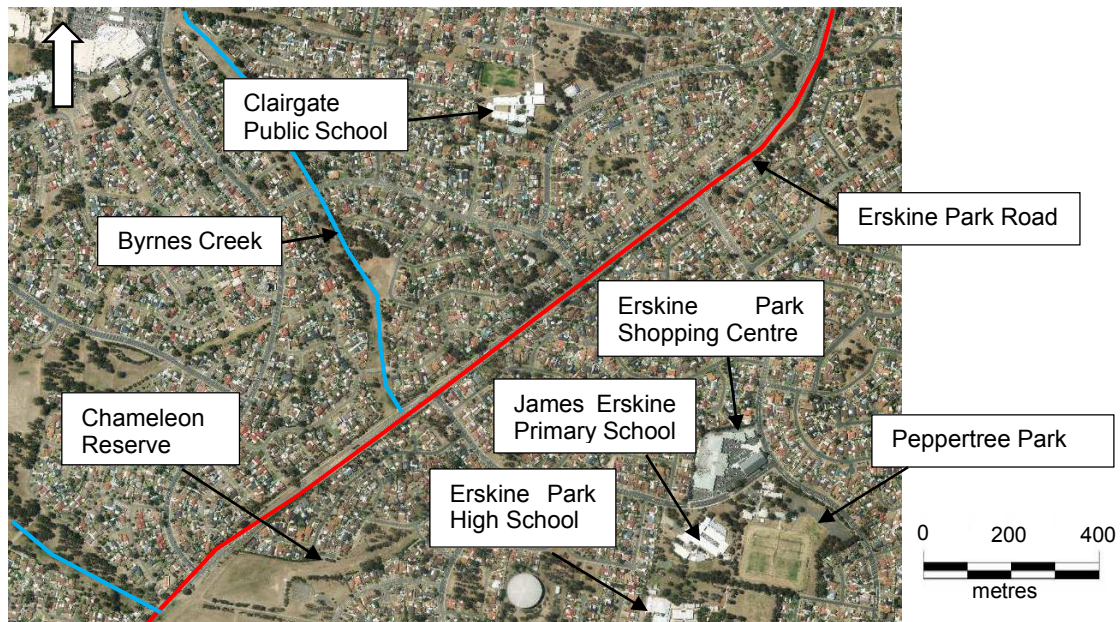
There are a number of recreational areas that can be accessed from Erskine Park Road (refer to Figure 6-7):

- Reserve around Byrnes Creek
- Reserve at culvert (west of Erskine Park Road)
- Chameleon Reserve
- Pedestrian path along west roadside of Erskine Park Road
- Reserve located between Erskine Park Road and Dilga Crescent
- Reserve located at corner of Erskine Park Road and Explorers Way.

There are three schools in the vicinity of the proposal:

- Erskine Park High School (located on Swallow Drive)
- James Erskine Primary School (located on Peppertree Drive)
- Clairgate Public School (located on Colorado Drive).

Peppertree Park and Erskine Park Shopping Centre are located on Swallow Drive.



**Figure 6-7 Location of proposal**

### 6.5.2 Potential impacts

#### **Construction**

The proposal would impact the local community through:

- Traffic and access (Section 6.2)
- Construction noise (Section 6.3)
- Visual impacts (Section 6.9)
- Air quality (Section 6.10).

Pedestrian access to reserves and cul-de-sacs from Erskine Park Road would be restricted during construction of the pedestrian/bicycle path. Access to all businesses, schools and recreational areas would be maintained throughout construction. During construction there is the potential for noise, visual and air quality impacts on residences. There are no businesses or schools on Erskine Park Road within close vicinity of the proposal site.

The proposal would require the acquisition of 15 square metres of 158 Explorers Way. This would reduce the area of this property and potentially impact the property value.

#### **Operation**

The proposal would have a positive impact for bicycle and pedestrian traffic, providing safe access on foot or bicycle to residential areas and reserves from Erskine Park Road. The pedestrian/bicycle path would provide improved recreational value and opportunities for active transport. The proposal would also have a positive impact on traffic conditions on Erskine Park Road, improving connectivity to residential areas, reserves, schools and commercial areas. The construction works, including widening lanes, extending existing right-turn lanes and installing traffic signals, would improve safety and reduce travel times.

At a regional scale, Erskine Park Road has been identified as a potential north-south transport corridor linking Mt Druitt and Leppington. The proposal would improve transport connections between residential and commercial developments in the South West Growth Centre, the Broader WSEA and the airport at Badgerys Creek. This

proposal is consistent with the *Metropolitan Strategy for Sydney*, which sets a vision for improving accessibility to support jobs, homes and lifestyle opportunities.

