



Transport
Roads & Maritime
Services

The Prospect Highway upgrade

Reservoir Road, Prospect to
St Martins Crescent, Blacktown

**Review of Environment Factors
Main Report and Appendices A to C
Volume 1**

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Roads and Maritime Services

Prospect Highway Upgrade

Review of environmental factors
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Prepared by
Sinclair Knight Merz Pty Ltd (Jacobs SKM)
ABN: 37 001 024 095

100 Christie Street
St Leonards NSW 2065
Australia

PO Box 164 St Leonards NSW 1590 Australia

Tel: +61 2 9928 2100
Fax: +61 2 9928 2502
www.jacobsskm.com

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Executive summary

The proposal

Roads and Maritime Services (Roads and Maritime) propose to upgrade Prospect Highway between Reservoir Road at Prospect and 200 metres north of St Martins Crescent at Blacktown, a length of 3.6 kilometres (the proposal). The proposal is located about 30 kilometres west of the Sydney Central Business District (CBD).

Prospect Highway functions as a principal arterial road linking major residential, commercial and industrial areas to the M4 Western Motorway, M7 Motorway and M2 Hills Motorway. The proposal aims to provide a generally four-lane divided road between Reservoir Road at Prospect and St Martins Crescent at Blacktown, with the section north of Lancelot Street to be upgraded as six-lane divided road. The additional lanes would be achieved primarily within the existing road corridor.

The main features of the proposal are:

- A new two way link road between the Great Western Highway and Prospect Highway including two new signalised intersections, at the Great Western Highway and Prospect Highway
- Upgrading of seven intersections on Prospect Highway, including provision of traffic lights and/or additional lanes for through and turning traffic. These intersections are:
 - Reservoir Road / Prospect Highway / Reconciliation Road
 - M4 Western Motorway westbound entry and exit ramps / Prospect Highway
 - M4 Western Motorway eastbound entry and exit ramps / Prospect Highway
 - Stoddart Road / Prospect Highway
 - Harrod Street / Prospect Highway
 - Keyworth Drive / Prospect Highway
 - St Martins Crescent / Prospect Highway
- Upgrading and altering the following intersections to left in and left out (no right turns):
 - Ponds Road / Prospect Highway
 - Vesuvius Road / Prospect Highway
 - Tudor Avenue / Prospect Highway
- Upgrading of the Roger Place / Prospect Highway intersection and altering the access arrangement to left in, right in and left out
- Widening to provide additional traffic lanes on Prospect Highway at the following location:
 - Four lanes between Reservoir Road / Reconciliation Road and Blacktown Road
 - Six lanes between Lancelot Street and 200 metres north of St Martins Crescent, with the two outside lanes being dedicated bus lanes
- A central median of variable width between the intersection of Reservoir Road / Prospect Highway / Reconciliation Road and the new two way link road / Prospect Highway intersection
- A central median of about 5.9 metres width between the new two way link road / Prospect Highway intersection and Roger Place, except at the location of the Old Church Lane to Keyne Street pedestrian underpass where the median narrows to a width of 3.5 metres
- A central median of about 4.2 metres width from Roger Place until the proposal's northern extent 200 metres north of St Martins Crescent

- New bridges over the M4 Western Motorway and Great Western Highway for northbound traffic
- Upgrade of the Old Church Lane to Keyne Street pedestrian underpass linking Old Church Lane and Keyne Street, Prospect
- Upgrade of the existing road pavement and cross drainage systems
- Utilities relocation and adjustment where required
- Upgrade of street lighting within the proposal area
- Provision of three retaining walls ranging from about 0.5 metres to 5.8 metres in height at the following locations:
 - St Bartholomew's Church and Cemetery for about 60 metres in length
 - Proposed two way link road and continuing northbound along Prospect Highway for a combined length of about 430 metres
 - Adjacent to an existing high voltage transmission tower north-west of the proposed bridge crossing of the M4 Western Motorway for about 51 metres in length
- Relocation of five bus stops and provision of two new bus stops
- Upgrading of the shared path on the western side of Prospect Highway between the M4 Western Motorway westbound entry ramp and Harrod Street
- Realignment of the shared path on the western side of Prospect Highway between the Old Church Lane to Keyne Street pedestrian underpass and the Blacktown Road intersection
- Provision of a signalised pedestrian crossing across Prospect Highway at the Blacktown Road / Prospect Highway intersection and at St Martins Crescent
- Construction of a new pedestrian path on the eastern side of Prospect Highway between Keyworth Drive and Roger Place
- Establishment of temporary site compounds during construction
- Landscaping of the proposal area.

Need for the proposal

A number of future residential and industrial developments are planned within the Blacktown Local Government Area, including the North West Growth Centre north of the proposal and the Western Sydney Employment Area to the south-west of the proposal. Traffic congestion is currently experienced by motorists on Prospect Highway during the morning and afternoon peak periods. The need to address this congestion is recognised by a number of strategic planning and policy documents, including the NSW Long Term Transport Master Plan (Transport for NSW 2012).

Prospect Highway is also identified in the NSW Long Term Transport Master Plan as a strategic bus corridor that connects major centres with transport, health, educational and other community facilities. Upgrading of Prospect Highway is needed to provide for future bus services to operate more efficiently and to support existing public transport systems.

Related to the above is the need to improve road safety. Between July 2008 and June 2012, 223 crashes were reported on Prospect Highway between Reservoir Road and St Martins Crescent. Increasing capacity, reducing traffic congestion, dividing the road and upgrading intersections are considered key factors in improving road safety along Prospect Highway.

Options considered

The proposal's design concentrated on the development of specific options within the existing corridor. The design involved an iterative method of investigation,

identification, evaluation and refinement of individual road network improvements.

Provision of a new alignment for Prospect Highway outside of the existing road corridor was not adopted as this would not be consistent with relevant strategic plans. It would introduce several new impacts to areas not currently affected by a road corridor.

The proposal was evaluated against the 'do nothing' option and Roads and Maritime's objectives. The preferred option for the overall upgrade of Prospect Highway was selected based on an evaluation of the identified options against the proposal objectives, traffic modelling and the environmental constraints identified within and adjacent to the corridor. Sub-options within the existing corridor were also considered for the proposed two way link road, Stoddart Road intersection and the northbound carriageway between Lancelot Street and St Martins Crescent to ensure an optimal design solution was chosen.

Design refinements were considered in response to specialist investigations and community feedback. These refinements included the proposed upgrade of the Old Church Lane to Keyne Street pedestrian underpass, the realignment of the existing shared user path on the western side of Prospect Highway for pedestrians and cyclists, the provision of a signalised pedestrian crossing at the Blacktown Road intersection and the provision of a pedestrian path on the eastern side of Prospect Highway between Keyworth Drive and Roger Place. The extension of the northbound and southbound bus lanes north of St Martins Crescent was included in the concept design following consultation with Transport for New South Wales (TfNSW).

Statutory and planning framework

The proposal has been assessed as permissible without consent in line with the State Environmental Planning Policy (Infrastructure) 2007 (ISEPP). The 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 facility to be carried out by or on behalf of a public authority without consent.

The proposal can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by Roads and Maritime as both the proponent and the determining authority. This means that development consent from Blacktown City Council and Holroyd City Council is not required.

The Former Great Western Road, Prospect has been nominated for listing on the State Heritage Register. The listing will include a series of site-specific exemptions under section 57(2) of the *Heritage Act 1977* primarily relating to the archaeological potential of the area that would be impacted by the proposal. If impacts cannot be avoided, and if the item is listed on the State Heritage Register before construction starts, an exemption from approval under Section 57(2) of the *Heritage Act 1977* would be requested from the Heritage Council.

An appropriate road occupancy licence would be in place before the start of construction.

The proposal is a scheduled activity under the *Protection of the Environment Operations Act 1997* and requires an environment protection licence.

Community and stakeholder consultation

During the proposal's development, consultation took place with the community, Blacktown City Council, Holroyd City Council, Transport for New South Wales and utility providers including Endeavour Energy.

In March 2013 Roads and Maritime started community consultation with the wider community through distribution of a community update and release of a project website. Information was provided about the proposed upgrade and access strategy to seek feedback, concerns, and suggestions from stakeholder meetings, letters, phone calls and email. Community and stakeholder feedback was used to inform the preliminary concept design.

In October and November 2013 consultation took place to provide an update about the proposal's preliminary concept design. Community and stakeholders were invited to comment through two community information sessions, stakeholder meetings, letter, phone calls and email. Community and stakeholder feedback was used to inform further development of the concept design.

Roads and Maritime will continue to consult the community and stakeholders during the proposal's development. In particular, the Review of Environmental Factors (REF) would be placed on public display and comments invited. Submissions received in response to the REF display will be addressed in a formal submissions report. Where appropriate, they will be considered when finalising the concept design and during the detailed design process.

Environmental impacts

Traffic and access

Traffic, transport and access is discussed in Section 6.1.

Under the construction staging strategy developed by Roads and Maritime, access to existing properties along the Prospect Highway corridor would be maintained during construction.

Prospect Highway is currently at capacity with vehicles travelling at very low speeds due to congestion and delays at intersections, particularly during peak periods. With the proposal in place, the operational capacity of Prospect Highway is expected to improve substantially.

The proposal would achieve the primary objective of providing increased capacity and improved performance for forecast traffic growth to 2031 along the corridor. Travel times along the corridor would decrease due to the upgrade. Additionally, the proposal would improve safety along the corridor, by introducing a divided carriageway, providing controlled turning movements at intersections, which are currently uncontrolled. The proposal would also construct additional bus lanes and provide further pedestrian and cyclist facilities, including paths and signalised crossings.

Noise and vibration

A number of residential, commercial and other noise sensitive receivers are located adjacent to the proposal area as discussed in Section 6.2. Predicted noise levels for each stage of construction indicate there would be noise impacts at sensitive receiver

locations which are close to the proposal boundary. Noise management levels predicted to exceed noise criteria would be mitigated through construction noise management.

If the upgraded Prospect Highway is opened to traffic as proposed, about 231 residential dwellings located adjacent and near to Prospect Highway would experience operational noise impacts. The majority of these receivers are located adjacent to the existing road's alignment and already experience acute noise levels during the day or night time. Noise mitigation, where reasonable and feasible, would be considered during detailed design.

Biodiversity

Eight vegetation communities are located in the biodiversity study area as discussed in Section 6.3. These communities include one remnant vegetation community type (Cumberland Plain Woodland) and seven highly modified, planted or exotic vegetation types.

The biodiversity assessment indicates the proposal would involve:

- Direct and indirect impacts to 0.12 hectares of high condition Cumberland Plain Woodland listed as critically endangered under the Commonwealth Environment Protection Biodiversity Conservation (EPBC) Act 1999
- Direct and indirect impacts to 0.69 hectares of Cumberland Plain Woodland listed under the NSW Threatened Species Conservation Act 1995 (TSC Act)
- The vulnerable *Grevillea juniperina* subsp. *juniperina* was recorded in the study area but in a highly modified area of Cumberland Plain Woodland not affected by the proposal. Removal of habitat for threatened flora species is limited to intact patches of vegetation. Targeted surveys did not provide evidence of the cryptic Spiked Rice-flower (*Pimelea spicata*)
- No threatened fauna individuals were identified during field surveys, however the proposal may have a limited impact on their habitat. Threatened fauna that may potentially occur near the proposal include the Cumberland Plain Land Snail, highly mobile fauna species including microbats, woodland birds, nectar-feeding birds and bat species such as Little Lorikeet, Swift Parrot and Grey-headed Flying-fox.

Offsets would be considered for the 0.69 hectares of Cumberland Plain Woodland that would be potentially directly and indirectly affected by the proposal in line with Roads and Maritime offset policy (2011). However, offsets are not formally required because there would not be a significant impact.

Landscape, visual amenity and urban design

The proposal area's visual environment can be described in terms of its southern, central and northern sections as discussed in Section 6.4. The southern section between Reservoir Road and the Great Western Highway comprises a more rural landscape with open paddocks, trees, rolling pasture and scattered farm infrastructure. The proposal's central section from the northern edge of the Great Western Highway to Lancelot Street mainly passes through Prospect's suburban residential areas to the east and west of the existing road corridor. The proposal's northern section between Lancelot Street and 200 metres north of St Martins Crescent includes a mix of suburban residential development, Shelley Public School, and retail facilities within St Martins Village and Blacktown Mega Centre.

Visual impacts would occur during the proposal's construction and operation.

Construction impacts include a changed visual environment from construction plant, equipment, temporary compounds and stockpiles. The proposal would result in permanent visual changes along the length of Prospect Highway.

The main visual changes would occur in the proposal's southern section from the two way link road between the Great Western Highway and Prospect Highway, and the addition of two bridges over the existing M4 Western Motorway and Great Western Highway.

Changes in the streetscape would be associated with three new retaining walls, an upgrade of the existing shared user path, new infrastructure (including raised medians, signage, traffic lights) and the removal of some existing vegetation.

Water quality and Hydrology

The Prospect Highway road corridor is located close to the catchment boundary of Greystanes Creek and Blacktown Creek as discussed in Section 6.5.

Runoff from the new and widened sections of Prospect Highway would be captured and conveyed by new pavement drainage systems to existing drainage lines along Prospect Highway. During construction, excavation, vegetation removal and other surface work could lead to sedimentation of runoff and potential water quality impacts during periods of heavy rainfall. Erosion and sedimentation control measures to manage potential water quality issues are identified in Section 6.5 of this REF.

Existing drainage patterns along Prospect Highway would be generally improved as part of the upgrade. The proposal's impact on peak surface water flows is minor and would not increase flood risk to adjacent development. Further excavation of an existing surface water detention basin is proposed to enable additional storage of flood waters during heavy rain.

Non-Aboriginal heritage

Ten listed heritage items were identified within 200 metres of the proposal boundary as discussed in Section 6.6. These are Prospect Reservoir, Former Great Western Road, St Bartholomew's Church and Cemetery, Bridestowe House, Hicks Diary, Seven Milestones, Dayton House and three further heritage listed houses located near to Prospect Highway.

The proposal's construction would directly impact the Former Great Western Road heritage site and may potentially cause vibration impacts near to the location of two further heritage items. However, impacts to the Former Great Western Road and any potential vibration impacts to other properties are likely to be minor and mitigated through the identified safeguards and management measures.

If direct physical impacts to the Former Great Western Road, Prospect, cannot be avoided, and if the item is listed on the State Heritage Register before construction starts, an exemption from approval under Section 57(2) of the *Heritage Act 1977* would be requested from the Heritage Council.

Aboriginal Heritage

Aboriginal heritage impacts are not expected to result from the proposal's development as discussed in Section 6.7.

Socio-economic

Access to most properties would be maintained during construction as discussed in Section 6.8. However, there may be a need to temporarily change access to some properties and local traffic conditions, including highway access for properties between Shelley Public School and St Martins Crescent which front the existing informal service road. Where temporary disruptions are required, alternative access would be identified in consultation with property owners. Temporary access requirements would be confirmed during detailed design and construction staging.

The proposal requires acquisition of two private properties at Topaz Crescent including one residential dwelling and a strip of land fronting Prospect Highway. A small strip of Blacktown City Council land is also required to the north of the Great Western Highway, adjacent to the proposed two way link road.

Impacts from property adjustments include relocating boundary fencing, driveway adjustments particularly between Keyworth Drive and Tudor Avenue and loss of roadside trees and landscaped areas. Property impacts and potential adjustments would also be confirmed during detailed design in consultation with the property owners.

The proposal has the potential for both wider regional and local benefits in the medium to longer term through reduced traffic congestion, improved access and more efficient connectivity between Blacktown and the M4 Western Motorway.

Justification and conclusion

The proposal 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 environmental matters affecting or likely to be affected by the proposal.

A number of potential environmental impacts from the proposal have been avoided or reduced during the concept design and options assessment process particularly at the location of the proposed two way link road between the Great Western Highway and Prospect Highway. The upgrade of Prospect Highway as described best meets the proposal's objectives, however, would still result in some potential impacts including construction and operational noise, construction vibration, habitat loss, changes to access and traffic delays during construction. Mitigation measures would seek to manage and minimise these potential impacts.

The proposal's environmental impacts are considered insignificant and so an environmental impact statement is not required. Therefore, approval is not required 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, within the meaning of the *Threatened Species Conservation Act 1995* or *Fisheries Management Act 1994* and so a Species Impact Statement is not required. The proposal is unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance.

The proposal would reduce traffic congestion, provide additional capacity and improve road user safety along Prospect Highway by increasing the number of lanes, dividing the carriageway and formalising intersection access arrangements. The proposal would also provide improved facilities for pedestrians and cyclists. On balance the proposal is considered justified.

Display of the review of environmental factors

This review of environmental factors is on display for comment up to Monday 30 June 2014. You can access the documents in the following ways:

Internet

The documents will be available as Portable Document Format (PDF) files on the Roads and Maritime website at website address:

<http://www.rms.nsw.gov.au/roadprojects> and search for 'Prospect Highway Upgrade'

Display

The review documents can be viewed at the following locations:

Blacktown City Council

62 Flushcombe Road, Blacktown

Monday to Friday 8:30am to 4:30pm

Max Webber Library

Corner Flushcombe Road and Alpha Street, Blacktown

Monday to Friday 9:30am to 7:45pm

Saturday 9:30am to 4pm

Sunday 12pm to 4pm

How can I make a submission?

To make a submission on the proposal, please send your written comments to:

Roads and Maritime Services project manager:

Prospect Highway Upgrade Project Team

Development Sydney

Roads and Maritime Services

PO Box 973

Parramatta NSW 2124

Email address: ProspectHighway@rms.nsw.gov.au

Phone number: 1300 660 275

Facsimile number: 02 8849 2817

Submissions must be received by Monday 30 June 2014 .

Privacy information

All information included in submissions is collected for the sole purpose of assisting in the assessment of this proposal. The information may be used during the environmental impact assessment process by relevant Roads and Maritime staff and its contractors.

Where the respondent indicates at the time of supply of information that their submission should be kept confidential, Roads and Maritime will attempt to keep it confidential.

However there may be legislative or legal justification for the release of the information, for example under the *Government Information (Public Access) Act 2009* or under subpoena or statutory instrument.

The supply of this information is voluntary. Each respondent has free access at all times to the information provided by that respondent but not to any identifying information provided by other respondents if a respondent has indicated that the representation should be kept confidential.

Any respondent may make a correction to the information that they have provided by writing to the same address the submission was sent.

The information will be held by the Roads and Maritime at 27-31 Argyle Street Parramatta, NSW.

What happens next?

Following the submissions period, Roads and Maritime will collate submissions. Acknowledgement letters will be sent to each respondent. The details of submission authors will be retained and authors will be subsequently advised when project information is released.

After consideration of community comments, Roads and Maritime will determine whether the proposal should proceed as proposed, or whether any alterations to the proposal are necessary. The community will be kept informed regarding Roads and Maritime's decision.

If the proposal goes ahead, Roads and Maritime would proceed with final design and tenders would be invited to construct the project pending confirmation of funding.

If you have any queries, please contact the Roads and Maritime project manager on 1300 660 275.

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1 Introduction

1.1 Proposal identification

Roads and Maritime Services (hereafter referred to as Roads and Maritime) propose to upgrade Prospect Highway between Reservoir Road at Prospect and 200 metres north of St Martins Crescent at Blacktown, a length of 3.6 kilometres. The proposal is located about 30 kilometres west of the Sydney Central Business District (CBD). Figure 1-1 shows the location of the proposal.

Prospect Highway is located in Western Sydney and is an 8.1 kilometre corridor running between Reservoir Road, Prospect and the M2 Hills Motorway, Seven Hills in the northeast. The road functions as a principal arterial road linking major urban, commercial and industrial areas to the M4 Western Motorway, M7 Motorway and M2 Hills Motorway. The corridor forms part of the main road through the suburbs of Prospect, Blacktown and Seven Hills.

The objective of the proposal is to provide increased capacity to cater for 2031 forecast transport growth on Prospect Highway between Reservoir Road, Prospect and St Martins Crescent, Blacktown. The proposal is needed to reduce traffic congestion currently experienced by road users and improve safety. The road is currently operating close to capacity in peak times, resulting in significant delays for motorists.

Prospect Highway within the proposal area is currently a combination of two lane and four lane undivided carriageway with 14 intersections and a posted speed of 60 kilometres per hour.

The proposal generally aims to provide a four-lane divided road between Reservoir Road, Prospect and St Martins Crescent, Blacktown. The development of additional lanes would be achieved within the existing road corridor. The proposal would deliver two lanes in each direction with a variable width central median (up to 12 metres wide at one point). The section between Lancelot Street and 200 metres north of St Martins Crescent would be six lanes, with the additional lanes being dedicated bus lanes. The widening along Prospect Highway occurs generally to the west of the existing carriageway.

The upgrade would involve improvements to the existing route of the Prospect Highway and include the following key features:

- A new two way link road between Great Western Highway and Prospect Highway including two new signalised intersections at the Great Western Highway and Prospect Highway
- Upgrading of seven intersections on Prospect Highway, including provision of traffic lights and/or additional lanes for through and turning traffic

These intersections are:

- Reservoir Road / Prospect Highway / Reconciliation Road
- M4 Western Motorway westbound entry and exit ramps / Prospect Highway
- M4 Western Motorway eastbound entry and exit ramps / Prospect Highway
- Stoddart Road / Prospect Highway
- Harrod Street / Prospect Highway
- Keyworth Drive / Prospect Highway
- St Martins Crescent / Prospect Highway

- Upgrading of three intersections and altering the access arrangements to left in and left out (no right turns). These intersections are:
 - Ponds Road / Prospect Highway
 - Vesuvius Road / Prospect Highway
 - Tudor Avenue / Prospect Highway
- Upgrading of Roger Place / Prospect Highway intersection and altering the access arrangements to left in, right in and left out
- Widening to provide additional traffic lanes on Prospect Highway at the following locations
 - Four lanes between Reservoir Road/ Reconciliation Road and Blacktown Road
 - Six lanes between Lancelot Street and 200 metres north of St Martins Crescent, with the two outside lanes being dedicated to buses
- A central median of variable widths between Reservoir Road / Prospect Highway / Reconciliation Road and the new two way link road / Prospect Highway intersection
- A central median of about 5.9 metres width between the new Great Western Highway / Prospect Highway intersection and Roger Place, except at the Old Church Lane to Keyne Street pedestrian underpass where the median narrows to a width of about 3.5 metres
- A central median of about 4.2 metres width from Roger Place until the northern extent of the proposal 200 metres north of St Martins Crescent
- New bridges over the M4 Western Motorway and Great Western Highway for northbound traffic
- Upgrade of the Old Church Lane to Keyne Street pedestrian underpass of Prospect Highway linking Old Church Lane and Keyne Street, Prospect
- Upgrade of the existing road pavement and cross drainage systems including the construction and extension of pavement drainage lines, as required
- Utilities relocation and adjustment where required
- Upgrade of street lighting within the proposal area
- Provision of three retaining walls at the following locations:
 - St Bartholomew's Church and Cemetery
 - Proposed two way link road continuing northbound along Prospect Highway
 - Adjacent to the existing high voltage transmission tower north-west of the proposed bridge crossing of the M4 Western Motorway
- Relocation of five bus stops and provision of two new bus stops
- Upgrading of the shared path on the western side of Prospect Highway between the M4 westbound entry ramp and Harrod Street
- Realignment of the shared path on the western side of Prospect Highway between the Old Church Lane to Keyne Street pedestrian underpass and Blacktown Road intersection
- Provision of signalised pedestrian crossings at Blacktown Road / Prospect Highway intersection and at St Martins Crescent
- Construction of new pedestrian path on the eastern side of Prospect Highway between Keyworth Drive and Roger Place
- Establishment of five temporary site compounds during construction
- Landscaping of the proposal area.

1.1.1 The locality

Prospect Highway forms the main road corridor connecting the major centre of Blacktown in the north with the M4 Western Motorway in the south. The proposal as shown on Figure 1-1 is mainly located within the Blacktown Local Government Area (LGA) with the southern section located within the Holroyd LGA.

The proposal traverses the catchments of Blacktown Creek and Greystanes Creek. Prospect Reservoir is located about 1.5 kilometres south-west of the proposal and the Hawkesbury River is about 25 kilometres north. The topography of the study area is undulating, with a general downhill slope in a northerly direction. The highest point is at the southern end of the study area between the eastbound entry ramp of the M4 Western Motorway and the Great Western Highway. The topography of the Prospect and Blacktown area has an average elevation of about 70 metres Australian Height Datum (AHD). The height of the study area ranges from 55 metres AHD at the northern end of the site to 95 metres AHD in the area between the Great Western Highway and the M4 Western Motorway.

