# Bus Priority Infrastructure Program
# On-time running improvements
# Castle Hill to M2 Motorway corridor

Review of Environmental Factors

**May 2017**

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## Roads and Maritime Services

# Bus Priority Infrastructure Program On-time running improvements Castle Hill to M2 Motorway Corridor

Review of Environmental Factors

## May 2017

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Prepared by Hills Environmental



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# Executive summary

## The proposal

Transport for NSW, in partnership with Roads and Maritime, is proposing to improve the reliability of buses by making changes to bus stops along the corridor between Castle Hill and the M2 Motorway (the proposal). The main features of the proposal are:

- Rationalising bus stop locations to optimise the spacing between bus stops
- Lengthening some bus stops to improve access for buses and assist passenger boarding and alighting
- Relocating some bus stops to optimise spacing and / or address traffic and safety issues
- Improving bus stop infrastructure at some locations including changes to bus stop signage
- Reducing delays for buses by moving bus stops to the departure side of traffic lights, allowing them to take advantage of the Public Transport Information and Priority System (PTIPS).

A summary of the proposed changes is provided below:

- Eight bus stop removals (including the removal of signage and other bus stop infrastructure)
- Three bus stop improvements (including extensions)
- Five bus stop relocations.

## Need for the proposal

The proposal forms part of the Bus Priority Infrastructure Program and supports *Sydney's Bus Future* (Transport for NSW, 2013) by delivering projects that make buses more reliable.

The Bus Priority Infrastructure Program is consistent with, recognises and progresses NSW Government policies and plans, including the NSW Premier Priorities and Sydney's Bus Future. The current program focus on improvements in Rapid and Suburban routes, as outlined in Sydney's Bus Future, and targeted corridors that experience lower service reliability.

The Bus Priority Infrastructure Program supports targeted improvements for bus on-time running through a range of initiatives, including:

- Combining or removing some bus stops where they are spaced close together
- Lengthening some bus stops to accommodate longer articulated buses
- Making it easier for buses to move in and out of bus stops by removing or relocating on-street parking
- Reducing potential delays for buses at traffic signals by moving stops to the departure side of the intersection.

This initiative is the first stage aimed at achieving on-time running improvements of buses. Any future proposal by the NSW Government to develop the corridor into a rapid route would involve further reviewing the bus service along this corridor and consideration of other road and traffic management improvements. This would be subject to further consultation.

## Proposal objectives

The objectives of the proposal are to:

1. Achieve more reliable travel times for bus passengers
2. Improve on-time running for buses consistent with the State Priority to maintain or improve reliability of public transport services
3. Improve road safety and traffic efficiency at bus stop locations #10, #23 and #28
4. Minimise impacts for users of suburban and local services
5. Minimise impacts on the environment and the community.

## Options considered

Given the nature of the proposal, consideration of options was largely confined to whether the proposal could be justified in the context of the proposal objectives. This is effectively an evaluation of the proposal against the 'do nothing' option.

Key considerations for developing the proposal were derived from *Sydney's Bus Future* (Transport for NSW, 2013) and the draft *Bus Stop Location Guidelines Sydney Metropolitan Area* (Transport for NSW, n.d.) and were as follows*:*

1. Plan to achieve a general standardised 400 metre spacing between bus stops, while spacing of bus stops between 800 metres and one kilometre apart would be considered as part of planning for a future rapid bus route
2. Ensure bus stops are located close to major patronage generators and community facilities to maximise the efficiency of a bus stop and eliminating redundant and underutilised stops
3. Locate bus stops on the departure side of signalised intersections to improve traffic conditions and help buses to meet the timetable using PTIPS.
4. Adjust and locate bus stops to improve pedestrian safety
5. Provide suitable bus zone length to allow buses to manoeuvre in and out of bus stops easily without obstructing the adjacent lane.

Another important consideration in developing the proposal was to ensure bus stops used by local and suburban services in the corridor remain accessible. Where removing a bus stop would result in excessive distance between stops for local and/or suburban routes, no changes have been proposed. Transport for NSW will further review bus stops along the corridor and undertake further consultation as part of future planning for a rapid bus route.

The 'do nothing' option (Option 2) involves making no changes to improve bus reliability. While Option 2 would not affect existing bus users (proposal objective 3) and would have no environmental impacts (proposal objective 4), it would not improve bus travel time reliability or improve on-time running (proposal objectives 1 and 2).

Option 1 best meets proposal objectives 1 and 2, and while it would have some environmental and community impacts, environmental safeguards and management measures have been proposed to address these impacts.

## Statutory and planning framework

The proposal is permissible without consent under *State Environmental Planning Policy (Infrastructure) 2007* and requires assessment under Part 5 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act).

For the purposes of these works, Roads and Maritime is the proponent and the determining authority under Part 5 of the EP&A Act.

The assessment of potential proposal impacts found that it would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Government Department of the Environment and Energy is not required.

## Community and stakeholder consultation

Roads and Maritime has developed a community consultation and stakeholder engagement plan for the proposal. The plan identifies key objectives and the desired consultation outcomes. It focuses on consultation with relevant Government agencies, stakeholders and the community affected by the proposal. The plan's overall objectives are to:

- Provide stakeholders with clear, relevant, timely and accurate information about the proposal, proposed changes and impacts
- Identify local issues to ensure the proposal aligns with community needs
- Inform and consult affected and interested stakeholder groups.

To date consultation has focused on government agencies, particularly local councils. No substantive issues or objections have been raised to date.

The REF will be displayed publicly and submissions will be invited. All issues raised will then be considered and responded to in the subsequent submissions report.

The REF will be displayed on the Roads and Maritime website. A community update will be letterbox-dropped to residents and businesses, and additional stakeholders will receive the community update with a covering email/letter.

During the public display period, potentially affected residents, businesses and other nearby stakeholders will be visited by project team staff near bus stops with significant changes to discuss the proposal and address their issues of concern. Project team staff will also schedule and meet with potentially affected residents and other stakeholders as requested.

## Environmental impacts

Impacts during the construction phase include delays to traffic and nuisance from noise, dust, soil and water. These potential impacts are minor and manageable with implementation of appropriate environmental safeguards and management measures.

The main potential operational benefits and impacts associated with the proposal would be:

- Improved reliability of bus services and reduced total travel time
- Improvements in traffic efficiency and road safety at some locations
- Removal and relocation of bus stops which would increase walking distance to bus stops for some people. The proposal targets 400 metre spacing between bus stops, however greater than 400 metres space was considered acceptable at some locations to minimise the amount of bus stop relocations across the corridor.

Environmental safeguards have been proposed for the design phase of the proposal and during construction and operation of the proposal, should it proceed. These include implementing a communication plan and complaints handling process and maintaining accesses to business and properties. These safeguards will minimise any potential adverse impacts arising from the proposed works on the surrounding environment.

## Justification and conclusion

The proposal to make changes to bus stops on the corridor from Castle Hill to the M2 Motorway serviced by Metrobus Route M61 and other suburban and local services, 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.

Several potential environmental impacts from the proposal have been avoided or reduced during the proposal development, including avoiding changes where bus stops are well used or needed to provide suitable access for less mobile people.

The proposal as described in the REF best meets the proposal objectives but would still result in some impacts, including increased walking distances to bus stops for some customers and temporary nuisance during construction Environmental safeguards and management measures as detailed in this REF would mitigate or minimise these expected impacts.

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 significantly affect threatened species, populations or ecological communities or their habitats 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.

On balance, the benefits derived from proceeding with the proposal are considered to outweigh the potential impacts. It is therefore considered justified.

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# 1 Introduction

## 1.1 Proposal identification

Transport for NSW is a lead agency in the Transport cluster with responsibility for setting the strategic direction and guiding an extended network of public and private service delivery agencies to provide improved transport outcomes. Roads and Maritime Services (Roads and Maritime) is the delivery agency providing agreed outcomes across the road and maritime networks within the context of an integrated transport strategy. Roads and Maritime delivers projects and programs to reliably and safely improve the movement of people and goods by various transport modes, including through the road and freight network, NSW waterways, the public transport network and active transport such as cycling and pedestrian networks.

Transport for NSW, in partnership with Roads and Maritime, is proposing to improve the reliability of buses by making changes to bus stops along the corridor between Castle Hill and the M2 Motorway (the proposal). The main features of the proposal are:

- Rationalising bus stop locations to optimise the spacing between bus stops
- Lengthening some bus stops to improve access for buses and assist passenger boarding and alighting
- Improving bus stop infrastructure at some locations including changes to bus stop signage
- Reducing delays for buses by moving bus stops to the departure side of traffic lights, allowing them to take advantage of the Public Transport Information and Priority System (PTIPS).

A summary of the proposed changes is provided below:

- Eight bus stop removals (including the removal of signage and other bus stop infrastructure)
- Three bus stop improvements (including extensions)
- Five bus stop relocations.

The proposal site traverses the suburbs of Baulkham Hills and Castle Hill and is within the Hills Shire local government area. The corridor between Castle Hill and the M2 Motorway is used by the Metrobus M61 route and a range of suburban and local bus services providing access between the Castle Hill and Baulkham Hills commercial / retail centres and the M2 Motorway. It also forms part of the broader corridor that links to Parramatta via Windsor Road and to Liverpool via the T-way. Implementation of the proposal would take up to two months.

## 1.2 Purpose of the report

This Review of Environmental Factors has been prepared by Hills Environmental on behalf of Roads and Maritime. For the purposes of these works, Roads and Maritime 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 proposed works and 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 examine and take 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 significance of any impact on nationally listed biodiversity matters under the EPBC Act, including whether there is a real possibility that the activity may threaten long-term survival of these matters, and whether offsets are required and able to be secured
- The potential for the proposal to significantly impact any other matters of national environmental significance or Commonwealth land and the need, subject to the EPBC Act strategic assessment approval, to make a referral to the Australian Government Department of the Environment and Energy for a decision by the Commonwealth Minister for the Environment on whether assessment and approval is required under the EPBC Act.

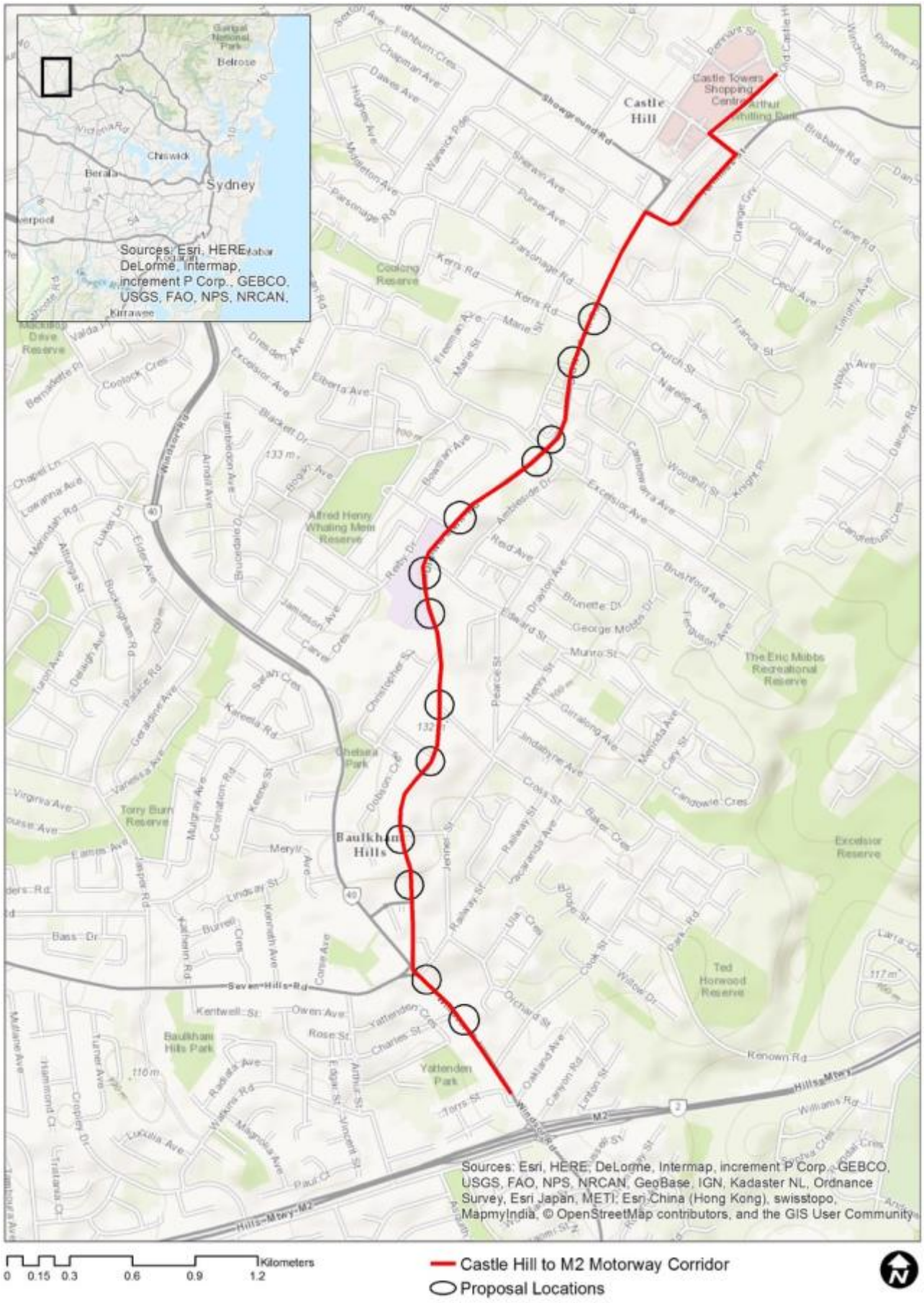



*Figure 1-1 Location of the proposal*

# 2 Need and options considered

## 2.1 Strategic need for the proposal

### Sydney's Bus Future

*Sydney's Bus Future* (Transport for NSW, 2013) is the NSW Government's long term plan to redesign the bus network to meet customer needs now and into the future. This strategic plan was published in December 2013 and is consistent with the *NSW Long Term Transport Master Plan* (Transport for NSW, 2012). *Sydney's Bus Future* identifies the city's most important bus routes, as the focus for investment in bus priority and more frequent services and aims to provide:

- A simpler bus network that is easy for customers to understand and use. It makes routes more direct, reduces duplication and increases the number of locations which customers can travel between by bus
- A faster bus network that gets customers where they want to go in the shortest amount of time. It is reliable and delivers frequent services that connect seamlessly with other buses, trains, light rail and ferries
- A better bus network that is more efficient, convenient and cost-effective with features that include a modern, comfortable fleet, real time customer information and world-class customer service.

*Sydney's Bus Future* identifies a clear, three-tiered network with each level delivering a defined level of service consistency and reliability. This is illustrated by Figure 1-1.

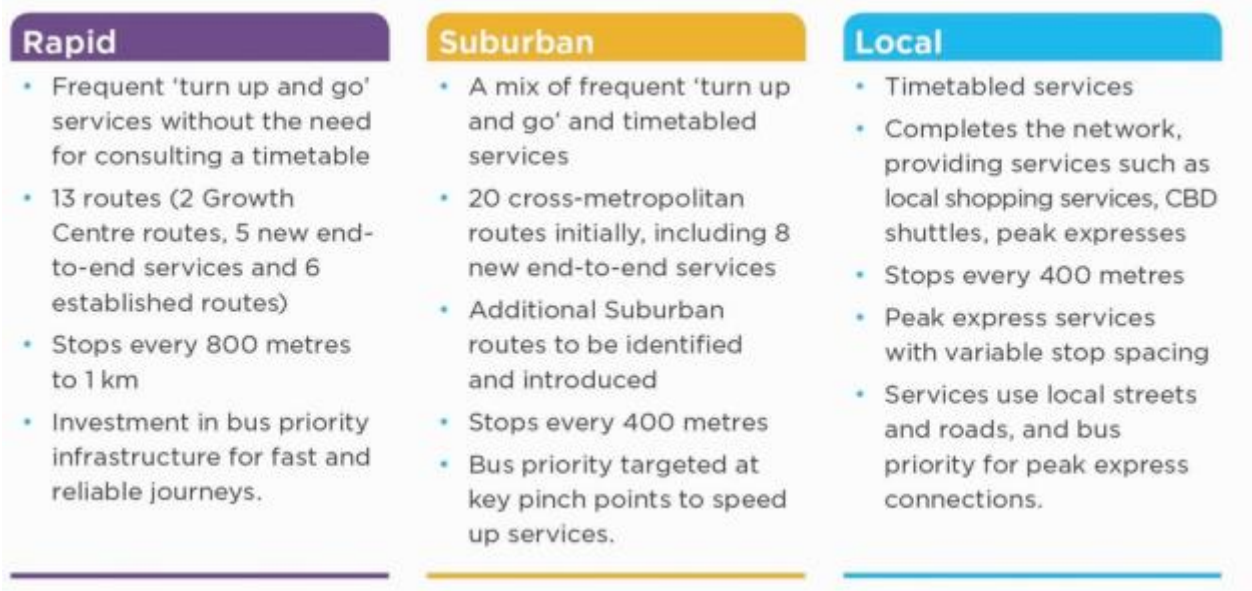



*Figure 2-1 Sydney's Bus Future route hierarchy*

Roads and Maritime and Transport for NSW is working to improve bus travel speeds and service reliability for customers on the corridor between Castle Hill and the M2 Motorway (and extending to Liverpool via the T-way) which is serviced by the Metrobus (route M61) and other suburban and local services. The key short-term actions identified in for this route in *Sydney's Bus Future* are:

- Implement bus priority along the full corridor
- High capacity vehicles on new end-to-end service
- High quality interchanges with consistent wayfinding and signage
- Address bus pinch points with bus priority treatments on:
  - Old Northern Road
  - Windsor Road between Baulkham Hills and North Parramatta.

As a longer term initiative, potential conversion to light rail as part of the Western Sydney Light Rail Network would be investigated.

The following customer benefits from these actions were identified as:

- Over 50 new services every weekday between Castle Hill and Parramatta
- Able to carry over 2000 extra customers each day
- More early morning, evening, night and weekend services.

The Bus Priority Infrastructure Program supports *Sydney's Bus Future* by delivering projects that make bus services more reliable and by allowing a higher frequency of service. This is consistent with the principle that rapid routes should provide a fast, reliable bus travel for customers between major centres. The proposal is being delivered under the Bus Priority Infrastructure Program.

The current program focuses on improvements in Rapid and Suburban routes, as outlined in *Sydney's Bus Future*, and targeted corridors that experience lower service reliability. It supports targeted improvements for bus on-time running through a range of initiatives, including:

- Combining or removing some bus stops where they are spaced close together
- Lengthening some bus stops to accommodate longer articulated buses
- Making it easier for buses to move in and out of bus stops by removing or relocating on-street parking
- Reducing potential delays for buses at traffic signals by moving stops to the departure side of the intersection.

Overall, the proposal is needed to help reduce total travel time and improve bus service reliability, consistent with the aims of the Bus Priority Infrastructure Program and *Sydney's Bus Future*. The results of a review of bus stops along the Castle Hill to M2 Motorway corridor and the proposed action at each location is provided in Chapter 3.

## NSW Premier's and state priorities

The NSW Government is working to achieve twelve Premier's priorities and 18 state priorities to grow the economy, deliver infrastructure, protect the vulnerable, and improve health, education and public services across NSW.

The Bus Priority Infrastructure Program is consistent with, recognises and progresses NSW Government policies and plans, including the NSW Premier's priorities and state priorities. The Bus Priority Infrastructure Program and the proposal specifically addresses the following state priority:

- *Ensure on-time running for public transport* - Maintain or improve reliability of public transport services over the next four years.

## NSW Long Term Master Plan

The *NSW Long Term Transport Master Plan* (Transport for NSW, 2012) brings together land use planning and transport planning, integrating planning for freight and passenger movements, as well as all modes of transport. It focuses on the following six key transport challenges:

- Integrating modes to meet customer needs
- Getting Sydney moving again
- Sustaining growth in Greater Sydney
- Providing essential access to regional NSW
- Supporting efficient and productive freight
- Statewide actions.

These challenges are responded to through four types of action:

- Integrate transport services
- Modernise our system
- Grow our networks to meet future demand (including the important tasks of corridor preservation)

- Maintain important road and public transport assets.

The Bus Priority Infrastructure Program and the proposal are consistent with the following specific bus related measures in the *NSW Long Term Transport Master Plan*:

- Increase bus priority measures and investigate Bus Rapid Transit along priority corridors as part of a bus strategy that includes a restructured three-tier network of improved local, intermediate and rapid mass transit services, supported by a bus network redesign, and a better, modern fleet
- Longer term investigation of Bus Rapid Transit on Sydney's busiest corridors that are not served by other mass transit modes
- A Strategic Bus Network program focusing on higher service frequencies and on-road priority for buses along strategic corridors will improve services and better manage road congestion, offering better public transport travel times and reliability at significant pinch points during weekday peak periods.

### State Infrastructure Strategy

As part of the *State Infrastructure Strategy* (the Strategy) (NSW Government, 2016), $20 billion will be invested into new infrastructure across the State. The Strategy highlights the importance of sustaining productivity growth in major centres and regional communities, as well as supporting population growth toward almost six million people in Sydney and more than nine million people in NSW. The Strategy notes that congestion costs Sydney $5 billion per annum and that this will grow to $8 billion per annum by 2020 without action.

The proposal is consistent with this focus on addressing congestion and with the $300 million identified in the *State Infrastructure Strategy* for bus rapid transit and bus priority infrastructure.

## 2.2 Existing road and infrastructure

The corridor between Castle Hill and the M2 Motorway, traverses a highly urbanised environment. Adjacent land use is primarily low and medium density residential, with some commercial uses and schools. It provides a link between the Castle Hill and Baulkham Hills commercial / retail centres and the M2 Motorway. It also forms part of the broader corridor that links to Parramatta via Windsor Road and to Liverpool via the T-way. The corridor services the Metrobus route M61 and other suburban and local bus services.