### 6.5.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Communications	<ul style="list-style-type: none"> <li>Penrith City Council would consult with the property owner of 158 Explorers Way to reach an agreement for the acquisition of property</li> </ul>	Penrith City Council	Design
	<ul style="list-style-type: none"> <li>A construction consultation liaison plan (CCLP), would be prepared and would detail consultation requirements during construction and include a procedure for dealing with complaints. The CCLP would require the construction contractor to provide the community with a 24 hour contact number for communication and complaints.</li> </ul>	Contractor	Pre Construction –
	<ul style="list-style-type: none"> <li>Construction related complaints received would be recorded and attended to promptly in accordance with the Roads and Maritime's <i>Community Involvement Practice Notes and Resource Manual</i>.</li> </ul>	Contractor	Construction

## 6.6 Non-Aboriginal heritage

### 6.6.1 Existing environment

The following databases were searched on 18 August 2015:

- State Heritage Register (search area: St Clair and Erskine Park)
- Australian Heritage Database (search area: St Clair and Erskine Park).

The nearest listed Australian heritage item is Mamre and Curtilage house on Mamre Road, about 2.5 kilometres from the proposal site. The nearest listed locally significant heritage item is Leeholme Horse Stud-Exercise Yard on Luddenham Road, about two kilometres from the proposal site.

### 6.6.2 History

The area which is now the suburbs of St Clair and Erskine Park was granted to James Erskine in 1818. It was rapidly developed agriculturally, providing food for the Sydney Colony. Up until the 1970's and 80's the area remained largely agricultural, producing dairy and beef cattle. In 1977 the first 2000 homes were developed at St Clair.

### 6.6.3 Potential impacts

The proposal would involve upgrading three existing intersections on Erskine Park Road. The works are not within the vicinity of any listed heritage items. There is low potential for impacting heritage items due to previous construction works and current land uses.

### 6.6.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Impact on unknown heritage items	<ul style="list-style-type: none"><li>Should any remains of historic heritage be encountered during the proposed works that have not been assessed here, work should cease in that location and the procedures in the Roads and Maritime's <i>Standard Management Procedure: Unexpected Archaeological Finds</i> (Roads and Maritime, 2012) must be followed.</li></ul>	Contractor	Construction

## 6.7 Aboriginal heritage

### 6.7.1 Existing environment

A search of the AHIMS database was carried out on 18 August 2015, in accordance with the Roads and Maritime PACHCI Stage 1 (refer to Appendix E). There were no registered Aboriginal heritage sites in the vicinity of the proposal.

### 6.7.2 History

The traditional owners of the Penrith region are the Gomerrigal-Tongarra clan, part of the Darug Tribe. The abundance of resources on the flat or undulating shale country of the Cumberland Plain allowed groups to live in one area for weeks or even months at a time, camping in *gunyahs*, which were windbreaks made of branches and sheets of bark. After European settlement, farming removed many traditional food sources, and Darug were forced onto reserves or missions, along with members of the neighbouring Gandangara and Darkinjung Tribes. Corroborees and other ceremonies continued until the 1830s. Today there are no remaining rock carvings or marked trees in the area. The area now has largest concentration of Indigenous Australians anywhere in New South Wales, with the Darug people joined by Torres Strait Islander and Aboriginal people from around Australia.

### 6.7.3 Potential impacts

The proposal site is highly disturbed due to previous construction works and current land uses. The potential for impacting Aboriginal heritage items is low.

### 6.7.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Impact on unknown heritage items	<ul style="list-style-type: none"><li>If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the regional environment officer and Roads and Maritime's Aboriginal</li></ul>	Contractor	Construction

Impact	Environmental safeguards	Responsibility	Timing
	cultural heritage advisor contacted immediately. Steps in the Roads and Maritime <i>Standard Management Procedure: Unexpected Archaeological Finds</i> (Roads and Maritime 2012) must be followed.		

## 6.8 Visual and landscape character

The assessment was carried out in accordance with the *Guideline for Landscape Character and Visual Impact Assessment* (Roads and Maritime, 2013).

### 6.8.1 Method

The method to measure visual impact is based on the combination of the sensitivity of the existing area or view to change and the magnitude (scale, character, distance) of the proposal on that area or view.

Sensitivity refers to the qualities of an area, the type number and type of receivers and how sensitive the existing character of the setting is to the proposed change. For example a pristine natural environment will be more sensitive to change than a built up industrial area.

Magnitude refers to the nature of the project. For example a large interchange would have a very different impact on landscape character than a localised road widening in the same area.

The combination of sensitivity and magnitude will provide the visual impact for viewpoints (refer to Table 6-8 for grading values).