Land uses that are nearby and serviced by Prospect Highway include commercial and industrial centres at Seven Hills, Blacktown, Prospect and Pemulwuy. Other neighbouring land uses include low density residential, educational institutions, an early learning childcare centre, Army Depot, historical church and graveyard (St Bartholomew's Church and Cemetery), St Mark's Coptic Catholic Church and shopping centres at the intersection of St Martins Crescent (St Martins Village and Blacktown Mega Centre) and adjacent to the Great Western Highway eastbound entry ramp (HomeBase). Wet 'n' Wild Sydney water theme park opened in December 2013 and is located to the southwest of the proposal, between the M4 Western Motorway and Reservoir Road, Prospect.

There are isolated patches of endangered Cumberland Plain Woodland within and adjacent to the proposal area, with vegetation in the remainder of the corridor consisting of cleared grassy areas, weeds, planted and regrowth trees and shrubs.

The proposal is within the Roads and Maritime Sydney Region.

Funding to complete the proposal would be sought from the State Government. Subject to approval, construction work is expected to take around two years to complete.

Indicative construction and funding staging indicates the proposal would be delivered in five stages. Construction of Stages one, two and three would be from Reconciliation Road to Blacktown Road and Stages four and five from Blacktown Road to 200 metres north of St Martins Crescent. It would be possible, subject to funding, for the southern section of the proposal (stages one, two and three) to occur at the same time as the northern section of the proposal (stages four and five). The proposal's final work methodology would be refined and determined during detail design.

1.1.2 Terms used in this report

The following terms are used in this review of environmental factors (REF):

- 'Prospect Highway' includes both Prospect Highway between Reservoir Road at Prospect to Blacktown Road, Prospect and Blacktown Road at Prospect to 200m north of St Martins Crescent at Blacktown
- 'The highway' refers to the Prospect Highway
- 'The proposal' refers to the upgrade of a section of the Prospect Highway between Reservoir Road, Prospect and 200 metres north of St Martins Crescent, Blacktown
- 'The proposal area' refers to the area that would be directly impacted by the construction and operation of the proposal. It encompasses the concept road

design, batters, cuts and embankments. It includes the total construction footprint, compound sites, stockpile sites and any other areas that would be temporarily disturbed (such as construction basins and access tracks)

- 'The study area' encompasses the proposal area and the area that may be indirectly impacted by the proposal. Where required, each environmental discipline defines their own relevant study area.



- | | | | | | | | |
|---|-----------------------|---|-----------------------|---|-----------------|---|-----------|
|  | The proposal boundary |  | National park/reserve |  | LGA boundary |  | Waterbody |
|  | The proposal |  | Park |  | Suburb boundary |  | Waterway |

Figure I-1
Proposal overview

1.2 Purpose of the report

This Review of Environmental Factors has been prepared by Jacobs SKM on behalf of Roads and Maritime Sydney Region. For the purposes of the proposal, 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 proposal and associated environmental impacts have been carried out with reference to 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 Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). 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 and Infrastructure under Part 5.1 of the EP&A Act
- The significance of any impact on threatened species as defined by the *Threatened Species Conservation Act 1995* and/or *Fisheries Management Act 1994*, and therefore identifying the requirement for a Species Impact Statement
- The potential for the proposal to significantly impact a matter of national environmental significance or Commonwealth land and the need to make a referral to the Federal Department of the Environment for a decision by the Federal Minister for the Environment on whether assessment and approval is required under the *Environment Protection and Biodiversity Conservation Act, 1999*.

2 Need and options considered

2.1 Strategic need for the proposal

Prospect Highway provides an important connection for freight, resident and commuter traffic to access the M4 Western Motorway and Great Western Highway to the south and the M2 Hills Motorway and M7 Motorway to the north. It also provides a connection to key employment, residential, retail and recreational land uses, including:

- To the south, HomeBase, Prospect Reservoir and Prospect Nature Reserve, Greystanes and Wetherill Park (industrial land use), Western Sydney Employment Area, Western Sydney Parklands and Wet 'n' Wild Sydney
- To the north, Blacktown town centre, including Blacktown Westpoint Shopping Centre, Blacktown Arts Centre and the Blacktown train station as well as Blacktown Hospital, Blacktown Showground and St Martins Village / Blacktown Mega Centre.

Prospect Highway links to Reconciliation Road, a local road which provides access to industrial uses along Reconciliation Road itself as well as Greystanes and Wetherill Park to the south.

Future residential and industrial development is planned for the Blacktown LGA, particularly the North West Growth Centre to the north of the proposal as well as the Western Sydney Employment Area located to the south-west of the proposal.

The proposal is required to:

- Reduce traffic congestion and improve traffic flow
- Support public transport
- Support freight movement
- Support growth areas
- Improve safety.

These are discussed further below.

Reduce traffic congestion and improve traffic flow

Traffic congestion is currently experienced by motorists on Prospect Highway, at the following locations in particular:

- Great Western Highway and M4 Western Motorway bridges: traffic demand exceeds the capacity of both bridges, leading to substantial queuing and delays for both northbound and southbound directions, especially during peak periods
- The lane configuration on Prospect Highway is inconsistent at intersections and causes traffic to merge frequently, generating congestion and increasing travel time where lane configurations change
- The southern section of the proposal area: congestion occurs during the afternoon peak period particularly at the M4 Western Motorway interchange
- Traffic congestion along the length of the corridor during peak periods and at the intersection of Ponds Road and Prospect Highway during the afternoon peak period results in unsatisfactory waiting times.

The proposal would provide increased capacity on Prospect Highway by providing a consistent four-lane divided carriageway that would decrease traffic congestion.

Support public transport

Prospect Highway is identified in the NSW Long Term Transport Master Plan as a strategic bus corridor, that is, a bus corridor that connects major centres with transport, health, educational and other community facilities. Sections of Prospect Highway are currently underutilised, with buses typically travelling along Blacktown Road between the Great Western Highway and the northern section of Prospect Highway rather than via the southern section of Prospect Highway. This is mainly a result of bus operators seeking to avoid traffic congestion along Prospect Highway and the current low demand for public transport in the area. The opening of Reconciliation Road through to Wetherill Park on 23 December 2013 has created an additional opportunity for north-south vehicle movement, which may also provide opportunities for additional public transport trips.

The proposal would introduce bus lanes between Lancelot Street and about 200 metres north of St Martins Crescent. This is shown on Figure 3-4 and Figure 3-5.

Support freight movement

The NSW Freight and Ports Strategy (November 2012) indicates areas to the north (Blacktown) and to the south (Wetherill Park) of the proposal are freight activity precincts that are expected to grow. The Prospect Highway corridor is therefore an important existing freight link between the M4 Western Motorway and Great Western Highway to these precincts that will support growth in freight movement.

Support growth areas

Prospect Highway connects the Blacktown town centre to the north with existing residential areas along Prospect Highway and developing employment lands to the south. Prospect Highway also connects Wet 'n' Wild Sydney in the south to the wider road network via the M4 Western Motorway. The upgrade of Prospect Highway would provide enhanced arterial road access for local traffic, freight and commuters.

It is anticipated that the Western Sydney Employment Area, located south west of the intersection of the M4 Western Motorway and M7 Motorway would accommodate 40,000 workers by 2031. While this employment area is located to the west of the proposal, it is anticipated that traffic volumes on Prospect Highway would increase as a result of this development.

Improve safety

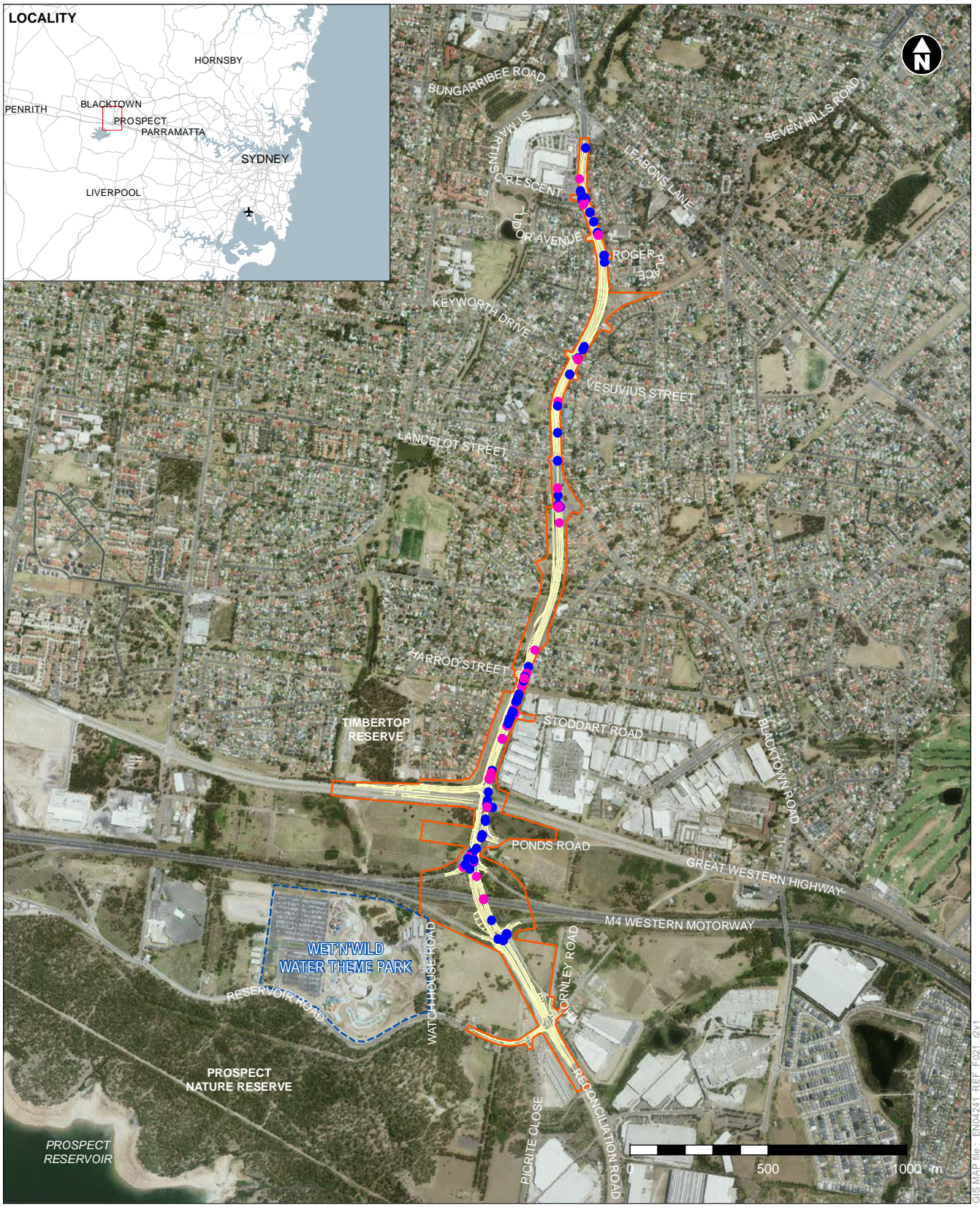
Between January 2008 and December 2012, 223 crashes were reported on Prospect Highway between Reservoir Road and St Martins Crescent, 87 of which resulted in injury (refer to Figure 2-1). The majority of these crashes occurred at intersections and during peak periods (morning and afternoon). There were no fatal crashes recorded along the proposal corridor during this period.

There are known difficulties at the intersections with the M4 Western Motorway interchange, Ponds Road and Stoddart Road. The proposal would provide traffic lights and/or additional lanes for through and turning movements at eight intersections along the proposal area including the intersection between the M4 Western Motorway entry and exit ramps (westbound and eastbound) and Prospect

Highway. The intersection at Ponds Road and Prospect Highway would also be upgraded to restrict traffic movements to left in and left out to improve road safety.

The proposal would improve driver safety through the dividing of the existing carriageway with a central median. This separation of southbound and northbound traffic would reduce the likelihood of head on collisions and improve overall road safety along the corridor.

By reducing existing congestion along Prospect Highway, and increasing capacity, it is also expected that the proposal would reduce the incidence of stop-start traffic movements and in turn the number of rear end collisions. Road crashes are discussed further in Section 6.1.



-  The proposal boundary
-  The proposal
- Crash locations 2008-2012**
-  Injury
-  Non-casualty (towaway)

Figure 2-1
Crash locations 2008-2012, Prospect Highway - Reservoir Road to St Martins Crescent

2.1.1 Strategic planning and policy context

The following major strategic planning and policy documents provide direction and establishes priorities that are relevant to an assessment of the proposal:

- National Road Safety Strategy 2011-2020 (Australian Transport Council 2011)
- NSW Ports and Freight Strategy (Transport for NSW 2013)
- NSW 2021: A plan to make NSW Number One (NSW Government 2011)
- NSW State Infrastructure Strategy (NSW Government 2012)
- NSW Long Term Transport Master Plan (Transport for NSW 2012)
- Congestion Management Program (Roads and Maritime 2011)
- NSW Bike Plan (NSW Government 2010)
- Sydney's Cycling Future - Cycling for everyday transport (Transport for NSW 2013)
- Draft Metropolitan Strategy for Sydney to 2031 (NSW Government 2013)
- West Central and North West Central Regional Strategy (NSW Government 2013)
- Roads and Maritime Services Corporate Delivery Plan 2012 – 2016 (Roads and Maritime 2012)
- Sydney's Bus Future (Transport for NSW 2013).

These strategies and relevant objectives are discussed further in the following sections.

National Road Safety Strategy 2011-2020

The National Road Safety Strategy (Australian Transport Council 2011) aims to reduce death and serious injury on Australian roads. A target of this strategy is to reduce fatalities and crashes on roads by at least 30 per cent between 2011 and 2020.

The proposal would contribute to achieving this target by reducing congestion at merge points and improving operation of the road network. These improvements would reduce vehicle crashes, particularly at intersections along the proposal area including Prospect Highway / M4 Western Motorway entry and exit ramps, Ponds Road and Stoddart Road.

The proposal has been designed in line with Austroads Guides and Roads and Maritime supplements to Austroads Guides for safe road operation. During construction, traffic management measures such as a reduced speed limit on Prospect Highway would be implemented to ensure safe conditions for motorists and workers on site.

NSW Ports and Freight Strategy 2013

The NSW Freight and Ports Strategy has been proposed to target specific challenges associated with the forecast doubling of the NSW freight task by 2031. Providing a network that minimises congestion will support economic growth and productivity and encourage regional development.

Of relevance to this strategy is the Metropolitan Road Freight Hierarchy on the State Road Network Practice Note. This sets out Road and Maritime's defined road freight hierarchy on the State Road network in the Greater Metropolitan Area. Road hierarchies can assist in defining the function of the road and in balancing the needs of various users and allocating priorities.

This Practice Note defines three hierarchies for road functions: primary, secondary and tertiary freight routes. Prospect Highway is classified as a secondary freight route, currently providing capacity for a medium volume of heavy vehicles (1000 – 5000 heavy vehicles per day). The proposal provides additional capacity for the movement of road freight, which supports the main objectives of the NSW Ports and Freight Strategy.

NSW 2021: A Plan to Make NSW Number One

NSW 2021: A Plan to Make NSW Number One (NSW 2021 Plan) (NSW Department of Premier and Cabinet 2011) is a 10-year plan to rebuild the economy, return quality services, renovate infrastructure, restore accountability to government, and strengthen local environment and communities. NSW 2021 places emphasis on investing in and delivering an efficient and effective transport system including road infrastructure that would relieve congestion, improve safety and expand capacity on road corridors.

While the proposal is not specified in the NSW 2021 Plan, it would address the following goals:

- Goal 7: reduce travel times with the target to improve the efficiency of the road network during peak times on Sydney's road corridors. Goal 7 would be achieved through the delivery of road infrastructure to relieve congestion, improve safety and enhance and expand capacity on the road corridor
- Goal 10: improve road safety. Goal 10 would be achieved through the upgrade of intersections on Prospect Highway with traffic lights and/or additional lanes for through and turning lanes as well as providing a central median to separate traffic. These measures would provide improved control of traffic movement on Prospect Highway
- Goal 19: invest in critical infrastructure. Goal 19 would be achieved through the upgrade of Prospect Highway which is an important road link to the M4 Western Motorway, Great Western Highway, M2 Hills Motorway, M7 Motorway and Reconciliation Road.

NSW Government State Infrastructure Strategy 2012-2032

The State Infrastructure Strategy documents an integrated approach to infrastructure planning and delivery. The Strategy builds on NSW 2021, plans for regional and metropolitan land use and development and the NSW Long Term Transport Master Plan, setting the State's infrastructure delivery and reform priorities over the next five years.

An objective of the State Infrastructure Strategy is to reduce delays and manage traffic on major arterial roads across Sydney, including at pinch points (peak hour congestion problem areas). Prospect Highway and its connections with the M4 Western Motorway and Great Western Highway have been identified as a pinch point by Transport for NSW and Roads and Maritime. The proposal would reduce congestion on Prospect Highway, which aligns with this strategy.

NSW Long Term Transport Master Plan 2012

The NSW Long Term Transport Master Plan (Transport for NSW 2012) identifies a planned and coordinated set of actions (reforms, service improvements and investments) to address the transport challenges facing Sydney and regions within NSW. It presents future service and infrastructure development which future decisions would be required to support, and against which proposed investments are to be evaluated.

The NSW Long Term Transport Master Plan identifies Blacktown Road, which forms the northern part of Prospect Highway, as a corridor targeted for improvement. This is due to growing pressure on Blacktown Road and Prospect Highway from the development of industrial land along Reconciliation Road at Greystanes and Wetherill Park to the south. There is also growth in residential development to the north of the proposal, particularly the North West Growth Centre.

The proposal would address actions within the NSW Long Term Transport Master Plan including:

- Congestion and pinch point management in western Sydney to respond to the growing pressure on the road network: Prospect Highway is identified as a Greater Sydney strategic corridor and part of the Road and Maritime Congestion Management Program. The proposal is consistent with the aim of the NSW Long Term Transport Master Plan of reducing congestion and improving safety at pinch point locations (Blacktown Road from Prospect to Blacktown)
- Safer travel: existing congestion on Prospect Highway and the intersections with the M4 Western Motorway, Ponds Road and Stoddart Road is a safety concern for motorists and cyclists. The proposal would improve safety through a reduction in congestion and improved turning arrangements to local streets from Prospect Highway. The proposal would improve safety for pedestrians and cyclists by upgrading the shared path on the western side of Prospect Highway from the M4 Western Motorway to Harrod Street to connect with the existing path north of Harrod Street
- Increased network efficiency for freight movements: the proposal would improve the efficiency of freight movement on Prospect Highway through the reduction of congestion and improvement of traffic flow. There is a strategic need to upgrade Prospect Highway to support freight movements as areas to the north (Blacktown) and to the south (Wetherill Park) of Prospect Highway are freight activity precincts. With the opening of Reconciliation Road, there are potential opportunities for additional freight to use this route for north-south movements along Prospect Highway.

Congestion Management Program 2011

Prospect Highway is listed as Pinch Point Corridor 1, which means it is a congested road (NSW Long Term Transport Master Plan December 2012). This congestion causes travel delays and a build-up of traffic on the wider road network. The proposal forms part of Roads and Maritime's Congestion Management program.

The Congestion Management Program targets corridors within the Sydney Region which experience congestion and poor traffic flow during peak hours (Roads and Maritime 2011). The objectives of the program are to reduce delays for road users, manage congestion, improve safety, and maintain consistent travel times along congested road corridors identified by the NSW Government. The Congestion

Management Program supports the NSW Long Term Transport Master Plan through the implementation of a program to address pinch points across Sydney.

NSW Bike Plan 2010

The NSW Bike Plan 2010 (NSW Government 2011) outlines a ten year bicycle infrastructure plan for NSW. Objectives include connecting Sydney's district centres by building missing links in the Metro Sydney Bike Network and completing neighbourhood cycleway networks. The NSW Bike Plan identifies cycling as important to combat congestion as well as improving quality of life.

The proposal would upgrade the temporary pedestrian and cycleway path located between the M4 Western Motorway westbound entry ramp and Harrod Street on the western side of Prospect Highway. Cycleways in Blacktown and Prospect are nominated in the NSW Bike Plan and the NSW Long Term Transport Master Plan.

Sydney's Cycling Future 2013

The overarching goal of Sydney's Cycling Future is to make cycling a safe, convenient and enjoyable transport option for short trips. By helping to reduce the burden of congestion on roads and increasing capacity on the transport system the Sydney's Cycling Future target is to increase the number of people riding a bike for transport.

The proposal would address the goals of Sydney's Cycling Future through upgrading the temporary pedestrian and cycleway path currently being built by the Roads and Maritime Cycleway Alliance. This would create a safer and more convenient cycle option for users by providing greater capacity for bicycles along the highway.

Draft Metropolitan Strategy for Sydney to 2031

The Draft Metropolitan Strategy for Sydney to 2031 (NSW Government 2013) was released in March 2013 and sets the framework and strategic planning foundation for Sydney's housing and job growth to 2031.

The proposal addresses accessibility and connectivity objectives of the Draft Metropolitan Strategy for Sydney to 2031, including:

- Objective 26: improve accessibility and connectivity for centres and for new urban centres. The proposal would improve access and connectivity for residents, commuters and freight to Blacktown, which is identified as a future major centre
- Objective 27: deliver efficient freight connections. The proposal would improve connections with the M4 Western Motorway, which is a primary freight road and part of the Global Economic Corridor linking western Sydney with Port Botany and Sydney Airport. The proposal would also improve the efficiency of the intersection with the M4 Western Motorway and Great Western Highway
- Objective 28: protect corridors and sites for our long-term transport needs. Prospect Highway is identified as a corridor which requires protecting for the long term transport needs of Blacktown City and the Sydney Region. The proposal would ensure that Prospect Highway can continue to be used as a north-south link between land uses in and around Blacktown, the M4 Western Motorway and Reconciliation Road.

West Central and North West Regional Strategy

A number of draft subregional strategies were developed to support the implementation of the Draft Metropolitan Strategy for Sydney to 2031. The West Central and North West Regional Strategy covers the Blacktown, Auburn, Holroyd, Parramatta and The Hills LGAs and therefore includes the entire proposal area.

The West Central and North West Regional Strategy identifies a number of priorities for the subregion. Of relevance to the proposal, Blacktown is identified as a future major centre for the Sydney Region. The proposal would strengthen the connection for residential and commuter traffic accessing Blacktown through the widening of Prospect Highway to four lanes as well as the upgrade of intersections.

In addition, the population of West Central and North West region is anticipated to increase by 355,000 people to 1,201,000 people by 2031 and an additional 148,000 additional houses and 142,000 additional jobs are planned. About 70,000 houses are to be located within the North West Growth Centre, to the north of the proposal. The proposal would assist in establishing efficient transport links that service the future growth of the Blacktown LGA, and the broader West Central and North West regions of Sydney.

Roads and Maritime Corporate Plan 2012 – 2016

The Roads and Maritime Corporate Plan 2012–2016 outlines what Roads and Maritime would deliver between 2012 and 2016. Strategy statements include achieving value for money, minimising impact on the environment, and improving the efficiency of the road network during peak times on Sydney's road corridors.

The proposal would be consistent with the strategy statements outlined above as it would deliver key infrastructure to support the safe, efficient and reliable movement of people and goods; improve road network efficiency; and support the movement of freight in the urban area.

Sydney's Bus Future 2013

Sydney's Bus Future outlines a number of actions and initiatives designed to integrate Sydney's bus network into the wider public transport network and its role in the NSW Long Term Transport Master Plan.

Sydney's existing bus network includes more than 600 bus routes, with customer demand for bus travel expected to grow by 30 per cent by 2031. Sydney's Bus Future aims to provide a simplified bus network and distribute buses more evenly across the city, reducing road congestion, delay and uncertainty for bus customers.

The entire network will be simplified into a clear, three-tiered system including rapid, suburban and local service routes. Each service level will deliver to a defined level of service consistency and reliability.

The proposal would contribute to the implementation of Sydney's Bus Future by linking the Blacktown city centre to Wetherill Park via Prospect Highway as part of the Bankstown to Blacktown new major suburban bus route. The proposal would provide for additional bus lanes and greater bus capacity on the Prospect Highway which would support growing demand for bus transport.