The following sections describe each of the proposal locations where bus stop removal, relocation, improvement or extension is proposed. Where available, opal data for the below stops is included in Table 3-1.

**Location 6 - Old Northern Road after Church Street, Castle Hill (southbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The signalised intersection with Kerrs Road is immediately to the south. The posted speed limit is 60 kilometres per hour, except where the 40 kilometre per hour school zone operates on school days between 8:00am and 9:30am, and between 2:30pm and 4:00pm. A clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential.

Bus stop 2154117 has a bus shelter (with advertising panel), plinth signage and a bin.

#6 View south to stop 2154117

#6 View north to stop 2154117

*Figure 2-2 Old Northern Road Location #6 images*

**Location 7 - Old Northern Road at St Gabriel's School, Castle Hill (northbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour, except where the 40 kilometre per hour school zone operates on school days between 8:00am and 9:30am, and between 2:30pm and 4:00pm. A clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential and St Gabriel's School is also nearby.

Bus stop 2154113 currently has plinth signage.

#7 View south to stop 2154113

*Figure 2-3 Old Northern Road Location #7 image*

**Locations 9 and 10 - Old Northern Road after Excelsior Avenue, Castle Hill (northbound and southbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour. A clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential, while a child care centre is located opposite bus stop 2154119 (#10).

Bus stop 2154112 (northbound, #9) and bus stop 2154119 currently have a shelters (with advertising panel), plinth signage and concrete pads. Bus stop 2154112 also has an indented bus bay.

#9 View to stop 2154112

#10 View to stop 2154119

*Figure 2-4 Old Northern Road Location #9 and #10 images*

**Locations 11 and 12 - Old Northern Road near Oxley Avenue, Castle Hill (northbound and southbound)**

Old Northern Road has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour. A clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is primarily residential, with a medical centre and health consulting rooms also present.

Bus stop 2154120 (#11) currently has plinth signage, a concrete pad and a seat, while bus stop 2154111 (#12) has plinth signage and a bus shelter with advertising.

#11 and #12 View to stop 2154120 and stop 2152111

*Figure* 2-5 *Old Northern Road Location #11 and #12 image*

**Location 13 - Baulkham Hills College, Old Northern Road, Castle Hill (northbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The signalised intersection with Edward Street is immediately to the north (and to the south of the proposed relocation site – see Chapter 3 (Description of the proposal)). The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. The Hills College (part of the TAFE Western Sydney Institute) is located adjacent to existing bus stop 2153218.

Bus stop 2153218 has a bus shelter (with advertising panel), plinth signage and associated indented bus bay.

#13 View to stop 2153218

#13 View to proposed relocation site (80 metres north of existing)

*Figure 2-6 Old Northern Road Location #13 images*

**Location 15 - Old Northern Road at No. 140, Baulkham Hills (northbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential.

Bus stop 2153217 currently has a bus shelter (with advertising panel), concrete pad and tactile ground surface indicators (TGSI).

#15 View south to stop 2153217

*Figure 2-7 Old Northern Road Location #15 image*

**Locations 18 and 19 - Old Northern Road near Cross Street, Baulkham Hills (northbound and southbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential.

Bus stop 2153221 (#18) currently has a bus shelter (with advertising panel), concrete pad and plinth signage. Bus stop 2153210 (#19) has plinth signage and a seat.

#18 View to stop 2153221

#19 View to stop 2153210

*Figure 2-8 Old Northern Road Location #18 and #19 images*

**Location 21 - Old Northern Road near Ackling Street, Baulkham Hills (northbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential.

Bus stop 2153209 (#21) currently has a concrete pad, plinth signage and a seat.

#21 Existing and proposed location (foreground) for stop 2153209

*Figure 2-9 Old Northern Road Location #21 image*

**Locations 22 and 23 - Old Northern Road near Hill Street, Baulkham Hills (northbound and southbound)**

Old Northern Road at this location has two-lanes in each direction, is undivided and is classified as a Main Road (MR160). The intersection at Hill Street is an unsignalised T-junction. The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is residential although this site marks the transition to the Baulkham Hills commercial / retail centre.

Bus stop 2153223 (#22) and bus stop 2153208 (#23) both currently have a concrete pad, plinth signage and a seat.

#22 View to stop 2153223 and site of relocated stop 2153208

#23 View to existing stop 2153208

*Figure 2-10 Old Northern Road Location #22 and #23 images*

**Location 24 Old Northern Road at Stockland Mall, Baulkham Hills (northbound)**

Old Northern Road at this location has two-lanes in each direction and is divided by a concrete median and which is classified as a Main Road (MR160). The posted speed limit is 60 kilometres per hour and a clearway operates between 6:00am and 10:00am and between 3:00pm and 7:00pm, Monday to Friday. Adjacent development is the Stockland Baulkham Hills Shopping Centre.

Bus stop 2153207 (#24) currently has a bus shelter (without advertising) and plinth signage.

#24 View to current stop 2153207

*Figure 2-11 Old Northern Road Location #24 image*

**Location 28 Windsor Road after Railway Street, Baulkham Hills (southbound)**

Windsor Road at this location is classified as a Main Road (MR184). It has three-lanes in each direction divided by a central barrier and associated pedestrian fencing. One of the three southbound lanes (kerbside) is a 24 hour bus lane. The posted speed limit is 60 kilometres per hour and adjacent development is commercial.

Bus stop 2153226 (#28) currently has a bus shelter (with advertising panel), plinth signage and a bin.

#28 View north towards existing stop 2153226 with new location in foreground

*Figure 2-12 Windsor Road Location #28 image*

**Location 29 Windsor Road near Charles Street, Baulkham Hills (southbound)**

Windsor Road at this location is classified as a Main Road (MR184). It has three-lanes in each direction divided by a central barrier and associated pedestrian fencing. One of the three southbound lanes is a 24 hour bus lane. The posted speed limit is 60 kilometres per hour and adjacent development is commercial / retail (security screens business) and residential.

Bus stop 2153227 (#29) currently has a brick bus shelter (with no advertising) and plinth signage. The rear of the bus shelter is designed for and used to store bins.

#29 View south- towards bus stop 2153227

#29 View north towards bus stop 2153227

*Figure 2-13 Windsor Road Location #29 images*

## 2.3 Proposal objectives

The objectives of the proposal are to:

1. Achieve more reliable travel times for buses passengers
2. Improve on-time running for buses consistent with the State Priority (refer to section 2.1) to maintain or improve reliability of public transport services
3. Improve road safety and traffic efficiency at bus stop locations #10, #23 and #28
4. Minimise impacts for users of suburban and local services
5. Minimise impacts on the environment and the community.

## 2.4 Alternatives and options considered

### 2.4.1 Methodology for selection of preferred option

The methodology for selecting the preferred option was an iterative process that involved several stages of evaluation as described below:

- Stage 1 – Field investigation / site observations
  - Inspect bus routes by riding the buses during peak periods to understand the bus route operation and identify operational issues
  - Conduct a survey on each bus stop to determine the of number passengers using the stop and user's profiles
  - Carry out an audit of each bus stop to prepare an inventory of existing infrastructure at the bus stop
- Stage 2 – Initial assessment
  - Review the survey data and identify deficiencies of existing bus stop infrastructure against the draft *Bus Stop Location Guidelines Sydney Metropolitan Area* (Transport for NSW, n.d.)
  - Carry out a preliminary assessment for each bus stop to determine whether the bus stop should be retained, modified, relocated or consolidated
- Stage 3 – Detailed assessment
  - Carry out additional surveys at the identified bus stops during peak periods covering extended periods for both weekday and weekend
  - Prepare concept drawings (to scale) for each bus stop where modifications are proposed, identifying new / removed / relocated infrastructure
  - Prepare a plan of work including ownership of assets and cost estimate for bus stop modification, relocation and consolidation
- Stage 4 – Consider community / stakeholder views and modify the proposal as appropriate.

Key considerations for developing the proposal were derived from the *Sydney's Bus Future* (Transport for NSW, 2013) and the draft *Bus Stop Location Guidelines Sydney Metropolitan Area* (Transport for NSW, n.d.) and were as follows*:*

1. Target a general standardised spacing of 400 metres between bus stops, with a greater than 400 metre spacing accepted at some locations to minimise the number of bus stop relocations across the corridor.

   Spacing of bus stops between 800 metres and one kilometre apart would be considered as part of planning for a future rapid bus route
2. Ensure bus stops are located close to major patronage generators and community facilities to maximise the efficiency of a bus stop and eliminating redundant and underutilised stops
3. Locate bus stops on the departure side of signalised intersections to improve traffic conditions and help buses to meet the timetable using PTIPS
4. Adjust and locate bus stops to improve pedestrian safety
5. Provide suitable bus zone length to allow buses to manoeuvre in and out of bus stops easily without obstructing the adjacent lane.

Another important consideration in developing the proposal was to ensure bus stops used by local and suburban services in the corridor remain accessible. Where removing a bus stop would result in excessive distance between stops for local and / or suburban routes, no changes have been proposed.

### 2.4.2 Identified options and analysis

Given the nature of the proposal, consideration of options was largely confined to whether the proposal could be justified in the context of the proposal objectives. This is effectively an evaluation of Option 1 (conducting the works, the proposal) against the Option 2 (the 'do nothing') option. The proposal was refined during project development based on information from site inspections, survey data and Opal data.

An overview of the proposal (Option 1) and an evaluation of the proposal against the proposal objectives is provided in Table 2-1, while Table 3-1 (in Chapter 3) reviews the need for changes at all bus stops along the corridor and identifies those locations where changes are warranted. The proposal generally involves removal of eight bus stops, relocation of five bus stops and improvements to three bus stops on the corridor from Castle Hill to the M2 Motorway, serviced by route M61.

The 'do nothing' option (Option 2) involves making no changes to improve bus reliability. While Option 2 would not affect existing bus users (proposal objective 3) and would have no environmental impacts (proposal objective 4), it would not improve bus travel time reliability or improve on-time running (proposal objectives 1 and 2).

Option 1 best meets proposal objectives 1 and 2, and while it would have some environmental and community impacts, environmental safeguards and management measures have been proposed to address these impacts.

*Table 2-1 Proposal (Option 1) evaluation*

| Proposed change | Evaluation |
|---|---|
| Removal of eight bus stops (2154113, 2154120, 2154111, 2153217, 2153221, 2153210, 2153207, 2153227) | • Improves reliability and on-time running consistent with proposal objective No.1 and No.2<br>• Addresses key consideration No.1<br>• Reduced convenience for users who live / work near the existing stops, but retention of nearby alternatives |
| Minor relocation of five bus stops (2154119, 2153218, 2153209, 2153208, 2153226) | • Improves reliability and on-time running consistent with proposal objective No.1 and No.2<br>• Addresses traffic and safety issues consistent with proposal objective No.3<br>• Addresses key consideration No.1 and No.4<br>• Potential for minor impacts associated with bus stop activity |
| Improvements (extensions, minor adjustments to bus zones, changes to signage) to three bus stops (2154117, 2154112, 2153223) | • Addresses key consideration No.5 and improves customer amenity |

## 2.5 Preferred option

The proposal (Option 1) is the preferred option as it responds to the identified need, addresses the proposal objectives and is consistent with key considerations for bus stop location as shown in Table 3-1 in Chapter 3 (Description of the proposal).

The principles of ecologically sustainable development encourage the integration of present and future economic, social development and environmental considerations into the decision-making process for all developments. The development of the proposal is consistent with these principles as demonstrated by the proposal objectives which include economic, social and environmental considerations, and the alignment of the preferred option with those objectives.

# 3 Description of the proposal

## 3.1 The proposal

### 3.1.1 Overview

Transport for NSW, in partnership with Roads and Maritime, is proposing to improve the reliability of buses by making changes to bus stops along the corridor between Castle Hill and the M2 Motorway, serviced by Metrobus Route M61 (the proposal). The main features of the proposal are:

- Rationalising bus stop locations to optimise the spacing between bus stops
- Lengthening some bus stops to improve access for buses and assist passenger boarding and alighting
- Relocating some bus stops to optimise spacing and / or address traffic and safety issues
- Improving bus stop infrastructure at some locations including changes to bus stop signage
- Reducing delays for buses by moving bus stops to the departure side of traffic lights, allowing them to take advantage of the Public Transport Information and Priority System (PTIPS).

A summary of the proposed changes is provided below:

- Eight bus stop removals (including the removal of signage and other bus stop infrastructure)
- Three bus stop improvements
- Five bus stop relocations.

Details of the proposal at each location are provided in Section 3.1.2, while concept design drawings are included in Appendix B. Note that while several of the existing bus shelters have an advertising component, new or relocated bus shelter advertising does not form part of the proposal. If proposed, it would be subject to a separate assessment and approval process.

### 3.1.2 Proposed changes by location

Table 3-1 provides a review of bus stops along the corridor from Castle Hill to the M2 Motorway, serviced by route M61, and summarises the proposed bus stop changes. Each of the proposal elements are shown on Figure 3-1 through to Figure 3-3.

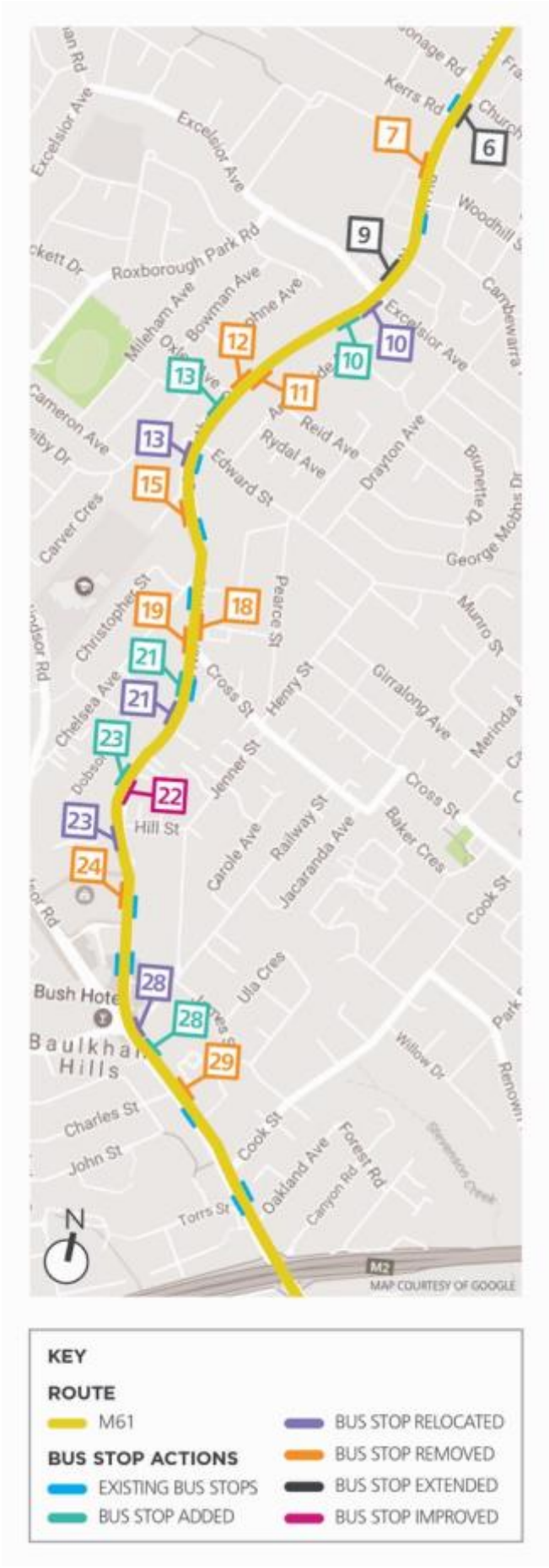



*Figure 3-1 Proposed changes on the corridor from Castle Hill to M2 Motorway*


*Figure 3-2 Detail of proposed changes Locations 6, 7, 9, 10, 11, 12, 13 and 15*


*Figure 3-3 Detail of proposed changes Locations 18, 19, 22, 23, 24, 28, 29*

*Table 3-1 Identified bus stop adjustments –Castle Hill to M2 Motorway corridor*

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 1 | Castle Hill Interchange, Old Castle Hill Road, Stand B (northbound stop 2154351) | No issues / opportunities identified at this location. | None |
| 2 | Castle Hill Interchange, Old Northern Road, Stand C (southbound stop 2154190) | No issues / opportunities identified at this location. | None |
| 3 | Old Northern Road after Cecil Avenue (northbound stop 2154116) | No issues / opportunities identified at this location. | None |
| 4 | Old Northern Road after Benaara Gardens (northbound stop 2154115) | No issues / opportunities identified at this location. | None |
| 5 | Old Northern Road opposite Church Street (northbound stop 2154114) | No issues / opportunities identified at this location. | None |
| 6 | Old Northern Road after Church Street (southbound stop 2154117) | There is an opportunity to improve the access at this bus stop by extending the bus zone. | Relocate the northern bus zone sign approximately 10 metres north.<br>Install TGSI.<br>Retain existing clearway operation, no loss of parking. |
| 7 | Old Northern Road at St Gabriel's School (northbound stop 2154113) | Bus stop 2154113 is located 330 metres from the previous bus stop and 215 metres from the next stop. This stop has low patronage with Opal data showing an average 24-hour weekday demand of 42 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be 545 metres. | Remove bus stop 2154113.<br>Existing clearway operation to be retained, no loss of parking. |
| 8 | Old Northern Road at Woodhill Street (southbound stop 2154118) | No issues / opportunities identified at this location. | None |

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 9 | Old Northern Road after Excelsior Avenue (northbound stop 2154112) | There is an opportunity to improve the access at this bus stop by extending the bus zone. | Extend the existing indented bus bay 15 metres to the north and adjust bus zone signage.<br>Retain existing clearway operation, no loss of parking. |
| 10 | Old Northern Road after Excelsior Avenue (southbound stop 2154119) | Bus stop 2154119 is located 310 metres from the previous bus stop and 360 metres from the next stop. Opal data shows an average 24-hour weekday demand of 209 customers.<br>Buses currently queue back into the Old Northern Road / Excelsior Road intersection affecting its operation. There is an opportunity to address this issue by relocating bus stop 2154119 a short distance further to the south.<br>The resulting spacing from the preceding stop would be about 328 metres and the spacing to the next stop would be about 622 metres (with the removal of stop 2154120 #11). | Relocate bus stop (including bus shelter and signage) about 18 metres to the south.<br>Install TGSI.<br>Install concrete pad.<br>New bus stop location replaces existing clearway. Original bus stop location to become no stopping zone. No loss of parking |
| 11 | Old Northern Road near Oxley Ave (southbound bus stop 2154120) | Bus stop 2154120 is located 360 metres from the previous bus stop and 280 metres from the next stop. Opal data shows an average 24-hour weekday demand of 140 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 640 metres. | Remove bus stop 2154120.<br>Existing clearway operation to be retained, no loss of parking. |
| 12 | Old Northern Road near Oxley Ave (northbound bus stop 2154111) | Bus stop 2154111 is located 240 metres from the previous bus stop and 425 metres from the next stop. Opal data shows an average 24-hour weekday demand of 183 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 665 metres. | Remove bus stop 2154120.<br>Existing clearway operation to be retained, no loss of parking. |

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 13 | Hills College, Old Northern Road (northbound bus stop 2153218) | Bus stop 2153218 is located 160 metres from the previous bus stop and 240 metres from the next stop. Opal data shows an average 24-hour weekday demand of 372 customers.<br>The current bus bay is of insufficient length and buses currently queue back into the through traffic lanes. Further, the position of bus stop 2153218 on the approach to the Edward Street intersection is currently less desirable as buses may not benefit from PTIPS (which extends green time when a bus is approaching traffic signals). There is an opportunity to relocate this stop to the departure side of the intersection while also providing improved bus stop infrastructure.<br>The resulting distance from the preceding stop would be about 445 metres (with the removal of stop 2153217 #15) and the distance to the next bus stop would be about 665 metres (with the removal of stop 2154111 #12). | Relocate bus stop 2153218 about 80 metres north to departure side of the Edward Street intersection.<br>Remove signage, shelter and other bus stop infrastructure from current location, leaving the bus bay in place.<br>Install shelter, signage and TGSI at new location.<br>New bus stop location replaces existing clearway. Original bus stop location to become a clearway. No loss of parking. |
| 14 | Old Norther Road, opposite Hills College (southbound bus stop 2153219) | No issues / opportunities identified at this location. | None |
| 15 | Old Northern Road at No. 140 (northbound bus stop 2153217) | Bus stop 2153217 is located 205 metres from the previous bus stop and 160 metres from the next stop. This stop has low patronage with Opal data showing an average 24-hour weekday demand of 50 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 365 metres. | Remove bus stop 2153217.<br>Existing clearway operation to be retained, no loss of parking. |
| 16 | Old Northern Road at No. 123 (southbound bus stop 2153220) | No issues / opportunities identified at this location. | None |
| 17 | Old Northern Road at Chelsea Avenue (northbound bus stop 2153211) | No issues / opportunities identified at this location. | None |

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 18 | Old Northern Road near Cross Street (southbound bus stop 2153221) | Bus stop 2153221 is located 235 metres from the previous bus stop and 190 metres from the next stop. Opal data shows an average 24-hour weekday demand of 201 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 425 metres. | Remove bus stop 2153221.<br>Existing clearway operation to be retained, no loss of parking. |
| 19 | Old Northern Road near Cross Street (northbound bus stop 2153210) | Bus stop 2153210 is located 220 metres from the previous bus stop and 175 metres from the next stop. Opal data shows an average 24-hour weekday demand of 158 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 395 metres. | Remove bus stop 2153210.<br>Existing clearway operation to be retained, no loss of parking. |
| 20 | Old Northern Road near Ackling Street (southbound bus stop 2153222) | No issues / opportunities identified at this location. | None |
| 21 | Old Northern Road at Ackling Street (northbound bus stop 2153209) | Bus stop 2153209 is located 350 metres from the previous bus stop and 220 metres from the next stop. Opal data shows an average 24-hour weekday demand of 116 customers.<br>There is an opportunity to relocate bus stop 2153209 to the north to optimise the spacing of bus stops, but also to improve driver sight lines at the Ackling Street intersection. The resulting distance from the preceding stop would be about 335 metres (with the relocation of stop 2153208 #23) and the distance to the next bus stop would be about 300 metres (with the removal of stop 2153210 #19). | Relocate bus stop 2153209 about 120 metres north.<br>Remove signage and seat from current location.<br>Install shelter, signage and TGSI at new location.<br>New bus stop location replaces existing clearway. Original bus stop location to become a clearway. No loss of parking. |
| 22 | Old Northern Road near Hill Street (southbound bus stop 2153223) | There is an opportunity to formalise the bus zone for bus stop 2153223 by installing bus zone signage. | Install bus zone signage for bus stop 2153223 creating a 30 metre long bus zone. No loss of parking |