**Table 6-8 Impact grading matrix (Roads and Maritime 2013)**

		Magnitude			
		High	Moderate	Low	
Sensitivity	High	High Impact	High-Moderate	Moderate	Negligible
	Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
	Low	Moderate	Moderate-Low	Low	Negligible
		Negligible	Negligible	Negligible	Negligible



## 6.8.2 Existing environment

### Landscape character

The proposal area is suburban. The dominant features are Erskine Park Road, the M4 Motorway, residential areas and open parkland.

### Visual sensitivity

The viewpoints in the area would be from residences and from road users. The views are of the existing Erskine Park Road. Views of the road from residences are generally obscured by boundary fences (refer to Figure 6-5). There is no access to properties from Erskine Park Road, therefore, residences open out to small suburban streets. Views from residences are mainly from residences located near the intersections.

Key viewpoints were used to assess the potential visual impact of the proposal and are listed in Table 6-9.

**Table 6-9 Key view points of the proposal**

View point and receiver	Description
View of Explorers Way intersection from 158 Explorers Way	Views of the intersection. Some screening from boundary fence and garden plants
View of Coonawarra Drive intersection from 63 Coonawarra Drive	Views of the intersection.
View of Bennett Road intersection from 283 Bennett Road	Views of the intersection.
Southbound road users	Views of Erskine Park Road and road reserve
Northbound road users	Views of Erskine Park Road and road reserve

## 6.8.3 Potential impacts

### Landscape character

The character of the area is moderately sensitive given that Erskine Park Road is currently an important arterial road in the area. The proposal would widen the road but would be unlikely to have a substantial impact on the landscape character of the area. Therefore, the impact on landscape character is assessed to be moderate-low.

Sensitivity	Magnitude	Impact
Moderate	Low	Moderate – low

### Visual sensitivity

The potential impact on sensitive receivers from the key viewpoint is assessed in Table 6-10.

**Table 6-10 Visual impact of key viewpoints**

Viewpoint	Phase	Impact of the proposal	Sensitivity	Magnitude	Overall impact	Comment
View of Explorers Way intersection from 158 Explorers Way	Construction	Views of construction work. Potential light spill from lights for night work	High	High	High	Light spill from night work has the potential to impact residents. This has the potential to be a high impact
	Operation	Views of completed intersection	High	Low	Moderate	The traffic lights and changed lane configuration are not expected to have a substantial impact on residents
View of Coonawarra Drive intersection from 63 Coonawarra Drive	Construction	Views of construction work. Potential light spill from lights for night work	High	High	High	Light spill from night work has the potential to impact residents. This has the potential to be a high impact
	Operation	Views of completed intersection. Vegetation removal in the patch of Cumberland Plain Woodland	High	Moderate	High-Moderate	The changed intersection/lane configuration are not expected to have a substantial impact on residents. If native vegetation is removed this may impact on views of local residents.
View of Bennett Road intersection from 283 Bennett Road	Construction	Views of construction work. Potential light spill from lights for night work	High	High	High	Light spill from night work has the potential to impact residents. This has the potential to be a high impact

Viewpoint	Phase	Impact of the proposal	Sensitivity	Magnitude	Overall impact	Comment
	Operation	Views of completed intersection	High	Low	Moderate	The traffic lights and changed lane configuration are not expected to have a substantial impact on residents
Southbound road users	Construction	Views of construction work	Moderate	Moderate	Moderate	Road users would have short-term views of the construction work.
	Operation	Views of the finished work	Moderate	Low	Moderate-Low	Road users would have short term views of the proposal. A substantial impact is not expected
Northbound road users	Construction	Views of construction work	Moderate	Moderate	Moderate	Road users would have short-term views of the construction work.
	Operation	Views of the finished work	Moderate	Low	Moderate-Low	Road users would have short term views of the proposal. A substantial impact is not expected

#### 6.8.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Rehabilitation	<ul style="list-style-type: none"><li>A Landscape Plan would be prepared in accordance with the Roads and Maritime <i>Landscape Guideline</i></li></ul>	Contractor	Pre-construction

### 6.9 Air quality

#### 6.9.1 Existing environment

Air quality at a regional level is impacted by photochemical smog and fine particle pollution. Motor vehicles are the greatest emitter of pollutants at a local level.

Air quality for St Clair is assessed using readings from the NSW Office of Environment and Heritage's monitoring stations at St Marys, located about 4 kilometres north-west of the proposal site, and Bringelly, located about 15 kilometres south-west of the site. Monitoring results are compared to National Environment Protection Measure (NEPM) standards. In the year from 18 August 2014 to 18 August 2015, 25 exceedences were recorded at the St Marys and Bringelly monitoring stations, three for ozone levels, 20 for suspended fine particles, and two for particles less than 10 micrometres in diameter.

Sensitive receivers in the area are local residents and staff in local businesses.