2.2 Existing road and infrastructure

Prospect Highway is a south-north arterial road connecting Blacktown with the Great Western Highway, M4 Western Motorway, Reconciliation Road, and Greystanes in the south and the M2 Hills Motorway and M7 Motorway to the north. Prospect Highway services private vehicles, buses, pedestrians, cyclists and is a B-Double truck route. It includes the following features:

- One northbound lane and one southbound lane (undivided) for the majority of the road, with two lanes in each direction between:
 - M4 Western Motorway westbound and eastbound entry/exit ramps
 - Blacktown Road and Lancelot Street
 - Tudor Avenue and 200 metres north of St Martins Crescent
- Northbound and southbound bus priority lanes at the Lancelot Street intersection
- A two-lane bridge is provided over the Great Western Highway and a four-lane bridge over the M4 Western Motorway
- Signalised pedestrian crossings at some intersections
- A shared user path along the western side of Prospect Highway
- Pedestrian paths along the eastern side of Prospect Highway at the following locations:
 - Stoddart Road to Harrod Street
 - Blacktown Road to Keyworth Drive
 - Roger Place to the northern extent of proposal
- A signposted speed limit of 60 kilometres per hour
- Eleven bus stops and shelters, which are located on both sides of Prospect Highway
- Old Church Lane to Keyne Street pedestrian underpass, located about 330 metres south of the Blacktown Road intersection
- An informal service road on the western side of Prospect Highway between Lancelot Street and St Martins Crescent, which includes an informal stopping area just south of Shelley Public School.

Within the proposal area, there are 14 existing signalised and unsignalised intersections with Prospect Highway including:

- Reservoir Road / Prospect Highway
- M4 Western Motorway westbound ramps / Prospect Highway
- M4 Western Motorway eastbound ramps / Prospect Highway
- Ponds Road / Prospect Highway
- Great Western Highway eastbound exit ramp / Prospect Highway
- Stoddart Road / Prospect Highway
- Harrod Street / Prospect Highway
- Blacktown Road / Prospect Highway
- Lancelot Street / Prospect Highway
- Vesuvius Street / Prospect Highway
- Keyworth Drive / Prospect Highway
- Roger Place / Prospect Highway
- Tudor Avenue / Prospect Highway
- St Martins Crescent / Prospect Highway.

2.3 Proposal objectives

The main objective of the proposal is to provide increased capacity on Prospect Highway between Reservoir Road, Prospect and 200 metres north of St Martins

Crescent, Blacktown to allow for forecast traffic growth to 2031. Other project objectives are to:

- Reduce traffic congestion and improve traffic flow
- Support public transport
- Support freight movement
- Support growth areas
- Improve safety.

2.4 Alternatives and options considered

In 2011, following identification of the need for the proposal, Roads and Maritime developed options to improve traffic congestion on Prospect Highway between Reservoir Road and St Martins Crescent.

Prospect Highway is an urban road corridor within an established urban setting, with residential properties, commercial centres, schools and churches adjacent to the road corridor.

The upgrade of Prospect Highway outside of the existing road corridor was not considered because it would not be consistent with the strategic plans discussed in Section 2.1.1. It would also introduce a number of new impacts such as increases in traffic, noise and vegetation removal to areas not currently affected by a road corridor. It would also require considerable property acquisition and changes in surrounding land use.

By investigating the existing Prospect Highway road corridor, two options were identified including the 'do-nothing' option (Option 1) and upgrade of Prospect Highway within the existing corridor (Option 2).

A detailed review of Option 1 and Option 2 was carried out by Roads and Maritime, to determine the preferred option. This included the following:

- Value Management Workshops (March 2012 and August 2013)
- Preliminary environmental investigation (PEI) (April 2012)
- Options Engineering Workshop (December 2012)
- Risk and Value Management Workshop (August 2013)
- Constructability Workshop (August 2013)
- Community consultation (April 2013 and October 2013) (refer to Chapter 5).

2.4.1 Methodology for selection of preferred option

As part of the options analysis, each option was reviewed against the proposal objectives outlined in Section 2.3.

Identified options

The two options were considered against the proposal objectives, and are listed below:

Option 1: Do-nothing

The do-nothing option would result in Prospect Highway remaining a two-lane road, including one northbound lane and one southbound lane along the majority of the

proposal area between Reconciliation Drive and St Martins Crescent. Routine maintenance and safety activities would continue to be carried out where required.

Option 2: Widening of Prospect Highway

This option would involve the widening of Prospect Highway from an undivided two-lane road to a divided four-lane road. Option 2 would also involve intersection upgrades, provision of cyclist and pedestrian facilities and new bridges over the Great Western Highway and the M4 Western Motorway. A full description of the proposal is provided in Chapter 3. Sub-options were considered for some sections of Option 2.

2.4.2 Analysis of options

An analysis of the options was carried out to identify and document a preferred option that meets the proposal objectives outlined in Section 2.3. The following summarises the outcome of this analysis.

Option 1: Do-nothing

Retaining Prospect Highway as a two and four-lane highway would result in Prospect Highway continuing to operate at capacity, particularly during peak periods.

The do-nothing option would not fulfil the proposal's objectives, particularly the following:

- Safety and access for both through and local traffic would not be improved
- Safety for cyclists and pedestrians would not be improved
- Travel times and congestion along Prospect Highway would not be reduced between Blacktown and the M4 Western Motorway
- The do nothing scenario would not support increased public transport along the corridor
- It would not assist in reducing traffic congestion or improving traffic flow on Prospect Highway, which is currently at capacity and experiences slow travel speeds and delays
- Safety risks and crashes, particularly at the Ponds Road intersection, Stoddart Road intersection and the M4 Western Motorway eastbound entry/exit ramp roundabout would not be addressed.

The do nothing option would lead to increased congestion on alternative nearby routes as traffic volumes grow.

Option 2: Upgrade of Prospect Highway

This option would involve the upgrade of Prospect Highway to provide for future traffic demand, reduce travel times and improve road safety. Option 2 would meet the proposal objectives, as follows:

- Option 2 would improve safety:
 - By increasing capacity and thereby reducing congestion along Prospect Highway. It is expected that the proposal would reduce the incidence of stop-start traffic movements and in turn the number of rear end collisions
 - Dividing the carriage way would reduce the likelihood of head on collisions occurring

- By providing traffic lights and additional lanes for through and turning movements at the intersection of Prospect Highway and the M4 Western Motorway eastbound entry and exit ramps
- By improving the configuration of the proposal corridor and intersections, particular in areas where road safety issues are known to occur between Reservoir Road and Stoddart Road
- Option 2 would also upgrade shared cycle and pedestrian facilities on the western side of Prospect Highway between the M4 Western Motorway westbound ramp and Harrod Street and on the eastern side to provide a pedestrian path between Keyworth Drive and Roger Place
- Option 2 would improve traffic flow and reduce traffic delays currently experienced on Prospect Highway through the implementation of at least four lanes along the length of the corridor
- Option 2 would support public transport along the corridor. Establishing a six lane configuration along Prospect Highway north of Lancelot Street would improve the reliability of bus services and increase average bus travel speeds along the corridor
- Option 2 would deliver an improved urban design theme along the road corridor by providing a continuous four lane road corridor with connected pedestrian and cyclist facilities and modern design and landscaping
- Option 2 would minimise environmental impacts by constructing the proposal mainly within the existing road reserve. The proposal minimises property impacts by limiting acquisition to two private properties at Topaz Crescent. The design of the two way link road has been refined to minimise environmental impacts by avoiding Timbertop Reserve, and limiting direct impacts to high condition Cumberland Plain Woodland to 0.08 hectares within the existing road reserve.

Two way link road sub-options

The original two way link road option was displayed to the community during October 2013 for comment. Roads and Maritime received a number of submissions to the original two way link road proposal. The submissions raised concerns regarding environmental impacts to Timbertop Reserve and adjacent Hampton Crescent properties. The original two way link road proposal is shown in Figure 2-2.



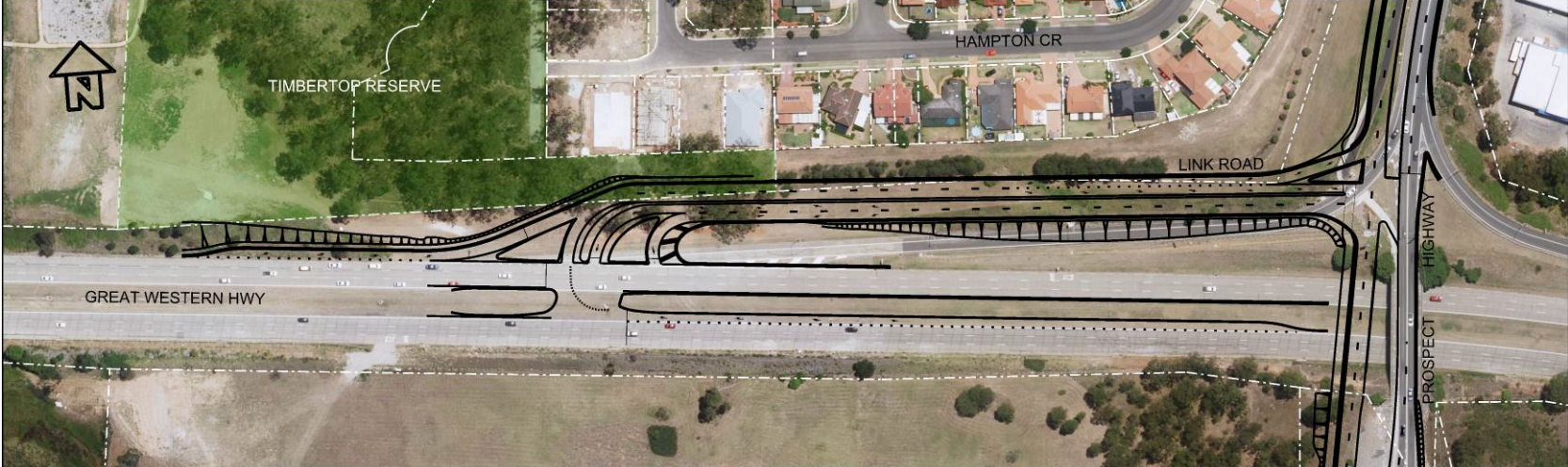
Figure 2-2 Original two way link road proposal

As part of the proposal a number of additional sub-options were developed for the proposed two way link road which connects the Great Western Highway to Prospect Highway. These sub-options were developed during concept development and refined following community consultation. The preliminary concept design option considered was found to impact upon Timbertop Reserve and Blacktown City Council's drainage easement. A number of alternative design sub-options were considered to satisfy the proposal objectives, and the following sub-objectives:

- Provide increased connectivity between the Great Western Highway and Prospect Highway
- Enable efficient network operation and traffic management of Prospect Highway, M4 Western Motorway and the Great Western Highway
- Maximise clearance between the two way link road and existing dwellings along Hampton Crescent
- Minimise the visual impact of the retaining wall along the two way link road
- Minimise or remove the need for acquisition of land within Timbertop Reserve and Blacktown City Council land
- Develop a cost effective proposal.

A summary of the proposed sub-options developed following community display of the preliminary concept design is provided in Table 2-1.

Table 2-1 Two way link road sub-options

| Sub-option | Description |
|------------|---|
| 1 |  <p>Description</p> <ul style="list-style-type: none"> Relocation of Great Western Highway intersection by 30 metres east to reduce impact to Timbertop Reserve. <p>Summary</p> <ul style="list-style-type: none"> Reduced storage capacity for vehicles on the two way link road The two way link road / Great Western Highway intersection would be relocated closer to existing Hampton Crescent dwellings. |

**Sub-
option**

Description

2




Description

- Relocation of two way link road / Great Western Highway intersection 30 metres east to reduce impact to Timbertop Reserve
- Eastbound right turn lane on two way link road removed
- Introduction of new signalised intersection on Great Western Highway at Ponds Road to allow Great Western Highway eastbound traffic to turn right onto Ponds Road.

Summary

- Additional delay for Great Western Highway westbound traffic due to new Ponds Road / Great Western Highway intersection
- Reduced delay along Prospect Highway due to the removal of the right turn out movement at the two way link road intersection
- Additional civil works would be required to upgrade Ponds Road and the Great Western Highway to suit the right turn in movement at the new intersection
- Reduced width of two way link road by two metres due to the removal of eastbound right turn lane. Two way link road would become a three lane road.

| Sub-option | Description |
|------------|---|
| 3 |  <p>Description</p> <ul style="list-style-type: none"> • Relocation of the Great Western Highway intersection 30 metres east to reduce impact to Timbertop Reserve • Realign Great Western Highway eastbound carriageway south into the median to allow the two way link road to be relocated south away from Hampton Crescent dwellings. Installation of major utility services on the southern side of the Great Western Highway prevents the realignment of the westbound carriageway further south. <p>Summary</p> <ul style="list-style-type: none"> • Very minimal impact to Timbertop Reserve • No acquisition of Blacktown City Council land required • Retention of all traffic movement as initially proposed • Additional civil works required to construct road pavement in the Great Western Highway median to suit realigned eastbound carriageway • Reduced median width along Great Western Highway preventing any future upgrade or widening works to the Great Western Highway • Requires removal of existing Great Western Highway concrete pavement to allow two way link road / Great Western Highway intersection construction • Increased construction noise, cost and duration for Hampton Crescent dwellings during removal and modification of the existing concrete pavement • Increased work area required to perform realignment of the Great Western Highway eastbound carriageway. |

**Sub-
option****Description**

4

**Description**

- Great Western Highway intersection relocated 30 metres east and south to remove impact to Timbertop Reserve
- Construct road pavement in the Great Western Highway median to provide long vehicles additional turning area when turning left from the two way link road
- Realign the two way link road south.

Summary

- No impact to Timbertop Reserve
- Very minimal acquisition of Blacktown City Council land required
- Retention of all traffic movements as initially proposed
- Additional civil works required to construct road pavement in the Great Western Highway median to suit the turning paths of long vehicles
- Utilises existing Great Western Highway eastbound exit ramp formation to reduce the quantity and cost of construction materials required
- Increased separation between the two way link road and the existing Hampton Crescent properties.

**Sub-
option****Description**

5

**Description**

- Two way link road proposal discounted. Existing Great Western Highway eastbound exit ramp to remain
- Remove existing Great Western Highway bridge and construct an at grade signalised intersection between Prospect Highway and the Great Western Highway.

Summary

- No impact to Timbertop Reserve or Blacktown City Council land
- Very significant civil works required to remove existing bridge structure and regrade Great Western Highway approaches to suit existing Prospect Highway
- Additional delay to Prospect Highway and Great Western Highway traffic due to additional signalised intersection
- Reduced travel speeds on Prospect Highway and Great Western Highway
- Extended construction time required, including complete closure of Great Western Highway to remove the existing bridge
- Increased quantity and cost of construction materials required.

Sub-option**Description**

6

**Description**

- Two way link road proposal discounted. Existing Great Western Highway eastbound exit ramp to remain
- Construct tunnel the along Great Western Highway beneath Prospect Highway with entry/exit ramps diverging from the tunnel to an at grade intersection on Prospect Highway
- Remove existing Great Western Highway bridge and construct an at grade signalised intersection between Prospect Highway and the proposed Great Western Highway entry/exit ramps
- Remove Ponds Road connection to Prospect Highway.

Summary

- No impact to Timbertop Reserve or Blacktown City Council land
- Very significant costs and delay to establish construction compound and resources to perform tunnel construction
- Very significant civil works required to remove existing bridge structure and regrade Great Western highway approaches to suit existing Prospect Highway
- Additional delay to Prospect Highway traffic due to additional signalised intersection
- Extended construction time required, including complete closure of Great Western Highway to remove the existing bridge
- Increased quantity and cost of construction materials required.

**Sub-
option****Description**

7

**Description**

- Two way link road located on the southern side of the Great Western Highway adjoining Prospect Highway opposite to the Ponds Road intersection. Median to remain closed between the two way link road and Ponds Road
- Provision of left turn entry lane onto the two way link road for Great Western Highway westbound traffic
- New signalised intersection at the Great Western Highway and Ponds Road to allow eastbound traffic to turn right onto Ponds Road.

Summary

- Removal of proposed signalised intersection between the two way link road and Prospect Highway
- Two new signalised intersections on the Great Western Highway at proposed two way link road and Ponds Road respectively
- Additional civil works would be required to upgrade Ponds Road and Great Western Highway to suit the right turn in movement at the new intersection
- Additional civil works required to construct the two way link road through terrain south of the Great Western Highway
- Extensive land acquisition required for the two way link road
- No impact to patch of Cumberland Plain Woodland on the southern side of the Great Western Highway
- No visual impact to Hampton Crescent dwellings
- No impact to Timbertop Reserve
- Additional delay to Great Western Highway and Ponds Road traffic
- Ponds Road traffic would have less opportunity to turn left onto Prospect Highway. Potential for extended queue lengths on Ponds Road.

Sub-option**Description**

8

**Description**

- Proposed two way link road with traffic travelling on opposite sides of the two way link road
- No impact to Timbertop Reserve or Blacktown City Council land
- Two way link road / Great Western Highway signalised intersection to allow traffic to enter/exit the two way link road at the same time.

Summary

- No impact to Timbertop Reserve or Blacktown City Council land
- Completely utilises existing Great Western Highway eastbound exit ramp formation to minimise quantity and cost of construction materials required
- Reduced delay to Great Western Highway traffic since traffic is able to enter/exit the two way link road at the same time
- Increased separation between the two way link road and the existing Hampton Crescent dwellings
- No impact to Timbertop Reserve
- Retaining wall height and visual impact to Hampton Crescent residents minimised since alignment follows the existing Great Western Highway eastbound exit ramp
- Creates road safety issue and requires extensive delineation and signposting to ensure traffic do not travel on incorrect side of ramp when entering from Prospect Highway (northbound traffic would be required to turn left onto the right hand side carriageway of the two-way ramp).

**Sub-
option****Description**

9

**Description**

- Great Western Highway intersection relocated 30 metres east and south
- Westbound left turn lane on two way link road removed and replaced with a right turn lane onto the existing Great Western Highway eastbound entry ramp.

Summary

- No impact to Timbertop Reserve
- Very minimal acquisition of Blacktown City Council land
- Partially utilises existing Great Western Highway eastbound exit ramp formation to reduce the quantity and cost of construction materials required
- Increased separation between the two way link road and the existing Hampton Crescent properties
- No impact to Timbertop Reserve
- Increased Great Western Highway bridge cost and construction duration due to added lane on the new bridge
- Increased traffic delay for Prospect Highway southbound traffic due to the right turn movement onto Great Western Highway eastbound entry ramp
- Signalisation of Great Western Highway eastbound entry ramp required for right turn movement onto Great Western Highway eastbound entry ramp.

The selection of the preferred sub-option for the proposed two way link road is discussed in Section 2.5.1.

Stoddart Road sub-options


As part of the proposal two sub-options were developed for the upgrade of the Stoddart Road intersection. The two sub options were considered maintaining the existing intersection configuration (no right turn out) or with the inclusion of the right turn out movement from Stoddart Road.


The objectives of this sub option assessment were to:

- Ensure efficient travel along Prospect Highway
- Ensure road safety is considered along Stoddart Road and Rowood Road when turning right into Prospect Highway
- Enable efficient network operation and traffic management in the vicinity of Prospect Highway.

A summary of the proposed sub-options is provided in Table 2-2.

Table 2-2 Stoddart Road intersection sub-options

| Sub-option | Description |
|------------|---|
| 1 |  <p>Description</p> <ul style="list-style-type: none"> • Inclusion of right turn out of Stoddart Road. <p>Summary</p> <ul style="list-style-type: none"> • Increased delay for Prospect Highway traffic to allow right turn out traffic to exit from Stoddart Road • Potential traffic volume increases along Rowood Road and Stoddart Road to access Prospect Highway • Increased risk of collision at priority controlled intersection of Rowood Road and Stoddart Road. |

| Sub-option | Description |
|------------|--|
| 2 |  <p>Description</p> <ul style="list-style-type: none"> • Signalise and maintain the existing configuration at Stoddart Road intersection (no right turn out). <p>Summary</p> <ul style="list-style-type: none"> • Reduced delay at Stoddart Road intersection due to reduction in traffic signal cycle times compared to sub option one • Maintain existing traffic volumes along Blacktown Road, Stoddart Road and Rowood Road. |

The selection of the preferred sub-option for the Stoddart Road intersection is discussed in Section 2.5.2.

Northbound Carriageway between Lancelot Street and St Martins Crescent sub-options

As part of the proposal two sub-options were developed for the upgrade of the northbound carriageway between Lancelot Street and St Martins Crescent. The sub options assessed the proposed use of the northbound kerbside lane along the western side of the corridor between Lancelot Street and St Martins Crescent.

The southbound carriageway was not considered in this sub option assessment as existing parking and access arrangements would not be altered by the inclusion of a southbound bus lane.

The sub options included the provision of a dedicated kerbside bus lane (sub option one) or shared kerbside area with bus priority lanes at intersection departures, left turn auxiliary lanes at intersection approaches and residual parking area (sub option two).

The objectives of this sub option assessment were to:

- Ensure efficient travel along Prospect Highway for all traffic modes
- Ensure safe property access/egress is maintained along Prospect Highway between Lancelot St and St Martins Crescent.

Sub option one includes the provision of a dedicated kerbside bus lane in the northbound direction between Lancelot Street and St Martins Crescent.

A summary of sub option one is included below:

- Provides separate travel lane for public transport vehicles
- Removes merging and traffic conflicts along northbound carriageway between general traffic and public transport vehicles
- Buses stopping at the four bus stops north of Lancelot Street would not create traffic flow impacts
- Improved road safety with majority of traffic travelling in general traffic lanes allowing vehicles to enter properties (along Prospect Highway) and local roads from bus lanes. The bus lanes would be less trafficked than general traffic lanes
- Reduced congestion and travel delays along Prospect Highway with public transport vehicles able to travel in separate lanes to general traffic
- Removal of informal service road on Roads and Maritime land which provides parking.

Sub option two includes the provision of a bus priority lane at the departure side of each intersection. This sub option would also include a left turn lane for each local road approach. The residual mid block area would be the shoulder area that would be available for parallel kerbside parking.

A summary of sub option two is included below:

- Provides separate bus lanes at each bus zone only
- Creates merging and traffic conflicts along northbound carriageway between general traffic and buses
- Reduces general traffic speeds due to increased merging and traffic conflicts
- Reduces general traffic speeds due to adjacent parking lane and limited driver sight lines to kerbside hazards and pedestrians. Parking vehicles would be travelling slower than general traffic when entering / exiting the parking area
- Creates road safety issue as parking vehicles may potentially stop in general traffic lane to reverse into parallel parking spaces
- Reduced driver sight lines for traffic exiting properties along Prospect Highway. Parked vehicles would create sight obstructions to oncoming traffic.

The selection of the preferred sub-option for the northbound carriageway kerbside lane allocation between Lancelot Street and St Martins Crescent is discussed in Section 2.5.3.

2.5 Preferred option

The preferred option between the do nothing option and the upgrade option is to upgrade Prospect Highway with widening in places to provide additional travel lanes (Option 2). Option 2 was selected by Roads and Maritime as the preferred option as it best meets the objectives of the proposal, including allowance for the forecasted transport growth to 2031.

The preferred option would:

- Provide additional lanes that would increase capacity, thereby reducing congestion and improving traffic efficiency for all road users on Prospect Highway
- Reduce stop-start traffic and merging movements at intersections and as such, minimise the risk of crashes
- Improve pedestrian and cycle facilities on the western side and pedestrian facilities on the eastern side of Prospect Highway as well as at the Prospect Highway / Blacktown Road intersection
- Provide improved traffic conditions and road linkages for freight through improved connections between the M2 Hills Motorway and the M4 Western Motorway and through to Greystanes and Wetherill Park via Reconciliation Road
- Improve bus services through increased traffic flow, potentially allowing for more frequent and reliable bus movements to be delivered by bus operators.

In addition, the preferred option would address strategic planning objectives, congestion and safety by increasing capacity for the movement of freight and general traffic on Prospect Highway. By using the existing road corridor the environmental and social impacts associated with the construction of a new urban corridor have been minimised to the greatest extent possible. Measures to avoid, minimise and manage environmental impacts are detailed in Chapter 7.

2.5.1 Preferred two way link road sub-option

Sub-option 4 was selected by Roads and Maritime as the preferred option for the design of the proposed two way link road as it enables the overall proposal objectives to be achieved and best meets the sub-objectives required for the two way link road. As outlined in Table 2-1, the preferred sub-option best supports environmental considerations at the two way link road.

The preferred option reduces direct and indirect impacts to Cumberland Plain Woodland. The combined direct and indirect impact was reduced from 0.32 hectares to less than 0.12 hectares of Cumberland Plain Woodland within the existing road reserve (0.08 hectares of direct impact, 0.04 hectares of indirect impact). The adopted sub-option avoids any direct impacts to Timbertop Reserve.