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 23 | Old Northern Road near Hill Street (northbound bus stop 2153208) | Bus stop 2153208 is located 190 metres from the previous bus stop and 350 metres from the next stop. Opal data shows an average 24-hour weekday demand of 122 customers.<br>During PM peak period, buses using this bus stop 2153208 impede outbound traffic on Old Northern Road as the kerbside lane is required at this location to pass vehicles turning right into Hill Street. There is an opportunity to address this issue by relocating bus stop 2153208 to the north.<br>The resulting distance from the preceding stop would be about 450 metres (with the removal of stop 2153207 #24) and the distance to the next bus stop would be about 355 metres (with the relocation of stop 2153209 #21). | Relocate bus stop 2153208 about 90 metres north to the departure side of the Hills Street intersection.<br>Remove signage and seat from current location.<br>Install shelter, signage and TGSI at new location.<br>New bus stop location replaces existing clearway. Original bus stop location to a clearway. No loss of parking. |
| 24 | Old Northern Road at Stockland Mall (northbound bus stop 2153207) | Bus stop 2153207 is located 170 metres from the previous bus stop and 190 metres from the next stop. Opal data shows an average 24-hour weekday demand of 432 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 360 metres. | Remove bus stop 2153207 and replace with clearway. No loss of parking |
| 25 | Old Northern Road at Stockland Mall (southbound bus stop 2153224) | No issues / opportunities identified at this location. | None |
| 26 | Old Northern Road near Raemot Lane (northbound bus stop 2153206) | No issues / opportunities identified at this location. | None |
| 27 | Old Northern Road near Raemot Lane (southbound bus stop 2153225) | No issues / opportunities identified at this location. | None |

| Ref# | Location | Identified bus stop issues / adjustments | Proposed action |
|---|---|---|---|
| 28 | Windsor Road after Railway Street (southbound bus stop 2153226) | Bus stop 2153208 is located 220 metres from the previous bus stop and 210 metres from the next stop. Opal data shows an average 24-hour weekday demand of 997 customers.<br>There are currently safety risks associated with the interaction between buses using bus stop 2153226, buses travelling southbound on Windsor Road, and traffic travelling southbound on Old Northern Road.<br>There is an opportunity to improve safety by relocating stop 2153226 further south away from the left-turn slip lane from Old Northern Road.<br>The resulting distance from the preceding stop would be about 285 metres and the distance to the next bus stop would be about 355 metres (with the removal of stop 2153227 #29). | Relocate bus stop 2153226 about 90 metres north to the departure side of the Hills Street intersection.<br>Remove shelter, signage and seat from current location.<br>Install shelter, signage and TGSI at new location.<br>Retain existing 24 hour bus lane operation, no loss of parking. |
| 29 | Windsor Road near Charles Street (southbound bus stop 2153227) | Bus stop 2153227 is located 210 metres from the previous bus stop and 305 metres from the next stop. This stop has low patronage with Opal data showing an average 24-hour weekday demand of 99 customers.<br>There is an opportunity to optimise the spacing of stops at this location to reduce delays by removing this stop. The resulting spacing between the preceding and next bus stops would be about 515 metres. | Remove bus stop 2153207 and retain 24 hour bus lane operation. No loss of parking.<br>Retain brick bus shelter as it also serves a bin storage / screening function. |
| 30 | Windsor Road near Charles Street (northbound bus stop 2153186) | No issues / opportunities identified at this location. | None |
| 31 | Windsor Road near Cook Street (southbound bus stop 2153228) | No issues / opportunities identified at this location. | None |
| 32 | Windsor Road near Torrs Street (northbound bus stop 2153185) | No issues / opportunities identified at this location. | None |

## 3.2 Design

### 3.2.1 Design criteria

The design criteria for the proposal are outlined in the *Bus Infrastructure Guide* (State Transit, 2011) and the *Standards for Accessible Public Transport 2002*. These guides aim to ensure the installation of bus infrastructure in a consistent, safe and effective manner. It specifies the design elements, which should be considered for the design of a bus stop, including:

- Location, including curvature of road, sight distance, adjacent parking and traffic environment, bus route operation and nearby land uses
- Street furniture in relation to bus stop, such as seats and shelter
- Necessary bus stop signage and information facilities, such as bus stop signs, J-stems, U-stems, blades and plinths
- Bus stop and bus zone configurations
- Bus stop accessibility requirements.

Figure 3-4 shows the typical bus stop layout with a bus shelter and is relevant to the proposed new bus stops at locations #10, #13, #21 and #23. Alternative bus stop designs may be used to suit local streetscapes, following further consultation with the Hills Shire Council during detailed design. Figure 3-5 illustrates the typical bus stop sign and shelter.

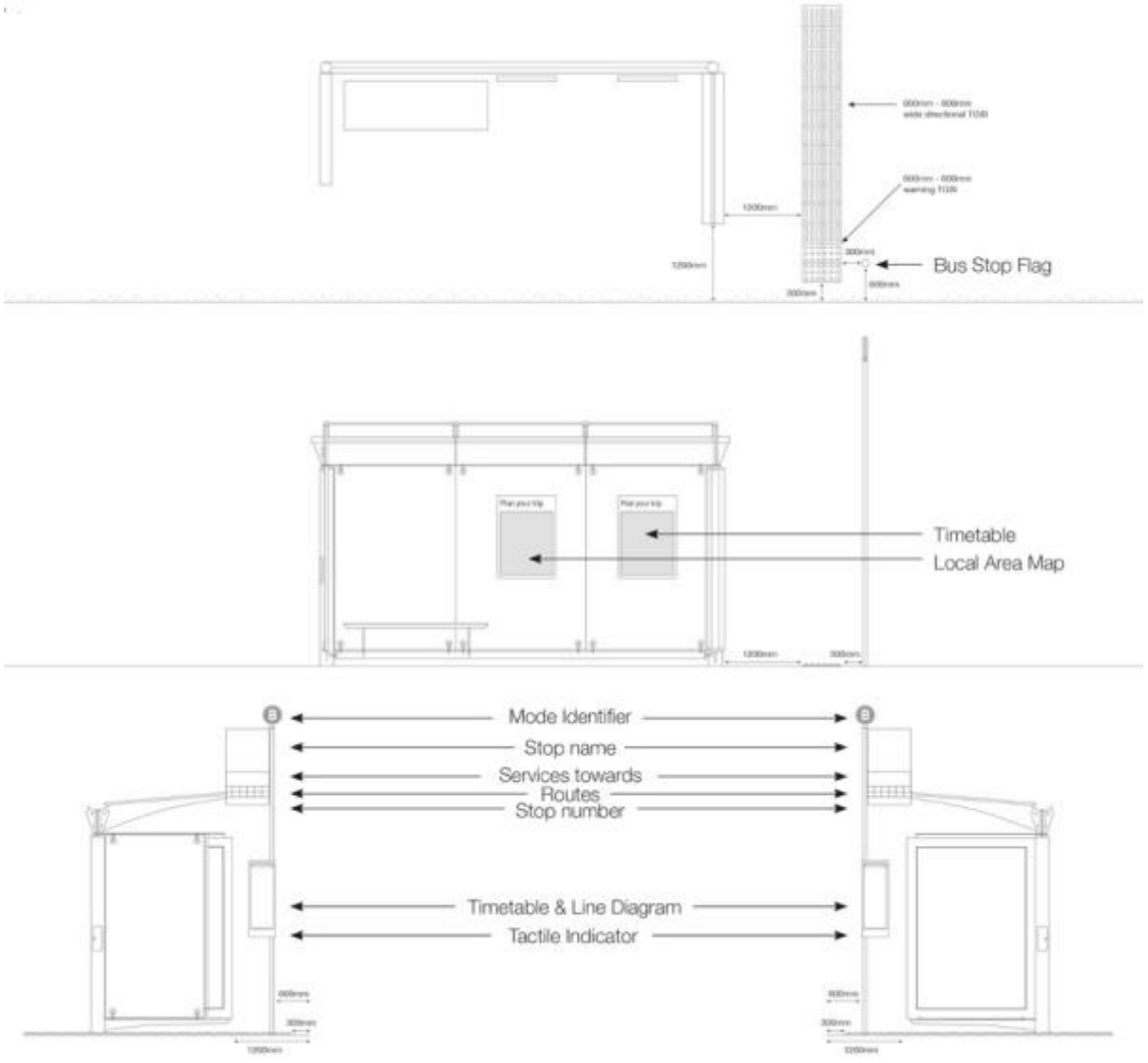



*Figure 3-4 Typical bus stop layout - with shelter*

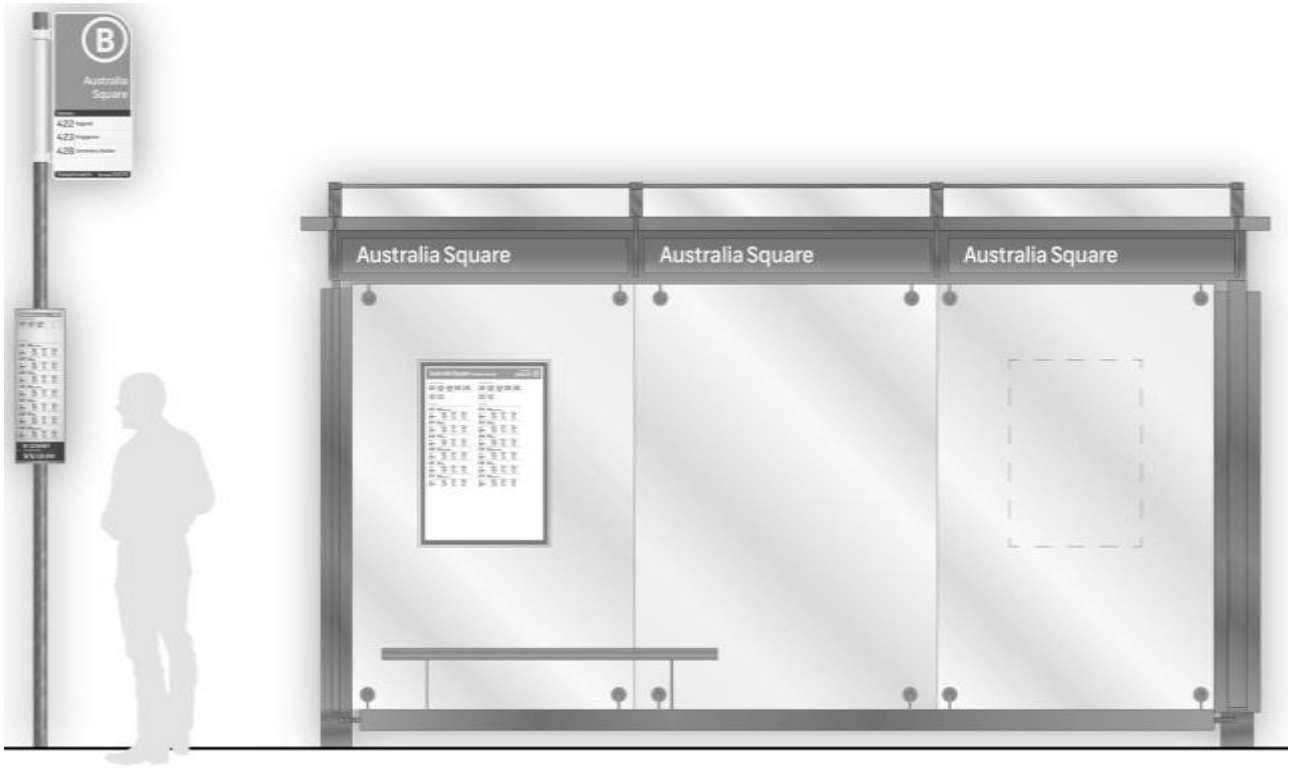



*Figure 3-5 Typical bus stop sign and shelter*

### 3.2.2 Engineering constraints

The proposal has the following identified constraints:

- Need to accommodate long buses at some locations
- Need to maintain through traffic and access on roads and footpaths
- Proximity to residences and businesses
- Location of utilities and services
- Existing trees.

## 3.3 Construction activities

### 3.3.1 Work methodology

An indicative work sequence for bus stop relocations is provided below

**Site establishment and preparation**

- Obtain any required working approvals from network authorities (including Transport Management Centre)
- Community notification to impacted residents and businesses
- Establish temporary fencing to secure work site (fencing and / or traffic barriers to re-direct pedestrians and traffic using appropriate directional signage)
- Establish traffic control at worksite including the temporary placement of mobile variable message signs (VMS)
- Establish environmental controls
- Search and identification for underground services and avoid, protect or adjust public utilities if required.

**Bus stop removal**

- Remove existing bus stop signage

- Remove seating and shelter (where present)
- Remove TGSI
- Remove concrete pads (where required)
- Make good to match existing.

**Bus stop extension**

- Remove trees (where specified)
- Adjust footpaths and pavements (where required)
- Construct new pavements, kerb and gutter for bus bay extension (location #9). This would involve:
  - Excavation and levelling of affected roadside area
  - Lay gravel base/sub-base layers for new pavement
  - Apply asphaltic concrete pavement using pavers and rollers
  - Repair existing pavements where required
  - Line marking where required
- Install new bus stop signage.

**Bus stop relocation**

- Saw-cut footpath to construct concrete slab for new bus shelter (where proposed). The existing footpath may be used as a base subject to agreement from the relevant local council
- Trench and connect new electricity cable to new bus shelter (if new shelter proposed)
- Remove spoil from site to authorised / approved site
- Pour concrete slab for new bus shelter to design level (where proposed and if required). Check that there is no sag point and that water drains away from the area sufficiently
- Deliver new bus shelter components and assemble on-site
- Establish footpath to match surrounding
- Install new bus stop signage.

**Completion of works**

- Cover the new sign(s) if necessary until the bus stops / shelters or bus zones are ready for use
- Remove temporary fencing and barriers
- Remove traffic control at worksite and notify network authorities
- Re-open footpath to pedestrians.

### 3.3.2 Construction hours and duration

Works would occur primarily during standard hours as follows:

- Monday to Friday: 7:00am to 6:00pm
- Saturday: 8:00am to 1:00pm
- Sunday: No work
- Public holidays: No work

Some works outside standard hours may be required in order to minimise impacts on traffic. Out of hours works would occur in accordance with the safeguards and management measures identified in section 6.3.5.

The start date for the works is planned for the second half of 2017. Weather permitting, works are expected to be complete within two months of construction commencement. Works at each individual project site would not exceed one week (including removing existing infrastructure and establishing relocated bus stops). Where only bus stop removal is proposed, works would be complete within two days.

### 3.3.3 Plant and equipment

The proposal would require the use of a range of equipment (varying from site to site based on the required works) including, but not limited to:

- Concrete truck, agitator, vibrator, wacker plate compactor
- Small tip truck Hiab
- Bobcat with broom
- Mini excavator / backhoe
- Paving machine (location #9 only)
- Roller (location #9 only)
- Line marking equipment (location #9 only)
- Hand tools
- Concrete saw.

### 3.3.4 Earthworks

Earthworks would be limited to the footings of signs and shelters, except at location #9 where excavation and levelling of the roadside area would be required for extension of the bus bay.

### 3.3.5 Source and quantity of materials

The proposal would require small quantities of materials, primarily manufactured steel and glass elements and concrete. The quantities of material required would not result in a regional or local supply shortage and none are likely to be in short supply in the foreseeable future. Materials would be sourced from local commercial suppliers where available.

Non-renewable resources such as petroleum fuels would not be used in large quantities.

### 3.3.6 Traffic management and access

Access to each proposal site would be directly from the adjacent carriageway.

Some temporary lane closures and minor temporary pedestrian diversions may be needed. These would occur in accordance with a site specific Traffic Management Plan (TMP) and, where necessary, a Road Occupancy Licence.

Where possible, the proposed construction work would be programmed to minimise impact on buses and general traffic along the route. Access for bus customers to bus stops would be maintained.

Standard traffic management measures would be employed to minimise short-term traffic impacts expected during construction. These measures would be identified in the TMP for the proposal and would be developed in accordance with the Roads and Maritime *Traffic Control at Works Sites Manual* (Roads and Traffic Authority, 2010) and Roads and Maritime Specification G10 – Control of Traffic.

During all stages of construction, access to businesses would be maintained.

Pedestrian and cyclist routes would be managed daily to suit construction activities. These routes would be coordinated with the stages of construction to ensure safe access.

The specific timing of bus stop relocations would be determined in consultation with State Transit.

## 3.4 Ancillary facilities

A site compound is not required for the proposal. Personnel and equipment would be transported to and from proposal sites daily.

## 3.5 Public utility adjustment

Major public utility adjustment and / or protection works are not required for the proposal. The need for any minor relocations / protection works would be determined following utilities investigations and, where required, would be undertaken in consultation with the relevant asset owner.

## 3.6 Property acquisition

Property acquisition is not required for the proposal.

# 4 Statutory and planning framework

## 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 the 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. The definition of road infrastructure facilities provided by Clause 93 of the ISEPP includes associated public transport facilities for roads used to convey customers by means of regular bus services.

As the proposal is for a road and road infrastructure facilities and is to be carried out by Transport for NSW / Roads and Maritime Services, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Development consent from council is not required. Note that relocation of commercial advertising at bus shelters does not form part of the proposal and where this is required it would be subject to a separate assessment and approval process.

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 or 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 (Stakeholder and community consultation) of this REF.

## 4.2 Local Environmental Plans

The proposal is located within the Hills Shire local government area. Land use and development within the areas where physical works are proposed is primarily regulated by *The Hills Local Environmental Plan 2012* (The Hills LEP). Works required for the proposal would occur in the following zones:

- R1 General Residential
- R2 Low Density Residential
- R3 Medium Density Residential
- R4 High Density Residential
- B2 Local Centre

Development for the purposes of roads is permitted with development consent in all the above land use zones. ISEPP removes the requirement for development consent from The Hills Shire Council (see section 4.1.1).

## 4.3 Other relevant legislation

### 4.3.1 Protection of the Environment Operations Act 1997

Section 120 of the *Protection of the Environment Operations Act 1997* (POEO Act) prohibits the pollution of waters. The proposal includes measures to address the risk of water pollution - see section 6.7.

Air pollution-related sections 124 to 126 (Chapter 5, Part 5.4, Division 1) of the POEO Act requires activities to be conducted in a proper and efficient manner. Section 128 (Chapter 5, Part 5.4, Division 1) of the POEO Act requires that all necessary and practicable means are used to prevent or minimise air pollution. Air quality is addressed in section 6.8.

Pollution of land and waste is covered by Part 5.6 of the POEO Act. The Act defines 'waste' for regulatory purposes and establishes management and licensing requirements for waste.

It defines offences relating to waste and sets penalties. The POEO Act also establishes the ability to set various waste management requirements via the *Protection of the Environment Operations (Waste) Regulation 2014*. Waste is addressed in section 6.11 contamination is considered in section 6.6.

Part 3.2 of the POEO Act requires an Environmental Protection Licence for scheduled development work and the carrying out of scheduled activities. The proposal does not trigger these requirements.

### 4.3.2 Heritage Act 1977

Section 57 of the *Heritage Act 1977* regulates development affecting items on the State Heritage Register or which are the subject of an interim heritage order. The proposal would not affect State listed items either directly or indirectly (refer to section 6.5).

An excavation permit is required to disturb or excavate any land knowing or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed. A permit is also required to disturb or excavate any land on which the person has discovered or exposed a relic. Section 134(4) of the *Heritage Act 1977* makes provision for the issuing of an exception in certain prescribed circumstances. Where items are defined as a ‘work’ rather than a ‘relic’, such as early road fabric, kerbing or tram tracks, no excavation permit or exception is required. An excavation permit is not expected to be required for the proposal because works are not likely to affect relics.

### 4.3.3 National Parks and Wildlife Act 1979

The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the *National Parks and Wildlife Act 1979* (NPW Act). Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or person or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons. Aboriginal objects and/or places are not expected to be affected by the proposal because the proposal locations are heavily disturbed by urban development and are not near any known Aboriginal sites (refer to section 6.6).

Part 8A of the NPW Act prohibits the harming or picking threatened species, endangered populations or endangered ecological communities. These activities can however occur where they constitute an activity by a determining authority within the meaning of Part 5 of EP&A Act and where the determining authority has complied with that Part. Threatened species, endangered populations or endangered ecological communities would not be affected by the proposal (refer to section 6.2).

### 4.3.4 Roads Act 1993

Section 138 of the *Roads Act 1993* requires consent from the relevant roads authority for the erection of a structure, or the carrying out of work in, on or over a public road, or the digging up or disturbance of the surface of a road.

Approval under Section 138 would not be required for the proposal. In relation to classified roads, Roads and Maritime may exercise the functions of the roads authority.

### 4.3.5 Passenger Transport Regulation 2007

The *Passenger Transport Regulation 2007* allows Transport for NSW to appoint bus stops, to be indicated by signs erected or displayed with the approval of the roads authority (under the *Roads Act 1993*).

## 4.4 Commonwealth legislation

### 4.4.1 Environment Protection and Biodiversity Conservation Act 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (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 A and Chapter 6 (Environmental assessment) of the REF.