#### 6.9.2 Potential impacts

Air pollution can cause a wide range of health symptoms, from coughing, wheezing and shortness of breath, to more serious impacts for those with pre-existing respiratory and cardiac conditions.

##### **Construction impacts**

During the proposed works there would be the potential for a localised deterioration in air quality due to:

- Emissions from machinery and vehicles
- Dust and particulates generated from disturbed surfaces, in particular during earthworks. Uncovered loads are also a potential source of dust.

The works would be located in close proximity to residents and dust emissions have the potential to cause disturbance, affect human health and coat windows, cars etc. Traffic disruptions during construction works have the potential to increase vehicle emissions in the local area. These impacts would be short-term.

##### **Operational impacts**

During operation, reduced congestion has the potential to reduce vehicle emissions in the area. This would have a minor positive impact on air quality in the local area.

### 6.9.3 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Vehicle emissions	<ul style="list-style-type: none"> <li>Plant and machinery will be maintained in accordance with manufacturer's specification.</li> </ul>	Contractor	Construction
Vehicle emissions	<ul style="list-style-type: none"> <li>Smoky emissions will be kept within the standards and regulations under the <i>Protection of the Environment Operations Act 1997</i> that no vehicle shall have continuous smoky emissions for more than 10 seconds.</li> </ul>	Contractor	Construction
Vehicle emissions	<ul style="list-style-type: none"> <li>Vehicles will not be left running when idle.</li> </ul>	Contractor	Construction
Dust generation	<ul style="list-style-type: none"> <li>Any material transported in trucks will be appropriately covered to reduce dust generation.</li> </ul>	Contractor	Construction
Dust emissions	<ul style="list-style-type: none"> <li>Measures including watering or covering exposed areas would be used to minimise or prevent dust generation.</li> </ul>	Contractor	Construction
Dust emissions	<ul style="list-style-type: none"> <li>Visual surveillance for dust generation would occur at all times. Work would cease when high levels of airborne dust cannot be controlled.</li> </ul>	Contractor	Construction
Smoke emissions	<ul style="list-style-type: none"> <li>Vegetation or other materials are not to be burnt on site.</li> </ul>	Contractor	Construction

## 6.10 Waste and resource management

### 6.10.1 Policy setting

Waste management would be undertaken in accordance with the *Waste Avoidance and Resource Recovery Act 2001*. The objectives of this Act that are applicable to the proposal are:

- (a) *to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,*
- (b) *to ensure that resource management options are considered against a hierarchy of the following order:*
  - (i) *avoidance of unnecessary resource consumption,*
  - (ii) *resource recovery (including reuse, reprocessing, recycling and energy recovery),*
  - (iii) *disposal,*
- (c) *to provide for the continual reduction in waste generation,*
- (d) *to minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,*
- (e) *to assist in the achievement of the objectives of the Protection of the Environment Operations Act 1997.*



### 6.10.2 Waste sources

The proposed works would generate waste from the following sources.

- Construction and demolition waste from removal of the median strip and road surface
- Metal waste from the removal of guard fences
- Grass, shrubs and tree cuttings from vegetation clearing
- Soil from any used excavated material that is not needed for reuse on site
- Waste from removal of utilities
- Packaging waste from materials brought on site for installation
- General waste.

### 6.10.3 Potential impacts

The quantities of waste generated during construction are not likely to be substantial. All wastes would be disposed of at appropriately licensed waste facilities.

### 6.10.4 Safeguards and management measures

Impact	Environmental safeguards	Responsibility	Timing
Production of packaging materials and other construction waste.	<ul style="list-style-type: none"><li>• The resource management hierarchy will be followed at all times throughout the proposal: <i>avoid resource consumption → recover recyclable materials for reuse → dispose material unable to be recycled</i></li></ul>	Contractor	Construction
Production of construction waste	<ul style="list-style-type: none"><li>• There will be no disposal or re-use of construction waste on to other land.</li></ul>	Contractor	Construction
Burning of waste	<ul style="list-style-type: none"><li>• Waste will not to be burnt on site.</li></ul>	Contractor	Construction
Waste on site	<ul style="list-style-type: none"><li>• Waste material will not be left on site once the works have been completed.</li></ul>	Contractor	Construction
Waste on site	<ul style="list-style-type: none"><li>• Working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day.</li></ul>	Contractor	Construction
Production of garden organics materials	<ul style="list-style-type: none"><li>• The cleared vegetation will be reused on site or disposed of at a facility licensed to receive garden organics materials.</li></ul>	Contractor	Pre-construction and construction

## 6.11 Cumulative impacts

The road network in Western Sydney will be substantially upgraded in the future. There will also be development at the proposed Badgerys Creek Airport and in the Broader WSEA. There is potential for these projects to have a cumulative traffic impact on road users in Western Sydney.