2.5.2 Preferred Stoddart Road intersection sub-option

Sub-option 2 was selected by Roads and Maritime as the preferred option for the Stoddart Road intersection as it enables the overall proposal objectives to be achieved and best meets the sub-objectives listed above.

An assessment of the route along Rowood Road and Stoddart Road to link Blacktown Road and Prospect Highway was undertaken by Roads and Maritime. The existing and considered alternate routes are shown below in Figure 2-3.

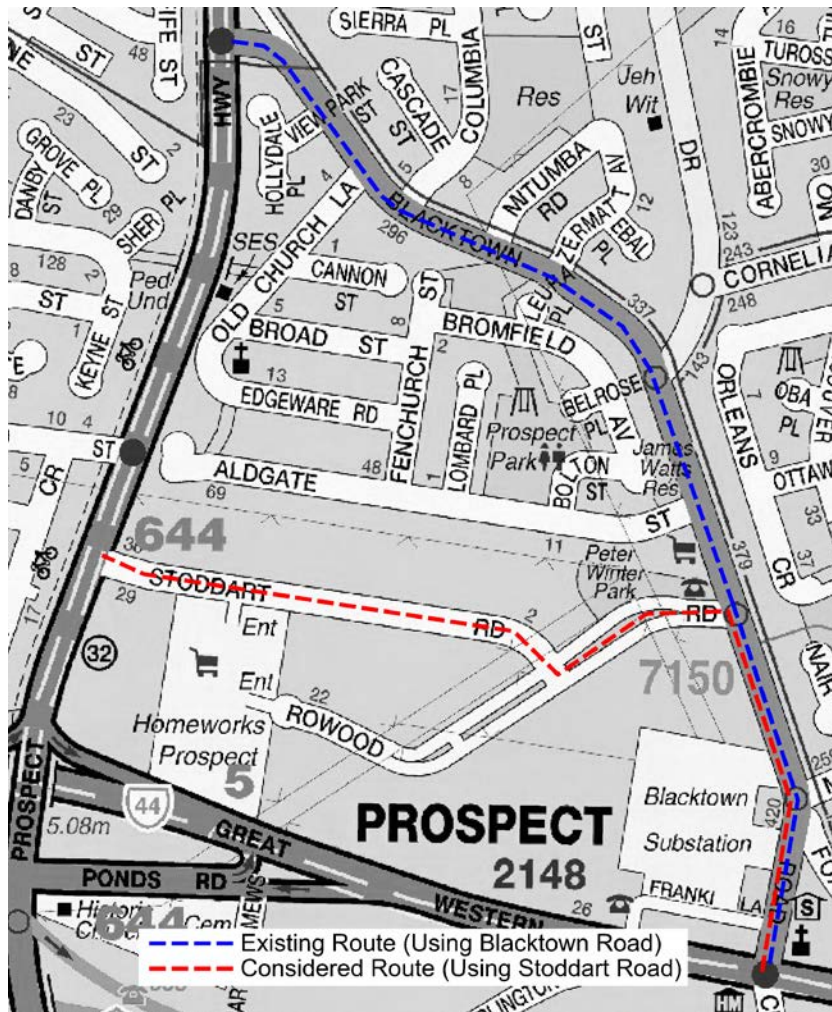


Figure 2-3 Alternate routes from Blacktown Road to Prospect Highway

The alternate route from Blacktown Road to Prospect Highway would be for traffic to:

- Turn left at the Rowood Road roundabout
- Turn right at Stoddart Road
- Turn right onto Prospect Highway.

The existing route is for traffic to travel north along Blacktown Road and turn onto Prospect Highway. The existing route is about 600m less in travel distance to the Prospect Highway / Blacktown Road intersection than the considered alternate route along Rowood Road, Stoddart Road and Prospect Highway. Blacktown Road traffic would continue to access Prospect Highway using Blacktown Road as it is more efficient.

Traffic commencing from properties along Rowood Road would travel up to 100m further to reach the Prospect Highway / Blacktown Road intersection using sub option one and turning right out of Stoddart Road. There is no travel benefit for traffic from Rowood Road using the right turn out of Stoddart Road to travel north along Prospect Highway.

Traffic commencing from Stoddart Road would achieve up to 1.3 kilometre reduction in trip length to reach the Blacktown Road intersection using sub option one. The benefit of this trip reduction is limited since traffic within about 100m of the western end of Stoddart Road (near the Rowood Road intersection) would not achieve a

reduction in travel distance to the Prospect Highway / Blacktown Road intersection. In fact a travel increase of up to 100m would be required for these properties using sub option one to turn right out of Stoddart Road and travel north along Prospect Highway.

The restriction of the right turn of Stoddart Road maintains existing network connectivity. The reduction in trip length only benefits traffic commencing their trip from the eastern end of Stoddart Road. This does not contribute to efficient network operation due to delay caused to all Prospect Highway traffic to allow the right turn out for this limited catchment. The existing road network supports heavy vehicle movements along Blacktown Road (regional route). Vehicles leaving Stoddart Road to travel north would continue to use Blacktown Road without relocating impacts. The existing arrangement is not made significantly worse by not introducing the right turn out of Stoddart Road at Prospect Highway.

2.5.3 Preferred northbound carriageway between Lancelot Street and St Martins Crescent sub-option

Sub option two was investigated further to determine the length of parking that could be available along the three mid block sections between Lancelot Street and St Martins Crescent.

For the section between Lancelot Street and St Martins Crescent, sub option two would only provide about 20 parking spaces between Keyworth Drive and Tudor Avenue. As detailed in section six of this report, the utilisation of the informal service road for parking was observed to be low. The largest generator of parking along the informal service road was the Medlife Medical Centre. The potential parking area would be equivalent in distance from the centre as the centre is from Tudor Avenue. The residences have off street parking and local road network parking options. The benefits of improved road safety, property access and traffic flow are higher compared to the benefits of provided some kerbside parking spaces.

Sub-option one was selected by Roads and Maritime as the preferred option for the northbound kerbside lane as it enables the overall proposal objectives to be achieved and best meets the sub-objectives listed above.

2.6 Design refinements

Following selection of the preferred options, the design has been refined based on consultation with the community and stakeholders, including Transport for NSW and bus operators. Design refinements include:

- The upgrade of the Old Church Lane to Keyne Street pedestrian underpass. The proposed upgrade of the pedestrian underpass is a result of consultation with urban designers and the local community to meet appropriate underpass design standards
- Provision of a pedestrian crossing on Prospect Highway at Blacktown Road and realignment of the existing shared path on the western side of Prospect Highway. The proposed crossing and path realignment is in response to community and safety concerns
- Provision of a 1.2 metre pedestrian path on the eastern side of Prospect Highway between Keyworth Drive and Roger Place. The pedestrian path is proposed in response to community requests for a safe pedestrian linkage between Keyworth Drive and Roger Place

- Extension of the existing northbound and southbound bus lanes north of Tudor Avenue. The bus lane would be extended from Tudor Ave to 200 metres north of St Martins Crescent in response to consultation with Transport for NSW around the provision of infrastructure for buses.

3 Description of the proposal

3.1 The proposal

The proposal involves upgrading Prospect Highway between Reservoir Road, Prospect and 200 metres north of St Martins Crescent, Blacktown, a length of 3.6 kilometres. The proposal would deliver a minimum of a four lane divided road (two lanes in each direction) with a variable width central median (up to 12 metres wide at one point). Some sections would be six lanes, with the additional lanes being dedicated bus lanes. The upgrade of Prospect Highway occurs generally to the west of the existing carriageway as shown on Figure 3-1 to Figure 3-5.

The general features of the proposal include:

- A new two way link road between the Great Western Highway and Prospect Highway. Two new signalised intersections would be provided at the junctions of the two way link road and Great Western Highway and the two way link road and Prospect Highway. The two way link road would replace the existing Great Western Highway eastbound exit ramp and provide access to and from Prospect Highway. It would provide access for Great Western Highway traffic to travel northbound and southbound along Prospect Highway
- A two span bridge over the M4 Western Motorway for northbound traffic would be provided. The proposed structure would be a Super T construction duplicating the existing four lane bridge and be located on the western side of the existing structure. The new bridge would include two dedicated right turn lanes to travel east on the M4 Western Motorway, two dedicated through lanes for northbound traffic on Prospect Highway and a 3.6 metre shared path on the western side
- The existing bridge over the M4 Western Motorway would be maintained. It would provide two dedicated right turn lanes to travel west on the M4 Western Motorway and two dedicated through lanes for southbound traffic on Prospect Highway
- A two span bridge over the Great Western Highway for northbound traffic would be provided. The proposed structure would be a Super T construction duplicating the existing two lane bridge and be located on the western side of the existing structure. The new bridge would include two dedicated through lanes for northbound traffic on Prospect Highway and a 3.6 metre shared path on the western side
- The existing single span bridge over the Great Western Highway would be maintained. It would provide two dedicated through lanes for southbound traffic on Prospect Highway
- Upgrading of seven existing intersections on Prospect Highway, including provision of traffic lights and/or additional lanes for through and turning movements. The intersections to be upgraded are:
 - Reservoir Road / Prospect Highway / Reconciliation Road
 - M4 Western Motorway westbound entry and exit ramps / Prospect Highway
 - M4 Western Motorway eastbound entry and exit ramps / Prospect Highway
 - Stoddart Road / Prospect Highway
 - Harrod Street / Prospect Highway

- Keyworth Drive / Prospect Highway
- St Martins Crescent / Prospect Highway
- Upgrading of the Blacktown Road / Prospect Highway signalised intersection to include a pedestrian crossing of Prospect Highway
- Upgrading of three intersections and altering traffic movements to left in, left out only (no right turns). These intersections are:
 - Ponds Road / Prospect Highway
 - Vesuvius Street / Prospect Highway
 - Tudor Avenue / Prospect Highway
- Upgrading of Roger Place / Prospect Highway intersection and changing the access arrangement to left in, right in and left out only
- Road widening to provide additional traffic lanes on Prospect Highway at the following locations:
 - Four lanes between Reservoir Road / Reconciliation Road and Blacktown Road
 - Six lanes between Lancelot Street and St Martins Crescent, with widening to the western side, including two dedicated kerbside bus lanes
 - Six lanes from St Martins Crescent to 200 metres north of St Martins Crescent, within the existing road pavement area, including two dedicated kerbside bus lanes
- A central median of variable width between the intersection of Reservoir Road / Prospect Highway / Reconciliation Road and the Great Western Highway / Prospect Highway intersection
- A central median of about 5.9 metres width between the new Great Western Highway / Prospect Highway intersection and Roger Place, except at the location of the proposed Old Church Lane to Keyne Street underpass where the median narrows to a width of 3.5 metres
- A central median of about 4.2 metres width from Roger Place until the northern limit of the proposal 200 metres past St Martins Crescent
- The Old Church Lane to Keyne Street pedestrian underpass under Prospect Highway would be upgraded to meet required design standards for a pedestrian underpass
- The temporary shared path would be upgraded to a 3.6 metre wide shared path on the western side of Prospect Highway between the M4 Western Motorway westbound ramps and the Harrod Street intersection
- The Blacktown City Council shared path north of Harrod Street would be realigned and form a connection with the new signalised pedestrian crossing at Blacktown Road
- Pedestrian path 1.2 metres in width on the eastern side of Prospect Highway between Keyworth Drive and Roger Place

The proposal would also include:

- Provision of retaining walls at the following three locations:
 - St Bartholomew's Church and Cemetery
 - Proposed two way link road continuing north along Prospect Highway
 - Adjacent to the high voltage electricity tower (north-west of the M4 Western Motorway)
- Upgrade of the existing pavement and cross drainage systems including the construction and extension of pavement drainage lines, as required
- Excavation work to increase Blacktown City Council's detention basin capacity by about 300 cubic metres
- Utilities relocation and adjustment where required
- The proposal would relocate one existing bus stop from south to north of Harrod Street and four existing bus stops located between Keyworth Drive and north of St Martins Crescent at the northern end of the proposal corridor (three northbound, one southbound)
- Two new bus stops at Reservoir Road
- Landscaping and urban design in consultation with Blacktown City Council and Holroyd City Council.

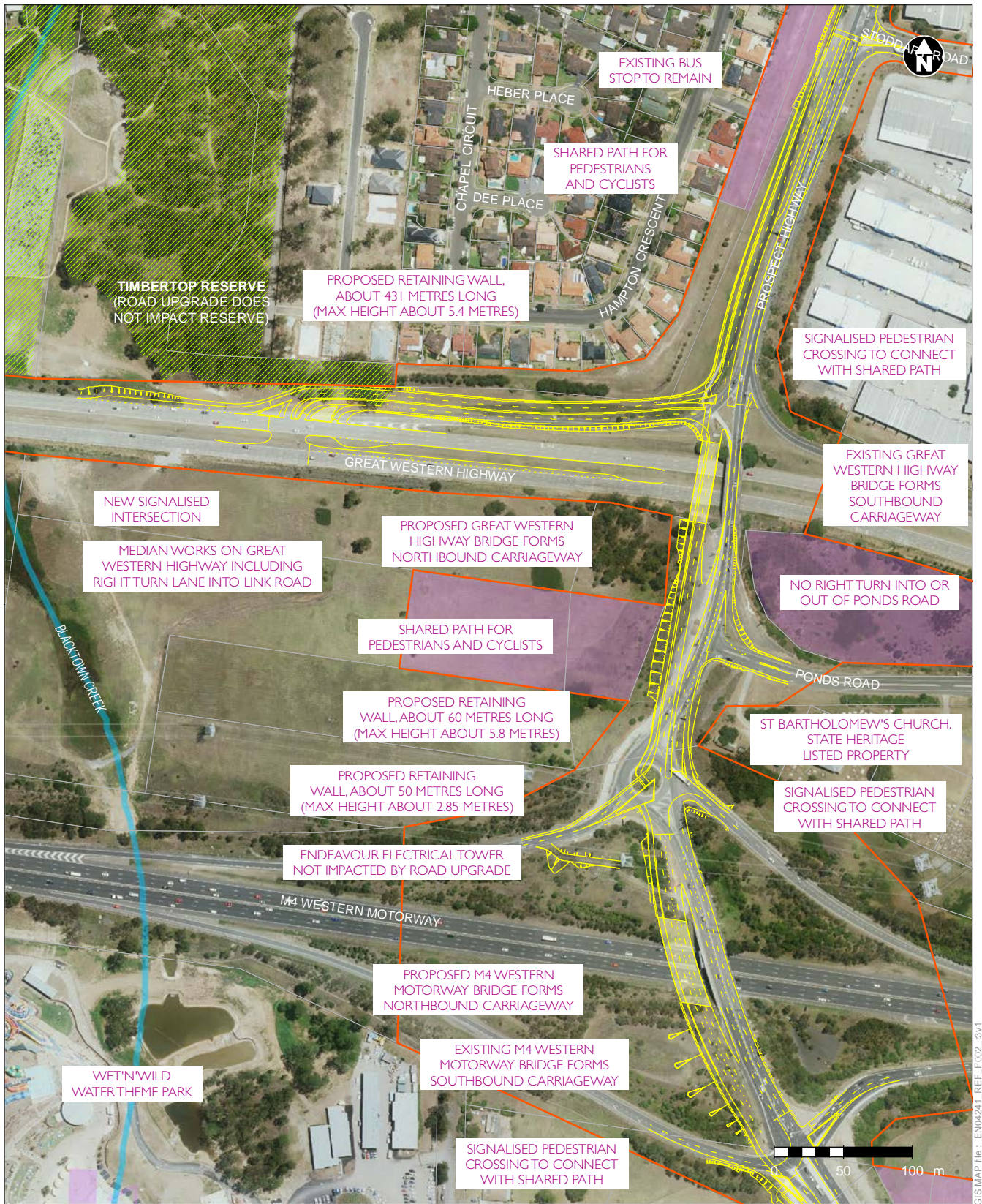
Figure 3-1 to Figure 3-5 illustrates the main features of the proposal. The concept design for the proposal is included in Appendix B. The concept design would be refined following public display of this REF, receipt of community feedback and during the detailed design phase



- The proposal boundary
- Proposed temporary compound site
- Waterway
- Proposed bus lanes
- National park/reserve
- Park

- 3-5
- 3-4
- 3-3
- 3-2
- 3-1

Figure 3-1
Main features of the proposal



GIS MAP file : EN04241_REF_F002_3VT

- The proposal boundary
- Proposed temporary compound site
- Proposed bus lanes
- Waterway
- National park/reserve
- Park

- 3-5
- 3-4
- 3-3
- 3-2
- 3-1

Figure 3-2
Main features of the proposal



- The proposal boundary
- Proposed temporary compound site
- Waterway
- Proposed bus lanes
- National park/reserve
- Park

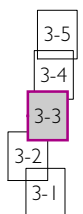


Figure 3-3
Main features of the proposal

GIS MAP file : EN04241_REF_F002_3.V1

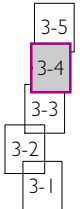
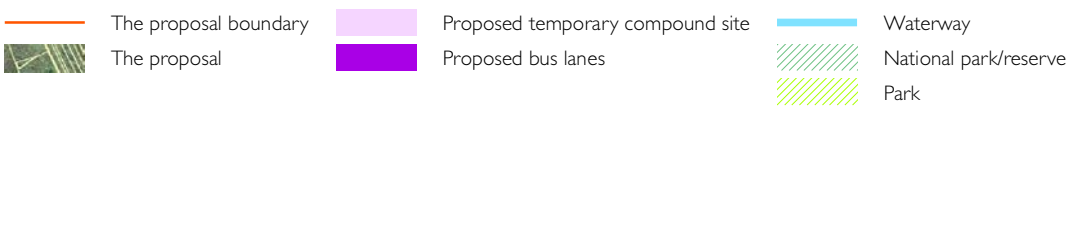
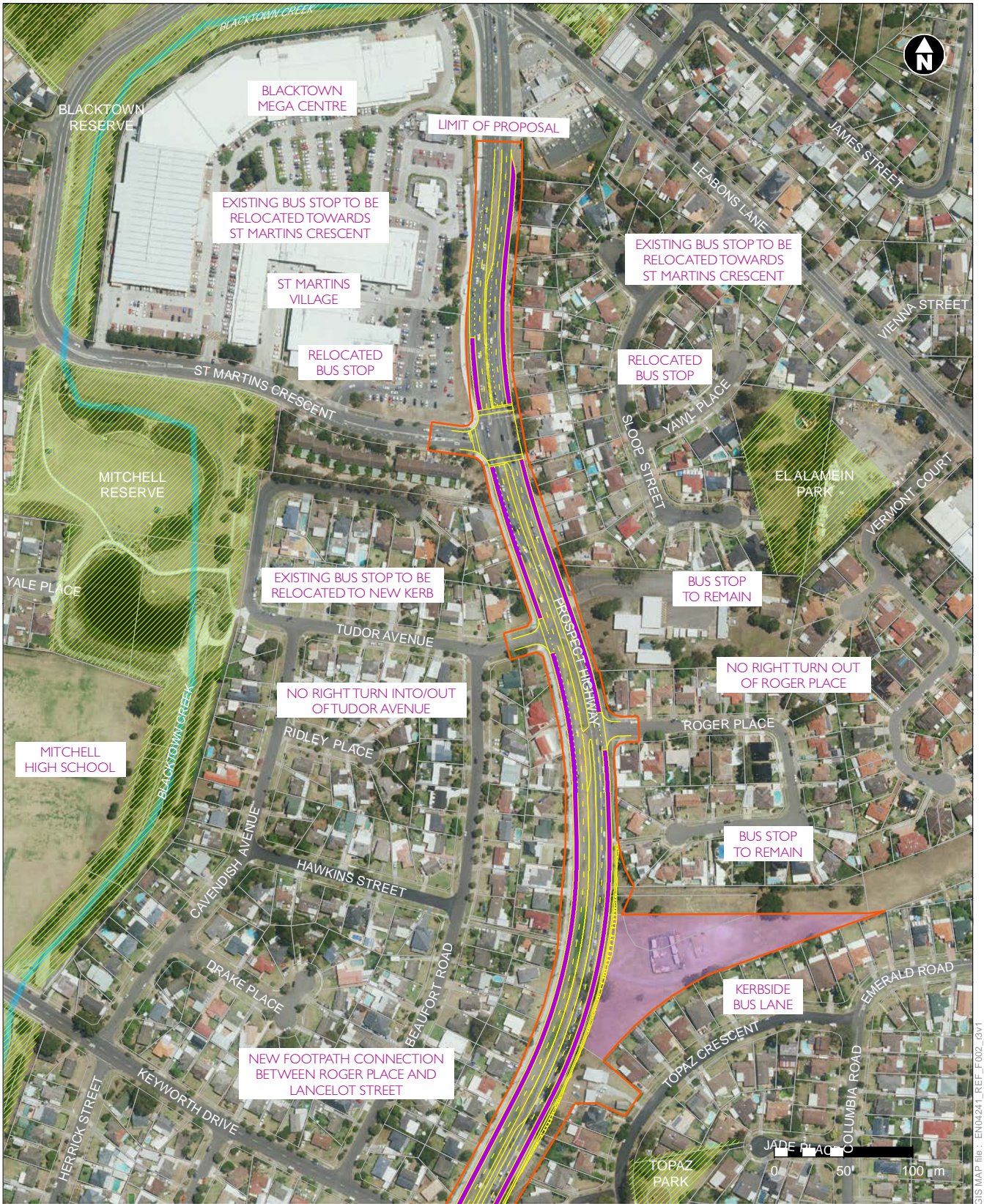


Figure 3-4
Main features of the proposal



- The proposal boundary
- Proposed temporary compound site
- Waterway
- Proposed bus lanes
- National park/reserve
- Park

- 3-5
- 3-4
- 3-3
- 3-2
- 3-1

Figure 3-5
Main features of the proposal

3.2 Design

The proposal was designed to be consistent with Roads and Maritime and Austroads design criteria and other specifications including the requirements of this REF. This section provides a description of the concept design of the proposal. The concept design will be further refined during the detailed design phase.

3.2.1 Design criteria

General

The road design has been developed in line with the following guidelines and standards:

- Austroads Guide to Road Design (Austroads 2009) and Roads and Maritime supplements to the Austroads Guide
- Austroads Guide to Road Safety (Part 6: Road Safety Audit) (Austroads 2002)
- Roads and Maritime Services Road Design Guide (Roads and Maritime 1989)
- Roads and Maritime Services Delineation Guidelines (Roads and Maritime 2008)
- Beyond the Pavement – Urban Design Policy (RTA 2009).

The proposal

The design criteria for the proposal include those outlined in Table 3-1.