A referral is not required for proposed road actions that may affect nationally listed threatened species, populations, endangered ecological communities and migratory species. This is because requirements for considering impacts to these biodiversity matters are the subject of a strategic assessment approval granted under the EPBC Act by the Australian Government in September 2015. Potential impacts to these biodiversity matters are also considered as part of section 6.2 and in Appendix A.

The assessment of potential proposal impacts found that it would be unlikely to cause a significant impact on matters of national environmental significance or the environment of Commonwealth land. A referral to the Australian Department of the Environment is not required.

### 4.4.2 Disability Discrimination Act 1992

The *Disability Discrimination Act 1992* (DD Act), and supporting standards, are the regulatory means by which governments seek to remove, as far as practicable, discrimination against people with disability. Public transport is a service covered by the DD Act and new bus stop infrastructure delivered as part of the proposal will need to meet the DD Act *Standards for Accessible Public Transport 2002*.

## 4.5 Confirmation of statutory position

The proposal is within the definition of activity set by Section 110 of the EP&A Act and is being proposed by a public authority. Assessment under Part 5 of the EP&A Act is therefore required.

Roads and Maritime is the proponent and the determining authority under Part 5 of the EP&A Act.

The proposal is categorised as development for the purpose of road infrastructure facilities and is being carried out by or on behalf of a public authority. Under clause 94 of the ISEPP the proposal is permissible without consent. The proposal is not State significant infrastructure or State significant development. The proposal can be assessed under Part 5 of the EP&A Act.

This REF fulfils Roads and Maritime's obligation under clause 111 of the EP&A Act to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

The matters prescribed by Clause 228 of the *Environmental Planning and Assessment Regulation 2000*, for consideration by assessments under Part 5, are reviewed at Appendix A.

A referral under the EPBC Act is not required.

Any relocation of commercial advertising at bus shelters does not form part of the proposal and where this is required it would be subject to a separate assessment and approval process.

# 5 Stakeholder and community consultation

## 5.1 Community involvement strategy

Roads and Maritime has developed a community consultation and stakeholder engagement plan for the proposal. The plan identifies key objectives and the desired consultation outcomes. It focuses on consultation with relevant Government agencies, stakeholders and the community affected by the proposal. The plan's overall objectives are to:

- Provide stakeholders with clear, relevant, timely and accurate information about the proposal, proposed changes and impacts
- Identify local issues to ensure the proposal aligns with community needs
- Inform and consult affected and interested stakeholder groups.

A mix of communication channels will be used to communicate with the community and stakeholders throughout the proposal's development.

## 5.2 Community involvement

To date consultation has focused on Government agencies, particularly local councils.

The communication and engagement plan notes that the REF will be displayed publicly and that submissions will be invited. All issues raised will then be considered and responded to in the subsequent submissions report.

The REF will be displayed on the Roads and Maritime website. A community update, advising of the public display of the REF will be letterbox-dropped to residents and businesses, and additional stakeholders will receive the community update with a covering email/letter.

During the public display period, potentially affected residents, businesses and other nearby stakeholders near bus stops with changes will be visited by Roads and Maritime to discuss the proposal and address their issues of concern. Roads and Maritime will also schedule and meet with potentially affected residents and other stakeholders as requested.

The REF will be on public display for five weeks from 15 May 2017 to 16 June 2017 and written submissions will be invited during this period. Further community consultation will be undertaken during the public display period to enable the community to comment and ask questions about the proposal.

Planned consultation activities associated with the public display include:

- *Internet* - The review of environmental factors will be available as pdf files on the Roads and Maritime Services website at www.rms.nsw.gov.au/bpp
- *Letter box drop* - A letter box drop will be completed to properties within 200 metres of the proposal area publicising the REF display
- *Advertisements* - Advertisements will be placed in the Hills Shire Times to publicise the REF display.

## 5.3 Aboriginal community involvement

The proposal has been considered against the requirements of the *Procedure for Aboriginal Cultural Heritage Consultation and Investigation* (PACHCI) (Roads and Maritime Services, 2011). This procedure is generally consistent with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (Department of Environment, Climate Change and Water, 2010). An outline of the procedure is presented in Table 5-1.

The Roads and Maritime Aboriginal Cultural Heritage Officer for Sydney Region has considered the proposal and has advised there is no requirement to proceed to Stage 2 of the Roads and Maritime PACHCI (see Appendix C).

*Table 5-1 Procedure for Aboriginal Cultural Heritage Consultation and Investigation*

| Stage | Description |
|---|---|
| Stage 1 | Initial Roads and Maritime assessment.<br>Desktop assessment to determine whether a Roads and Maritime proposal is likely to harm Aboriginal cultural heritage, and whether further assessment or investigation is required. |
| Stage 2 | Further assessment and site survey.<br>Further assessment and a survey with specific Aboriginal stakeholders and an archaeologist to assess whether a project would impact Aboriginal cultural heritage. |
| Stage 3 | Formal consultation and preparation of cultural heritage assessment report.<br>Aboriginal parties must be involved in the preparation of these reports in accordance with legislative requirements and the *Aboriginal cultural heritage consultation requirements for proponents 2010* (Department of Environment, Climate Change and Water, 2010). |
| Stage 4 | Implement project mitigation measures.<br>Undertake salvage and/or project implementation in accordance with an Aboriginal Heritage Impact Permit (AHIP) and/or a Part 5.1/Part 4 approval or Part 5 determination obtained under the EP&A Act. |

Aboriginal cultural heritage impacts are not expected as a result of the proposal because the proposal locations are heavily disturbed by urban development and are not near any known Aboriginal sites (see section 6.6). An Aboriginal Heritage Information Management System (AHIMS) search was undertaken on 9 April 2017 and identified 32 registered sites in the wider area around the proposal sites. There are no known sites in the immediate vicinity of proposal locations.

## 5.4 ISEPP consultation

Part 2 Division 1 of the ISEPP outlines circumstances where consultation with councils and other public authorities is required. The consultation requirements at clauses 13-16 of the ISEPP have been reviewed and it is considered that formal consultation with The Hills Shire Council is required.

ISEPP consultation requirements are reviewed in Appendix D. A consultation letter was sent to The Hills Shire Council on 23 March 2017 (refer to Appendix D).

The Hills Shire Council responded on 11 April 2017 and raised the following issues and queries:

- Previous request lodged with Roads and Maritime for traffic signals to be installed at the intersection of Cross Street and Old Northern Road (site of a fatal pedestrian crash in 2014) to provide an additional signalised crossing point for pedestrians, particularly for bus commuters who park in local streets adjacent to Old Northern Road
- Query regarding whether investigations have occurred or are planned into the volume of commuter parking in the residential streets surrounding the bus stops
- Query regarding whether investigations have occurred into the number of pedestrians crossing Old Northern Road, particularly between the traffic signals at Edward Street and Olive Street, where there are no pedestrian facilities
- Query regarding whether additional pedestrian crossing points are proposed on Old Northern Road between Edward Street and Olive Street, a distance of 1.4 kilometres, with no safe area for bus commuters to cross the road each day.

The queries raised by The Hills Shire Council relate to matters beyond the immediate scope of the proposal. They have been referred to the relevant parts of Transport for NSW / Roads and Maritime for consideration and response.

## 5.5 Government agency and stakeholder involvement

The Hills Shire Council been consulted about the proposal. A response was received on 11 April 2017 (refer to section 5.4).

Further consultation with The Hills Shire Council will occur during the public display of the REF.

## 5.6 Ongoing or future consultation

As noted in section 5.2, the REF will be publicly displayed and submissions will be invited. All submissions will be reviewed and issues raised will be considered and responded to in a subsequent submissions report, which will be made publicly available.

Nearby residents and businesses will be notified prior to the commencement of any construction. This notification would reference working hours and expected impacts. Contact details of the works supervisor would be made available to residences via a letterbox drop to allow construction phase issues to be raised and addressed.

# 6 Environmental assessment

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

- Potential impacts on matters of national environmental significance under the EPBC Act
- The factors specified in the guidelines *Is an EIS required?* (Department of Urban Affairs and Planning, 1995) and *Roads and Related Facilities – EIS Guideline* (Department of Urban Affairs and Planning, 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 A.

Site-specific environmental safeguards and management measures are provided to mitigate the identified potential impacts. These would be documented in a Construction Environment Management Plan (CMEP) which would cover each proposal site and proposed works.

## 6.1 Socio-economic

### 6.1.1 Existing environment

**Community Profile**

Key demographic, social and economic information derived from the 2011 Census (Australian Bureau of Statistics, 2011) for the suburbs of Castle Hill and Baulkham Hills are outlined below in Table 6-1 and Table 6-2 respectively.

The Census data indicates that the use of buses for the journey to work is well above the NSW average (3.7 per cent) for both Castle Hill and Baulkham Hills. The use of the car is also above the NSW average (57.6 per cent) for both suburbs.

*Table 6-1 Key social and demographic information – Castle Hill*

| Population | Median Age | Household Occupancy | People in labour force | Travel to work | Median weekly household income | Motor vehicles per dwelling |
|---|---|---|---|---|---|---|
| 37,915 | 39 | 3 | • 19,877<br>• 62.9% full-time<br>• 28.3% part-time<br>• 4.2% unemployed | • 63.8% car driver<br>• 9.6% bus<br>• 4.2% car passenger | $2,059 | 2 |

*Table 6-2 Key social and demographic information – Baulkham Hills*

| Population | Median Age | Household Occupancy | People in labour force | Travel to work | Median weekly household income | Motor vehicles per dwelling |
|---|---|---|---|---|---|---|
| 33,945 | 37 | 2.9 | • 18,190<br>• 63.1% full-time<br>• 27.4% part-time<br>• 4.2% unemployed | • 62.3% car driver<br>• 10.4% bus<br>• 4.2% car passenger | $1,872 | 1.9 |

**Accessibility**

Table 3-1 in Chapter 3 (Description of the proposal) reviews all bus stops along the Castle Hill to M2 Motorway corridor and provides existing patronage data for those locations where removal or relocation of bus stops is proposed. Figure 3-1 shows the location of existing bus stops and their accessibility from surrounding areas.

**Key social infrastructure**

There is a range of social infrastructure located near the proposal sites. This includes:

- Schools (Gilroy Catholic College, St Gabriel's, Baulkham Hills High School, Our Lady of Lourdes Primary School)
- TAFE Western Sydney Institute
- Baulkham Hills Library (Railway Street)
- Child Care Centre (corner Old Northern Road and Excelsior Avenue)
- Medical centres (Castle Hill and Baulkham Hills).

**Economic profile and businesses**

A snapshot of the economic profile for the Hills Shire local government area is provided in Table 6-3.

*Table 6-3 Economic profile of the Hills Shire local government area*

| Gross regional product | Jobs | Businesses | Largest industry |
|---|---|---|---|
| $8.44 billion | 69,468 | 17,466 | Retail trade |

Source: (National Economics, 2015).

The proposal locations where there is the potential for businesses to be affected are:

- Old Northern Road (stop 2153207) (adjacent to Stockland Baulkham Hills Shopping Centre)
- Windsor Road (stop 2153227) (real estate business adjacent to existing stop location)
- Windsor Road (stop 2153227) (massage, photo/film conversion businesses adjacent to proposed relocated stop)
- Windsor Road (stop 2153227) (security screens business).

### 6.1.2 Potential impacts

**Construction**

Issues such as air quality, dust, noise, vibration, visual amenity, traffic delays have the potential to affect the local community and road users during construction of the proposal.

General amenity impacts during construction of the proposal would be minor, temporary and would potentially occur due to the following:

- Increases in noise due to the operation of plant and equipment
- Potential dust mobilisation due to pavement works and minor excavation
- Increase in construction traffic due to the delivery of plant, materials and construction personnel
- Traffic management arrangements and associated minor delays for traffic.

These issues have been outlined and assessed in other sections of this report, as follows:

- Visual impacts (refer section 6.3)
- Noise and vibration (refer section 6.4)
- Air quality (refer section 6.9)
- Traffic and transport (refer to section 6.10).

During construction, access to adjacent properties would be maintained and bus services would still operate servicing established stops along the route. For bus stop improvements, existing bus stops would remain operational during works, with minimal impacts on customers. For bus stop relocations, the existing bus stop would remain operational and signage associated with the relocated stop would be covered until it becomes operational. Changes would be communicated to potentially affected customers in advance. In the event that temporary bus stops are required during the works, this would be managed by the Traffic Management Plan.

**Operation**

***Accessibility***

The proposal would result in fewer stops and changes to the location of some bus stops along the corridor. While for some people this would mean additional walking distance and reduced convenience, the proposal has targeted a standardised spacing of 400 metres between bus stops, with a greater than 400 metre spacing accepted at some locations to minimise the number of bus stop relocations across the corridor. Those locations where the proposal would result in a greater than 400 metre spacing between bus stops are as follows:

- Location #7 – resultant spacing would be 545 metres
- Location #10 – distance from the preceding stop would be about 328 metres and the spacing to the next stop would be about 622 metres (with the removal of stop 2154120 #11)
- Location #11 – resultant spacing would be 640 metres
- Location #12 – resultant spacing would be 665 metres
- Location #13 – distance from preceding stop would be about 445 metres (with the removal of stop 2153217 #15) and the distance to the next bus stop would be about 665 metres (with the removal of stop 2154111 #12)
- Location #18 – resultant spacing would be 665 metres
- Location #23 – distance from the preceding stop would be about 450 metres (with the removal of stop 2153207 #24) and the distance to the next bus stop would be about 355 metres (with the relocation of stop 2153209 #21)
- Location #29 – resultant spacing would be 515 metres.

The proposed changes would still mean the bus services using the corridor would be accessible and would remain an attractive transport option. Spacing of bus stops between 800 metres and one kilometre apart would be considered as part of a future planned rapid bus route.

An important consideration in developing the proposal was to ensure bus stops used by local and suburban services in the corridor remain accessible. A review of the impact of bus stop removal and relocation on suburban and local services found that in almost all cases there would be limited impact on suburban and local services because all services stop at the preceding and following bus stops and the resulting spacing with the proposal would be consistent with the acceptable spacing discussed above. The results of the review are presented below in Table 6-4.

*Table 6-4 Review of impacts on suburban and local services*

| Ref# | Location | Proposal | Local / suburban routes | Comment |
|---|---|---|---|---|
| 7 | Old Northern Road at St Gabriel's School (northbound) | Remove bus stop | 600, 603, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 10 | Old Northern Road after Excelsior Avenue (southbound) | Relocate bus stop | 600, 610, 610X, 612X, 619, 627 | Minor relocation (18 metres). All routes stop at preceding and next stops with acceptable spacing maintained. |
| 11 | Old Northern Road near Oxley Ave (southbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 12 | Old Northern Road near Oxley Ave (northbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 13 | Hills College, Old Northern Road (northbound) | Relocate bus stop | 600, 610, 610X, 612X, 619, 627 | 80 metre relocation. All routes stop at preceding and next stops with acceptable spacing maintained. |
| 15 | Old Northern Road at No. 140 (northbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 18 | Old Northern Road near Cross Street (southbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 19 | Old Northern Road near Cross Street (northbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 21 | Old Northern Road at Ackling Street (northbound) | Relocate bus stop | 600, 610, 610X, 612X, 619, 627, 630 | 100 metre relocation. All routes (except 630) stop at preceding and next stops with acceptable spacing maintained.<br>While route 630, which leaves |

| Ref# | Location | Proposal | Local / suburban routes | Comment |
|---|---|---|---|---|
| | | | | Old Northern Road at Cross Street, acceptable spacing would be maintained with the relocation of bus stop 2153209 (#21) to the north and the existing position of bus stop 2153236 at the western end of Cross Street. |
| 23 | Old Northern Road near Hill Street (northbound) | Relocate bus stop | 600, 610, 610X, 612X, 619, 627, 630 | 90 metre relocation. All routes stop at preceding and next stops with acceptable spacing maintained. |
| 24 | Old Northern Road, Stockland (northbound) | Remove bus stop | 600, 610, 610X, 612X, 619, 627, 630 | All routes stop at preceding and next stops with acceptable spacing maintained. |
| 28 | Windsor Road after Railway Street, Baulkham Hills (southbound) | Relocate bus stop | 600, 601, 610, 610X, 612X, 615X, 618, 619, 627, 628, | 65 metre relocation. All routes (that use Old Northern Road) stop at preceding and next stops with acceptable spacing maintained. |
| 29 | Windsor Road after Charles Street (southbound) | Remove bus stop | 600, 601, 610, 610X, 612X, 615X, 618, 619, 627, 628, | All routes stop at preceding and next stops with acceptable spacing maintained. |

***Service reliability***

With the proposal, users of buses along the route would benefit from improved service reliability and reduced journey times facilitated by improved bus access / exit from bus stops and reduced time spent stationary.

***Loss of parking***

The proposal would result in no loss of on-street parking.

***Business impacts***

Businesses can be potentially affected by removal or relocation of bus stops. The potential impacts on local businesses are summarised in Table 6-5.

*Table 6-5 Local business impacts and benefits*

| Ref# | Location | Proposal | Affected businesses | Impacts / benefits |
|---|---|---|---|---|
| 24 | Old Northern Road, Stockland (northbound) | Remove bus stop | Stockland Baulkham Hills Shopping | Negligible impact. Adjacent bus stop 2153206 services the M61 and other services and is located |

| | | | | |
|---|---|---|---|---|
| | | | Centre | at a distance of about 160 metres to the south. Suitable access to Stockland Baulkham Hills Shopping Centre is maintained via bus stop 2153206 (#26). Impacts on convenience of access, business exposure and attractiveness not expected. |
| 28 | Windsor Road after Railway Street, Baulkham Hills (southbound) | Relocate bus stop | Real estate, massage, film / photography | Negligible impact associated with minor relocation of bus stop 65 metres to the south. Impacts on convenience of access, business exposure and attractiveness not expected. |
| 29 | Windsor Road after Charles Street (southbound) | Remove bus stop | Security screen businesses | Negligible impact. Adjacent bus stop 2153226 services the M61 and other services and would be located about 140 metres to the north (with the proposed relocation). Impacts on convenience of access, business exposure and attractiveness not expected. |

### 6.1.3 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Socio-economic - communication | A Communication Plan will be prepared and included in the CEMP. The Communication Plan will include (as a minimum):<br>• Requirements to provide details and timing of proposed activities to affected residents<br>• Contact name and number for complaints<br>• Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access.<br>The communication plan will be prepared in | Contractor | Detailed design / pre-construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | accordance with G36 requirements and the Roads and Maritime *Community Engagement and Communications Manual* (2012). | | | |
| Socio-economic - complaints | A complaints handling procedure and register would be included in the CEMP and maintained for the duration of the project. | Contractor | Pre-construction / construction | Standard safeguard |
| Socio-economic – interruptions to utility services | In the event that utilities relocation would be required, residents would be informed prior to any interruptions to utility services that may be experienced as a result of utilities relocation. | Contractor | Pre-construction / construction | Standard safeguard |
| Socio-economic – access | Road users, pedestrians and cyclists would be informed of changed conditions, including likely disruptions to access during construction. | Contractor | Pre-construction / construction | Standard safeguard |
| Socio-economic – access | Access to residences, businesses and retained bus stops will be maintained during construction. | Contractor | Construction | Additional safeguard |

## 6.2 Biodiversity

### 6.2.1 Methodology

The approach to the assessment of potential biodiversity impacts associated with the proposal first involved evaluating the potential for threatened species, populations, endangered ecological communities, or their habitat to be present at each site. This was done by reference to:

- Review of vegetation mapping (Office of Environment and Heritage, 2009)
- Bionet search dated 9 April 2017 (refer to Appendix E)
- EPBC Act protected matters search dated 9 April 2017 (refer to Appendix E)
- Observations from an inspection of each site.

Conclusions were then drawn about potential impacts, considering the existing environment and the nature and extent of the proposed works.

### 6.2.2 Existing environment

**Vegetation communities and flora**

The proposal sites are all highly urbanised environments, none of which include remnant native vegetation. At all locations, trees are setback beyond the area of proposed works.

Several threatened flora species listed under the EPBC Act and / or the TSC Act have been previously recorded within the broader area (see database search results included in Appendix E). The proposal sites do not represent suitable habitat for these species because they consist of urban pavements, exotic groundcovers and bus stop infrastructure including signage structures and bus shelters. Threatened flora is therefore not expected to be present at any of the proposal sites.

**Fauna**

Several threatened flora species listed under the EPBC Act and / or the TSC Act have been previously recorded within the broader area (see database search results included in Appendix E). None of the proposal sites represent suitable habitat for these species because they consist of urban pavements, exotic groundcovers and bus stop infrastructure including signage structures and bus shelters. Threatened fauna is therefore not expected to be present at any of the proposal sites.

### 6.2.3 Potential impacts

Biodiversity impacts are not expected as a result of the proposal. No trees would be removed and impacts on vegetation would be limited to disturbance of turfed roadside areas.

While several threatened flying mammal species (i.e. Grey-headed Flying-fox and insectivorous bats, birds) have been previously recorded within the broader area and may fly over the area investigated on occasion. None are expected to use any of the proposal sites and therefore the proposal is not expected to have a significant impact on the local or regional viability of these species, their populations or habitats.

### 6.2.4 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Safeguard / additional safeguard |
|---|---|---|---|---|
| Unexpected threatened species impact | If unexpected threatened flora or fauna are discovered, works would stop immediately and the Roads and Maritime *Unexpected Threatened Species Find Procedure*, identified in the Roads and Maritime *Biodiversity Guidelines* (Roads and Traffic Authority, 2011) will be implemented. | Contractor | Construction | Standard safeguard |

## 6.3 Visual amenity

### 6.3.1 Assessment approach

The landscape character and visual assessment was considered in accordance with the *Guidelines for landscape character and visual impact assessment* (Roads and Maritime Services, 2013).