There are no known existing or future developments in the immediate area of the proposal that have the potential to result in a cumulative impact with the proposal.

## 6.12 Summary of beneficial effects

The proposal is expected to improve traffic flow in the area and provide additional traffic capacity to accommodate future traffic volumes in the area.

## 6.13 Summary of adverse effects

The proposal has the potential to result in noise impacts to residents. There would be impacts to traffic flow during construction. The proposal would also require the removal of 0.44 of vegetation.

## 7 Environmental management

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### 7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified in order to minimise adverse environmental impacts, including social impacts, which could potentially arise as a result of the proposal. Should the proposal proceed, these management measures would be incorporated into the detailed design and applied during the construction and operation of the proposal.

A CEMP will be prepared to describe safeguards and management measures identified. These plans will provide a framework for establishing how these measures will be implemented and who would be responsible for their implementation.

The plans will be prepared prior to construction of the proposal and must be reviewed and certified by the Roads and Maritime Environment Officer, Sydney Region, prior to the commencement of any on-site works. The CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP would be developed in accordance with the specifications set out in the: QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan) and the QA Specification G40 – Clearing and Grubbing.

### 7.2 Summary of safeguards and management measures

Environmental safeguards outlined in this document would be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These safeguards would minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The safeguards and management measures are summarised in Table 7-1.

**Table 7-1 Summary of site specific environmental safeguards**

No.	Impact	Environmental safeguards	Responsibility	Timing
1	General	<ul style="list-style-type: none"> <li>All environmental safeguards must be incorporated within the following: <ul style="list-style-type: none"> <li>Project Environmental Management Plan</li> <li>Detailed design stage</li> <li>Contract specifications for the proposal</li> <li>Contractor's Environmental Management Plan</li> </ul> </li> </ul>	Project manager	Pre-construction
2	General	<ul style="list-style-type: none"> <li>The Roads and Maritime Services Project Manager must notify the Roads and Maritime Services Environmental Officer Sydney at least five working days prior to work commencing.</li> </ul>	Project manager	Pre-construction
3	General	<ul style="list-style-type: none"> <li>All businesses and residences likely to be affected by the proposed works must be notified at least five working days prior to the commencement of the proposed activities.</li> </ul>	Project manager	Pre-construction
4	General	<ul style="list-style-type: none"> <li>Environmental awareness training must be provided, by the contractor, to all field personnel and subcontractors.</li> </ul>	Contractor	Pre-construction and during construction as required.
5	Biodiversity	<ul style="list-style-type: none"> <li>Vegetation removal should be minimised where possible.</li> </ul>	Penrith City Council	Design
6	Biodiversity	<ul style="list-style-type: none"> <li>The construction concept plan should minimise vegetation removal in the section of better quality Cumberland Plain Woodland as a matter of priority.</li> </ul>	Penrith City Council	Design
7	Biodiversity	<ul style="list-style-type: none"> <li>Prior to the start of any clearing a physical clearing boundary is to be demarcated and implemented. The demarcation of the exclusion zone will be in accordance with Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects. Guide 2: exclusion zones (Roads and Maritime, 2011).</li> </ul>	Contractor	Pre-construction
8	Biodiversity	<ul style="list-style-type: none"> <li>Use areas already impacted by previous clearing or disturbance for access purposes during construction or the establishment of compound sites.</li> </ul>	Contractor	Pre-construction

No.	Impact	Environmental safeguards	Responsibility	Timing
9	Biodiversity	<ul style="list-style-type: none"> <li>All vegetation removal including habitat tree removal is to be done in accordance with the Roads and Maritime Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects. Guide 4: Clearing of vegetation and removal of bushrock (Roads and Maritime, 2011).</li> </ul>	Contractor	Pre-construction
10	Biodiversity	<ul style="list-style-type: none"> <li>Declared noxious weeds will be managed according to the requirements stipulated by the Noxious Weeds Act 1993, and any weed removal activities will follow Guide 6 (Weed Management) in the Biodiversity Guidelines (RTA 2011).</li> </ul>	Contractor	Pre-construction
11	Biodiversity	<ul style="list-style-type: none"> <li>Revegetation of any bare soil or cleared areas with locally-occurring native flora species typical of the original habitat will be undertaken to improve habitat for both native and threatened species that have the potential to occur in the area.</li> </ul>	Contractor	Construction
12	Traffic	<ul style="list-style-type: none"> <li>A Traffic Management Plan would be developed for the construction work including: <ul style="list-style-type: none"> <li>Staging plans, including temporary traffic arrangements</li> <li>Construction Traffic Control Plans</li> <li>Signpost layout plan showing location, size and legend of all temporary signs; temporary regulatory signs and temporary speed zones; and all traffic control devices including temporary traffic signals, road marking, pavement reflectors, guideposts, safety barrier systems and barrier boards</li> </ul> </li> <li>Communication details for personnel nominated for contact outside normal working hours to arrange for adjustments or maintenance of traffic control devices and temporary roadways. Details must also be supplied to the New South Wales Police Service.</li> </ul>	Contractor	Pre-construction
13	Traffic	<ul style="list-style-type: none"> <li>Traffic controls would be established at the site in accordance with Roads and Maritime's <i>Traffic Controls at Work Sites</i>.</li> </ul>	Contractor	Pre-construction