Table 3-1 Design criteria

| Design features | Requirement |
|--------------------------|---|
| Design speed | 70 kilometres per hour. |
| Posted speed | 60 kilometres per hour. |
| Number of lanes | Two through lanes in each direction plus turning and merging lanes between Reconciliation Road to Lancelot Street. Two through lanes and one kerbside bus lane in each direction plus turning and merging lanes from Lancelot Street to 200 metres north of St Martins Crescent. |
| Stopping sight distances | Reaction time: 1.5 seconds. Horizontal: 83 metres. |
| Grade | Desirable maximum six per cent. Absolute maximum ten per cent. |
| Lane width | 3.5 metres (centre lane) 4.2m (kerbside lane) 3.3m (turning lane) |
| Shoulder width | No shoulder except on bridge structures 0.5 metres (median side only). |
| Median width | Variable. 1.2 metres to 12 metres. |
| Shared path | 3.6 metres. |
| Clear zone | 4 metres. |
| Design vehicle | 26 metre B Doubles. 19 metre semi-trailer. 12.5 metre rigid vehicle. |
| Hydraulic standard | Pavement drainage Design storm event: 10 year annual recurrence interval |

| Design features | Requirement |
|--|---|
| | <p>(ARI). Maximum width of flow: 1.0 metre, except at pedestrian crossings and bus zones 0.5 metres. Minimum longitudinal pipe size: 375 mm. Minimum transverse pipe size: 450 mm. Kerbside inlet pit type: SA1 and SA2 pits. Median inlet pit type: SE pit. Pipe type: Reinforced concrete pipes. Maximum depth of pavement flow: 4 mm. Minimum pipe depth: 300 mm clearance below select material zone.</p> <p>Crossing Drainage Structures Design storm event: 100 year annual recurrence interval (ARI). Blockage Factor: 50 per cent.</p> |
| Bridges | <p>M4 Western Motorway bridge: two span. Bridge type: Super T construction.</p> <p>Great Western Highway: two span. Bridge type: Super T construction.</p> |
| Pedestrian underpass and bridge design | <p>Pedestrian underpass: single span. Bridge type: Plank girder.</p> |
| Intersection treatment | <p>Signalised intersections would be provided with:</p> <ul style="list-style-type: none"> • At least a minimum approach sight distance and entering sight distance for all legs of the intersection • At least the desirable minimum distance maintained between signalised intersections to maintain an appropriate level of service • Auxiliary lane lengths would be designed such that all speed reduction occurs within these lanes and not on the through lanes. |
| Traffic barriers | <p>Traffic barriers would be provided along the Prospect Highway corridor at the bridge voids over the M4 Western Motorway and Great Western Highway.</p> <p>Traffic barriers would be provided adjacent to major utilities, principally the high voltage transmission tower located south of Harrod Street, operated by Endeavour Energy.</p> |
| Pavement type | <p>The proposed pavement would be a composite pavement structure. Pavement composition would comprise:</p> <ul style="list-style-type: none"> • 50 mm AC14 (A15E) • 130 mm AC20 (AR450) (2x65mm) • 220 mm Lean Mix Concrete Subbase • 300 mm Select Material. |

3.2.2 Engineering constraints

The proposal presented a number of engineering constraints. These were identified during the development of the concept design and are provided below:

- Issues associated with construction and maintenance of the proposal considering the proximity of the Prospect Highway upgrade to:
 - Endeavour Energy high voltage transmission tower. The tower is located between the M4 Western Motorway bridge and M4 Western Motorway eastbound exit ramp. This tower is located about six metres west of the proposed shared path and around 17 metres away from the kerbside of the northbound carriageway
 - Endeavour Energy high voltage transmission tower. The tower is located 60 metres south of Harrod Street. This tower is located about one metre west of the proposed shared path and around 5.5 metres away from the kerbside of the northbound carriageway
- Issues associated with the construction of the proposal include:
 - Integration with existing structures along Prospect Highway
 - Stability concerns on the south-western side of the M4 Western Motorway due to the fill embankment and concern about the reinforced concrete wall adjacent to the exit ramp of the Great Western Highway due to the presence of a high water table
 - The construction footprint of the two way link road between the Great Western Highway and Prospect Highway, which has been minimised to reduce impact on existing vegetation within the road reserve and the area south of Timbertop Reserve
 - St Bartholomew’s Church and Cemetery. The property is NSW heritage listed and the property’s curtilage would be located about 5.2 metres from the proposed retaining wall
- Limited median width for construction of a central pier for the proposed bridge over the M4 Western Motorway.

3.2.3 Road widening

Widening to provide additional lanes is proposed as described in Table 3-2.

Table 3-2 Proposed road widening

| Section | Existing width (m) | | Proposed width (m) | | Verge widening | Median widening |
|---|--------------------|------|--------------------|------|----------------|-----------------|
| | Min | Max | Min | Max | | |
| Between Reservoir Road / Reconciliation Road and Blacktown Road. | 12 | 20 | 26.3 | 41.4 | Y | Y |
| Between Blacktown Road and Lancelot Street. | 25 | 25 | 25 | 25 | N | N |
| Between Lancelot Street and St Martins Crescent. | 7.1 | 24.3 | 23.6 | 31.2 | Y | Y |
| Between St Martins Crescent and 200 metres north to the proposal’s northern extent. | 24.4 | 28 | 26.6 | 26.6 | Y | Y |

3.2.4 Main design features

The main design features are described in detail below and comprise:

- Replacement of eastbound exit ramp from Great Western Highway with a two way link road
- Bridge duplication over the M4 Western Motorway
- Bridge duplication over the Great Western Highway
- Widening of the existing Prospect Highway to provide additional traffic lanes south and north of the M4 Western Motorway
- Provision of kerbside bus lanes between Lancelot Street and 200 metres north of St Martins Crescent
- Retaining walls
- Upgrade of existing intersections with Prospect Highway
- New signalised intersections
- Relocation of existing and provision of new bus stops
- Upgrading a shared user path along sections of the western side of Prospect Highway
- Providing a pedestrian path on the eastern side of Prospect Highway between Keyworth Drive and Roger Place
- Providing signalised pedestrian crossing facilities, where required, at upgraded intersections
- Pavement and drainage works
- Upgrading the Old Church Lane to Keyne Street pedestrian underpass.

3.2.5 Replacement of eastbound exit ramp from Great Western Highway with a two way link road

The proposal would replace the existing eastbound exit ramp from the Great Western Highway. A connection to Prospect Highway would be created via a new two way link road with a central median.

The proposed two way link road would include new traffic signals at each end, where it connects with the Great Western Highway and where it connects with Prospect Highway. The new signalised intersection on Great Western Highway would include new traffic signal posts, two entry and two exit lanes, a right turn bay in the Great Western Highway median for westbound traffic, a left turn lane on the Great Western Highway for eastbound traffic. No pedestrian crossing is proposed at this connection to the Great Western Highway.

The new signalised intersection connecting the two way link road to Prospect Highway would include new traffic signals and two entry and two exit lanes. Pedestrian crossing facilities would be provided along the western side of Prospect Highway to provide a connection across the two way link road entry and exit lanes. Refer to Section 2.5.1 and option four of Table 2-1 for details.

The proposed two way link road would provide both northbound and southbound access onto Prospect Highway for traffic travelling east and west on the Great Western Highway. The two way link road would replace the existing northbound access to Prospect Highway from Ponds Road (right out) and the existing westbound access to the Great Western Highway from Prospect Highway to Ponds Road (right in). The Ponds Road / Prospect Highway intersection would be altered to permit left in, left out turning movements only.

3.2.6 Bridge duplication over the M4 Western Motorway

The new two span bridge over the M4 Western Motorway would be duplicated on the western side of the existing bridge.

The bridge would be up to 21 metres in width, with a central pier in the M4 Western Motorway median. The bridge type is a Super T profile and the structure's typical appearance is shown in Figure 3-6. The bridge would function as the new northbound carriageway and provide a shared user path for pedestrian and cyclists. This would replace the footway located on the existing bridge over the M4 Western Motorway.

Duplication of the existing bridge over the M4 Western Motorway is proposed to provide two dedicated through lanes for northbound traffic on Prospect Highway, and two right turn lanes onto the M4 Western Motorway eastbound entry ramp.

The main features of the bridge would include:

- Kerbside lane width 4.2 metres
- Central through lane width 3.5 metres
- Dual right turn lanes for M4 Western Motorway eastbound traffic width 3.3 metres
- Median side shoulder width 0.5 metres
- Western kerbside shared path width 3.6 metres
- Traffic barriers and railings along both sides of the bridge
- Galvanised steel safety screens
- Longitudinal drainage system.

Southbound lanes would be provided by converting the existing bridge over the M4 Western Motorway to the new southbound carriageway.

Refer to Figure 3-6 for a typical cross-section of the proposed bridge duplication over the M4 Western Motorway.

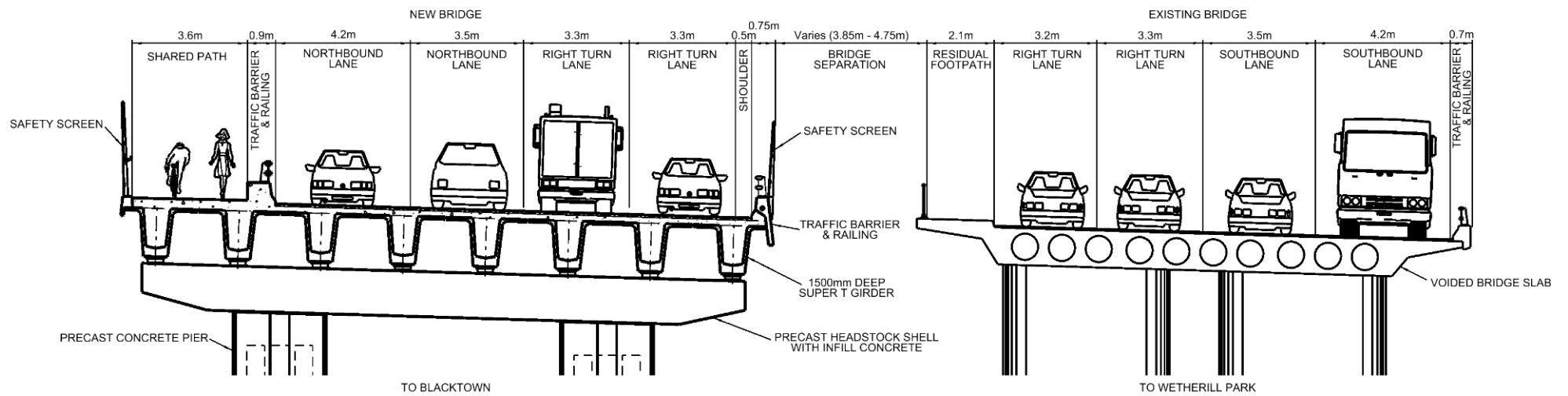


Figure 3-6 Typical bridge section— M4 Western Motorway bridge

3.2.7 Bridge duplication over the Great Western Highway

The new two span bridge over the Great Western Highway would be duplicated on the western side of the existing bridge.

The new bridge would be up to 14 metres in width, with a central pier in the Great Western Highway median. The bridge type is a Super T profile and the structure's typical appearance is shown in Figure 3-7. The new bridge would function as the new northbound carriageway and provide a shared user path for pedestrian and cyclists. This would replace the footway located on the existing bridge over the Great Western Highway.

Duplication of the existing bridge over the Great Western Highway is proposed to provide two dedicated through lanes for northbound traffic on Prospect Highway.

The main features of the bridge would include:

- Kerbside lane width 4.2 metres
- Central through lane width 3.5 metres
- Median side shoulder width 0.5 metres
- Western kerbside shared path width 3.6 metres
- Traffic barriers and railings along both sides of the bridge
- Galvanised steel safety screens
- Longitudinal drainage system.

Southbound lanes would be provided by converting the existing bridge over the Great Western Highway to the new southbound carriageway.

Refer to Figure 3-7 for a typical cross-section of the proposed bridge duplication over the Great Western Highway.

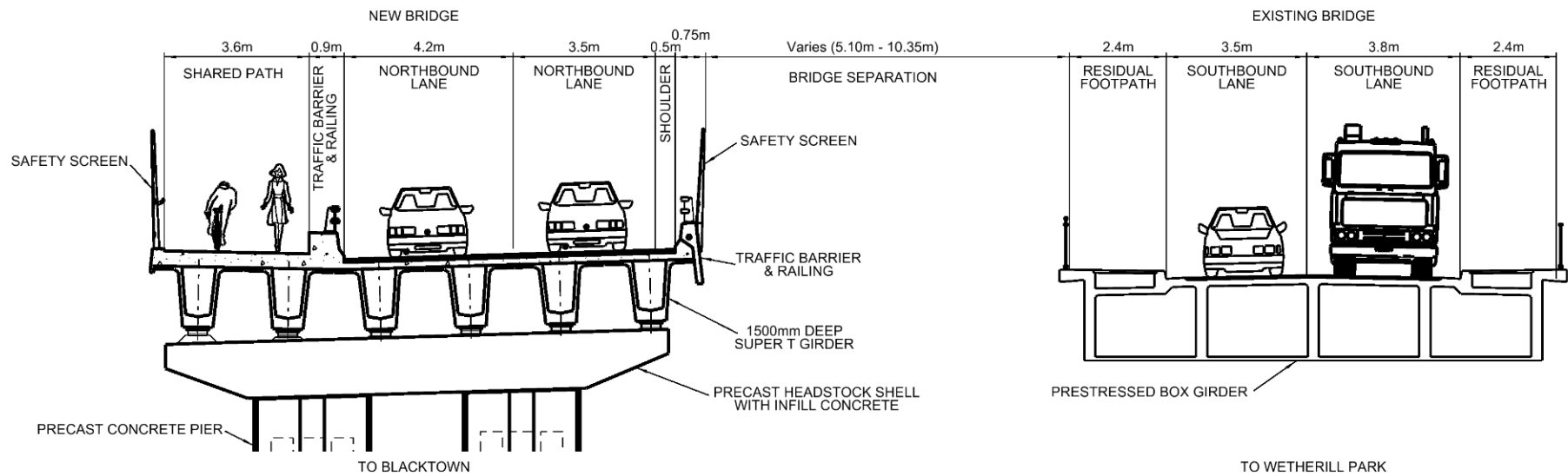


Figure 3-7 Typical bridge cross section – Great Western Highway bridge

3.2.8 Upgrade of the existing Prospect Highway between Reservoir Road and two way link road

The proposal would widen the existing Prospect Highway carriageway to provide additional traffic lanes, as described below:

- Two lanes in each direction with a central median between the intersection of Reservoir Road / Prospect Highway and the M4 Western Motorway westbound entry and exit ramp / Prospect Highway intersection. This section would provide dual right turn lanes for southbound traffic on Prospect Highway onto Reservoir Road and a left turn lane onto the M4 Western Motorway westbound entry ramp for northbound traffic on Prospect Highway. Refer to Figure 3-1 for details
- Two lanes in each direction with a central median (and separate bridge structures) between the M4 Western Motorway westbound entry and exit ramp and the M4 Western Motorway eastbound entry and exit ramp. This section includes dual right turn lanes at the M4 Western Motorway westbound entry ramp for southbound traffic on Prospect Highway and at the M4 Western Motorway eastbound entry ramp for northbound traffic on Prospect Highway
- Two lanes in each direction with a central median between the M4 Western Motorway eastbound entry and two way link road. This section would also include a left turn lane onto the M4 Western Motorway eastbound entry ramp for southbound traffic on Prospect Highway and a left turn lane onto Ponds Road for southbound traffic on Prospect Highway. Separate bridge structures are provided over the Great Western Highway.

Refer to Figure 3-8 and Figure 3-9 for a typical cross-section of a four lane and six lane section of Prospect Highway.

3.2.9 Upgrade of the existing Prospect Highway between two way link road and Roger Place

The proposal would upgrade Prospect Highway from an undivided two lane road to a divided four lane road between the proposed two way link road and Roger Place. The upgrade would tie in to the existing four lane road between the Prospect Highway intersection with Blacktown Road and Lancelot Street.

- Two lanes in each direction with about a 5.9 metre central median between the two way link road and Blacktown Road except at the location of the Old Church Lane to Keyne Street pedestrian underpass where the median narrows to a width of about 3.5 metres
- The proposal would tie-in to the existing lanes on Prospect Highway at Blacktown Road and Lancelot Street
- The existing four lanes along Prospect Highway between Blacktown Road and Lancelot Street would remain
- A new signalised pedestrian crossing across Prospect Highway at the Blacktown Road intersection
- Three lanes in each direction between Lancelot Street and Roger Place with a 5.9 metre central median. Dedicated bus lanes would be provided kerbside
- Right turn bays would be provided into Lancelot Street, Keyworth Drive and Roger Place
- Bus lanes would function as shared left turn lanes at intersections and driveways.

Refer to Figures 3-1 to 3-5 for the proposal.

3.2.10 Upgrade of the existing Prospect Highway between Roger Place and 200 metres north of St Martins Crescent

The proposal would include:

- Three lanes in each direction between Roger Place and 200 metres of St Martins Crescent with a 4.2 metre central median. Dedicated bus lanes would be provided kerbside. The northbound bus lane would terminate north of St Martins Crescent requiring buses to merge into the travel lane. The southbound bus lane would start 200 metres north of St Martins Crescent
- A right turn bay would be provided into St Martins Crescent
- Bus lanes would function as shared left turn lanes at intersections and driveways.

Refer to Figures 3-1 to 3-5 for the proposal.

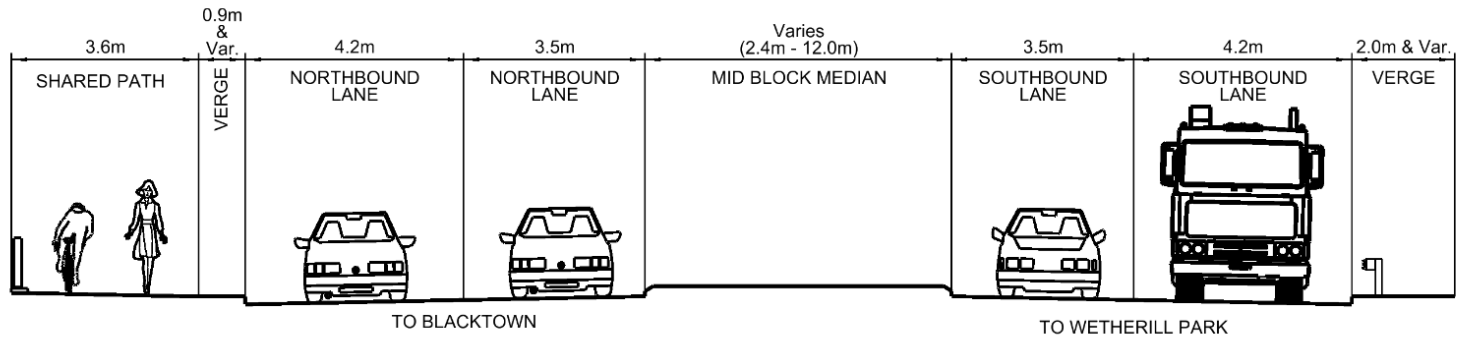


Figure 3-8 Typical section for Prospect Highway – four lane section

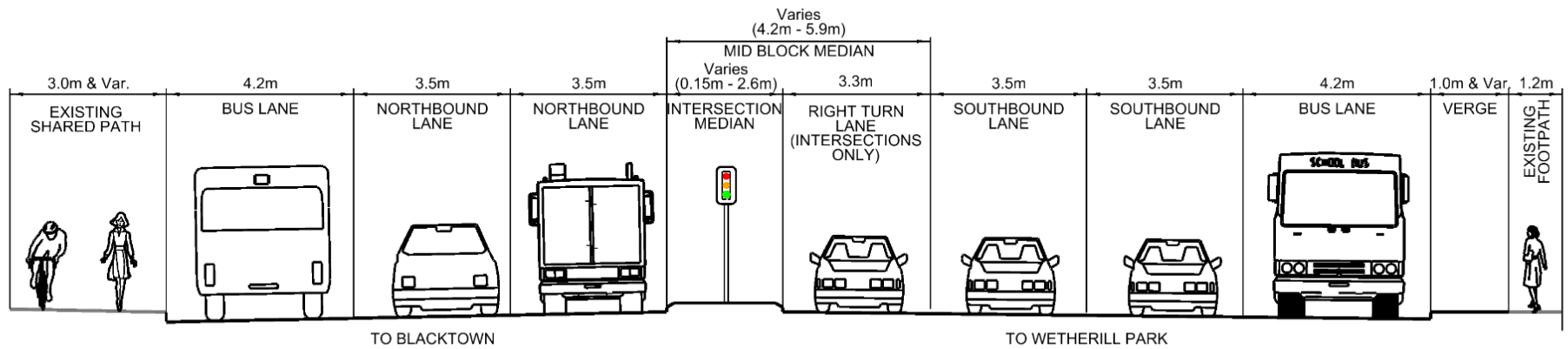
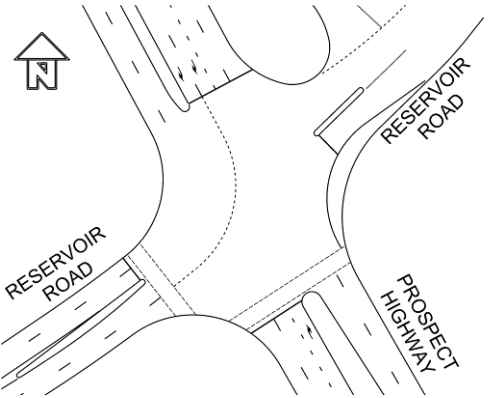


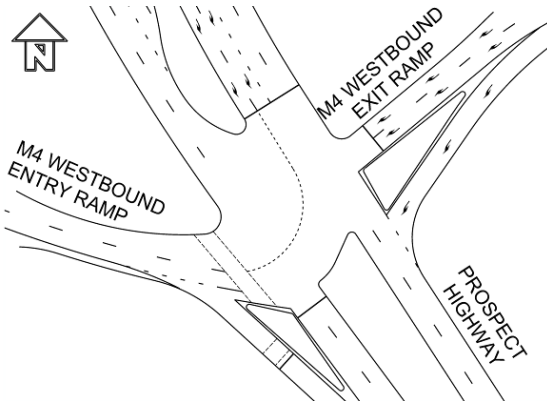
Figure 3-9 Typical section for Prospect Highway – six lane section

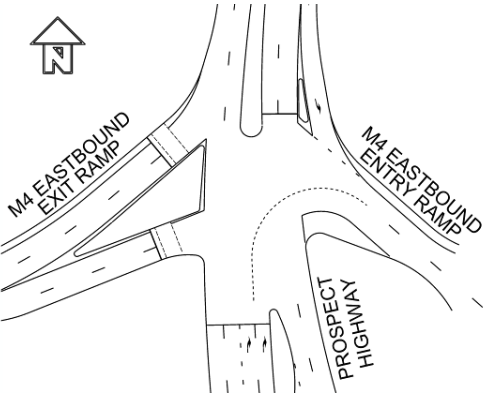
3.2.11 Intersections

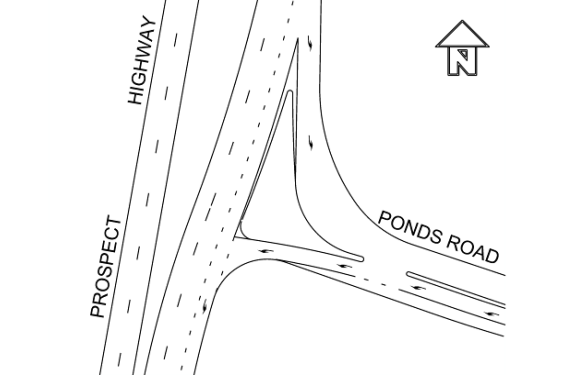
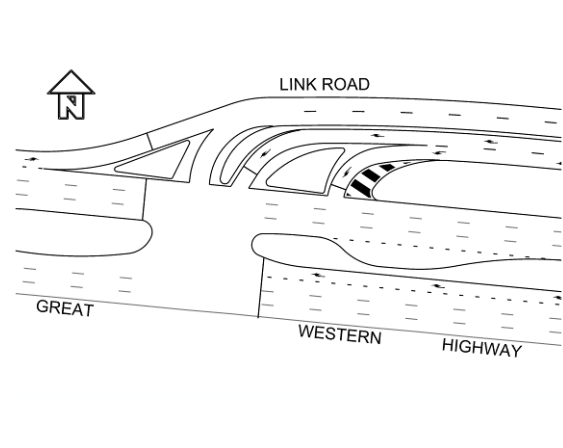
Changes to each of the intersections within the proposal area are described and shown in Table 3-3.