The guidelines establish an assessment process by reference to the sensitivity of the area and magnitude of the proposal in that area. Figure 6-1 illustrates this process.

| SENSITIVITY | MAGNITUDE: HIGH | MODERATE | LOW | NEGLIGIBLE |
|---|---|---|---|---|
| HIGH | HIGH | HIGH - MODERATE | MODERATE | NEGLIGIBLE |
| MODERATE | HIGH - MODERATE | MODERATE | MODERATE - LOW | NEGLIGIBLE |
| LOW | MODERATE | MODERATE -LOW | LOW | NEGLIGIBLE |
| NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE |

*Figure 6-1 Landscape Character / Visual impact grading matrix*

**Landscape character**

The landscape character assessment sums up an area's sense of place including all built, natural and cultural aspects, covering towns, countryside and all shades between (Roads and Maritime Services, 2013). The assessment involves identifying landscape character sensitivity and potential impacts attributable to the proposal under consideration.

**Visual impact**

The visual impact assessment of the proposal involves a consideration of whether any important viewpoints would be affected and, where relevant, an assessment of visual impact.

### 6.3.2 Existing environment

**Landscape character**

The proposal sites all occur in an urban context with landscape character sensitivity assessed as ranging from low to moderate. Table 6-6 considers landscape character sensitivity for those sites where bus stops are being relocated, extended or improved. The visual context of these sites is shown by the figures included in section 2.2. There would be negligible visual impact associated with bus stop removal and therefore the locations where bus stop removal has been proposed are not considered further.

*Table 6-6 Landscape character sensitivity*

| Ref# | Location | Sensitivity | Comment |
|---|---|---|---|
| 6 | Old Northern Road after Church Street (southbound stop 2154117) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 9 | Old Northern Road after Excelsior Avenue (northbound stop 2154112) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 10 | Old Northern Road after Excelsior Avenue (southbound stop 2154119) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |

| Ref# | Location | Sensitivity | Comment |
|---|---|---|---|
| 13 | Hills College, Old Northern Road (northbound bus stop 2153218) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 21 | Old Northern Road at Ackling Street (northbound bus stop 2153209) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 22 | Old Northern Road near Hill Street (southbound bus stop 2153223) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 23 | Old Northern Road near Hill Street (northbound bus stop 2153208) | Low | Urban arterial road environment. Minimal visual interface with adjacent development. |
| 28 | Windsor Road after Railway Street (southbound bus stop 2153226) | Low | Urban arterial road environment with adjacent commercial development. |

**Views**

The proposal locations were not assessed as having scenic views or high quality vistas. Views at all sites listed above in Table 6-5 are considered to have low sensitivity.

### 6.3.3 Potential impacts

Visual impacts during construction would be associated with presence of work vehicles and the construction site itself. These impacts would be minor and very short-term.

Table 6-7 evaluates the potential landscape character and visual amenity impacts of the proposal once works are complete. There would be negligible visual impact associated with bus stop removal and therefore Table 6-7 only covers those sites where bus stops are being relocated or improved. In these cases, there is the potential for visual impacts associated with new signage, shelters (where proposed) and other bus stop infrastructure.

*Table 6-7 Landscape character and visual amenity impacts*

| | Location | Proposed works | Sensitivity | Magnitude | Impact | Comment |
|---|---|---|---|---|---|---|
| 6 | Old Northern Road after Church Street (southbound stop 2154117) | Improvement - extension of bus stop | Low | Negligible | Negligible | Relocation of bus zone signage and installation of TGSI only. Significant views would not be affected. |
| 9 | Old Northern Road after Excelsior Avenue (northbound stop 2154112) | Improvement - extension of bus stop | Low | Low | Low | Minor increase in road space associated with extension of bus bay. Adjacent trees would not be affected. Significant views would not be affected. |
| 10 | Old Northern Road after Excelsior Avenue (southbound stop 2154119) | Relocation of bus stop | Low | Low | Low | Minor relocation with similar bus stop infrastructure. Some impact on the appearance of the 175E Old Northern Road frontage due to the repositioning of the bus shelter. Significant views would not be affected. |
| 13 | Hills College, Old Northern Road (northbound bus stop 2153218) | Relocation of bus stop | Low | Low | Low | New signage and other elements would be small scale and consistent with existing streetscape.<br>Some impact on the appearance of the 166 Old Northern Road frontage due to the installation of the bus shelter.<br>Significant views would not be affected. |
| 21 | Old Northern Road at Ackling Street (northbound bus stop 2153209) | Relocation of bus stop | Low | Negligible | Negligible | New signage and other elements would be small scale, consistent with existing streetscape and would not affect any significant views.<br>Negligible impact on frontage of adjacent residences due to the presence of a high brick wall. |

| | Location | Proposed works | Sensitivity | Magnitude | Impact | Comment |
|---|---|---|---|---|---|---|
| 22 | Old Northern Road near Hill Street (southbound bus stop 2153223) | Improvement - extension of bus stop | Low | Negligible | Negligible | New signage would be small scale, consistent with existing streetscape and would not affect any significant views. |
| 23 | Old Northern Road near Hill Street (northbound bus stop 2153208) | Relocation of bus stop | Low | Negligible | Negligible | New signage and other elements would be small scale, consistent with existing streetscape and would not affect any significant views.<br>Negligible impact on frontage of adjacent residences due to the presence of a high brick wall. |
| 28 | Windsor Road after Railway Street (southbound bus stop 2153226) | Relocation of bus stop | Low | Negligible | Negligible | New signage and other elements would be small scale, consistent with existing streetscape and would not affect any significant views. |

### 6.3.4 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Construction related visual impacts | The work site would be left in a tidy manner at the end of each work day. | Contractor | Construction | Standard safeguard |
| Bus stop design | Bus stop signage and other infrastructure will comply with applicable Transport for NSW requirements and standards. | Transport for NSW / Roads and Maritime | Detailed design | Additional safeguard |

## 6.4 Noise and vibration

### 6.4.1 Methodology

The Roads and Maritime *Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016) and associated Construction Noise Estimator were used to determine the potential for construction noise impacts at the nearest residential receivers.

Construction noise calculations for most sites have assumed the presence of workers, the use of hand tools, the use of a truck, the use of a jackhammer and the use of a concrete saw. At Location #9, where the existing bus bay is to be extended, the use of a paver, excavator and roller was also assumed. At locations #11, #12, #15, #18 and #19, some barrier attenuation was allowed for in calculations given the presence of solid walls on the property frontage.

In most cases works would have a duration of less than one day. Works would be primarily carried out during standard construction hours, although some evening and night works may be required to minimise impacts on traffic.

As no significant changes to traffic volumes or road geometry are proposed, operation noise modelling was not conducted. Qualitative assessment of operational noise is provided in section 6.4.4.

### 6.4.2 Existing environment

Existing noise in the area is dominated by road traffic noise. Sensitive receivers include primarily residences and schools. The nearest receivers are located at distances of between five and 85 metres.

Based on guidance provided by the R*oads and Maritime Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016) and associated Construction Noise Estimator, the following variables were adopted for the construction noise assessment:

- Representative noise environment for all locations: the background noise environment is influenced by road traffic noise on the adjacent arterial road (R3)
- Background noise levels: 50 dBA day, 45 dBA evening and 40 dBA night
- Timing: Day is 7am to 6pm, evening is 6pm to 10pm and night is 10pm to 7am.

### 6.4.3 Criteria

**Construction noise**

Noise management goals for construction are given in the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).

For residential receivers, the guideline provides that the construction noise should not exceed the background by more than 10 dBA during standard hours, and by more than 5 dBA out of hours (that is, for night-time works). This is referred to as the noise management level (NML). The level of 75 dBA is identified as the point above which there may be a strong community reaction to noise.

The guideline provides the following noise management goals for other receivers:

- Active recreation areas (such as parks): external $L_{Aeq}$, 15min 65 dBA (when in use)
- Industrial premises: external $L_{Aeq}$, 15min 75 dBA
- Offices, retail outlets: external $L_{Aeq}$, 15min 70 dBA
- Places of worship $L_{Aeq}$, 15min 45 dBA (internal) (when in use)
- Hospital wards and operating theatres $L_{Aeq}$, 15min 45 dBA (internal)
- Classrooms at schools $L_{Aeq}$, 15min 45 dBA (internal) (when in use).

It is anticipated that the proposal would take no more than one week to complete at each location and would therefore be appropriately categorised as short-term infrastructure maintenance under the *Interim Construction Noise Guideline* (Department of Environment and Climate Change, 2009).

**Construction vibration**

The publication *Assessing Vibration: a technical guideline* (Department of Environment and Conservation, 2006) sets out human comfort criteria for continuous, impulsive and intermittent vibration. Where vibration is intermittent, as would be the case with the proposal, the dose values in Table 6-7 are applicable.

*Table 6-8 Acceptable vibration dose values for intermittent vibration (m/s 1.75)*

| Location | Daytime(1) | | Night time(1) | |
|---|---|---|---|---|
| | Preferred | Maximum | Preferred | Maximum |
| Critical areas (2) | 0.10 | 0.20 | 0.10 | 0.20 |
| Residences | 0.20 | 0.40 | 0.13 | 0.26 |
| Offices, schools, educational institutions and places of worship | 0.40 | 0.80 | 0.40 | 0.80 |
| Workshops | 0.80 | 1.60 | 0.80 | 1.60 |

1) Daytime is 7.00am to 10.00pm and night time is 10.00pm to 7.00am.

2) Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas. Source: *BS 6472-1992 Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)* (British Standards Institution, 1992).

In relation to potential building damage, *BS 7385-2 1993 Evaluation and measurement for vibration in buildings* (British Standards Institution, 1993) sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. For residential or light commercial buildings, the following recommended limits are given:

- 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz
- 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

### 6.4.4 Potential impacts

**Construction noise**

Table 6-9 shows construction noise predictions for those sites where physical works are proposed. The results presented show that, due to the proximity of receivers, noise management levels are likely to be exceeded for the nearest residential and commercial receivers. At all locations, the 75 dBA highly noise affected criteria would also be exceeded. These exceedances represent a worst case and would only occur for short periods while the noisiest equipment is being used. Works at each site would not exceed one week.

*Table 6-9 Construction noise predictions*

| Ref # | Location | Receiver distance (metres) | NML (day) | Prediction $L_{Aeq}$ 15min dBA | Exceedance above NML (standard hours) |
|---|---|---|---|---|---|
| 6 | Old Northern Road after Church Street (stop 2154117) | 15 | 60 | 88 | 28 |
| 7 | Old Northern Road at St Gabriel's School (stop | 10 | 60 | 91 | 31 |

| Ref # | Location | Receiver distance (metres) | NML (day) | Prediction $L_{Aeq}$ 15min dBA | Exceedance above NML (standard hours) |
|---|---|---|---|---|---|
| | 2154113) | | | | |
| 9 | Old Northern Road after Excelsior Avenue (northbound stop 2154112) | 25 | 60 | 80 | 20 |
| 10 | Old Northern Road after Excelsior Avenue (southbound stop 2154119) | 15 | 60 | 88 | 28 |
| 11 | Old Northern Road near Oxley Ave (southbound bus stop 2154120) | 10 | 60 | 86 | 26 |
| 12 | Old Northern Road near Oxley Ave (northbound bus stop 2154111) | 10 | 60 | 86 | 26 |
| 13 | Hills College, Old Northern Road (northbound bus stop 2153218) | 15 | 60 | 88 | 28 |
| 15 | Old Northern Road at No. 140 (northbound bus stop 2153217) | 15 | 60 | 83 | 23 |
| 18 | Old Northern Road near Cross Street (southbound bus stop 2153221) | 15 | 60 | 83 | 23 |
| 19 | Old Northern Road near Cross Street (northbound bus stop 2153210) | 10 | 60 | 86 | 26 |
| 21 | Old Northern Road at Ackling Street (northbound bus stop 2153209) | 10 | 60 | 91 | 31 |
| 22 | Old Northern Road near Hill Street (southbound bus stop 2153223) | 10 | 60 | 91 | 31 |
| 23 | Old Northern Road near Hill Street (northbound bus stop 2153208) | 10 | 60 | 91 | 31 |
| 24* | Old Northern Road at Stockland Mall (northbound bus stop 2153207) | 5 | 70 | 97 | 27 |
| 28* | Windsor Road after Railway Street (southbound bus stop 2153226) | 5 | 70 | 97 | 27 |
| 29* | Windsor Road near Charles Street (southbound bus stop 2153227) | 15 | 70 | 88 | 18 |

* No adjacent residences. Commercial only.

### Construction vibration

Having regard to the types of equipment that could be used and the typical distance to nearby buildings, vibration is not expected to be an issue in terms of both structural damage and human response. The Transport for NSW *Construction Noise Strategy* (Transport for NSW, 2012) sets out minimum working distances for vibration intensive plant to avoid building damage and human response. These are summarised in Table 6-10.

*Table 6-10 Minimum safe working distances for vibration intensive plant*

| Plant Item | Rating / Description | Safe Working Distance | |
|---|---|---|---|
| | | Cosmetic Damage | Human Response |
| Jackhammer | Hand held | 1 m (nominal) | Avoid contact w/structure |

### Operational noise and vibration

The proposal would not result in changes to road geometry (except at Location #9 where the change would be minor), traffic volumes or traffic mix and therefore a change in operational road traffic noise is not expected.

At locations where new / relocated bus stops are proposed, some short term static noise associated with pick-up and departure of buses, and waiting customers at bus stops, may be noticeable. This would be periodic as per the bus timetable and would be experienced in the context of existing road traffic noise from other vehicles. The same static noise impacts would be eliminated at other locations where bus stops are removed, noting that there is an overall reduction in the number of bus stops. Buses would not be idling for extended periods at any of the new / relocated bus stops.

The proposal would not introduce new sources of vibration during operation and therefore vibration impacts are not expected.

### 6.4.5 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Construction noise and vibration | A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP in accordance with the Roads and Maritime Construction Noise and Vibration Guideline (2016). This plan would include, but not be limited to:<br>• A map indicating the locations of sensitive receivers including residential properties<br>• Management measures to minimise the potential noise impacts (including implementation of EPA *Interim Construction Noise Guideline* (DECCW, 2009)<br>• A risk assessment to determine potential risk for activities likely to affect receivers<br>• Mitigation measures to avoid noise and vibration impacts during construction activities<br>• A process for assessing the performance of the implemented mitigation measures<br>• A process for documenting and | Contractor | Pre-construction / construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | resolving issues and complaints<br>• A process for updating the plan when activities affecting construction noise and vibration change<br>• Identify in toolbox talks where noise and vibration management is required. | | | |
| Construction noise and vibration - complaints | During work hours, a community liaison phone number and site contact would be provided to enable complaints to be received and responded to. | Contractor | Construction | Standard safeguard |
| Construction noise and vibration - complaints | If deemed necessary, attended compliance noise and vibration monitoring would be undertaken upon receipt of a complaint. Monitoring would be reported as soon as possible. In the case that exceedances are detected, the situation would be reviewed in order to identify means to minimise the impacts to residences, the appropriate changes made and the NVMP updated accordingly. | Contractor | Construction | Standard safeguard |
| Construction noise and vibration - training | The environmental induction program will include specific noise and vibration issues awareness training including, but not limited to, the following:<br>• Avoiding use of radios during work outside normal hours<br>• Avoiding shouting and slamming doors<br>• Where practical, | Contractor | Pre-construction / construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods<br>• Avoiding dropping materials from height and avoiding metal to metal contact on material. | | | |
| Construction noise and vibration impacts | Where feasible and reasonable, construction will be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels will be scheduled during less sensitive time periods. | Contractor | Construction | Additional safeguard |
| Construction noise and vibration impacts | Quieter and less vibration emitting construction methods will be used where feasible and reasonable. | Contractor | Construction | Additional safeguard |
| Construction noise and vibration impacts | The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the *Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016). | Contractor | Construction | Additional safeguard |
| Construction noise and vibration impacts | Night time construction noise shall be limited to two consecutive nights. High noise generating works will be completed before 11:00pm. | Contractor | Construction | Additional safeguard |

## 6.5 Non-Aboriginal heritage

### 6.5.1 Existing environment

A search of the NSW State Heritage Inventory was undertaken for the Hills Shire local government areas on 9 April 2017. It returned 154 records. A similar search of the Australian Heritage Database (for the suburbs of Castle Hill and Baulkham Hills) returned 11 records. The Hills Shire LEP and Roads and Maritime Heritage Conservation Register were also searched with no additional items identified.

Figure 6-2 and Figure 6-3 show the location of heritage items and conservation areas in relation to proposal locations. There would be negligible potential impacts on heritage values associated with bus stop removal and these are only shown for context.

There are no World Heritage or National Heritage Places proximate to the proposal.


*Figure 6-2 Heritage items – Map 1*

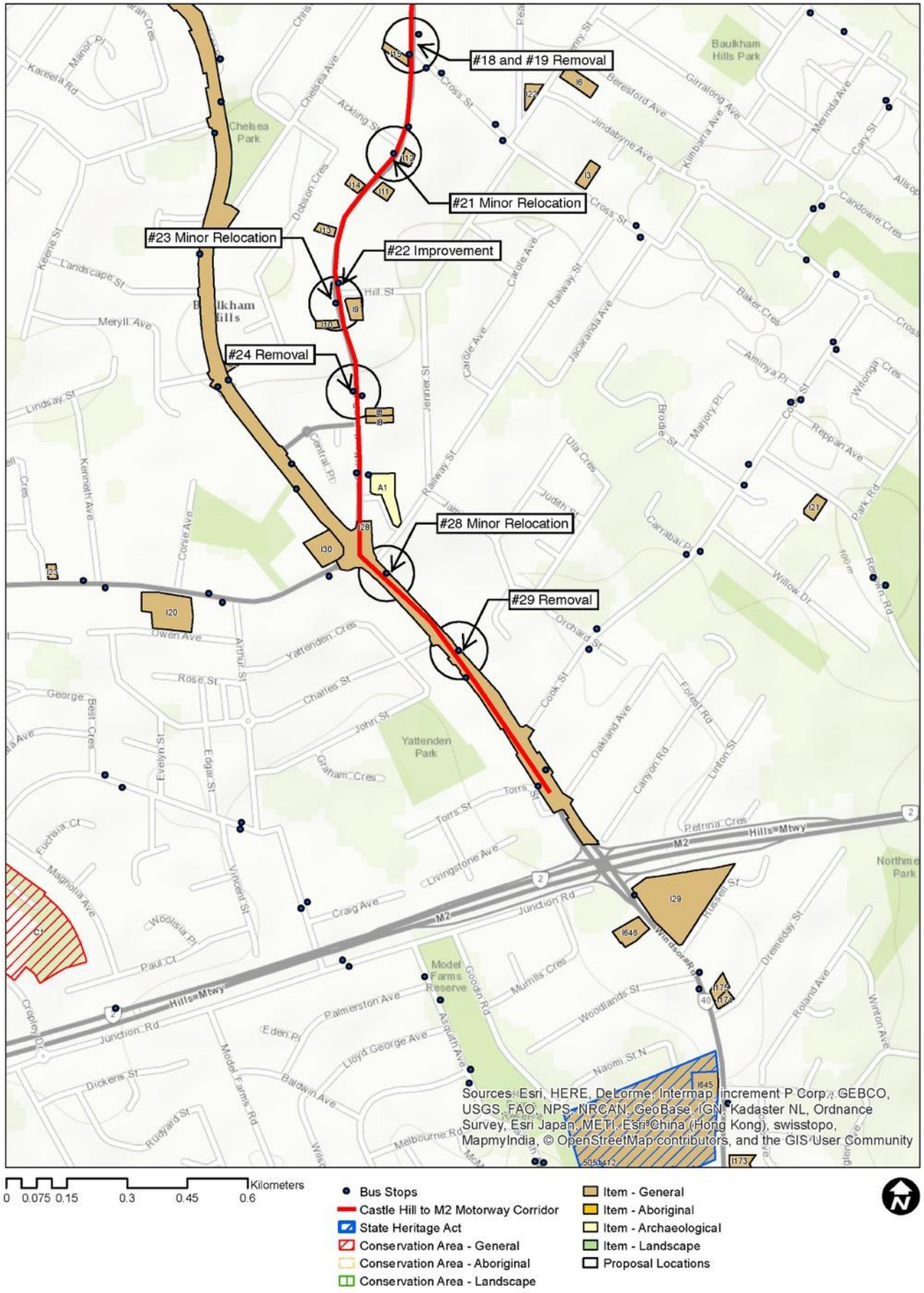



*Figure 6-3 Heritage items – Map 2*

### 6.5.2 Potential impacts

The proposal (at locations #28 and #29) would occur within the boundary of The Hills LEP listed item identified as “Windsor Road from Baulkham Hills to Box Hill”. However, as the photographs in Figure 2-12 and Figure 2-13 illustrate, the section of Windsor Road at locations #28 and #29 has been heavily modified by relative recent road upgrade works. It is not considered that the proposed relocation of bus stop 2153226 (#28) and the removal of bus stop 2153227 (#29) would affect heritage fabric or values.

Table 6-11 reviews potential impacts on adjacent heritage items and conservation areas. There would be negligible potential impacts on heritage values associated with bus stop removal, because physical works would be limited to the removal of existing bus stop infrastructure, and therefore the locations where bus stop removal is proposed are not discussed further.