No.	Impact	Environmental safeguards	Responsibility	Timing
14	Traffic	<ul style="list-style-type: none"> <li>Safety barriers would be used to isolate the construction area from the existing travel lane.</li> </ul>	Contractor	Pre-construction and construction
15	Traffic	<ul style="list-style-type: none"> <li>Variable message signs (VMS) would be used to warn approaching road users of the works.</li> </ul>	Contractor	Pre-construction and construction
16	Traffic	<ul style="list-style-type: none"> <li>Access to residences would be maintained during the works.</li> </ul>	Contractor	Construction
17	Noise and vibration	<ul style="list-style-type: none"> <li>A Noise and Vibration Impact Assessment would be carried out prior to detailed design. The assessment would assess both construction and operational impacts.</li> </ul>	Penrith City Council	Pre – Construction
18	Soil, water and hydrology	<ul style="list-style-type: none"> <li>A Soil and Water Management Plan (SWMP) will be prepared as part of the Construction Environmental Management Plan (CEMP) in accordance with the requirements of Roads and Maritime contract specification G38 prior to the commencement of construction. The SWMP will also address the following: <ul style="list-style-type: none"> <li>Roads and Maritime Code of Practice for Water Management</li> <li>Roads and Maritime Erosion and Sedimentation Procedure</li> <li>The NSW Soils and Construction – Managing Urban Stormwater Volume 1 “the Blue Book” (Landcom, 2004) and Volume 2 (DECC, 2008).</li> <li>Roads and Maritime Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011.</li> </ul> </li> <li>Roads and Maritime Technical Guideline: Environmental Management of Construction Site Dewatering, 2011.</li> </ul>	Contractor	Pre-construction and construction
19	Soil, water and hydrology	<ul style="list-style-type: none"> <li>Environmental safeguards (e.g. sediment fences etc.) are to be installed consistent with “Managing Urban Stormwater: Soils and Construction” (4<sup>th</sup> Edition Landcom, 2004, aka the Blue Book (see <a href="http://www.landcom.com.au/whats-new/the-blue-book.aspx">http://www.landcom.com.au/whats-new/the-blue-book.aspx</a>)) to ensure that there is no escape of turbid plumes into the adjacent aquatic environment.</li> </ul>	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
20	Soil, water and hydrology	<ul style="list-style-type: none"> <li>Exposed batters are to be progressively stabilised and within two weeks of completion.</li> </ul>	Contractor	Construction
21	Soil, water and hydrology	<ul style="list-style-type: none"> <li>During rehabilitation, stabilise the exposed areas to minimise erosion.</li> </ul>	Contractor	Construction
22	Soil, water and hydrology	<ul style="list-style-type: none"> <li>The compound site would be not be located near any waterway.</li> </ul>		
23	Soil, water and hydrology	<ul style="list-style-type: none"> <li>Spill kits are to be kept on site, with staff trained with how to use them.</li> </ul>	Contractor	Construction
24	Soil, water and hydrology	<ul style="list-style-type: none"> <li>Response to spills to be discussed during toolbox meetings.</li> </ul>	Contractor	Construction
25	Soil, water and hydrology	<ul style="list-style-type: none"> <li>All re-fuelling of vehicles and equipment would be undertaken in an impervious bunded area.</li> </ul>	Contractor	Construction
26	Socio-economic	<ul style="list-style-type: none"> <li>A construction consultation liaison plan (CCLP), would be prepared and would detail consultation requirements during construction and include a procedure for dealing with complaints. The CCLP would require the construction contractor to provide the community with a 24 hour contact number for communication and complaints.</li> </ul>	Contractor	Pre – Construction
27	Socio-economic	<ul style="list-style-type: none"> <li>Construction related complaints received would be recorded and attended to promptly in accordance with the Roads and Maritime's <i>Community Involvement Practice Notes and Resource Manual</i>.</li> </ul>	Contractor	Construction
28	Non-Aboriginal heritage	<ul style="list-style-type: none"> <li>Should any remains of historic heritage be encountered during the proposed works that have not been assessed here, work should cease in that location and the procedures in the Roads and Maritime's <i>Standard Management Procedure: Unexpected Archaeological Finds</i> (Roads and Maritime, 2012) must be followed.</li> </ul>	Contractor	Construction
29	Aboriginal heritage	<ul style="list-style-type: none"> <li>If Aboriginal heritage items are uncovered during the works, all works in the vicinity of the find must cease and the regional environment officer and Roads and Maritime's Aboriginal cultural heritage advisor contacted immediately. Steps in the Roads and Maritime <i>Standard</i></li> </ul>	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
		<i>Management Procedure: Unexpected Archaeological Finds</i> (Roads and Maritime 2012) must be followed.		
30	Visual	<ul style="list-style-type: none"> <li>A Landscape Plan would be prepared in accordance with the Roads and Maritime <i>Landscape Guideline</i></li> </ul>	Contractor	Pre-construction
31	Air quality	<ul style="list-style-type: none"> <li>Plant and machinery will be maintained in accordance with manufacturer's specification.</li> </ul>	Contractor	Construction
32	Air quality	<ul style="list-style-type: none"> <li>Smoky emissions will be kept within the standards and regulations under the <i>Protection of the Environment Operations Act 1997</i> that no vehicle shall have continuous smoky emissions for more than 10 seconds.</li> </ul>	Contractor	Construction
33	Air quality	<ul style="list-style-type: none"> <li>Vehicles will not be left running when idle.</li> </ul>	Contractor	Construction
34	Air quality	<ul style="list-style-type: none"> <li>Any material transported in trucks will be appropriately covered to reduce dust generation.</li> </ul>	Contractor	Construction
35	Air quality	<ul style="list-style-type: none"> <li>Measures including watering or covering exposed areas would be used to minimise or prevent dust generation.</li> </ul>	Contractor	Construction
36	Air quality	<ul style="list-style-type: none"> <li>Visual surveillance for dust generation would occur at all times. Work would cease when high levels of airborne dust cannot be controlled.</li> </ul>	Contractor	Construction
37	Air quality	<ul style="list-style-type: none"> <li>Vegetation or other materials are not to be burnt on site.</li> </ul>	Contractor	Construction
38	Waste and resource management	<ul style="list-style-type: none"> <li>The resource management hierarchy will be followed at all times throughout the proposal:</li> <li><i>avoid resource consumption → recover recyclable materials for reuse → dispose material unable to be recycled</i></li> </ul>	Contractor	Construction
39	Waste and resource management	<ul style="list-style-type: none"> <li>There will be no disposal or re-use of construction waste on to other land.</li> </ul>	Contractor	Construction