Table 3-3 Intersection changes along Prospect Highway

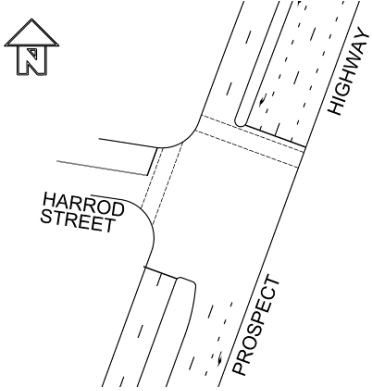
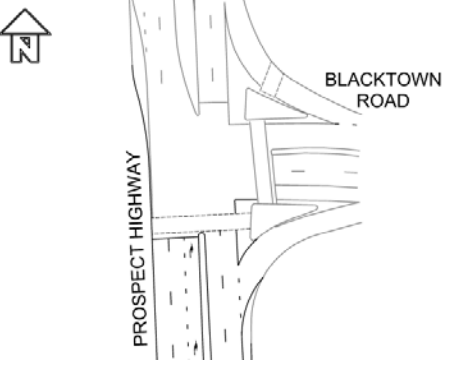
| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|--------------------------------------|---------------------------------|---|---|---|
| Reservoir Road / Reconciliation Road | Unsignalised roundabout | Wetherill Park Huntingwood Prospect Wet "n" Wild Sydney | <p>The existing intersection would be upgraded by providing traffic signals and additional lanes for through and turning movements including two additional lanes in each direction on Reservoir Road west of Prospect Highway, two additional lanes in each direction on Reconciliation Road south of Reservoir Road. A designated right turn lane into Reservoir Road would be provided for northbound traffic along Reconciliation Road.</p> <p>A pedestrian crossing is provided for north/south pedestrian movements along the western side of Prospect Highway across Reservoir Road. A crossing is provided for east/west movements to the south of Reservoir Road across Reconciliation Road.</p> |  |

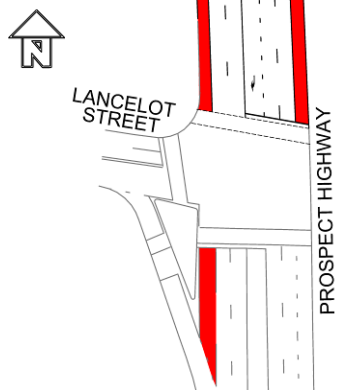
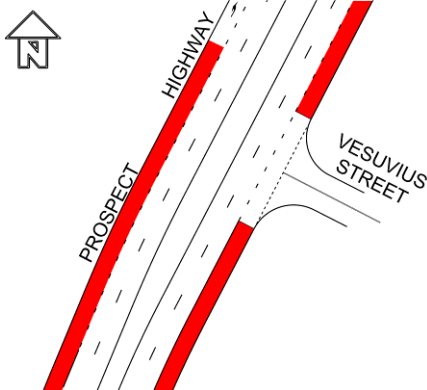
| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|--|---------------------------------|--------------------------------------|---|---|
| M4 Western Motorway westbound entry and exit ramp intersection | Signalised | Huntingwood Prospect Girraween | <p>Upgrade would include two dedicated right turn lanes for southbound traffic on Prospect Highway to travel west on the M4 Western Motorway and two dedicated through lanes in each direction on Prospect Highway. Two right turn lanes would be maintained for westbound traffic exiting the M4 Western Motorway to travel north along Prospect Highway.</p> <p>One unsignalised turning lane would be maintained for M4 Western Motorway westbound traffic to travel south along Prospect Highway. A signalised turning lane would be provided for northbound traffic on Prospect Highway to turn left onto the M4 Western Motorway westbound entry ramp.</p> <p>Pedestrian crossing facilities are provided for the north/south crossing of the M4 Western Motorway westbound entry ramp.</p> |  |

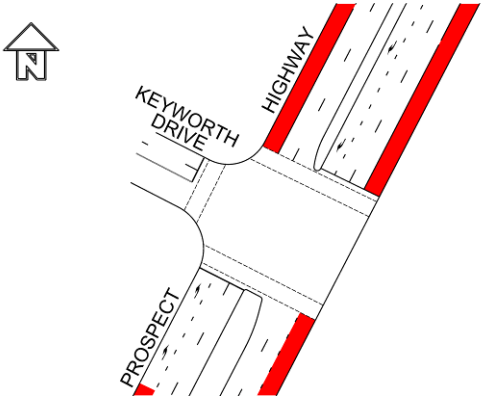
| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|---|---------------------------------|--------------------------------------|--|---|
| M4 Western Motorway eastbound entry and exit ramp | Unsignalised Roundabouts | Huntingwood Prospect Girraween | <p>The existing roundabout intersection would be upgraded and replaced by providing traffic signals and additional lanes for through and turning movements, including providing two right turn lanes for exiting traffic going south onto Prospect Highway and two left turn lanes for exiting traffic going north along Prospect Highway. Two designated through traffic lanes would be provided for northbound and southbound traffic each, as well as the provision of two right turn lanes for northbound traffic turning onto the M4 Western Motorway eastbound entry ramp and an unsignalised left turn lane for southbound traffic turning onto the M4 Western Motorway eastbound entry ramp.</p> <p>Pedestrian crossing facilities are provided through two separate dual lane crossings across both the left and right turning M4 Western Motorway eastbound exit lanes. These crossings allow for north/south pedestrian movements along the western side of Prospect Highway.</p> |  <p>The drawing is a plan view of the intersection. A north arrow is located in the upper left. The M4 Western Motorway eastbound entry ramp is shown as a road entering from the bottom right, turning left to merge with Prospect Highway. The M4 Western Motorway eastbound exit ramp is shown as a road exiting from the top left, turning right to merge with Prospect Highway. Prospect Highway is a vertical road running through the center of the intersection. Labels include 'M4 EASTBOUND EXIT RAMP', 'M4 EASTBOUND ENTRY RAMP', and 'PROSPECT HIGHWAY'.</p> |

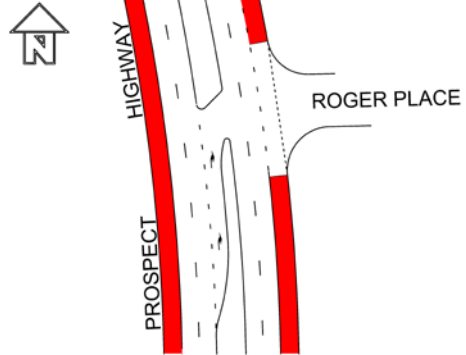
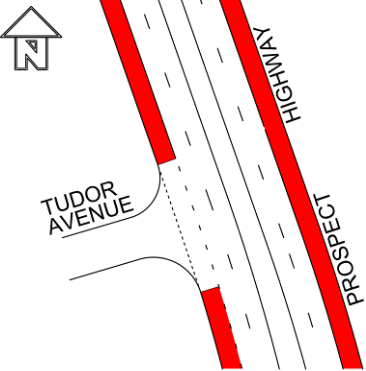
| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|---|---|---------------------|--|--|
| Ponds Road / Prospect Highway | Unsignalised intersection | Prospect | The existing intersection would be upgraded. Access arrangements would change by converting the existing unsignalised intersection to permit left in and left out movements only. |  |
| Proposed two way link road between the Great Western Highway and Prospect Highway: Great Western Highway intersection | Not applicable as the two way link road is not existing | Prospect | <p>The new signalised intersection on Great Western Highway would include new traffic signals. Two entry lanes are provided along the two way link road for left and right turning traffic entering the Great Western Highway. Two exit lanes are provided along the two way link road for left and right turning traffic exiting the Great Western Highway. Access to the exit lanes is provided by a right turn bay in the Great Western Highway median for westbound traffic and a left turn slip lane on the Great Western Highway for eastbound traffic. Both eastbound lanes on the two way link road would connect to Prospect Highway.</p> <p>No pedestrian facilities would be provided at this end of the two way link road.</p> |  |

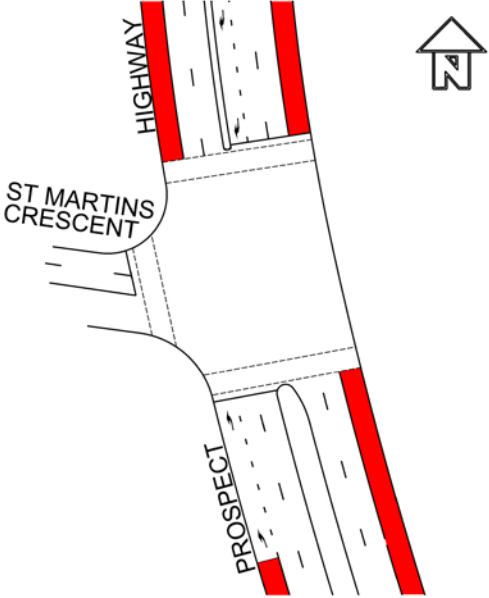
| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|---|---------------------------------|---------------------|--|----------------------|
| Proposed two way link road between the Great Western Highway and Prospect Highway: Prospect Highway intersection | Pedestrian signalised crossing | Prospect | <p>The new signalised intersection at Prospect Highway would include new traffic signals and two entry and two exit lanes along the two way link road. Both left turn and right turn exit lanes are provided for traffic entering Prospect Highway from the Great Western Highway. Both westbound lanes on the two way link road would connect to the Great Western Highway. The intersection provides for two lanes of through traffic in both directions along Prospect Highway.</p> <p>A signalised pedestrian crossing is provided across the two way link road at the intersection with Prospect Highway.</p> | |
| Stoddart Road / Prospect Highway | Unsignalised intersection | Prospect | <p>The existing T-intersection would be upgraded by providing traffic signals and additional lanes for through and turning movements including two northbound and two southbound through lanes along Prospect Highway. A right turn lane into Stoddart Road would also be provided. The existing left in left out turning lanes would be maintained in the upgraded configuration.</p> <p>A pedestrian crossing is provided for east/west pedestrian movements across Prospect Highway on the southern side of the intersection. A pedestrian crossing is also provided for north/south movements across Stoddart Road</p> | |

| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|-----------------------------------|---------------------------------|---------------------|---|--|
| Harrod Street / Prospect Highway | Signalised intersection | Prospect Blacktown | <p>The existing T-intersection would be upgraded to provide two lanes in each direction along Prospect Highway with a dedicated right turn bay into Harrod Street for southbound traffic on Prospect Highway. The existing southbound left turn lane to Stoddart Road would be maintained at the Harrod Street intersection.</p> <p>Traffic exiting Harrod Street would remain unchanged with both a left and right turning lane provided for both traffic turning into northbound and southbound lanes along Prospect Highway.</p> <p>A pedestrian crossing is provided for north/south pedestrian movements along the western side of Prospect Highway across Harrod Street. A pedestrian crossing is provided for east/west pedestrian movements across Prospect Highway north of Harrod Street.</p> |  <p>The diagram shows a north-south road labeled 'PROSPECT HIGHWAY' intersecting with an east-west road labeled 'HARROD STREET'. A north arrow is located in the top left corner of the drawing area.</p> |
| Blacktown Road / Prospect Highway | Signalised intersection | Prospect Blacktown | <p>The existing Blacktown Road / Prospect Highway intersection would maintain the existing configuration.</p> <p>A pedestrian crossing is provided for east/west pedestrian movements across Prospect Highway south of Blacktown Road. The existing shared path west of Prospect Highway would be realigned to join the new pedestrian crossing.</p> |  <p>The diagram shows a north-south road labeled 'PROSPECT HIGHWAY' intersecting with an east-west road labeled 'BLACKTOWN ROAD'. A north arrow is located in the top left corner of the drawing area.</p> |

| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|------------------------------------|---------------------------------|-----------------------|---|--|
| Lancelot Street / Prospect Highway | Signalised intersection | Prospect Blacktown | <p>The existing Lancelot Street / Prospect Highway intersection would maintain the existing configuration.</p> <p>Existing pedestrian facilities would be maintained.</p> <p>Bus lanes would be provided kerbside in both directions to the north of Lancelot Street along Prospect Highway as shown in red on the intersection drawing.</p> |  <p>The diagram shows a north-south intersection. Lancelot Street runs east-west, and Prospect Highway runs north-south. A north arrow is in the top left. Red lines on Prospect Highway indicate bus lanes extending north from Lancelot Street.</p> |
| Vesuvius Street / Prospect Highway | Unsignalised intersection | Blacktown Seven Hills | <p>The existing T-intersection would be upgraded. Access arrangements would change by converting the existing unsignalised intersection to permit left in and left out movements only.</p> <p>The bus lanes would be provided kerbside in both directions as shown in red on the intersection drawing. The lanes would function as shared bus through/left turn lanes at the intersection approach.</p> |  <p>The diagram shows a T-intersection where Vesuvius Street (east-west) meets Prospect Highway (north-south). A north arrow is in the top left. Red lines on Prospect Highway indicate bus lanes in both directions.</p> |

| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|-----------------------------------|---------------------------------|---------------------|---|---|
| Keyworth Drive / Prospect Highway | Signalised intersection | Blacktown | <p>The existing Keyworth Drive / Prospect Highway would be upgraded to provide two lanes in each direction with additional bus lanes in each direction. The upgrade includes a dedicated right turn bay into Keyworth Drive for southbound traffic on Prospect Highway.</p> <p>Movements out of Keyworth Drive would operate similarly under the new configuration with both left and right turn lanes provided for entry onto Prospect Highway.</p> <p>The bus lanes would be provided kerbside in both directions as shown in red on the intersection drawing. The lanes would function as shared bus through/left turn lanes at the intersection approach.</p> <p>Existing pedestrian facilities would be upgraded to match the new intersection configuration with both east/west and north/south crossings maintained.</p> |  <p>The drawing shows a T-junction where Keyworth Drive meets Prospect Highway. Keyworth Drive is on the left, and Prospect Highway is on the right. A north arrow is located in the top left corner. Red lines highlight the bus lanes on both sides of the road, which are shared bus through/left turn lanes. The drawing also shows lane markings and a dedicated right turn bay for southbound traffic on Prospect Highway.</p> |

| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|--------------------------------|---------------------------------|--------------------------|---|---|
| Roger Place / Prospect Highway | Unsignalised intersection | Blacktown Seven Hills | <p>The existing T-intersection at Roger Place / Prospect Highway would be upgraded to permit left in, left out and right in movements only.</p> <p>The bus lanes would be provided kerbside in both directions as shown in red on the intersection drawing. The lanes would function as shared bus through/left turn lanes at the intersection approach.</p> |  <p>The diagram shows a north-south road labeled 'PROSPECT HIGHWAY' and an east-west road labeled 'ROGER PLACE'. A north arrow is in the top left. Red shaded areas on the Prospect Highway indicate bus lanes on both sides of the road, extending to the intersection with Roger Place.</p> |
| Tudor Ave / Prospect Highway | Unsignalised intersection | Blacktown | <p>The existing T-intersection would be upgraded. Access arrangements would change by converting the existing unsignalised intersection to permit left in and left out movements only.</p> <p>The bus lanes would be provided kerbside in both directions as shown in red on the intersection drawing. The lanes would function as shared bus through/left turn lanes at the intersection approach.</p> |  <p>The diagram shows a north-south road labeled 'PROSPECT HIGHWAY' and an east-west road labeled 'TUDOR AVENUE'. A north arrow is in the top left. Red shaded areas on the Prospect Highway indicate bus lanes on both sides of the road, extending to the intersection with Tudor Avenue.</p> |

| Intersecting road | Existing traffic control method | Provides access to: | Proposed upgrade and changes in access | Intersection drawing |
|--|---------------------------------|------------------------------------|--|--|
| St Martins Crescent / Prospect Highway | Signalised intersection | Blacktown Blacktown Mega Centre | <p>The existing T-intersection would be upgraded with a similar configuration to provide two lanes in each direction. The upgrade would maintain a dedicated right turn bay into St Martins Crescent for southbound traffic on Prospect Highway.</p> <p>The bus lanes would be provided kerbside in both directions as shown in red on the intersection drawing. The lanes would function as shared bus through/left turn lanes at the intersection approach.</p> <p>Existing pedestrian facilities would be upgraded to match the new intersection configuration. An additional east/west pedestrian crossing is provided across Prospect Highway south of St Martins Crescent.</p> |  |

3.2.12 Provision of kerbside bus lanes between Lancelot Street and St Martins Crescent

The proposal would provide three lanes in each direction between Lancelot Street and St Martins Crescent. Bus lanes would be provided as the kerbside lanes in both directions. The bus lanes would function as shared bus through and left turn lanes at the respective intersection approaches and departures. In addition they provide access to private properties as traffic is permitted to use the bus lanes to enter / exit driveways.

Refer to section 2.4.2 and 2.5.3 for the consideration and options assessment of the kerbside lane allocation between Lancelot Street and St Martins Crescent.

The proposal would also provide three lanes in each direction from St Martins Crescent to 200 metres north of St Martins Crescent. This would be accommodated within the existing pavement area and include two dedicated kerbside bus lanes.

Refer Figure 3-4 to Figure 3-5 for details.

3.2.13 Retaining walls

The proposal would require three retaining walls ranging from one metre to around 5.8 metres in height at the following locations:

- Adjacent to St Bartholomew's Church with a length of around 60 metres and a maximum height of around 5.8 metres. This wall is proposed as a soil nail retaining wall
- Proposed two way link road and continuing northbound along Prospect Highway for around 430 metres in length with a maximum height of about 5.4 metres. The wall is proposed as a reinforced concrete retaining wall
- Between the M4 Western Motorway and the M4 Western Motorway eastbound exit ramp, which would be about 51 metres in length. The maximum height would be around 2.8 metres. The construction method would require bored concrete piles and a capping beam.

3.2.14 Bus stops

Two new bus stops would be provided for north and southbound buses around the proposal's southern extent along Reconciliation Road north and south of the intersection with Reservoir Road.

An existing bus stop would be relocated as part of the proposal from south of Harrod Street to around 50 metres north of Harrod Street.

The proposal would relocate four existing northbound bus stops located between Keyworth Drive and north of St Martins Crescent (three northbound, one southbound). The northbound bus stops at Keyworth Drive and Tudor Avenue would be relocated behind the proposed kerb on the western side of Prospect Highway. The two bus stops north of St Martins Crescent would be relocated south towards the St Martins Crescent intersection.

The proposed changes to bus stop locations along the proposal corridor are shown in Figure 3-10.



- | | | | | | |
|---|-----------------------|---|---|---|-----------------|
|  | The proposal boundary |  | Existing bus stop |  | LGA boundary |
|  | The proposal |  | New bus stop |  | Suburb boundary |
| | |  | Relocated bus stop from service road to area adjacent to shared user path | | |
| | |  | Relocated bus stop | | |

Figure 3-10
Proposed bus stop changes

3.2.15 Shared user path

The proposal would upgrade about one kilometre of shared path along the western side of Prospect Highway between the M4 Western Motorway westbound entry ramp and Harrod Street. The new path would be 3.6 metres in width. Construction would comprise excavation to 300 millimetres, placement of 150 millimetres of sub-base and the laying of a 150 millimetre concrete pavement.

The proposed shared path would be located directly behind the western kerb and cross the new bridges over the M4 Western Motorway and Great Western Highway.

The proposed shared path would provide a connection to the existing shared path on the northern side of Harrod Street and south of M4 Western Motorway. Refer to Figure 3-1 to Figure 3-3 for details.

3.2.16 Pedestrian path

A pedestrian path would be provided on the eastern side of Prospect Highway between Keyworth Drive and Roger Place as shown on Figure 3-5. The new pedestrian path would be 1.2 metres wide.

3.2.17 Pedestrian underpass

The existing Old Church Lane to Keyne Street pedestrian underpass would be upgraded in accordance with current underpass design standards. The median width has been locally narrowed to 3.5 metres to minimise the length of the proposed underpass structure.

The existing concrete cell underpass would be replaced with a single span plank girder bridge. The underpass would be upgraded to suit current shared path and underpass requirements for safety and amenity and is shown in Figure 3-11 below.

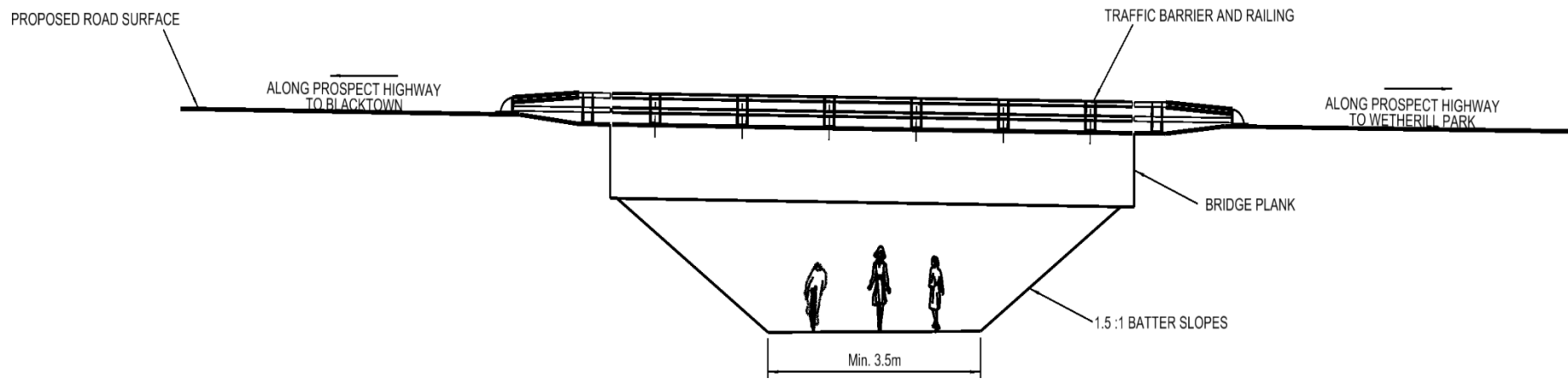


Figure 3-11 Typical section of upgraded Old Church Lane to Keyne Street pedestrian underpass

3.2.18 Road pavement work

The proposal would upgrade the existing road surface and include the construction of new pavement to suit the proposed road formation. Overall around 82,600 square metres of road pavement would be provided. The work would also include the upgrade of existing drainage lines and the construction of additional lines where required to suit the proposed formation.

The main pavement type proposed along the Prospect Highway is a composite flexible pavement with the following composition:

- 50 mm AC14 (A15E)
- 130 mm AC20 (AR450) (2x65mm)
- 220 mm Lean Mix Concrete Subbase
- 300 mm Select Material.

The pavement work would also include treatment and replacement of the existing sub grade foundation where required.

The existing and proposed bridge structures would include waterproofed concrete surfacing with a 75 mm asphalt overlay.

3.2.19 Drainage

Stormwater runoff from the new and widened sections of road pavement would be controlled by new piped drainage systems discharging to existing drainage lines located downstream of the road corridor.

The hydraulic standard for the pavement drainage system is an ARI (Annual Recurrence Interval) of 10 years under present day climatic conditions. A concept layout for the new pavement drainage system has been developed to show the indicative location of inlet pits and piped drainage lines that would be required to capture and convey runoff from the upgraded section of road to receiving drainage lines. The layout of drainage pits was determined using hydraulic calculations and complies with road pavement drainage requirements. The proposed drainage layout is shown in Appendix H.

The proposal would upgrade existing cross drainage systems and extend cross drainage structures to suit the proposed road formation. Existing cross drainage structures would be maintained except for the upgrade of the existing cross drainage pipe around 150 metres south of Roger Place from a 450 mm to a 675 mm reinforced concrete pipe.

The existing 750 mm reinforced concrete pipe across the Great Western Highway about 100 metres west of Prospect Highway would require an outlet extension to suit the proposed retaining wall along the two way link road. These upgrades to the existing cross drainage are listed in Table 3-4 and are shown in Figures 6-22 to 6-25

The proposal would also require the upgrade of an existing Blacktown City Council detention basin on the western side of Prospect Highway, which is located about 220 metres south of Blacktown Road, adjacent to Lorne Street. The detention basin would require excavation of about 300 cubic metres of earth to provide additional stormwater detention capacity.

The proposed excavation would avoid steepening the basin walls beyond a slope of 4H:1V.

Refer to the hydrology and utility report included as Appendix H for further details about the drainage features of the proposal (Hyder Consulting, 2014).

Table 3-4 Cross drainage structures and upgrades

| Catchment | Design road location | Size / Type (mm) | Upstream invert level (m AHD) | Downstream invert level (m AHD) | Adjacent road level (m AHD) | Proposed treatment |
|------------------|--|------------------|-------------------------------|---------------------------------|-----------------------------|---|
| Greystanes Creek | About 150 metres north of Reservoir Road | 1350 *RCP | 65.32 | 63.86 | 72.41 | No change |
| Blacktown Creek | Across the Great Western Highway about 100 metres west of Prospect Highway | 750 *RCP | 74.55 | 69.57 | 79.52 | Extension of existing culvert. |
| | About 270 metres south of Blacktown Road | 900 *RCP | 64.75 | 63.14 | 70.11 | No change |
| | About 150 metres south of Roger Place | 675 *RCP | 59.28 | 59.12 | 61.48 | Demolish and replace existing 450 mm *RCP with new 675 mm *RCP. |

*RCP – reinforced concrete pipe

3.3 Construction activities

This section provides a summary of the likely construction methodology, staging, work hours, plant and equipment and associated activities that would be used to construct the proposal. For the purpose of this REF, an indicative construction plan and methodology are provided. Detailed construction staging plans and methods would be determined by the construction contractor(s) after completion of the detail design.

3.3.1 Construction staging

It is expected that a single contract would be awarded to complete detail design of the proposal. The actual staging of the proposal would be dependent on when funding becomes available and be refined during the detail design phase.

Indicative construction staging indicates the proposal would be delivered in five stages of work as shown in Appendix B. Stage one would include construction of the northbound carriageway on the western side of the corridor from Reservoir Road / Reconciliation Road to the Blacktown Road intersection. This would include the proposed bridge over the M4 Western Motorway, bridge over the Great Western Highway, the western side of the Old Church Lane to Keyne Street bridge structure and the two-way link road. Construction of the southbound carriageway on the eastern side of the corridor including the eastern side of the Old Church Lane to Keyne Street bridge structure and the retaining wall adjacent to St Bartholomew's Church and Cemetery would occur during stage two.

The construction of the northbound carriageway in the informal service road area north of Lancelot Street would occur during stage four and the southbound carriageway north of Lancelot Street would occur during stage five.