*Table 6-11 Review of potential non-Aboriginal heritage impacts for items / areas adjacent the proposal*

| Location / works | Items / conservation areas | Impact |
|---|---|---|
| Location 6<br>Old Northern Road after Church Street (southbound stop 2154117).<br>Relocate the northern bus zone sign approximately 10 metres north. Install TGSI. | Locally significant “Castle Hill House” (I50) is located about 45 metres to the north beyond Church Street. | No impact. The proposed signage and other elements would be consistent with the existing streetscape and would not affect the heritage values of the nearby items. Works would not occur within the curtilage of the heritage item. |
| Location 10<br>Old Northern Road after Excelsior Avenue (southbound stop 2154119).<br>Relocate bus stop (including bus shelter and signage) about 18 metres to the south. Install TGSI. Install concrete pad. | Current bus stop is located adjacent to the locally significant 'Bellerive' (I49). | No impact. Bus stop would be moved to the south away from this item and works would not occur within the curtilage of the heritage item. The proposed relocation would be consistent with the existing streetscape and would not affect the heritage values of the nearby items. |
| Location 21<br>Old Northern Road at Ackling Street (northbound bus stop 2153209)<br>Relocate bus stop 2153209 about 120 metres north. Remove signage and seat from current location. Install shelter, signage and TGSI at new location. | Locally significant house (I12) is located opposite existing bus stop location. | No impact. Bus stop would be moved to the north away from this item and works would not occur within the curtilage of the heritage item. The proposed relocation would be consistent with the existing streetscape and would not affect the heritage values of the nearby items. |
| Location 22<br>Old Northern Road near Hill Street (southbound bus | Locally significant house (I9) is located about 30 metres to the south (on the southern side of Hills Street) of the | No impact. Bus stop is set back sufficiently from this item and works would not occur within the curtilage of the heritage item. |

| Location / works | Items / conservation areas | Impact |
|---|---|---|
| stop 2153223)<br>Install bus zone signage for bus stop 2153223 creating a 30 metre long bus zone. | existing bus stop location. | The proposed relocation would be consistent with the existing streetscape and would not affect the heritage values of the nearby items. |
| Location 23<br>Old Northern Road near Hill Street (northbound bus stop 2153208).<br>Relocate bus stop 2153208 about 90 metres north to the departure side of the Hills Street intersection. Remove signage and seat from current location. Install shelter, signage and TGSI at new location. | Current bus stop is located opposite locally significant house. | No impact. Bus stop would be moved further to the north away from this item and works would not occur within the curtilage of the heritage item. |

At all proposal locations, there has been previous disturbance of the natural soil profile associated with urban development, road construction and utilities. Given the minor nature of proposed excavations (shelter footings, signage footings and concreted pads) archaeological potential is likely to be low. There is some potential for kerbing and historic road pavement to be uncovered. These historic items, if found, would be categorised as “works” rather than archaeological relics in accordance the *Standard Management Procedure: Unexpected Heritage Finds* (Roads and Maritime Services, 2015).

### 6.5.3 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Unexpected impacts on heritage values | If unexpected heritage item/s, archaeological remains or potential relics are uncovered during the works, all works would cease in the vicinity of the material / find and the *Standard Management Procedure: Unexpected Heritage Finds* (Roads and Maritime Services, 2015) would be followed. | Roads and Maritime<br>Contractor | Construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Inadvertent impacts on known heritage items and unexpected impacts on heritage values | Non-Aboriginal heritage awareness training would be provided for workers prior to commencement of construction work to communicate potential heritage items (including those associated with Windsor Road) that may be impacted during works, and the procedure required to be carried out in the event of discovery of historical heritage materials, features or deposits. | Contractor | Pre-construction | Additional safeguard |

## 6.6 Aboriginal heritage

### 6.6.1 Existing environment

An Aboriginal Heritage Information Management System (AHIMS) search was undertaken on 9 April 2017 and identified 32 registered sites in the wider area around the proposal sites. None of the sites are near proposal locations. There are no declared Aboriginal places near the proposal sites. All the proposal sites have been highly disturbed by urban development, road construction and utilities placement.

### 6.6.2 Potential impacts

Aboriginal cultural heritage impacts are not expected as a result of the proposal. The Roads and Maritime Aboriginal Cultural Heritage Advisor for Sydney Region has provided the following advice in relation to the proposal (refer to Appendix C):

- The proposal is unlikely to harm known Aboriginal objects or places
- The AHIMS search did not indicate any known Aboriginal objects or places in the immediate study area
- The study area does not contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due Diligence Code of Practice for the Protection of Aboriginal objects in NSW* (Department of Environment, Climate Change and Water, 2010) and the Roads and Maritime procedure (Roads and Maritime Services, 2011)
- The cultural heritage potential of the study area appears to be reduced due to past disturbance.

### 6.6.3 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Disturbance of Aboriginal objects | The *Standard Management Procedure: Unexpected Heritage Finds* (Roads and Maritime | Roads and Maritime<br>Contractor | Construction | Additional safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | Services, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction.<br>Work will only re-commence once the requirements of that procedure have been satisfied. | | | |

## 6.7 Water quality

### 6.7.1 Existing environment

The proposal sites are within the Parramatta River catchment. Water quality that drains to this catchment is generally poor and flows are altered by the constructed stormwater system. Stormwater from the urban catchment is generally not treated (except for gross pollutants). Common urban stormwater pollutants would include gross pollutant and litter, sediments and suspended solids, nutrients, toxic organics, heavy metals and hydrocarbons.

### 6.7.2 Potential impacts

The construction of the proposal has the potential to result in impacts on local water quality through:

- Accidental spills of fuels, oils or other chemicals from construction vehicles or equipment
- Discharge of water containing suspended solids from disturbed areas at work sites.

Without appropriate safeguards, such pollutants (such as fuel, chemicals or wastewater from accidental spills, and sediment from excavations and stockpiles) could potentially reach nearby stormwater drains and flow into waterways. These pollutants could then affect aquatic life and the amenity value of the receiving waterways.

No groundwater extraction would be required for construction of the proposal and it is unlikely the water table would be intercepted given excavations would be shallow and generally limited to the depth of existing pavements and subbase material.

Following construction there would be no remaining disturbed surfaces and there would be negligible change to runoff from each site. There would be no operational water quality impacts associated with the proposal.

### 6.7.3 Environmental safeguards and mitigation measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Erosion and sedimentation | Erosion and sediment control measures will be documented in the CEMP | Contractor | Pre-construction / construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | and implemented and maintained in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) to:<br>• Minimise sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets<br>• Reduce water velocity and capture sediment on site<br>• Minimise the amount of material transported from site to surrounding pavement surfaces<br>• Divert off site water around the site. | | | |
| Erosion and sedimentation | Erosion and sedimentation controls are to be checked and maintained on a regular basis and after a rain event of 10 millimetres or greater (including clearing of sediment from behind barriers) and records kept and provided on request. | Contractor | Construction | Standard safeguard |
| Erosion and sedimentation | Any material transported onto pavements will be swept and removed at the end of each working shift and prior to rainfall. | Contractor | Construction | Standard safeguard |
| Erosion and sedimentation | Erosion and sediment control measures are not to be removed until the works are complete or areas are stabilised. | Contractor | Construction | Standard safeguard |
| Pollution from site runoff | Refuelling, storage of fuels, vehicle wash down and concrete washout will occur at a dedicated location | Contractor | Construction | Additional safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | offsite. | | | |
| Spills | An emergency spill kit is to be kept on-site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.<br>If a spill or incident occurs, the *Environmental Incident Classification and Management Procedure* (Roads and Maritime Services, 2015) is to be followed and the Roads and Maritime Contract Manager notified immediately. | Contractor | Construction | Standard safeguard |
| Stockpiling | If temporary stockpiles are required on-site they would be located away from drainage lines and removed before the end of each shift. | Contractor | Construction | Additional safeguard |

## 6.8 Air quality

### 6.8.1 Existing environment

The main influence on air quality at the proposal sites is road traffic. The nearest Environment Protection Authority air quality monitoring site is in William Lawson Park at Prospect. Table 6-12 Air quality - EPA site at Prospect presents data from the Prospect site for the period January to December 2016 and compares that data to standards / goals from the National Environment Protection (Ambient Air Quality) Measure (NEPM).

*Table 6-12 Air quality - EPA site at Prospect*

| Pollutant | Averaging time | NEPM maximum | Exceedance goal | Exceedances over NEPM maximum |
|---|---|---|---|---|
| Carbon monoxide | 8 hours | 9.0 ppm | 1 day/year | - |
| Nitrogen dioxide | 1 hour | 0.12 ppm | 1 day/year | - |
| | 1 year | 0.03 ppm | None | 0 |
| Ozone | 1 hour | 0.10 ppm | 1 day/year | 1 |
| | 4 hours | 0.08 ppm | 1 day/year | 0 |
| Sulfur dioxide | 1 hour | 0.20 ppm | 1 day/year | 0 |

| Pollutant | Averaging time | NEPM maximum | Exceedance goal | Exceedances over NEPM maximum |
|---|---|---|---|---|
| | 1 day | 0.08 ppm | 1 day/year | - |
| | 1 year | 0.02 ppm | None | - |
| Particulate matter (PM10) | 1 day | 50 µg/m$^3$ | 5 days/year | 4 |
| Particulate matter (PM2.5) | 1 day | 25 µg/m$^3$ | - | - |
| | 1 year | 8 µg/m$^3$ | - | 5 |

### 6.8.2 Potential impacts

Potential impacts associated with the proposal during construction include minor emissions from machinery (eg delivery vehicles, construction plant).

Emissions from construction vehicles / equipment would be minor and short term due to the short amount of time needed to complete the works at each proposal site.

Sources of dust associated with the construction of the proposal include minor excavation works and wind erosion of the exposed surfaces. Small amounts of dust may be generated from these activities. The total amount of dust would depend on the silt and moisture content in the soil and the types of activities being carried out.

The mobilisation of dust associated with the proposal is expected to be below nuisance levels given the very small areas of ground disturbance.

The proposal would not alter traffic composition or volumes and therefore operational air quality impacts are not expected.

### 6.8.3 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Dust | Measures (including watering or covering exposed areas) will be documented in the CEMP and used to minimise or prevent air pollution and dust, where necessary. | Contractor | Pre-construction / construction | Standard safeguard |
| Dust and other emissions | Vehicles transporting waste or other materials that may produce odours or dust will be covered during transportation. | Contractor | Construction | Standard safeguard |
| Other emissions | Works (including the spraying of paint and other materials) will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely. | Contractor | Construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| | Plant, vehicles and equipment will be maintained in good condition and in accordance with manufacturer's specifications.<br>Plant and machinery will be turned off when not in use. | | | |
| Dust and other emissions | Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention. | Contractor | Construction | Standard safeguard |

## 6.9 Traffic and transport

### 6.9.1 Existing environment

The existing traffic and transport environment is described in section 2.2.1.

### 6.9.2 Potential impacts

Construction of the proposal would create an increase in construction vehicles travelling to and from each proposal site via the motorway network, the wider arterial road network and the local road network. The relatively small number of construction vehicles required for the proposal is not likely to affect traffic flow on these roads, however there may be very short delays associated with vehicles accessing each site.

Temporary kerbside lane closures along the route may be required to allow for mobile crane access (for bus shelter installation) and any pavement works. Any such closures would be short-term and would occur in accordance with a Road Occupancy Licence to minimise impacts on road users.

The proposal would result in no changes to parking.

During operation, the proposal would reduce total travel time and improve bus service reliability, by improving access into and out of bus stops and reducing the amount of bus stops, consistent with the aims of the Bus Priority Infrastructure Program and *Sydney's Bus Future*. Traffic safety was considered during development of the proposal and would be reviewed during detailed design.

### 6.9.3 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / Additional safeguard |
|---|---|---|---|---|
| Road safety and impacts to traffic flow | A traffic management plan will be prepared and implemented in accordance with *Traffic control at worksites* (Roads and Traffic Authority, 2010). | Contractor | Pre-construction / construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / Additional safeguard |
|---|---|---|---|---|
| Property access | Vehicular property access would be maintained where possible including pre-schools, places of worship and all commercial premises. | Contractor | Construction | Standard safeguard |
| Pedestrian and cyclist access | Pedestrian and cyclist access is to be maintained throughout construction.<br>Provision of signs outlining the pedestrians and cyclists diversion routes would be displayed during construction. | Contractor | Construction | Standard safeguard |
| Bus stop access | Access for bus passengers to bus stops would be maintained during construction. | Contractor | Construction | Additional safeguard |
| Operational traffic safety | A safety review of all new bus stop locations will be conducted during the design phase to assess any changes to traffic changes. | Roads and Maritime | Pre-construction | Additional safeguard |

## 6.10 Hazards and risks

### 6.10.1 Potential impacts

Hazards and risks associated with the construction of the proposal would potentially include:

- Work close to sensitive receivers such as schools, childcare centres and hospitals
- Undertaking work within or next to major arterial and regional roads
- Work which may impact or restrict emergency access from existing building and/or emergency vehicles undertaking work within highly pedestrianised areas
- Carrying out work within close proximity to existing buildings and vibration sensitive structures
- Carrying out work within the vicinity of existing services and utilities (e.g. high voltage power lines and gas mains)
- The use and storage of hazardous materials
- The use of heavy machinery
- Unexpected excavation of contaminated land.

A review of the list of contaminated sites notified to the Environment Protection Authority as at (14 April 2016) and a search of the record of notices kept under section 58 of the *Contaminated Land Management Act 1997* (as at 1 May 2017) did not identify any sites potentially affecting the proposal.

Construction hazards and risks are manageable through the application of standard mitigation measures, which would be developed by the construction contractor prior to construction.

Hazards or risks associated with the operation of the proposal would be limited to the potential for changed pedestrian behaviour associated with new bus stop locations (for example, crossing major roads away from signalised crossings). Where possible, pedestrian crossing access was considered when making decisions relating to retaining and removing or relocating bus stops. Operational hazards and risks are manageable through design and standard mitigation measures and plans (such as emergency response plans).

### 6.10.2 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Construction hazards and risks | As part of the site specific CEMP, a Hazard and Risk Management Plan, including an emergency response plan, will be prepared. The plan will identify construction phase hazards and risks detail measures to mitigate those risks. | Contractor | Pre-construction | Additional safeguard |
| Pedestrian safety | A safety review of all new bus stop locations will be conducted during the design phase to identify whether any additional pedestrian safety measures are required. | Roads and Maritime | Pre-construction | Additional safeguard |
| Contamination | In the event that indications of contamination are encountered (known and unexpected, such as odorous or visually contaminated materials), work in the area would cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate. | Contractor | Construction | Standard safeguard |

## 6.11 Waste minimisation and management

### 6.11.1 Policy setting

Transport for NSW and Roads and Maritime are committed to ensuring the responsible management of unavoidable waste and promotes the reuse of such waste in accordance with the

resource management hierarchy principles outlined in the *Waste Avoidance and Resource Recovery Act 2001*. These resource management hierarchy principles, in order of priority are:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, reprocessing, recycling and energy recovery)
- Disposal.

By adopting the above principles, Roads and Maritime aims to efficiently reduce resource use, reduce costs, and reduce environmental harm in accordance with the principles of ecologically sustainable development (refer section 8.2).

### 6.11.2 Potential impacts

The proposal is not expected to generate large quantities of waste materials. The following waste streams have been identified:

- Spoil
- Waste concrete
- Materials from decommissioned bus stops (steel, aluminium, glass, plastic)
- General garbage and refuse.

The proposal would require small quantities of materials, primarily manufactured steel and glass elements and concrete. The quantities of material required would not result in a regional or local supply shortage and none are likely to be in short supply in the foreseeable future. Materials would be sourced from local commercial suppliers where available.

Non-renewable resources such as petroleum fuels would not be used in large quantities.

### 6.11.3 Safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Construction waste management | The following resource management hierarchy principles will be followed:<br>• Avoid unnecessary resource consumption as a priority<br>• Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)<br>• Disposal would be undertaken as a last resort (in accordance with the Waste Avoidance and Resource Recovery Act 2001). | Roads and Maritime<br>Contractor | Construction | Standard safeguard |
| Construction waste | All wastes will be managed in accordance with the *Protection of the* | Contractor | Construction | Standard safeguard |

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| management | *Environment Operations Act 1997*.<br>All wastes will be disposed of legally in accordance with their classification under the Waste Classification Guidelines Part 1: Classifying Waste (Department of Environment, Climate Change and Water, 2009). | | | |
| Resource use | Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective. | Roads and Maritime<br>Contractor | Detailed design / pre-construction | Standard safeguard |
| Waste tracking | Types of waste collected, amounts, date / time and details of disposal are to be recorded in a waste register. | Contractor | Pre-construction / construction | Standard safeguard |
| Litter | Works sites would be maintained, kept free of rubbish and cleaned up at the end of each working day. | Contractor | Construction | Standard safeguard |
| Waste disposal | Suitable waste disposal locations would be identified and used to dispose of litter and other wastes on-site, during construction. Suitable containers would be provided for waste collection.<br>Wastes would be removed from each site at the end of each work shift. | Contractor | Pre-construction / construction | Standard safeguard |

## 6.12 Cumulative impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal as well as interaction with other projects that may be occurring or planned within the locality or the broader region. Clause 228(2) of the Environmental Planning and Assessment Regulation 2000 requires that potential cumulative impacts be considered during the environmental impact assessment process.

Construction traffic volumes associated with the proposal would be relatively small. Impacts from the interaction with construction traffic from other development projects are therefore not expected.

Water quality in receiving watercourses is another area where cumulative effects are possible. The main potential water quality impacts associated with the proposal would be during construction and measures have been proposed to address these impacts. Cumulative water quality impacts are therefore not expected.

Minimising impacts attributable to the proposal is the best way to address any potential cumulative effects and various measures have been proposed throughout this chapter.

The proposal would deliver cumulative reliability benefits to buses using the route and in conjunction with other projects being delivered as part of the Bus Priority Infrastructure Program.

### 6.12.1 Environmental safeguards and management measures

| Impact | Environmental safeguards | Responsibility | Timing | Standard / additional safeguard |
|---|---|---|---|---|
| Construction phase cumulative impacts | The CEMP will be revised to consider potential cumulative impacts from surrounding development activities as they become known. This will include a process to review and update mitigation measures as new work begins or complaints are received. | Contractor | Pre-construction / construction | Standard safeguard |

# 7 Environmental management

## 7.1 Environmental management plans (or system)

A number of environmental 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 will be incorporated into the detailed design and applied during the construction and operation of the proposal.

A Project Environmental Management Plan (PEMP) and a Construction Environmental Management Plan (CEMP) will be prepared to describe environmental safeguards and management measures identified. These plans will provide a framework for establishing how these measures will be implemented and who will be responsible for their implementation.

The PEMP and CEMP will be a working document, subject to ongoing change and updated as necessary to respond to specific requirements. The CEMP and PEMP will be developed in accordance with the specifications set out in QA Specification G36 – Environmental Protection (Management System), QA Specification G38 – Soil and Water Management (Soil and Water Plan), QA Specification G40 – Clearing and Grubbing and QA Specification G10 - Traffic Management.