No.	Impact	Environmental safeguards	Responsibility	Timing
40	Waste and resource management	<ul style="list-style-type: none"> <li>Waste will not to be burnt on site.</li> </ul>	Contractor	Construction
41	Waste and resource management	<ul style="list-style-type: none"> <li>Waste material will not be left on site once the works have been completed.</li> </ul>	Contractor	Construction
42	Waste and resource management	<ul style="list-style-type: none"> <li>Working areas will be maintained, kept free of rubbish and cleaned up at the end of each working day.</li> </ul>	Contractor	Construction
45	Waste and resource management	<ul style="list-style-type: none"> <li>The cleared vegetation will be reused on site or disposed of at a facility licensed to receive garden organics materials.</li> </ul>	Contractor	Pre-construction and construction

### 7.3 Licensing and approvals

No licences or approvals would be required for the proposal.



## 8 Conclusion

### 8.1 Justification

Penrith City Council, on behalf of Roads and Maritime, proposes to upgrade four intersections on Erskine Park Road to improve traffic flow and provide additional capacity to cater for future traffic growth. The proposal also includes improvements for pedestrian and cyclists.

While the proposal has the potential to impact on a number of environmental factors including noise and traffic during construction, these impacts would be temporary. The proposal would also require the removal of about 0.44 hectares of Cumberland Plain Woodland. Mitigation measures would be implemented to minimise and manage the impacts. The long term benefits of the proposal outweigh any environmental impacts. The proposal is therefore justified.