Construction of the proposal would comprise the stages summarised in Table 3-5. Refer to Section 3.5 for details of utility adjustments.

Table 3-5 Indicative construction staging

| Stage | Work element |
|-------|---|
| 1 | <ul style="list-style-type: none"> • Construct temporary pavement within existing median and roundabout at the intersection of Prospect Highway / Reconciliation Road / Reservoir Road • Construct the northbound carriageway, west of the existing Prospect Highway corridor between Reconciliation Road and Blacktown Road • Construct the southern side of Reservoir Road up to Picrite Close, west of the Prospect Highway / Reconciliation Road intersection • Construct the proposed two span bridges over the M4 Western Motorway and Great Western Highway, west of the existing bridges • Construct the western half of the Old Church Lane to Keyne Street bridge structure • Construct the new two way link road, keeping the existing Great Western Highway eastbound exit ramp open to traffic • Construct the median on the Great Western Highway, west of the Prospect Highway corridor • Additional staging at the intersection of Reservoir Road / Picrite Close would be required to maintain all movements at the intersection during stage 1 works • Temporarily relocate northbound bus stop at Stoddart Road to the temporary verge area just north of Harrod Street. |
| 2 | <ul style="list-style-type: none"> • Switch traffic onto the newly constructed northbound carriageway between Reconciliation Road and Blacktown Road • Switch traffic onto the southern side of Reservoir Road, west of the Prospect Highway / Reconciliation Road intersection • Open the two way link road to traffic • Construct the southbound carriageway, closing the existing lanes between the Great Western Highway bridge and M4 Western Motorway eastbound entry ramp. Traffic would use the newly constructed northbound carriageway for travel in both directions • Access between Ponds Road and Prospect Highway would be provided using the newly constructed two way link road • Construct the eastern half of the Old Church Lane to Keyne Street bridge structure • Additional staging at the intersections of Prospect Highway / Reservoir Road / Thornley Road, Prospect Highway / M4 Western Motorway westbound exit ramp, Prospect Highway / M4 Western Motorway eastbound entry ramp, Prospect Highway / two way link road and Prospect Highway / Stoddart Road would be required to maintain all movements at the intersection during stage 2 works • Temporarily relocate southbound bus stop south of Stoddart Road to the temporary verge area. |

| Stage | Work element |
|-------|---|
| 3 | <ul style="list-style-type: none"> • Open both the northbound and southbound carriageways to traffic • Reconstruct temporary pavement on the northbound Prospect Highway carriageway, for a length of about 120 metres north of Reservoir Road • Additional staging at the intersections of Prospect Highway / Reservoir Road, Prospect Highway / M4 Western Motorway westbound entry ramp, Prospect Highway / M4 Western Motorway eastbound exit ramp, Prospect Highway / Stoddart Road, Prospect Highway / Harrod Street and Prospect Highway / Blacktown Road would be required to maintain all movements at the intersection during stage 3 works. |
| 4 | <ul style="list-style-type: none"> • Construct the northbound carriageway between Lancelot Street and north of St Martins Crescent • Construct about 30 metres of temporary pavement of the existing southbound shoulder, south of Vesuvius Street to strengthen the pavement for traffic • Reduce the width of the existing left turn bay into the child care centre • Remove existing pedestrian crossing on Prospect Highway, south of Keyworth Drive • Divert Tudor Avenue traffic to Keyworth Drive • Close Keyworth Drive intersection and divert traffic to Tudor Avenue. Open newly constructed Keyworth Drive intersection, close Tudor Avenue intersection and divert traffic to Keyworth Drive • Temporarily relocate existing northbound bus stops, north of Keyworth Drive and north of Tudor Avenue to temporary verge area. |
| 5 | <ul style="list-style-type: none"> • Construct the southbound carriageway between Lancelot Street and north of St Martins Crescent • Construct pedestrian footpath on eastern side of Prospect Highway between Roger Place and Keyworth Drive • Replace existing informal service road with formal property accesses, west of the Prospect Highway corridor • Additional staging at Prospect Highway / Roger Place intersection would be required to maintain access during stage 5 works • Temporarily relocate the southbound bus stop north of Keyworth Drive to the temporary verge area • Temporarily remove the southbound bus stop adjacent to Roger Place • Temporarily relocate southbound bus stop opposite Tudor Avenue, about 50 metres south. |

Preliminary work

A construction contractor would be engaged as part of this initial work phase.

Preliminary work would require the establishment of construction compound sites, stockpile areas and temporary access. Subject to investigations during detailed design, Roads and Maritime may begin utility relocations prior to the start of road construction activities where possible to minimise disruption to traffic and nearby residents. Vegetation clearing and grubbing may also be required to undertake utility relocations. Selected environmental safeguards would be established in this preliminary work prior to construction, such as erosion controls, property adjustments and noise mitigation where relevant.

Temporary enabling work would be required to adjust M4 Western Motorway travel lanes at the roundabout approaches to Prospect Highway. Temporary barriers, work zones and line markings would be established prior to the start of bridge construction for the structures over the M4 Western Motorway and Great Western Highway. Where required, property adjustments would consider driveway access requirements during detailed design particularly for residents currently accessing their property from the existing informal service roads.

The actual construction method may vary from the description in this chapter as a result of factors including on-site conditions identified during pre-construction activities, ongoing refinement of the detailed design and community consultation including consideration of submissions received.

3.3.2 Work methodology

Construction activities would be subject to a Construction Environmental Management Plan (CEMP) that would be developed in line with the requirements of Roads and Maritime QA Specification G36 Environmental Protection (Management System). Work would be located within the work area specified within the CEMP and completed to incorporate all safeguards as described in this REF and any other relevant Roads and Maritime environmental specifications.

General road work

The proposal would involve the following general work methodology:

- Pre-construction identification and marking of sensitive areas as identified in this REF and the CEMP
- Establishment of temporary fencing
- Installation of temporary environmental controls including erosion, sediment and water quality controls
- Establishment of construction compound sites and access. Setting up of construction compound and stockpile areas including the extension and provision of services to the compound
- Temporary traffic signals where required. Installation of traffic management measures such as placing safety barriers in accordance with the traffic control plan
- Surveys, investigations and establishment of the construction footprint in line with the proposal's design plans
- Vegetation clearing and grubbing including tree removal where necessary
- Property adjustment work

- Stripping, stockpiling and management of topsoil and unsuitable material
- Earthwork for pavement construction
- Bulk earthwork
- Utility adjustment work where required. Refer to section 3.5 for details
- Forming of embankments for the new bridge construction
- Bridge work including the substructure, abutment and superstructure
- Retaining wall work including the foundation work, construction of walls and back filling
- Drainage work installation of cross, longitudinal and subsoil drainage
- Work related to a Blacktown City Council detention basin
- Road pavement construction including compaction of select fill, sub base, and asphalt wearing surface. Includes demolition of existing road pavement where required
- Kerb and gutter work
- Installation of street lighting
- Construction of shared and pedestrian pathways
- Topsoil rehabilitation, revegetation and landscaping
- Installation of permanent traffic control signals
- Installation of line marking and signposting
- Landscaping work
- Rehabilitation of temporary stockpiles including decommissioning of construction compound and stockpile areas.
- Finishing work including installation of safety barriers, fencing, pavement marking, signposting, and street lights
- Site clean-up.

Establish exclusion zones

Exclusion zones would be established to avoid damage to native vegetation and fauna habitats and prevent the distribution of pests, weeds and disease. Basic temporary fencing would be installed to indicate the limits of clearing. The location of exclusion fencing to be installed would be identified on plans in the CEMP and the function and importance of the exclusion zones communicated to construction personnel. Exclusion zones would be established around any remnant or planted vegetation to be retained to avoid accidental incursions. For example, areas of high and moderate condition Cumberland Plain Woodland would be protected with exclusion fencing.

The construction boundary adjacent to the area of high condition Cumberland Plain Woodland adjacent to Timbertop Reserve would be minimised to an area around one metre from the edge of the proposal. Permanent chain-link fencing would be established along the construction boundary in this area to exclude machinery and personnel during construction, and to avoid encroachment from maintenance activities during operation.

An exclusion zone would be established around the area of freshwater wetland on the proposed compound site between Prospect Highway and Thornley Road. A 50 metre buffer surrounding this area would be established as an exclusion zone if this compound site is to be used.

Duplication of the existing bridge crossing over the M4 Western Motorway

Duplication of the existing bridge over the M4 Western Motorway would be undertaken using the following methodology:

- Issue resident notifications regarding the proposed construction activities
- Reduce the speed limit on the M4 Western Motorway for the duration of the bridge construction in consultation with the Transport Management Centre
- Close the verge side shoulders on the M4 Western Motorway in the vicinity of the bridge site to create sufficient space to construct the central bridge pier
- Provision of alternate access for M4 Western Motorway cyclists via exit and entry ramps and across Prospect Highway during construction
- Establish exclusion zones
- Enabling work to adjust travel lanes, establish temporary traffic barriers, work zones and line marking
- Install temporary erosion, sedimentation and drainage controls
- Establish the site compound between Prospect Highway and Thornley Road, and between the M4 Western Motorway and the Great Western Highway
- Establish construction phase traffic control including temporary traffic signs, safety barriers, line marking changes and similar
- Mark any trees requiring clearing
- Clearing of vegetation
- Relocation, adjustment and/or protection of all affected utilities and services
- Construct piles, pile caps, place precast central pier and headstock
- Construct abutments
- Establish temporary traffic management plan for M4 Western Motorway in both directions to allow for lifting and placement of Super T girders
- Two span Super T girder bridge structure would be erected by placing each pre-fabricated Super T girder between the bridge abutments and the central pier from either side of the M4 Western Motorway
- In situ concreting for the bridge deck, asphaltting of wearing course, installation of parapets, barrier railing and safety screen
- New line marking, lighting and signage
- Site clean-up and disposal of all surplus waste materials
- Removal of construction traffic management and opening of new infrastructure to traffic.

Duplication of the existing bridge crossing over the Great Western Highway

Duplication of the existing bridge over the M4 Western Motorway would be undertaken using the following methodology:

- Issue resident notifications regarding the proposed construction activities
- Reduce the speed limit on the Great Western Highway for the duration of the bridge construction in consultation with the Transport Management Centre
- Issue resident notifications regarding the proposed construction activities
- Establish exclusion zones
- Enabling work to adjust travel lanes, establish temporary traffic barriers, work zones and line marking
- Install temporary erosion, sedimentation and drainage controls
- Establish site compound area between the M4 Western Motorway and the Great Western Highway and north of Ponds Road, south of the Great Western Highway

- Establish construction phase traffic control including temporary traffic signs, safety barriers, line marking changes and similar
- Establish exclusion zones to identify remnant Cumberland Plain Woodland to be retained, to the south of the Great Western Highway and west of the proposed bridge
- Mark any trees requiring clearing
- Clearing of vegetation
- Relocation, adjustment and/or protection of all affected utilities and services
- Construct piles, pile caps place precast central pier and headstock
- Construct abutments
- Two span Super T girder bridge structure would be erected by placing each pre-fabricated Super T girder between the bridge abutments and the central pier from either side of the Great Western Highway
- Insitu concreting for the bridge deck, asphaltting of wearing course, installation of parapets, barrier railing and safety screen
- New line marking, lighting and signage
- Site clean-up and disposal of all surplus waste materials
- Removal of construction traffic management and opening of new infrastructure to traffic.

Two way link road between Great Western Highway and Prospect Highway

- Issue resident notifications regarding the proposed construction activities, including to residents within Hampton Crescent and the recently constructed residential subdivision west of Hampton Crescent
- Issue notifications to Blacktown City Council regarding the drainage easement and work in the area of Lot 91/DP803853
- Establish exclusion zones adjacent to Timbertop Reserve to identify remnant Cumberland Plain Woodland to be retained
- Pre-clearing surveys would also target potentially occurring threatened flora species such as Spiked Rice-flower (*Pimelea spicata*)
- Permanent fencing would be established along the edges of the high condition Cumberland Plain Woodland remnant adjacent to Timbertop Reserve to avoid incursions into this area during construction and operation
- Reduce the speed limit on the Great Western Highway for the duration of the two way link road construction and at the intersection with Prospect Highway
- Enabling work to adjust travel lanes, establish temporary traffic barriers, work zones and line marking
- Install temporary erosion, sedimentation and drainage controls
- Establish construction phase traffic control at each end of the proposed two way link road including temporary traffic signs, safety barriers, line marking changes and similar
- Pre-clearing surveys for Cumberland Plain Land Snail would be undertaken during the appropriate season and climatic conditions prior to construction in moderate and high condition areas of Cumberland Plain Woodland (as described in Section 6.2.2)
- Carry out fauna rescue and relocation as required
- Mark any trees requiring clearing including those trees to be retained
- Clearing of vegetation
- Relocation, adjustment and/or protection of all affected utilities and services
- Close the shoulders on the Great Western Highway in the vicinity of the two way link road to create sufficient space for earthworks and pavement construction

- Establish earthworks and construct the retaining wall to required height of up to 5.4 metres for a length of around 430 metres using a reinforced concrete wall construction method with precast concrete façade panels
- Construct noise and privacy barrier along two-way link road
- Establish earthworks and road formation to required grade
- Construct asphaltic concrete pavement and associated works
- Install traffic signals at each end of the two way link road
- New line marking, lighting and signage
- Site clean-up and disposal of all surplus waste materials
- Plant new vegetation along two-way link road formation
- Removal of construction traffic management and opening of new infrastructure to traffic.

3.3.3 Construction hours and duration

If approved, the proposal would progress to the detailed design stage. Subject to funding being available, construction would follow. The timing of these activities is unknown at this stage. It is possible the earliest construction start date would be early 2016 with the year of opening no sooner than 2018.

Construction work for the proposal would generally be carried out during standard working hours, as follows:

- Monday to Friday, 7am to 6pm
- Saturday, 8am to 1pm
- Sunday and Public Holidays, no work.

Construction workers would travel to and from site outside these hours to access the site.

Out of hours work including night and weekend work would be required, subject to permitted road occupancy licences and construction staging. Should any out of hours work be required, work would be carried out in line with the procedures contained within the EPA Interim Construction Noise Guideline (ICNG) (DECC 2009) and the Roads and Maritime Environmental Noise Management Manual (RTA 2001): Practice Note vii – Roadworks outside normal working hours. Procedures would include notifying the local community including local residents and businesses prior to the start of any work.

3.3.4 Plant and equipment

Plant and equipment needed for the proposal would be confirmed during the construction planning phase. It is anticipated that the plant and equipment used for the proposal would include those outlined in Table 3-6.

Table 3-6 Indicative construction plant and equipment

| Construction phase | Plant and equipment |
|---|--|
| Preparation and establishment of site compounds | <ul style="list-style-type: none"> • Franna cranes • Generators • Hand tools • Trucks • Excavators. |

| Construction phase | Plant and equipment |
|---|--|
| General construction activities including breaking out of existing roads where required | <ul style="list-style-type: none"> • Air compressors • Bobcats • Bulldozers • Concrete saws • Cranes • Excavators • Generators • Hand tools • Haulage trucks • Jackhammers • Light commercial and passenger vehicles • Road sweepers • Semi-trailers and large delivery trucks • Tree clearing machine • Vegetation grader • Water carts • Welding equipment. |
| Retaining wall and associated work | <ul style="list-style-type: none"> • Excavator, tip trucks • Piling rigs, bore piles, driven piles • Crane • Soil nail drilling machine. |
| Road embankment and drainage construction | <ul style="list-style-type: none"> • Backhoes • Concrete agitating trucks • Excavator • Graders • Pneumatic drilling machines • Scrapers • Tipper truck • Trenching machines • Under boring rig • Vibrating and static rollers. |
| Road pavement construction | <ul style="list-style-type: none"> • Asphalt milling machine • Bitumen trucks • Bitumen spraying and asphalt paver • Concrete agitator trucks • Concrete/asphalt pavers • Concrete pumps • Concrete vibrators • Kerb extruding machine • Line marking machine • Portable lighting • Saw cutter • Smooth drum roller • Stabilizers • Trucks. |
| Structures including bridges and culverts | <ul style="list-style-type: none"> • Concrete pump • Concrete trucks/agitator • Cranes • Excavators • Piling rigs |

| Construction phase | Plant and equipment |
|--------------------------------|---|
| | <ul style="list-style-type: none"> • Scaffold structures • Trucks • Various items of small equipment. |
| Traffic management and control | <ul style="list-style-type: none"> • Trailer mounted traffic lights • Attenuation vehicles • Trailer mounted VMS boards • Portable concrete barriers • Traffic delineation devices • Temporary signage and signposts. |

3.3.5 Earthwork

The proposal would require earthwork for the construction of a widened carriage way, and for construction of retaining walls. The estimated quantities of earthwork required for the proposal are outlined in Table 3-7. These quantities would be refined during detailed design.

Table 3-7 Earthwork required for the proposal

| Cut (m ³) | Fill (m ³) | Import (m ³) |
|-----------------------|------------------------|--------------------------|
| 33,700 | 15,700 | 0 |

3.3.6 Source and quantity of materials

Materials and estimated quantities are outlined in Table 3-8 and would be refined during the detailed design phase. Materials would be sourced from local areas where practicable.

Table 3-8 Materials and estimated quantities required for the proposal

| Material | Estimated quantity (approximate) |
|-----------|----------------------------------|
| Road base | 46,100 cubic metres |
| Asphalt | 15,600 cubic metres |
| Topsoil | 2,650 cubic metres |
| Concrete | 3,030 square metres |

The pavement area is estimated to be around 82,600 square metres.

Surplus material that cannot be used on site would be reused or disposed of in the following order of priority:

- Transfer to other Roads and Maritime projects for immediate re-use in line with the NSW Environmental Protection Authority (EPA) Excavated Public Road Material resource recovery exemption
- Transported off-site for re-use by a third party in line with a relevant EPA resource recovery exemption
- Disposal at an approved materials recycling or waste disposal facility
- As otherwise provided for by the relevant waste legislation.

3.3.7 Traffic management and access

Construction is proposed to be staged to allow Prospect Highway to remain open to traffic, with only partial lane closures. Heavy and light vehicular traffic associated with construction, including those required for delivery of materials would generally use the main arterial routes available to access Prospect Highway. Construction vehicles would also travel to and from construction compounds.

Vehicle movements

Road traffic, bicycles and pedestrians are likely to be impacted throughout all stages of construction. As identified in Section 3.3.1, construction has been staged to allow Prospect Highway to remain open to traffic during construction, with only partial lane closures required. Traffic speeds adjacent to partial lane closures would be reduced to ensure worker safety.

Prospect Highway currently accommodates over 35,000 vehicles per day and, similarly, the Great Western Highway and M4 Western Motorway accommodate over 30,000 and 70,000 vehicles per day respectively. It is anticipated that during normal working days 50 to 100 heavy vehicles and up to 100 light vehicle movements would be required per day on and off-site. Heavy vehicles would be used to deliver construction material to the site and the transfer of construction materials to temporary stockpile sites or to other areas within the site. The location of the temporary stockpile sites would be confirmed during detailed design.

Traffic management

Standard traffic management measures would be employed to minimise short-term traffic impacts that could be expected during construction. These measures would be identified in a traffic management plan (TMP) for the proposal and would be developed in line with the Roads and Maritime's Traffic Control at Works Sites Manual (Roads and Traffic Authority 2010) and Roads and Maritime G10 Specification for Traffic Management (Roads and Maritime 2011).

The TMP would provide details of traffic management to be implemented during construction, to ensure that traffic flow along Prospect Highway is maintained throughout construction. Impacts to the public (including traffic, pedestrians and cyclists) during construction would be managed through the TMP and detailed pedestrian traffic control plans. Pedestrian and cyclist routes would be managed on a daily basis to suit construction activities. These routes would be coordinated with the stages of construction to ensure safe access.

The traffic management plan would detail specific haulage routes that construction traffic would follow during the construction phase. To avoid major congestion, lane closures would only occur during off-peak periods and in consultation with the Transport Management Centre. A reduced speed limit may be introduced for the duration of the work.

Bus stops would require relocation or temporary closure during construction and this would be carried out in consultation with Blacktown City Council, Transport for NSW and the local bus operator. Any proposed relocation would take the implications for commuters into account. Additional access for garbage trucks during construction would be taken into account.

Further details regarding the potential traffic impacts during construction is provided in Section 6.1.

Access

Access to the five construction compounds would be via Prospect Highway, the M4 Western Motorway westbound and eastbound entry and exit ramps, Great Western Highway, Reservoir Road, Ponds Road, Thornley Road and Blacktown Road. Local roads would be required for access as described in Table 3-9. Construction traffic issues are discussed further in Section 6.1.

Property access would be maintained during the works. Should any temporary impacts to property access occur, consultation with affected residents and property owners would take place. The management of property access would be considered by the construction contractor and detailed as part of the final staging plan for the proposal.

3.4 Auxiliary construction sites

Temporary site compounds would be established during construction. Refer to Figure 3-12 for the indicative locations of compound sites required to construct the proposal.

Five indicative sites for construction compounds have been identified as described in Table 3-9. The main compound sites would be located on cleared land within or adjacent to the road corridor. The required area and site access would be confirmed during the detailed design stage.

Three general and two bridge work compounds are proposed. The main construction compounds during stage 1 of the work would be located immediately to the east of Prospect Highway between Prospect Highway and Thornley Road. To enable construction of the bridge crossings of the M4 Western Motorway and Great Western Highway, two compounds would be established as part of the first stage of work. The upgrade is expected to be established from south to north along the alignment of the proposal corridor from Reconciliation Road to Blacktown Road and Blacktown Road to the proposal's northern extent 200 metres north of St Martins Crescent. Construction compounds are shown in Figure 3-12.

Table 3-9 Indicative temporary compound site locations

| Compound number | Site location | Site access | Lot, DP | Property area (hectares) | Compound type |
|------------------------|---|--|-----------------------------|------------------------------------|------------------------|
| 1 | Site adjacent to Reservoir Road and Thornley Road. | M4 Western Motorway westbound exit ramp Prospect Highway Reservoir Road Thornley Road | Lot 24-25/DP 801210 | 1.57 | General |
| 2 | Site between M4 Western Motorway and Great Western Highway. | Prospect Highway | Lot 5/DP 803359 | 1.26 | General and bridgework |
| 3 | Site between Ponds Road and Great Western Highway. | Prospect Highway Ponds Road | Lot 1/DP 124950 | 1.59 | General and bridgework |
| 4 | Site west of Prospect Highway near the intersection with Stoddart Road. | Prospect Highway Great Western Highway | Lot 91 and lot 92/DP 803853 | 0.22 and 0.43 total site area 0.65 | General |
| 5 | Site on vacant land at future Seven Hills Road corridor link. | Prospect Highway Blacktown Road | Lot 12 and Lot 20/DP 817295 | 0.14 and 0.71 total site area 0.85 | General |



GIS MAP file : EN04241_REF_F023_12V1

Figure 3-12
Proposed compound sites overview

The main construction compounds would typically include a combination of demountable offices, meal rooms, toilets/showers and parking facilities.

Stockpiles have the potential to be located within the five construction compound sites shown on Figure 3-12. Stockpiles would be required to store materials such as spoil, stripped topsoil, excavated rock and building materials. Other stockpile sites would typically allow for lay down areas, equipment storage, maintenance sheds, chemical and fuel stores and other construction materials. They would be located on relatively level ground and away from areas of ecological and heritage conservation value.

The final location of the stockpile areas would be subject to the site location criteria set out in the Roads and Maritime's Stockpile Site Management Procedures (RTA 2011).

The final location of the compounds, stockpile and any storage sites would be confirmed during detailed design. Each site would be securely fenced with temporary fencing. Signage would be erected advising the general public of access restrictions. Upon completion of the construction work, the temporary site compound, work area and stockpiles would be removed, the site cleared of all rubbish and materials and rehabilitated.

3.5 Public utility adjustments

Consultation with public utility authorities has been carried out as part of the development of the concept design to identify and locate existing utilities and incorporate utility authority requirements for relocations and/or adjustments. Chapter 5 provides a summary of the consultation carried out for the proposal.

Where possible, relocation would be carried out before or during pre-construction activities. If access is not possible under existing traffic conditions, some utility relocations may be staged during construction (refer to Section 3.3).

Electrical transmission lines, street lighting, telecommunications, gas, traffic infrastructure, sewer and water mains would require relocation or adjustment as part of the construction of the proposal. Potential relocations and adjustments are described in Sections 3.5.1 to 3.5.4.

3.5.1 Electricity and street lighting

In the vicinity of Prospect Highway there are low and high voltage underground assets, overhead high voltage mains, high voltage transmission towers, overhead transmission lines and street lighting.