## 7.2 Summary of safeguards and management measures

Environmental safeguards and management measure outlined in this document will be incorporated into the detailed design phase of the proposal and during construction and operation of the proposal, should it proceed. These environmental safeguards and management measures will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. The environmental 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 |
|---|---|---|---|---|
| GEN1 | General - minimise environmental impacts during construction | A CEMP will be prepared and submitted for review and endorsement of the Roads and Maritime Environment Manager prior to commencement of the activity.<br>As a minimum, the CEMP will address the following:<br>• Any requirements associated with statutory approvals<br>• Details of how the project will implement the identified safeguards outlined in the REF<br>• Issue-specific environmental management plans<br>• Roles and responsibilities<br>• Communication requirements<br>• Induction and training requirements<br>• Procedures for monitoring and evaluating environmental performance, and for corrective action<br>• Reporting requirements and record-keeping<br>• Procedures for emergency and incident management<br>• Procedures for audit and review.<br>The endorsed CEMP will be implemented during the undertaking of the activity. | Contractor / Roads and Maritime | Pre-construction / detailed design |
| GEN2 | General - notification | All businesses, residential properties and other key stakeholders (eg schools, local councils) affected by the activity will be notified at least five days prior to commencement of the activity. The notification letter will include (as a minimum):<br>• Contact name and phone number<br>• Working hours and proposed construction period<br>• Complaints process. | Contractor Roads and Maritime | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| GEN3 | General – environmental awareness | All personnel working on site will receive training to ensure awareness of environment protection requirements to be implemented during the project. This will include up-front site induction and regular "toolbox" style briefings.<br>The environmental awareness training is to include (as a minimum):<br>• Environmentally sensitive locations<br>• Requirement to report and the process for reporting environmental issues ineffective environmental controls<br>• Erosion and sediment control measures<br>• Incident management process<br>• Site staff environmental responsibilities. | Contractor<br>Roads and Maritime | Pre-construction / detailed design |
| GEN4 | General - notification | The Roads and Maritime Services Project Manager must notify the Roads and Maritime Regional Environmental Officer at least five working days prior to commencement of works. | Roads and Maritime | Pre-construction |
| SOE1 | Socio-economic - communication | A Communication Plan will be prepared and included in the CEMP. The Communication Plan will include (as a minimum):<br>• Requirements to provide details and timing of proposed activities to affected residents<br>• Contact name and number for complaints<br>• Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access.<br>The communication plan will be prepared in accordance with G36 requirements and the Roads and Maritime *Community Engagement and Communications Manual* (2012). | Contractor | Detailed design / pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| SOE2 | Socio-economic - complaints | A complaints handling procedure and register would be included in the CEMP and maintained for the duration of the project. The environmental awareness training is to include (as a minimum):<br>• Environmentally sensitive locations and/or no go zones<br>• Requirement to report and the process for reporting environmental issues on site<br>• Requirement to report and the process for reporting damaged environmental controls<br>• Erosion and sediment control<br>• Incident management process<br>• Site staff environmental responsibilities. | Contractor | Pre-construction / construction |
| SOE3 | Socio-economic – interruptions to utility services | In the event that utilities relocation would be required, residents would be informed prior to any interruptions to utility services that may be experienced as a result of utilities relocation. | Contractor | Pre-construction / construction |
| SOE4 | Socio-economic – access | Road users, pedestrians and cyclists would be informed of changed conditions, including likely disruptions to access during construction. | Contractor | Pre-construction / construction |
| SOE5 | Socio-economic – access | Access to residences, businesses and retained bus stops will be maintained during construction. | Contractor | Construction |
| BIO1 | Unexpected threatened species impact | If unexpected threatened flora or fauna are discovered, works would stop immediately and the Roads and Maritime *Unexpected Threatened Species Find Procedure*, identified in the Roads and Maritime *Biodiversity Guidelines* (Roads and Traffic Authority, 2011) will be implemented. | Contractor | Construction |
| VIS1 | Construction related visual impacts | The work site would be left in a tidy manner at the end of each work day. | Contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| VIS2 | Bus stop design | Bus stop signage and other infrastructure will comply with applicable Transport for NSW requirements and standards. | Transport for NSW / Roads and Maritime | Detailed design |
| NVI1 | Construction noise and vibration | A Construction Noise and Vibration Management Plan (CNVMP) would be prepared as part of the CEMP, in accordance with the Roads and Maritime Construction Noise and Vibration Guideline (2016). This plan would include, but not be limited to:<br>• A map indicating the locations of sensitive receivers including residential properties<br>• Management measures to minimise the potential noise impacts (including implementation of EPA *Interim Construction Noise Guideline* (DECCW, 2009)<br>• A risk assessment to determine potential risk for activities likely to affect receivers<br>• Mitigation measures to avoid noise and vibration impacts during construction activities<br>• A process for assessing the performance of the implemented mitigation measures<br>• A process for updating the plan when activities affecting construction noise and vibration change<br>• A process for documenting and resolving issues and complaints<br>• Identify in toolbox talks where noise and vibration management is required. | Contractor | Pre-construction / construction |
| NV2 | Construction noise and vibration - complaints | During work hours, a community liaison phone number and site contact would be provided to enable complaints to be received and responded to. | Contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| NV3 | Construction noise and vibration - complaints | If deemed necessary, attended compliance noise and vibration monitoring would be undertaken upon receipt of a complaint. Monitoring would be reported as soon as possible. In the case that exceedances are detected, the situation would be reviewed in order to identify means to minimise the impacts to residences, the appropriate changes made and the NVMP updated accordingly. | Contractor | Construction |
| NV4 | Construction noise and vibration - training | The environmental induction program will include specific noise and vibration issues awareness training including, but not limited to, the following:<br>• Avoiding use of radios during work outside normal hours<br>• Avoiding shouting and slamming doors<br>• Where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods<br>• Avoiding dropping materials from height and avoiding metal to metal contact on material. | Contractor | Pre-construction / construction |
| NV5 | Construction noise and vibration impacts | Where feasible and reasonable, construction will be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels will be scheduled during less sensitive time periods. | Contractor | Construction |
| NV6 | Construction noise and vibration impacts | Quieter and less vibration emitting construction methods will be used where feasible and reasonable. | Contractor | Construction |
| NV7 | Construction noise and vibration impacts | The noise levels of plant and equipment must have operating Sound Power or Sound Pressure Levels compliant with the criteria in Appendix H of the *Construction Noise and Vibration Guideline* (Roads and Maritime Services, 2016). | Contractor | Construction |
| NV8 | Construction noise and vibration impacts | Night time construction noise shall be limited to two consecutive nights High noise generating works will be completed before 11:00pm. | Contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| NAH1 | Unexpected impacts on heritage values | If unexpected heritage item/s, archaeological remains or potential relics are uncovered during the works, all works would cease in the vicinity of the material / find and the *Standard Management Procedure: Unexpected Heritage Finds* (Roads and Maritime Services, 2015) would be followed. | Roads and Maritime<br>Contractor | Construction |
| NAH2 | Inadvertent impacts on known heritage items and unexpected impacts on heritage values | Non-Aboriginal heritage awareness training would be provided for workers prior to commencement of construction work to communicate potential heritage items (including those associated with Windsor Road) that may be impacted during works, and the procedure required to be carried out in the event of discovery of historical heritage materials, features or deposits. | Roads and Maritime<br>Contractor | Pre-construction |
| ABH1 | Disturbance of Aboriginal objects | • The *Standard Management Procedure: Unexpected Heritage Finds* (Roads and Maritime Services, 2015) will be followed in the event that an unknown or potential Aboriginal object/s, including skeletal remains, is found during construction.<br>• Work will only re-commence once the requirements of that procedure have been satisfied. | Roads and Maritime<br>Contractor | Construction |
| WQU1 | Erosion and sedimentation | • Erosion and sediment control measures will be documented in the CEMP and implemented and maintained in accordance with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) to:<br>  • Minimise sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets<br>  • Reduce water velocity and capture sediment on site<br>  • Minimise the amount of material transported from site to surrounding pavement surfaces<br>  • Divert off site water around the site. | Contractor | Pre-construction / construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| WQU2 | Erosion and sedimentation | Erosion and sedimentation controls are to be checked and maintained on a regular basis and after a rain event of 10 millimetres or greater (including clearing of sediment from behind barriers) and records kept and provided on request. | Contractor | Construction |
| WQU3 | Erosion and sedimentation | Any material transported onto pavements will be swept and removed at the end of each working shift and prior to rainfall. | Contractor | Construction |
| WQU4 | Erosion and sedimentation | Erosion and sediment control measures are not to be removed until the works are complete or areas are stabilised. | Contractor | Construction |
| WQU5 | Pollution from site runoff | Refuelling, storage of storage of fuels, vehicle wash down and concrete washout will occur at a dedicated location offsite. | Contractor | Construction |
| WQU6 | Spills | An emergency spill kit is to be kept on site at all times. All staff are to be made aware of the location of the spill kit and trained in its use.<br>If a spill or incident occurs, the *Environmental Incident Classification and Management Procedure* (Roads and Maritime Services, 2015) is to be followed and the Roads and Maritime Contract Manager notified immediately. | Contractor | Construction |
| WQU7 | Stockpiling | If temporary stockpiles are required on site they would be located away from drainage lines and removed before the end of each shift. | Contractor | Construction |
| AQU1 | Dust | Measures (including watering or covering exposed areas) will be documented in the CEMP and used to minimise or prevent air pollution and dust, where necessary | Contractor | Pre-construction / construction |
| AQU2 | Dust and other emissions | Vehicles transporting waste or other materials that may produce odours or dust will be covered during transportation. | Contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| AQU3 | Other emissions | Works (including the spraying of paint and other materials) will not be carried out during strong winds or in weather conditions where high levels of dust or air borne particulates are likely.<br>Plant, vehicles and equipment will be maintained in good condition and in accordance with manufacturer's specifications.<br>Plant and machinery will be turned off when not in use. | Contractor | Construction |
| AQU4 | Dust and other emissions | Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention | Contractor | Construction |
| TTR1 | Road safety and impacts to traffic flow. | A traffic management plan will be prepared and implemented in accordance with *Traffic control at worksites* (Roads and Traffic Authority, 2010). | Contractor | Pre-construction / construction |
| TTR2 | Property access | Vehicular property access would be maintained where possible including pre-schools, places of worship and all commercial premises. | Contractor | Construction |
| TTR3 | Pedestrian and cyclist access | Pedestrian and cyclist access is to be maintained throughout construction.<br>Provision of signs outlining the pedestrians and cyclists diversion routes would be displayed during construction.<br>There will be advance notification of any construction works that affect pedestrians and cyclists. | Contractor | Construction |
| TTR4 | Bus stop access | Access for bus passengers to bus stops would be maintained during construction. | Contractor | Construction |
| TTR5 | Operational traffic safety | A safety review of all new bus stop locations will be conducted during the design phase to assess any changes to traffic changes. | Roads and Maritime | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| HZR1 | Construction hazards and risks | As part of the site specific CEMP, a Hazard and Risk Management Plan, including an emergency response plan, will be prepared. The plan will identify construction phase hazards and risks detail measures to mitigate those risks. | Contractor | Pre-construction |
| HZR2 | Pedestrian safety | A safety review of all new bus stop locations will be conducted during the design phase to identify whether any additional pedestrian safety measures are required. | Roads and Maritime | Design |
| HZR3 | Contamination | In the event that indications of contamination are encountered (known and unexpected, such as odorous or visually contaminated materials), work in the area would cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate. | Contractor | Construction |
| WMM1 | Construction waste management | The following resource management hierarchy principles will be followed:<br>• Avoid unnecessary resource consumption as a priority<br>• Avoidance would be followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery)<br>• Disposal would be undertaken as a last resort (in accordance with the *Waste Avoidance and Resource Recovery Act 2001*). | Roads and Maritime<br>Contractor | Construction |
| WMM2 | Construction waste management | All wastes will be managed in accordance with the *Protection of the Environment Operations Act 1997*.<br>All wastes will be disposed of legally in accordance with their classification under the *Waste Classification Guidelines Part 1: Classifying Waste* (Department of Environment, Climate Change and Water, 2009) | Contractor | Construction |
| WMM3 | Resource use | Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective. | Roads and Maritime<br>Contractor | Detailed design / pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|---|---|---|---|---|
| WMM4 | Waste tracking | Types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register. | Contractor | Pre-construction / construction |
| WMM5 | Litter | Works sites would be maintained, kept free of rubbish and cleaned up at the end of each working day. | Contractor | Construction |
| WMM6 | Waste disposal | Suitable waste disposal locations would be identified and used to dispose of litter and other wastes on-site during construction. Suitable containers would be provided for waste collection.<br>Wastes would be removed from each site at the end of each work shift. | Contractor | Pre-construction / construction |
| CUI1 | Construction phase cumulative impacts | The CEMP will be revised to consider potential cumulative impacts from surrounding development activities as they become known. This will include a process to review and update mitigation measures as new work begins or complaints are received. | Contractor | Pre-construction / construction |

## 7.3 Licensing and approvals

Where required, an applicable Road Occupancy Licence would be in place prior to the commencement of works.

No other specific licencing/approval requirements have been identified.

# 8 Conclusion

## 8.1 Justification

The proposal forms part of the Bus Priority Infrastructure Program and supports *Sydney's Bus Future* (Transport for NSW, 2013) by delivering projects that make bus services more reliable. Specifically, the proposal targets a general standardised 400 metre spacing between bus stops, while spacing of bus stops between 800 metres and one kilometre apart would be considered as part of planning for a future rapid bus route.

While there would be some environmental impacts as a consequence of the proposal, they have been avoided or minimised wherever possible through design and site-specific safeguards summarised in Chapter 7 (Environmental management).

The benefits of the proposal are considered to outweigh the mostly temporary adverse impacts and risks associated with the proposal.

## 8.2 Objects of the EP&A Act

A consideration of the proposal in the context of the objects of the EP&A Act is presented in Table 8-1 below.

*Table 8-1 Objects of the EP&A Act review*

| 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 reliability of bus services. Social and economic impacts are assessed in section 6.1. The assessment includes management measures to avoid and / or minimise impacts. |
| 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. | Not relevant to the proposal. |
| 5(a)(iv) To encourage the provision of land for public purposes. | The proposal represents the improvement of a public asset. |
| 5(a)(v) To encourage the provision and co-ordination of community services and facilities. | The proposal aims to deliver improved reliability in bus services. |

| Object | Comment |
|---|---|
| 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 proposal is unlikely to have impacts on native animals and plants. It is not expected to have a significant impact on threatened species, populations and ecological communities, and their habitats. Refer to section 6.2. |
| 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 proposal. |
| 5(b) To promote the sharing of the responsibility for environmental planning between different levels of government in the State. | Not relevant to the proposal. |
| 5(c) To provide increased opportunity for public involvement and participation in environmental planning and assessment. | The REF will be displayed publicly and submissions will be invited. All issues raised will then be considered and responded to in the subsequent submissions report.<br>Refer to Chapter 5 (Stakeholder and community consultation). |

## 8.3 Ecologically sustainable development

Ecologically sustainable development (ESD) is development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends. The principles of ESD have been a consideration throughout the development of the proposal.

The EP&A Act recognises that ESD requires the effective integration of economic and environmental considerations in decision-making processes. The four main principles supporting the achievement of ESD are considered in the context of the proposal below.

### 8.3.1 Precautionary principle

The precautionary principle deals with certainty in decision-making. It provides that where there is a threat of serious or irreversible environmental damage, the absence of full scientific certainty should not be used as a reason to postpone measures to prevent environmental degradation.

In the case of this proposal case there is no threat of serious or irreversible environmental damage. Where practicable, management measures have been included to manage potential impacts of the proposal.

### 8.3.2 Intergenerational equity

Social equity is concerned with the distribution of economic, social and environmental costs and benefits. Inter-generational equity introduces a temporal element with a focus on minimising the distribution of costs to future generations.

The impacts of the proposal have been identified as short term and manageable. Improved reliability of bus services would be experienced over a longer period.

### 8.3.3 Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and ecological integrity have been a consideration during the design and assessment process with a view to identifying, avoiding, minimising and mitigating impacts.

The proposal is not expected to have significant biodiversity impacts (refer to section 6.2).

### 8.3.4 Improved valuation, pricing and incentive mechanisms

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a project, including air, water, land and living things. While it is often difficult to place a reliable monetary value on the residual, environmental and social effects of the proposal, the value placed on environmental resources within and around the corridor is evident in the extent of environmental investigations, planning and design of impact management measures to prevent adverse environmental impacts.

## 8.4 Conclusion

The proposal to improve the reliability of buses by making changes to bus stops in the suburbs of Castle Hill and Baulkham Hills, and 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.

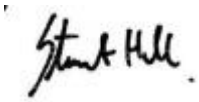
A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design development and options assessment. The proposal as described in the REF best meets the project objectives but would still result in some impacts including increased walking distances to bus stops for some customers, construction noise and changes to visual amenity.

Environmental safeguards have been proposed for the design phase of the proposal and during construction and operation of the proposal, should it proceed. These include implementing a communication plan and complaints handling process and maintaining accesses to business and properties. These safeguards will minimise any potential adverse impacts arising from the proposed works on the surrounding environment. 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 *Threatened Species Conservation Act 1995* 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

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.



Stuart Hill

Environmental Planner, Hills Environmental

Date: 5 May 2017

I have examined this review of environmental factors and the certification by Stuart Hill (Hills Environmental) and accept the review of environmental factors on behalf of Roads and Maritime Services.

David Keane

Project Manager

Roads and Maritime Services, Sydney Region

Date: 5 May 2017

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# Terms and acronyms used in this REF

| Term | Definition |
|---|---|
| CEMP | Construction environmental management plan |
| EIA | Environmental impact assessment |
| EP&A Act | *Environmental Planning and Assessment Act 1979* (NSW). Provides the legislative framework for land use planning and development assessment in NSW |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth). 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 | *Fisheries Management Act 1994* (NSW) |
| Heritage Act | *Heritage Act 1977* (NSW) |
| ISEPP | State Environmental Planning Policy (Infrastructure) 2007 |
| LEP | Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act. |
| NES | Matters of national environmental significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. |
| NPW Act | *National Parks and Wildlife Act 1974* (NSW) |
| TGSI | Tactile ground surface indicators |
| TSC Act | *Threatened Species Conservation Act 1995* (NSW) |
| QA Specifications | Specifications developed by Roads and Maritime Services for use with roadworks and bridgeworks contracts let by Roads and Maritime Services |

# Appendix A

## Consideration of clause 228(2) factors and matters of national environmental significance

# Clause 228(2) Checklist

In addition to the requirements of the *Is an EIS required?* guideline as detailed in the REF, the following factors, listed in clause 228(2) of the *Environmental Planning and Assessment Regulation 2000*, have also been considered to assess the likely impacts of the proposal on the natural and built environment.

| Factor | Impact |
|---|---|
| a. Any environmental impact on a community?<br>There would be some short-term impacts on communities due to disruption associated with construction. In the longer-term bus users would benefit from more reliable bus services, but some users may have to walk a short distance further to their nearest bus stop. Localised impacts for businesses are not expected. | Short-term negative (minor)<br>Long-term positive and negative |
| b. Any transformation of a locality?<br>The proposal would not transform a locality. | Nil |
| c. Any environmental impact on the ecosystems of the locality?<br>The proposal would not affect habitats on which native plants and animals (including threatened species) would be reliant. | Nil |
| d. Any reduction of the aesthetic, recreational, scientific or other environmental quality or value of a locality?<br>The proposal would result in site disturbance and the presence of plant / equipment for short periods during construction. Once works are complete at each site new infrastructure would be consistent with the visual character of the arterial road environment. No important views would be affected. | Short-term negative (minor) |
| e. Any effect on a locality, place or building having aesthetic, anthropological, archaeological, architectural, cultural, historical, scientific or social significance or other special value for present or future generations?<br>Impacts on the heritage listed “Windsor Road from Baulkham Hills to Box Hill” would be negligible given the minor nature of the works proposed and the heavily modified state of the road reserve at Location #28 and #29.<br>Other proposal sites are adjacent to heritage items, but all proposed works are minor in nature, consistent with existing streetscapes and would not detract from heritage values. | Negligible |
| f. Any impact on the habitat of protected fauna (within the meaning of the *National Parks and Wildlife Act* 1974)?<br>There would be no impacts on the habitat of protected fauna. Refer to section 6.2. | Nil |

| Factor | Impact |
|---|---|
| g. Any endangering of any species of animal, plant or other form of life, whether living on land, in water or in the air?<br>The proposal would not endanger any species of animal, plant or other form of life, except for limited disturbance of turfed roadside areas. | Negligible |
| h. Any long-term effects on the environment?<br>Longer term bus reliability improvements are expected and this represents a social and economic benefit. | Long-term positive |
| i. Any degradation of the quality of the environment?<br>The proposed works would potentially degrade the quality of the environment in the short-term, however the potential impacts would be minimised with the implementation of the environmental safeguards and management measures given in Chapter 7 (Environmental management) of this REF. | Short-term negative (minor) |
| j. Any risk to the safety of the environment?<br>Measures have been proposed to ensure the proposal does not represent a risk to the safety of the environment. | Nil |
| k. Any reduction in the range of beneficial uses of the environment?<br>The proposal would not reduce the range of beneficial uses of the environment. | Nil |
| l. Any pollution of the environment?<br>No pollution of the environment is expected to result from the works, provided appropriate safeguards are implemented. | Nil |
| m. Any environmental problems associated with the disposal of waste?<br>Waste generated during construction would be removed from site and disposed of legally. No environmental problems are anticipated for the disposal of waste. | Nil |
| n. Any increased demands on resources (natural or otherwise) that are, or are likely to become, in short supply?<br>The proposed works would not increase demand for resources, which are, or are likely to become, in short supply. | Nil |
| o. Any cumulative environmental effect with other existing or likely future activities?<br>The proposed works have the potential to have cumulative environmental effects with other existing or likely future activities, however cumulative effects are not expected due to the limited scope of works. | Nil |

| Factor | Impact |
| --- | --- |
| p. Any impact on coastal processes and coastal hazards, including those under projected climate change conditions?<br>The works would not influence coastal processes and / or coastal hazards. | Nil |

# Matters of National Environmental Significance

Under the environmental assessment provisions of the *Environment Protection and Biodiversity Conservation Act 1999*, the following matters of national environmental significance and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government Department of the Environment.

| Factor | Impact |
|---|---|
| a. Any impact on a World Heritage property?<br>There are no world heritage properties proximate to the proposal. Direct or indirect impacts are not expected. | Nil |
| b. Any impact on a National Heritage place?<br>There are no National Heritage Places proximate to the proposal. Direct or indirect impacts are not expected. | Nil |
| c. Any impact on a wetland of international importance?<br>The proposal is not within the catchment of a wetland of international importance. | Nil |
| d. Any impact on a listed threatened species or communities?<br>A number of Commonwealth listed threatened species have the potential to occur in the local area. The nature, scale and location of the proposal are such that impacts on these species or their habitats are not expected. Indirect impacts are also not expected. | Nil |
| e. Any impacts on listed migratory species?<br>A number of Commonwealth listed migratory species have the potential to occur in the local area. The nature, scale and location of the proposal is such that impacts on these species or their habitats are not expected. Indirect impacts are also not expected. | Nil |
| f. Any impact on a Commonwealth marine area?<br>As there are no Commonwealth Marine areas near the proposal sites, there would be no environmental impact on a Commonwealth Marine area. | Nil |
| g. Does the proposal involve a nuclear action (including uranium mining)?<br>The proposed works do not constitute a nuclear action. | Nil |
| h. Any impact on a water resource, in relation to coal seam gas development and large coal mining development?<br>The proposal is not for coal seam gas development or large coal mining development. | Nil |
| Additionally, any impact (direct or indirect) on Commonwealth land? | Nil |

# Appendix B

Concept drawings

# Appendix C

Aboriginal cultural heritage advice

Transport
Roads & Maritime
Services

12/4/2017

Emma-Lyn Horvath
Project Environmental Engineer
Easing Sydney's Congestion Program Office | Journey Management

Dear Emma-Lyn

**Re: Preliminary assessment results for the Bus Priority Program On-time running improvements Castle Hill to M2 Motorway Corridor REF, proposal based on Stage 1 of the *Procedure for Aboriginal cultural heritage consultation and investigation* (the procedure).**

The project, as described in the Stage 1 assessment checklist, was assessed as being unlikely to have an impact on Aboriginal cultural heritage. The assessment is based on the following due diligence considerations:

- The project is unlikely to harm known Aboriginal objects or places.
- The AHIMS search did not indicate any known Aboriginal objects or places in the immediate study area.
- The study area does not contain landscape features that indicate the presence of Aboriginal objects, based on the Office of Environment and Heritage's *Due diligence Code of Practice for the Protection of Aboriginal objects in NSW* and the Roads and Maritime Services' procedure.
- The cultural heritage potential of the study area appears to be reduced due to past disturbance.

Your project may proceed in accordance with the environmental impact assessment process, as relevant, and all other relevant approvals.

If the scope of your project changes, you must contact me and your regional environmental staff to reassess any potential impacts on Aboriginal cultural heritage.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the project, all works in the vicinity of the find must cease. Follow the steps outlined in the Roads and Maritime Services' *Unexpected Archaeological Finds Procedure*.

For further assistance in this matter and do not hesitate to contact me.