### 8.2 Objects of the EP&A Act

Object	Comment
5(a)(i) To encourage the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.	The proposal would improve the road network to cater for future traffic growth due to the Broader WSEA. The proposal would have a positive impact on the social and economic welfare on the community.
5(a)(ii) To encourage the promotion and co-ordination of the orderly economic use and development of land.	Not relevant to the proposal.
5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services.	The proposal would ensure that services in the area with the potential to be impacted would be relocated or protected.
5(a)(iv) To encourage the provision of land for public purposes.	Not relevant to the proposal.
5(a)(v) To encourage the provision and co-ordination of community services and facilities.	Not relevant to the proposal.
5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.	The detailed design would aim to minimise any impacts on Cumberland Plain Woodland
5(a)(vii) To encourage ecologically sustainable development.	Ecologically sustainable development is considered in Sections 8.2.1 – 8.2.4 below.
5(a)(viii) To encourage the provision and maintenance of affordable housing.	Not relevant to the project.
5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State.	The proposal is Federal Government funded. Penrith City Council are implementing the proposal on behalf of Roads and Maritime. This demonstrates local, State and Federal involvement in the proposal.
5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment.	This REF would be made available on the Penrith City Council website and the community would be provided with an opportunity to comment on the REF.

### 8.2.1 The precautionary principle

The precautionary principle has been adopted during the concept design phase of the proposal. The proposal has been designed to ensure that no serious or irreversible environmental damage would arise from the proposed activities. The proposal design was modified to avoid potential flooding impacts. The safeguards that would be implemented to minimise or mitigate any potential impacts provide a high degree of certainty the proposal would not result in significant impacts.

### 8.2.2 Intergenerational equity

The proposal would improve the road network and cater for future traffic growth in the area. The proposal would improve the operation of transport infrastructure and improve safety and would have positive impacts and would not adversely impact on the environment such that it would compromise the health, diversity or productivity of the environment to unsustainable levels that would impact on present and future generations.

### 8.2.3 Conservation of biological diversity and ecological integrity

The proposal would require the removal of about 0.44 hectares of vegetation. This impact is not expected to be significant. The proposal would maintain biological diversity and the ecological integrity of the locality.

### 8.2.4 Improved valuation, pricing and incentive mechanisms

The proposal would support future development in the area. This would reduce the need for future work and reduce future costs.

## 8.3 Conclusion

The proposed intersection upgrades on Erskine Park Road is subject to assessment under Part 5 of the EP&A Act. The REF has examined and taken into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposed activity. This has included consideration of conservation agreements and plans of management under the NPW Act, joint management and biobanking agreements under the TSC Act, wilderness areas, critical habitat, impacts on threatened species, populations and ecological communities and their habitats and other protected fauna and native plants.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts on noise, traffic and biodiversity. Mitigation measures as detailed in this REF would ameliorate or minimise these expected impacts. The proposal would also improve the road network, reduce travel times and improve road safety. On balance the proposal is considered justified.

The environmental impacts of the proposal are not likely to be significant and therefore it is not necessary for an environmental impact statement to be prepared and approval to be sought for the proposal from the Minister for Planning under Part 5.1 of the EP&A Act. The proposal is unlikely to affect threatened species, populations or ecological communities or their habitats, within the meaning of the TSC Act or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have an impact on any matters of national environmental significance.

## 9 Certification

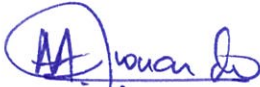
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This review of environmental factors provides a true and fair review of the proposal in relation to its potential effects on the environment. It addresses to the fullest extent possible all matters affecting or likely to affect the environment as a result of the proposal.



Jonathan Dowling  
Senior Environmental Consultant  
NGH Environmental  
Date: 9 September 2015

I have examined this review of environmental factors and the certification by Jonathan Dowling, NGH Environmental and accept the review of environmental factors on behalf of Penrith City Council.



Ari Fernando  
Project Manager  
Penrith City Council  
Date: 9 - Sept - 2015

## 10 References

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# Terms and acronyms used in this REF

CEMP	Construction environmental management plan
EIA	Environmental impact assessment
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i> . Provides the legislative framework for land use planning and development assessment in NSW
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i> . Provides for the protection of the environment, especially matters of national environmental significance, and provides a national assessment and approvals process.
ESD	Ecologically sustainable development. Development which uses, conserves and enhances the resources of the community so that ecological processes on which life depends, are maintained and the total quality of life, now and in the future, can be increased
FM Act	<i>Fisheries Management Act 1994 (NSW)</i>
Heritage Act	<i>Heritage Act 1977 (NSW)</i>
ISEPP	State Environmental Planning Policy (Infrastructure) 2007
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act.
LoS	Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers.
NES	Matters of national environmental significance under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Noxious Weeds Act	<i>Noxious Weeds Act 1993 (NSW)</i>
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
SEPP	State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act.
SEPP 14	<i>State Environmental Planning Policy No.14 – Coastal Wetlands</i>
TSC Act	<i>Threatened Species Conservation Act 1995 (NSW)</i>
QA Specifications	Specifications developed by Roads and Maritime Services for use with roadworks and bridgeworks contracts let by Roads and Maritime Services
Seagull junction	Intersection configuration providing separate deceleration and acceleration lanes in the main road for right turn vehicles to and from the minor side road respectively.