Yours sincerely

M Lester

Mark Lester
Aboriginal Cultural Heritage Officer – Sydney Region
27-31 Argyle St Parramatta NSW 2150
[redacted]

# Appendix D

ISEPP consultation checklists and letters

**Council related infrastructure or services**

| Issue | Potential impact | Yes / No | If 'yes' consult with | ISEPP clause |
|---|---|---|---|---|
| Stormwater | Are the works likely to have a *substantial* impact on the stormwater management services which are provided by council? | No | | ISEPP cl.13(1)(a) |
| Traffic | Are the works likely to generate traffic to an extent that will *strain* the existing road system in a local government area? | No | | ISEPP cl.13(1)(b) |
| Sewerage system | Will the works involve connection to a council owned sewerage system? If so, will this connection have a *substantial* impact on the capacity of any part of the system? | No | | ISEPP cl.13(1)(c) |
| Water usage | Will the works involve connection to a council owned water supply system? If so, will this require the use of a *substantial* volume of water? | No | | ISEPP cl.13(1)(d) |
| Temporary structures | Will the works involve the installation of a temporary structure on, or the enclosing of, a public place which is under local council management or control? If so, will this cause more than a *minor* or *inconsequential* disruption to pedestrian or vehicular flow? | Yes | Consultation with The Hills Shire Council has occurred. Refer to Section 5.5. | ISEPP cl.13(1)(e) |
| Road & footpath excavation | Will the works involve more than *minor* or *inconsequential* excavation of a road or adjacent footpath for which council is the roads authority and responsible for maintenance? | Yes | Consultation with The Hills Shire Council has occurred. Refer to Section 5.5. | ISEPP cl.13(1)(f) |

**Local heritage items**

| Issue | Potential impact | Yes / No | If 'yes' consult with | ISEPP clause |
|---|---|---|---|---|
| Local heritage | Is there is a local heritage item (that is not also a State heritage item) or a heritage conservation area in the study area for the works? If yes, does a heritage assessment indicate that the potential impacts to the item/area are more than *minor* or *inconsequential*? | Yes there is a local heritage item | However any impacts would be minor or inconsequential. | ISEPP cl.14 |

**Flood liable land**

| Issue | Potential impact | Yes / No | If 'yes' consult with | ISEPP clause |
|---|---|---|---|---|
| Flood liable land | Are the works located on flood liable land? If so, will the works change flood patterns to more than a *minor* extent? | No | | ISEPP cl.15 |

**Public authorities other than councils**

| Issue | Potential impact | Yes / No | If 'yes' consult with | ISEPP clause |
|---|---|---|---|---|
| National parks and reserves | Are the works adjacent to a national park or nature reserve, or other area reserved under the *National Parks and Wildlife Act 1974*? | No | Office of Environment and Heritage | ISEPP cl.16(2)(a) |
| Marine parks | Are the works adjacent to a declared marine park under the *Marine Parks Act 1997*? | No | Department of Planning and Environment | ISEPP cl.16(2)(b) |
| Aquatic reserves | Are the works adjacent to a declared aquatic reserve under the *Fisheries Management Act 1994*? | No | Office of Environment and Heritage | ISEPP cl.16(2)(c) |
| Sydney Harbour foreshore | Are the works in the Sydney Harbour Foreshore Area as defined by the *Sydney Harbour Foreshore Authority Act 1998*? | No | Department of Planning and Environment | ISEPP cl.16(2)(d) |
| Bush fire prone land | Are the works for the purpose of residential development, an educational establishment, a health services facility, a correctional centre or group home in bush fire prone land? | No | | ISEPP cl.16(2)(f) |

Transport
Roads & Maritime
Services

23 March 2017

Mr David Walker
General Manager
The Hills Shire Council
PO Box 7064
BAULKHAM HILLS BC NSW 2153

Dear Mr Walker

**RE: Consultation regarding bus priority program initiatives**
**Castle Hill to the M2 Motorway corridor (Metrobus M61 route)**

Transport for NSW, in partnership with Roads and Maritime, is proposing to improve the reliability of bus services using the corridor between Castle Hill and the M2 Motorway (Metrobus M61 route) by making changes to bus stops at several locations on Windsor Road and Old Northern Road.

Under *State Environmental Planning Policy (Infrastructure) 2007*, Roads and Maritime is required to consult with The Hills Shire Council under clause 13(1)(e) and 13(1)(f) due to impacts on Council managed pavements and the enclosing of public space during construction respectively. While some of the proposed changes would occur within the curtilage of the *Hills Local Environmental Plan 2012* listed Windsor Road, impacts on the heritage values of this item would be minor.

For your reference, details of the proposal are included in the attachment to this letter.

It would be appreciated if you could provide any comments regarding this proposal at the earliest opportunity. Council's views will be considered before finalising the proposal.

Roads and Maritime would be pleased to provide further information if required. In this regard, I can be contacted on [redacted] or by email [redacted].

Yours sincerely

David Keane
Project Manager

# Appendix E

EPBC Act protected matters search and Bionet search

Data from the BioNet Atlas of NSW Wildlife website, which holds records from a number of custodians. The data are only indicative and cannot be considered a comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive Species Data Policy may have their locations denatured (^ rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environment and Heritage. Search criteria : Public Report of all Valid Records of Threatened (listed on TSC Act 1995) or Commonwealth listed Entities in selected area [North: -33.69 West: 150.94 East: 151.04 South: -33.79] returned a total of 671 records of 45 species.
Report generated on 9/04/2017 2:31 PM

| Kingdom | Class | Family | Species Code | Scientific Name | Exotic | Common Name | NSW status | Comm. status | Records | Info |
|---|---|---|---|---|---|---|---|---|---|---|
| Animalia | Amphibia | Myobatrachidae | 3116 | *Pseudophryne australis* | | Red-crowned Toadlet | V,P | | 11 | |
| Animalia | Amphibia | Hylidae | 3166 | *Litoria aurea* | | Green and Golden Bell Frog | E1,P | V | 1 | |
| Animalia | Aves | Ardeidae | 0196 | *Ixobrychus flavicollis* | | Black Bittern | V,P | | 3 | |
| Animalia | Aves | Cacatuidae | 0268 | *^^Callocephalon fimbriatum* | | Gang-gang Cockatoo | V,P,3 | | 3 | |
| Animalia | Aves | Cacatuidae | 0268 | *^^Callocephalon fimbriatum* | | Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas | E2,V,P,3 | | 1 | |
| Animalia | Aves | Cacatuidae | 0265 | *^Calyptorhynchus lathami* | | Glossy Black-Cockatoo | V,P,2 | | 3 | |
| Animalia | Aves | Psittacidae | 0260 | *Glossopsitta pusilla* | | Little Lorikeet | V,P | | 2 | |
| Animalia | Aves | Psittacidae | 0309 | *^^Lathamus discolor* | | Swift Parrot | E1,P,3 | CE | 11 | |
| Animalia | Aves | Psittacidae | 0277 | *^^Polytelis swainsonii* | | Superb Parrot | V,P,3 | V | 2 | |
| Animalia | Aves | Strigidae | 0246 | *^^Ninox connivens* | | Barking Owl | V,P,3 | | 2 | |
| Animalia | Aves | Strigidae | 0248 | *^^Ninox strenua* | | Powerful Owl | V,P,3 | | 74 | |
| Animalia | Aves | Tytonidae | 0250 | *^^Tyto novaehollandiae* | | Masked Owl | V,P,3 | | 1 | |
| Animalia | Aves | Meliphagidae | 0603 | *Anthochaera phrygia* | | Regent Honeyeater | E4A,P | CE | 2 | |
| Animalia | Aves | Meliphagidae | 8303 | *Melithreptus gularis gularis* | | Black-chinned Honeyeater (eastern subspecies) | V,P | | 1 | |
| Animalia | Aves | Neosittidae | 0549 | *Daphoenositta chrysoptera* | | Varied Sittella | V,P | | 1 | |
| Animalia | Aves | Artamidae | 8519 | *Artamus cyanopterus cyanopterus* | | Dusky Woodswallow | V,P | | 15 | |
| Animalia | Aves | Petroicidae | 0382 | *Petroica phoenicea* | | Flame Robin | V,P | | 1 | |
| Animalia | Aves | Petroicidae | 0383 | *Petroica rodinogaster* | | Pink Robin | V,P | | 1 | |
| Animalia | Mammalia | Dasyuridae | 1008 | *Dasyurus maculatus* | | Spotted-tailed Quoll | V,P | E | 1 | |
| Animalia | Mammalia | Phascolarctidae | 1162 | *Phascolarctos cinereus* | | Koala | V,P | V | 1 | |
| Animalia | Mammalia | Pteropodidae | 1280 | *Pteropus poliocephalus* | | Grey-headed Flying-fox | V,P | V | 57 | |
| Animalia | Mammalia | Emballonuridae | 1321 | *Saccolaimus flaviventris* | | Yellow-bellied Sheathtail-bat | V,P | | 8 | |
| Animalia | Mammalia | Molossidae | 1329 | *Mormopterus norfolkensis* | | Eastern Freetail-bat | V,P | | 20 | |
| Animalia | Mammalia | Vespertilionidae | 1353 | *Chalinolobus dwyeri* | | Large-eared Pied Bat | V,P | V | 1 | |
| Animalia | Mammalia | Vespertilionidae | 1372 | *Falsistrellus tasmaniensis* | | Eastern False Pipistrelle | V,P | | 13 | |
| Animalia | Mammalia | Vespertilionidae | 1346 | *Miniopterus australis* | | Little Bentwing-bat | V,P | | 11 | |
| Animalia | Mammalia | Vespertilionidae | 1834 | *Miniopterus schreibersii oceanensis* | | Eastern Bentwing-bat | V,P | | 44 | |
| Animalia | Mammalia | Vespertilionidae | 1357 | *Myotis macropus* | | Southern Myotis | V,P | | 10 | |
| Animalia | Mammalia | Vespertilionidae | 1361 | *Scoteanax rueppellii* | | Greater Broad-nosed Bat | V,P | | 11 | |
| Animalia | Gastropoda | Camaenidae | I006 | *Meridolum corneovirens* | | Cumberland Plain Land Snail | E1 | | 8 | |
| Animalia | Gastropoda | Camaenidae | I130 | *Pommerhelix duralensis* | | Dural Woodland Snail | E1 | E | 4 | |
| Plantae | Flora | Dilleniaceae | 11250 | *Hibbertia superans* | | | E1,P | | 85 | |
| Plantae | Flora | Elaeocarpaceae | 6205 | *Tetratheca glandulosa* | | | V,P | | 13 | |
| Plantae | Flora | Ericaceae | 7752 | *Epacris purpurascens var. purpurascens* | | | V,P | | 131 | |
| Plantae | Flora | Ericaceae | 9569 | *Leucopogon fletcheri subsp. fletcheri* | | | E1,P | | 2 | |
| Plantae | Flora | Fabaceae (Mimosoideae) | 3728 | *Acacia bynoeana* | | Bynoe's Wattle | E1,P | V | 3 | |
| Plantae | Flora | Fabaceae (Mimosoideae) | 7229 | *Acacia gordonii* | | | E1,P | E | 1 | |
| Plantae | Flora | Fabaceae (Mimosoideae) | 3860 | *Acacia pubescens* | | Downy Wattle | V,P | V | 11 | |
| Plantae | Flora | Myrtaceae | 4024 | *Darwinia biflora* | | | V,P | V | 61 | |
| Plantae | Flora | Myrtaceae | 4134 | *Eucalyptus nicholii* | | Narrow-leaved Black Peppermint | V,P | V | 5 | |
| Plantae | Flora | Myrtaceae | 8907 | *Eucalyptus scoparia* | | Wollangarra White Gum | E1,P | V | 1 | |
| Plantae | Flora | Myrtaceae | 11892 | *Eucalyptus sp. Cattai* | | | E4A,P | | 2 | |
| Plantae | Flora | Myrtaceae | 4293 | *Syzygium paniculatum* | | Magenta Lilly Pilly | E1,P | V | 5 | |
| Plantae | Flora | Proteaceae | 5458 | *^^Persoonia hirsuta* | | Hairy Geebung | E1,P,3 | E | 14 | |
| Plantae | Flora | Thymelaeaceae | 6965 | *Pimelea curviflora var. curviflora* | | | V,P | V | 13 | |

Australian Government
Department of the Environment and Energy

# EPBC Act Protected Matters Report

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

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

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 09/04/17 14:29:27

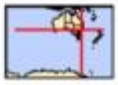

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements





Coordinates
Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 5 |
| Listed Threatened Species: | 37 |
| Listed Migratory Species: | 13 |

## Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

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

| | |
|---|---|
| Commonwealth Land: | 3 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 19 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Commonwealth Reserves Marine: | None |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 54 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

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

| Name | Status | Type of Presence |
|---|---|---|
| Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion | Endangered | Community may occur within area |
| Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion | Critically Endangered | Community may occur within area |
| Shale Sandstone Transition Forest of the Sydney Basin Bioregion | Critically Endangered | Community may occur within area |
| Turpentine-Ironbark Forest of the Sydney Basin Bioregion | Critically Endangered | Community likely to occur within area |
| Western Sydney Dry Rainforest and Moist Woodland on Shale | Critically Endangered | Community may occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Anthochaera phrygia<br>Regent Honeyeater [82338] | Critically Endangered | Species or species habitat likely to occur within area |
| Botaurus poiciloptilus<br>Australasian Bittern [1001] | Endangered | Species or species habitat known to occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Dasyornis brachypterus<br>Eastern Bristlebird [533] | Endangered | Species or species habitat may occur within area |
| Grantiella picta<br>Painted Honeyeater [470] | Vulnerable | Species or species habitat may occur within area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| **Fish** | | |
| Macquaria australasica<br>Macquarie Perch [66632] | Endangered | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| | | habitat may occur within area |
| Prototroctes maraena<br>Australian Grayling [26179] | Vulnerable | Species or species habitat may occur within area |
| **Frogs** | | |
| Heleioporus australiacus<br>Giant Burrowing Frog [1973] | Vulnerable | Species or species habitat likely to occur within area |
| Litoria aurea<br>Green and Golden Bell Frog [1870] | Vulnerable | Species or species habitat likely to occur within area |
| Mixophyes balbus<br>Stuttering Frog, Southern Barred Frog (in Victoria) [1942] | Vulnerable | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Chalinolobus dwyeri<br>Large-eared Pied Bat, Large Pied Bat [183] | Vulnerable | Species or species habitat likely to occur within area |
| Dasyurus maculatus maculatus (SE mainland population)<br>Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184] | Endangered | Species or species habitat likely to occur within area |
| Isoodon obesulus obesulus<br>Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050] | Endangered | Species or species habitat may occur within area |
| Petauroides volans<br>Greater Glider [254] | Vulnerable | Species or species habitat likely to occur within area |
| Petrogale penicillata<br>Brush-tailed Rock-wallaby [225] | Vulnerable | Species or species habitat may occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)<br>Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat likely to occur within area |
| Pseudomys novaehollandiae<br>New Holland Mouse, Pookila [96] | Vulnerable | Species or species habitat may occur within area |
| Pteropus poliocephalus<br>Grey-headed Flying-fox [186] | Vulnerable | Foraging, feeding or related behaviour known to occur within area |
| **Other** | | |
| Pommerhelix duralensis<br>Dural Land Snail [85268] | Endangered | Species or species habitat likely to occur within area |
| **Plants** | | |
| Acacia bynoeana<br>Bynoe's Wattle, Tiny Wattle [8575] | Vulnerable | Species or species habitat likely to occur within area |
| Acacia pubescens<br>Downy Wattle, Hairy Stemmed Wattle [18800] | Vulnerable | Species or species habitat known to occur within area |
| Allocasuarina glareicola<br>[21932] | Endangered | Species or species habitat may occur within area |
| Asterolasia elegans<br>[56780] | Endangered | Species or species habitat may occur within |

| Name | Status | Type of Presence |
|---|---|---|
| | | area |
| Cryptostylis hunteriana<br>Leafless Tongue-orchid [19533] | Vulnerable | Species or species habitat may occur within area |
| Darwinia biflora<br>[14619] | Vulnerable | Species or species habitat likely to occur within area |
| Genoplesium baueri<br>Yellow Gnat-orchid [7528] | Endangered | Species or species habitat known to occur within area |
| Melaleuca deanei<br>Deane's Melaleuca [5818] | Vulnerable | Species or species habitat likely to occur within area |
| Pelargonium sp. Striatellum (G.W.Carr 10345)<br>Omeo Stork's-bill [84065] | Endangered | Species or species habitat may occur within area |
| Pimelea curviflora var. curviflora<br>[4182] | Vulnerable | Species or species habitat known to occur within area |
| Pimelea spicata<br>Spiked Rice-flower [20834] | Endangered | Species or species habitat likely to occur within area |
| Pterostylis saxicola<br>Sydney Plains Greenhood [64537] | Endangered | Species or species habitat may occur within area |
| Syzygium paniculatum<br>Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307] | Vulnerable | Species or species habitat likely to occur within area |
| Thesium australe<br>Austral Toadflax, Toadflax [15202] | Vulnerable | Species or species habitat may occur within area |
| Reptiles | | |
| Hoplocephalus bungaroides<br>Broad-headed Snake [1182] | Vulnerable | Species or species habitat likely to occur within area |

Listed Migratory Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Migratory Marine Birds | | |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| Cuculus optatus<br>Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species habitat known to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | | Species or species habitat known to occur within area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| Monarcha trivirgatus<br>Spectacled Monarch [610] | | Species or species habitat may occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Motacilla flava | | |
| Yellow Wagtail [644] | | Species or species habitat likely to occur within area |
| Myiagra cyanoleuca | | |
| Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Rhipidura rufifrons | | |
| Rufous Fantail [592] | | Species or species habitat known to occur within area |
| Migratory Wetlands Species | | |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Gallinago hardwickii | | |
| Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus | | |
| Osprey [952] | | Species or species habitat may occur within area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

### Commonwealth Land [ Resource Information ]

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

| Name |
|---|
| Commonwealth Land - Commonwealth Bank of Australia |
| Commonwealth Land - Defence Housing Authority |
| Commonwealth Land - Telstra Corporation Limited |

### Listed Marine Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Birds | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat likely to occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Cuculus saturatus | | |
| Oriental Cuckoo, Himalayan Cuckoo [710] | | Species or species habitat known to occur |

| Name | Threatened | Type of Presence within area |
|---|---|---|
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| Hirundapus caudacutus<br>White-throated Needletail [682] | | Species or species habitat known to occur within area |
| Lathamus discolor<br>Swift Parrot [744] | Critically Endangered | Species or species habitat likely to occur within area |
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| Monarcha trivirgatus<br>Spectacled Monarch [610] | | Species or species habitat may occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat likely to occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat known to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat may occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat known to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat may occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Extra Information

### Invasive Species [ Resource Information ]

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

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Acridotheres tristis<br>Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Alauda arvensis<br>Skylark [656] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Carduelis chloris<br>European Greenfinch [404] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Lonchura punctulata<br>Nutmeg Mannikin [399] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Passer montanus<br>Eurasian Tree Sparrow [406] | | Species or species habitat likely to occur within area |
| Pycnonotus jocosus<br>Red-whiskered Bulbul [631] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| Turdus merula<br>Common Blackbird, Eurasian Blackbird [596] | | Species or species habitat likely to occur within area |
| **Frogs** | | |
| Rhinella marina<br>Cane Toad [83218] | | Species or species habitat likely to occur within area |
| **Mammals** | | |

| Name | Status | Type of Presence |
|---|---|---|
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Lepus capensis<br>Brown Hare [127] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus norvegicus<br>Brown Rat, Norway Rat [83] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| Plants | | |
| Alternanthera philoxeroides<br>Alligator Weed [11620] | | Species or species habitat likely to occur within area |
| Anredera cordifolia<br>Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] | | Species or species habitat likely to occur within area |
| Asparagus aethiopicus<br>Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] | | Species or species habitat likely to occur within area |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Asparagus plumosus<br>Climbing Asparagus-fern [48993] | | Species or species habitat likely to occur within area |
| Asparagus scandens<br>Asparagus Fern, Climbing Asparagus Fern [23255] | | Species or species habitat likely to occur within area |
| Cabomba caroliniana<br>Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] | | Species or species habitat likely to occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
| --- | --- | --- |
| Chrysanthemoides monilifera subsp. rotundata<br>Bitou Bush [16332] | | Species or species habitat likely to occur within area |
| Cytisus scoparius<br>Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934] | | Species or species habitat likely to occur within area |
| Dolichandra unguis-cati<br>Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119] | | Species or species habitat likely to occur within area |
| Eichhornia crassipes<br>Water Hyacinth, Water Orchid, Nile Lily [13466] | | Species or species habitat likely to occur within area |
| Genista linifolia<br>Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800] | | Species or species habitat likely to occur within area |
| Genista monspessulana<br>Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana<br>Broom [67538] | | Species or species habitat may occur within area |
| Lantana camara<br>Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] | | Species or species habitat likely to occur within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Nassella neesiana<br>Chilean Needle grass [67699] | | Species or species habitat likely to occur within area |
| Nassella trichotoma<br>Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884] | | Species or species habitat likely to occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Pinus radiata<br>Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within area |
| Protasparagus densiflorus<br>Asparagus Fern, Plume Asparagus [5015] | | Species or species habitat likely to occur within area |
| Protasparagus plumosus<br>Climbing Asparagus-fern, Ferny Asparagus [11747] | | Species or species habitat likely to occur within area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Sagittaria platyphylla<br>Delta Arrowhead, Arrowhead, Slender Arrowhead [68483] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii<br>Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
| --- | --- | --- |
| Salvinia molesta | | |
| Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665] | | Species or species habitat likely to occur within area |
| Senecio madagascariensis | | |
| Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624] | | Species or species habitat likely to occur within area |
| Ulex europaeus | | |
| Gorse, Furze [7693] | | Species or species habitat likely to occur within area |
| **Reptiles** | | |
| Hemidactylus frenatus | | |
| Asian House Gecko [1708] | | Species or species habitat likely to occur within area |

# Caveat

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

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

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

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

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-33.734991 151.002933,-33.737132 151.001388,-33.739416 151.000014,-33.740415 150.999843,-33.741129 150.999671,-33.742985 150.999328,-33.743841 150.997785,-33.745897 150.99538,-33.746981 150.994006,-33.750264 150.994006,-33.752548 150.994178,-33.754831 150.993835,-33.75583 150.992805,-33.756972 150.992633,-33.758828 150.992805,-33.760826 150.992805,-33.761825 150.992976,-33.766819 150.997439

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-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

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

Please feel free to provide feedback via the Contact Us page.


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