There are underground electrical utilities crossing Prospect Highway at the following locations:

- In the vicinity of the Reservoir Road intersection
- Around the entry and exit ramp intersections with the M4 Western Motorway
- In the vicinity of the two way link road intersection
- At the intersection with Harrod Street, Stoddart Road and Blacktown Road.

Existing electrical utilities at these locations and along Prospect Highway would be relocated outside the proposed road formation between Reservoir Road and

Blacktown Road. The required relocations generally occur on the western side of the corridor in line with the proposed road widening.

Existing electrical utilities between Lancelot Street and St Martins Crescent are found on both sides of the corridor. These utilities would be relocated outside the proposed road pavement. Crossing conduits would be relocated to suit road construction. Utilities on the western side of the corridor would require relocation within the existing shared path.

There are high voltage (132kV) overhead transmission line crossings of Prospect Highway at the following locations:

- Immediately south of the M4 Western Motorway eastbound exit ramp
- Around 50 metres south of Harrod Street.

The transmission towers associated with these crossings are located to the west of Prospect Highway. The proposal would not impact or require relocation of these high voltage towers.

3.5.2 Telecommunications infrastructure

The proposal area contains underground cables and optical fibre assets for both Telstra and Optus. The proposal area also contains overhead Optus assets mounted on Endeavour Energy poles north of Lancelot Street.

There are underground telecommunications along and crossing Prospect Highway at the following locations:

- Optical fibres in the vicinity of the Reservoir Road intersection
- Adjacent to the Old Church Lane to Keyne Street pedestrian underpass
- At the intersections with Lancelot Street and Vesuvius Street
- Between Lancelot Street and Tudor Avenue on the western side of the corridor along the existing shared path
- Between Roger Place and north St Martins Crescent on the eastern side of the corridor along the existing footpath and verge area.

Existing telecommunication utilities between Lancelot Street and St Martins Crescent are found on both sides of the corridor as described above. These utilities would be relocated outside the proposed road pavement. Crossing conduits would be relocated to suit road construction. Utilities on the western side of the corridor would require relocation within the existing shared path. Utilities on the eastern side of the corridor would require relocation in the footpath and verge area.

3.5.3 National broadband network

National broadband network (NBN) services have been installed on the western side of Prospect Highway between Lancelot Street and north of St Martins Crescent. These services have been combined with existing underground Telstra assets. It is anticipated that a number of combined Telstra – NBN conduits would be relocated within the existing shared path on the western side of the corridor.

3.5.4 Gas

The proposal area contains underground gas mains mainly between the intersection with Blacktown Road and north of St Martins Crescent. There are also several property gas connections running along and crossing Prospect Highway.

Gas services are found at the following locations:

- Between Lancelot Street and Keyworth Drive on both sides of the corridor with a number of underground road crossings
- Underground crossing at Roger Place
- Underground crossing at St Martins Crescent and continuing north along the eastern side of the corridor.

These gas crossings and other gas mains would require protection/relocation during construction. It is anticipated that a number of these mains would be decommissioned, and longitudinal mains used to reduce the number of crossings. This may require the upgrade of existing longitudinal mains or the installation of a new main. Gas services on the western side of the corridor would require relocation within the existing shared path. Gas services on the eastern side of the corridor would require relocation in the footpath and verge area.

3.5.5 Sewer and water mains

There are several water mains running along and crossing Prospect Highway. Those that would require relocation or adjustment to accommodate the proposal include:

- 300 mm, 500 mm and 750 mm diameter water mains at the Reservoir Road intersection
- Underground crossing about 50 metres north of Harrod Street
- Between Lancelot Street and Keyworth Drive on both sides of the corridor with a number of underground road crossings
- Between Keyworth Drive and St Martins Crescent on the western side of the corridor along the existing shared path
- Underground crossing at Roger Place and continuing north along the eastern side of the corridor.

In addition to the above water mains, a single sewer main is located immediately north of Roger Place and crosses Prospect Highway. The proposal is not expected to require relocation of the sewer main. Protection would be required during construction to avoid impact to the sewer main.

3.6 Property acquisition

The upgrade of Prospect Highway would generally be accommodated within the existing road reserve.

Properties impacted by partial acquisition or adjustments are listed in Table 3-10 and are shown in Figure 3-13. Impacts associated with property adjustments include relocating property boundary fencing, driveway adjustments and loss of roadside trees and landscaped areas. The extent of property impacts would be refined and confirmed during detailed design in consultation with the property owners.

Table 3-10 Property acquisition and adjustments required for the proposal

| Lot and DP | Current land use | Approximate area (m²) | Acquisition type |
|-------------------|---|---|-------------------------|
| 91/DP803853 | Blacktown City Council Drainage Easement | 235 | Partial |
| 1/DP563443 | Residential, vacant yard area fronting Prospect Highway | 190 | Partial |
| 177/DP557378 | Residential, single dwelling | 1620 | Full |








- | | | | |
|---|-----------------------|---|--|
|  | The proposal boundary |  | Lot acquisition |
|  | The proposal |  | 30 Topaz Crescent, Seven Hills |
| | |  | 26 Topaz Crescent, Seven Hills |
| | | | Blacktown City Council drainage easement |

Figure 3-13
Property acquisition

4 Statutory and planning framework

This chapter provides the statutory and planning framework for the proposal and considers the provisions of relevant state environmental planning policies, local environmental plans and other legislation.

4.1 State Environmental Planning Policies

4.1.1 State Environmental Planning Policy (Infrastructure) 2007

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

Clause 94 of ISEPP permits development 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 proposal is for the upgrade of Prospect Highway to a four lane highway including intersection controls, facilities for buses, pedestrians and cyclists as well as the duplication of the bridges in the corridor and improved access to the M4 Western Motorway and Great Western Highway. As the proposal would be carried out by Roads and Maritime, it can be assessed under Part 5 of the *Environmental Planning and Assessment Act 1979*. Development consent from Blacktown City Council and Holroyd City Council is not required.

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

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

4.1.2 Other State Environmental Planning Policy(s) and deemed SEPPs.

State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

The purpose of the State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011 (the SEPP) is to support water catchments that deliver high quality water, to ensure that consent authorities only allow proposed development that has a neutral or beneficial effect on water quality, and to support water quality objectives in the drinking water catchment.

Prospect Reservoir catchment area, restricted as 'Special Areas: no entry' in the SEPP, is located adjacent to the proposal area at the southern limit of the proposal between Reservoir Road and Reservoir Access Road. Appropriate erosion and sedimentation controls would be implemented during construction to avoid impacts to Prospect Reservoir and surrounding catchment area. Refer to Section 6.5 for further details.

4.2 Local Environmental Plans

The study area is mainly within the Blacktown LGA. A small portion is located within the Holroyd LGA. The LGA boundaries as they relate to the proposal are shown in Figure 1-1.

Two local environmental plans (LEPs) apply to the land within the proposal area:

- Blacktown LEP 1988 and 2013 (draft)
- Holroyd LEP 2013.

As outlined in Section 4.1.1, the ISEPP removes the requirement for development consent from councils. The provisions of the relevant LEP zonings within the proposal area are identified in the following sections.

4.2.1 Blacktown Local Environmental Plan

Blacktown Local Environmental Plan 1988

Various zones under the current Blacktown Local Environmental Plan 1988 (Blacktown LEP) are within or immediately adjacent to the study area. These zones are outlined in Table 4-1 and include:

- Zone No 2 (a) Residential “A” Zone
- Zone No 3 (a) General Business
- Zone No 5 (a) Special Uses - General Zone
- Zone No 5 (b) Special Uses - Arterial Road and Arterial Road Widening Zone
- Zone No 6 (a) Public Recreation Zone.

Table 4-1 Consistency of proposal against relevant Blacktown LEP 1988 zoning objectives

| Zone | Objectives | Consistency of proposal against objectives and permissibility |
|---|--|---|
| Zone No 2(a) Residential “A” Zone | <ul style="list-style-type: none"> • To allow within the zone a range of non-residential uses which either serve the needs of the surrounding population or the needs of the City of Blacktown without conflicting with the basic intent of the zone. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal does not conflict with this objective as it could facilitate further development in the LGA. It would maintain the efficiency of the road network by providing additional capacity.</p> |
| Zone No 3(a) General Business | <ul style="list-style-type: none"> • To encourage appropriate development which will result in the growth of major foci for accommodating the retail, commercial and social needs of the community • To encourage development and expansion of business activities which will contribute to the economic | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with these objectives as it would support a range of economic development within the zone while maintaining the efficiency of the road network by improving traffic movement and providing additional capacity.</p> |

| Zone | Objectives | Consistency of proposal against objectives and permissibility |
|--|--|--|
| | <p>growth of, and the creation of employment opportunities within the City of Blacktown</p> <ul style="list-style-type: none"> By means of development control plans to provide for a program of environmental improvements within each centre with a view towards improving traffic movement and shopper safety and comfort. | |
| Zone No 5 (a) Special Uses - General Zone | <ul style="list-style-type: none"> To identify land which is currently used by public authorities, organisations and the council to provide certain community facilities and services. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with this objective as it would provide an upgraded road, pedestrian and cycle infrastructure. In turn, this would assist in supporting community facilities and services.</p> |
| Zone No 5 (b) Special Uses - Arterial Road and Arterial Road Widening Zone | <ul style="list-style-type: none"> To identify land required for existing or proposed arterial roads including the widening of existing arterial roads. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with this objective as Prospect Highway is being upgraded.</p> |

Blacktown Local Environmental Plan 2013 (draft)

The Draft Blacktown LEP 2013 is currently being reviewed by Blacktown City Council. Upon completion of this review, the submissions received during the exhibition of the draft LEP will be reported to Blacktown City Council with any recommendations for amendments to finalise the Draft Blacktown LEP 2013.

The Draft Blacktown LEP 2013 Written Instrument contains information about zoning, development controls and provisions that will affect how land in Blacktown can be developed and used in the future. Various zones under the Draft Written Instrument apply to the proposal and are within or immediately adjacent to the proposal as described in Table 4-2.

As the Blacktown LEP 2013 is at the draft stage, the following is provided only to demonstrate consistency with future zoning objectives for the Blacktown LGA.

Table 4-2 Consistency of proposal against relevant draft Blacktown LEP 2013 zoning objectives

| Zone | Objectives | Consistency of proposal against objectives and permissibility |
|--|---|---|
| Zone SP2 Infrastructure | <ul style="list-style-type: none"> To provide for infrastructure and related uses To prevent development that is not compatible with or that may detract from the provision of infrastructure To ensure that development does not have an adverse impact on the form and scale of the surrounding neighbourhood. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with these objectives.</p> |
| Zone B5 Business Development | <ul style="list-style-type: none"> To enable other land uses that provide facilities or services to meet the day to day needs of workers in the area To allow development that is compatible with the scale and form of the surrounding area. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with this objective.</p> |
| Zone B1 Neighbourhood Centre | <ul style="list-style-type: none"> To allow development that is compatible with the scale and form of the surrounding area. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with this objective.</p> |
| Zone R2 Low Density Residential | <ul style="list-style-type: none"> To enable other land uses that provide facilities or services to meet the day to day needs of residents To enable certain activities to be carried out within the zone that do not adversely affect the amenity of the neighbourhood. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with these objectives as it would support a range of economic development within the zone while maintaining the efficiency of the road network by improving traffic movement and providing additional capacity.</p> |
| Zone SP1 - Special Activities (Cemetery) | <ul style="list-style-type: none"> To facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land. | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP.</p> <p>The proposal is consistent with this objective as the proposal does not directly impact St Bartholomew's Church and Cemetery.</p> |
| Zone E2 Environmental Conservation | <ul style="list-style-type: none"> To protect, manage and restore areas of high ecological, scientific, | <p>Permitted with development consent; however, consent requirements are removed as the proposal falls under</p> |

| Zone | Objectives | Consistency of proposal against objectives and permissibility |
|------|---|--|
| | cultural or aesthetic values <ul style="list-style-type: none"> • To prevent development that could destroy, damage or otherwise have an adverse effect on those values. | the ISEPP. The proposal impacts about 0.12 hectares of Cumberland Plain Woodland located within the existing road reserve. Where required, offsets would be provided as part of the proposal. |

4.2.2 Holroyd Local Environmental Plan 2013

Under the Holroyd Local Environmental Plan 2013, land immediately to the south of the Reservoir Road / Reconciliation Road intersection is zoned IN2 – Light Industrial as shown in Table 4-3.

Table 4-3 Consistency of proposal against relevant Holroyd LEP 2013 zoning objectives

| Zone | Objectives | Consistency of proposal against objectives and permissibility |
|---------------------------|---|--|
| Zone IN2 Light Industrial | <ul style="list-style-type: none"> • To encourage employment opportunities and to support the viability of centres • To minimise any adverse effect of industry on other land uses. | Permitted with development consent; however, consent requirements are removed as the proposal falls under the ISEPP. The proposal is consistent with these objectives as the road upgrade would encourage and protect employment opportunities and minimise any adverse effects of industry on other land uses through reducing congestion in the area and provide increased opportunities for public transport and pedestrians and cyclists. |

4.3 Other relevant legislation

4.3.1 Environmental Planning and Assessment Act 1979

Under Part 5 of the EP&A Act (section 111 and section 112), all proposals must include an assessment of threatened flora and fauna and their habitats that are likely to occur within the area of the activity or that may be indirectly affected by the construction and operation of an activity. The assessment must address whether the proposed activity 'is likely to have a significant effect' on the threatened biodiversity identified, and a decision made on whether an Environmental Impact Statement (EIS) or Species Impact Statement (SIS) is required. To make this decision, a determining authority must consider the effect of an activity on:

- Threatened species, populations and ecological communities, and their habitats (listed under the TSC Act or FM Act) and whether there is likely to be a significant effect on these (as determined in Section 5A of the EP&A Act)
- Critical habitat (listed under the TSC Act or FM Act)
- Any other protected fauna or protected native plants within the meaning of the *National Parks and Wildlife Act 1974* (NPW Act).

4.3.2 Threatened Species Conservation Act, 1995

The *Threatened Species Conservation Act 1995* (TSC Act) protects threatened species, populations and ecological communities and their habitat in NSW. If threatened species, populations, ecological communities or their habitat could be impacted by the proposal, an assessment of significance must be completed to determine the significance of the impact, in line with Section 5A of the EP&A Act.

Significance assessments were carried out for one threatened ecological community, and 15 threatened flora and fauna species. Ecological investigations have considered the requirements of Section 5A of the EP&A Act and concluded that the proposal would be unlikely to result in a significant impact on threatened species, populations, ecological communities or their habitat. Potential biodiversity impacts of the proposal are discussed further in Section 6.2.3.

The TSC Act also lists Key Threatening Processes, which comprise matters that threaten the survival or evolutionary development of a species, population or ecological community.

4.3.3 National Parks and Wildlife Act, 1974

The harming or desecrating of Aboriginal objects or places is an offence under section 86 of the *National Parks and Wildlife Act 1979*. Under section 90, an Aboriginal heritage impact permit may be issued in relation to a specified Aboriginal object, Aboriginal place, land, activity or specified types or classes of Aboriginal objects, Aboriginal places, land, activities or persons.

The Office of Environment and Heritage (OEH) has published the Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW (DECCW, 2010). The due diligence process outlined in section 8 of that publication has been followed for the proposal and it has been determined that an application for an Aboriginal Heritage Impact Permit is not required in this case. Aboriginal objects or places are not likely to be affected by the proposal.

4.3.4 Fisheries Management Act, 1994

The *Fisheries Management Act 1994* establishes provisions for the identification, conservation and recovery of threatened fish, aquatic invertebrates and marine vegetation. This Act also covers the identification and management of key threatening processes which affect threatened species or which could cause other species to become threatened. For further information refer to Section 6.2.

4.3.5 Heritage Act 1977

The *Heritage Act 1977* (Heritage Act) provides for the conservation of buildings, work, relics and places that are of historic, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance to the State. Matters protected under the Act include items subject to an Interim Heritage Order and items listed on the State Heritage Register, the heritage schedules of local council LEPs, and the heritage and conservation registers established under section 170 of the Act by NSW state government agencies (section 170 Registers). The Act also provides for the protection of archaeological 'relics', being any deposit, object or material evidence that relates to the non-Aboriginal settlement of NSW and is of State or local heritage significance.

Approval under section 60 of the Act is required for any action that would adversely affect an item that is subject to an Interim Heritage Order or a listing on the State Heritage Register. An excavation permit under Section 139 of the Act is required for activities that would result in or are likely to result in the disturbance or excavation of a 'relic'.

A Section 139 excavation permit would not be required for the proposal due to the low likelihood of archaeological potential. However, an Exemption Notification Form is expected to be submitted to the Heritage Council of NSW prior to construction due to the requirement to excavate in the vicinity of the Former Great Western Road, Prospect.

Non-Aboriginal heritage is further discussed in Section 6.6.

4.3.6 *Noxious Weeds Act 1993*

The *Noxious Weeds Act 1993* provides for the identification, classification and control of noxious weeds in NSW. Responsibility for the control of noxious weeds lies with the owner and/or occupier of private land and Crown land, local councils and other public authorities on land they occupy. Under the *Noxious Weeds Act 1993*, the Minister for Primary Industries may declare a plant to be a noxious weed. Control notices can be issued by the Minister and local control authorities to ensure obligations are met.

Seven species of noxious weed were recorded as part of field surveys within the study area, including three weeds of national significance (refer to Section 6.3.2). Weeds within the study area would be managed during construction through the weed management plan. The growth of noxious weeds must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits their reproduction (refer to Section 6.3.4).

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 Section 6.2 of the REF.

About 0.12 hectares of Cumberland Plain Woodland north of the Great Western Highway would be impacted by the proposed two way link road between the Great Western Highway and Prospect Highway (0.08 hectares of direct impacts, 0.04 hectares of indirect impacts). This area satisfies the criteria to be listed under the EPBC Act 1999.

A referral to the Department of Environment would determine whether or not the proposal constitutes a controlled action under the EPBC Act. However, as the potential impacts on Cumberland Plain Woodland north of the two way link road are not considered significant a referral is not proposed. Refinements to the design of the two link road including the design and consideration of nine sub-options have reduced impacts from an initial estimate of 0.32 hectares to less than 0.12 hectares of direct and indirect impacts.

4.5 Confirmation of statutory position

The proposal has been assessed as permissible without consent under the relevant environmental planning instruments. That position is established by reference to clause 94 of the ISEPP.

The proposal is within the activity definition 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 both the proponent and the determining authority for the purposes of Part 5 of the Act.

The matters prescribed by clause 228 of the Environmental Planning and Assessment Regulation 2000, for consideration by assessments under Part 5, are reviewed and included in Appendix A. No requirement for a referral under the EPBC Act has been identified.

5 Stakeholder and community consultation

This chapter outlines consultation carried out for the proposal with the local community, relevant government agencies, Aboriginal groups and other stakeholders. It also outlines the consultation approach proposed for the future.

5.1 Consultation strategy

Roads and Maritime has developed a communications plan in line with Roads and Maritime's *Community Engagement Policy Statement (Road and Maritime 2012)* and *Community Engagement and Communications – A resource manual for staff (Roads and Maritime 2012)*. This plan identifies key objectives and outcomes of consultation with the community, stakeholders and government agencies.

The consultation objectives for the proposal are to:

- Introduce the project team to the community, develop relationships and provide a point of contact for stakeholders
- Raise awareness and provide details of the proposal's features including timelines for key milestones
- Ensure the local community, road users, commuters and other major stakeholders are kept informed of the options and design process
- Provide clear, consistent and timely information about the proposal
- Identify and anticipate issues of concern to stakeholders and implement strategies to address concerns
- Provide all stakeholders with an opportunity to submit regular feedback, manage issues and feedback in a timely and effective manner.

A number of stakeholders were identified as part of the consultation process. These stakeholders included:

- Local community, including property owners and those directly affected by the proposal; specifically those who live alongside the proposal
- Local providers of community facilities and services (eg: education, health, emergency), utilities providers, and local businesses
- Local and State Government agencies/departments
- Regional community members, including road users, users of local facilities and services and residents of the wider Western Sydney area.

Consultation for the proposal has been undertaken since early 2013 with the aforementioned stakeholders. Section 5.2 outlines the consultation that has been carried out during different stages of the proposal's development.

This REF has been placed on public display and comments from the community and other stakeholders are invited. All submissions will be considered by Roads and Maritime as part of the process to finalise the concept design and detailed design of the proposal.

5.2 Community involvement

Consultation has been carried out during the proposal's development. Community members were encouraged to provide their feedback, leave comments and make

submissions via mail, email or phone contact with the proposal team. The community could contact Roads and Maritime and leave comments and submissions by:

- Email: ProspectHighway@rms.nsw.gov.au
- Phone: 1300 660 275
- Mail: Prospect Highway upgrade, Roads and Maritime, PO Box 973, Parramatta CBD NSW 2124.

5.2.1 Community update – access strategy

Roads and Maritime carried out consultation activities between March and May 2013 to inform the community of the proposal to upgrade Prospect Highway and the proposed access strategy. The community update provided details about the Prospect Highway upgrade, which aimed to:

- Seek comment, feedback, ideas, and suggestions from the community for consideration when developing the proposal
- Build a database of interested and concerned community members who Roads and Maritime can continue to engage with during development of the proposal.

The community was provided with information about the proposed access strategy and where to see it, and invited to comment through:

- A community update newsletter letter dropped on 30-31 March 2013 to 4000 local residences and mailed to 37 key stakeholders including government agencies, emergency services, local community groups, schools and transport and utility providers
- Newspaper advertisements and media releases in local newspapers Blacktown City Sun and the Blacktown Advocate (2-3 April 2013)
- The project webpage:
www.rms.nsw.gov.au/roadprojects/projects/sydney_region/western_sydney/prospect_highway/index.html
- Stakeholder briefings at Blacktown City Council on 25 March 2013 and with community group Residents of Blacktown and Seven Hills Against Further Traffic, 22 April 2013
- Comments were received until 10 May 2013 allowing a six week consultation period.

Roads and Maritime received 48 responses on the proposal from members of the community identified as local residents, commuters, business operators, organisations and pedestrians.

The most commonly raised concerns from the community were:

- Road noise increases along Prospect Highway
- Access issues.

5.2.2 Preliminary concept design

Consultation presenting the preliminary concept design of the proposal took place between October 2013 and 24 November 2013. Consultation activities included:

- Community update newsletter distributed to stakeholders and residents in October 2013

- Advertisements placed in the local Blacktown press in November 2013 inviting comment on the concept design and providing project display, information session and project contact details
- Media release issued for the concept design to invite stakeholder comment and provide project contact details
- Stakeholder briefings and community information sessions were held at Max Webber Library in Blacktown on 26 October 2013 and Shelley Public School in Blacktown on 6 November 2013
- The preliminary concept design displayed in November 2013 at the following locations:
 - Westpoint Shopping Centre, 17 Patrick Street, Blacktown (Thursday 14 November 2013, 3pm-7pm)
 - Max Webber Library Building, Corner Flushcombe Road and Alpha Street, Blacktown (until 24 November 2013)
 - Blacktown City Council, 62 Flushcombe Road, Blacktown (until 24 November 2013)
- Discussions at community information sessions with representatives of Residents of Blacktown and Seven Hills Against Further Traffic, Prospect Residents Action Group and Timbertop Reserve Group
- Meetings with local stakeholder groups including Blacktown and District Environmental Group, Blacktown City Council, Shelley Public School and Saint Mark's Coptic Catholic Church over the course of this consultation period.

An analysis of all the comments received by Roads and Maritime during the two consultation periods shows a general understanding for the need for the upgrade and the access strategy proposed for Prospect Highway. Suggestions, comments and queries have informed the concept design which is displayed as part of this REF.

A summary of the common community responses received to the community update newsletter (April 2013), the Roads and Maritime response (October 2013), concept design update (October – November 2013) and Roads and Maritime responses (March 2014) are provided in Table 5-1. For all community comments and Roads and Maritime responses refer to Appendix C or the Roads and Maritime project website.

Table 5-1 Summary of Roads and Maritime responses to community comments on community issues report and concept design update

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|--------------|--|---|---|
| Access | Changes to access will increase travel distance. | Travel distance for some residents would be slightly increased as a result of the proposed access strategy. Access to existing uncontrolled intersections would be restricted to improve road safety and traffic flow. Roads and Maritime has investigated traffic modelling and alternative routes and has found travel times generated by the turn bans would be offset by reduced travel times along the Prospect Highway. In some cases the proposed improvements are expected to reduce travel times compared to the existing situation despite the access restrictions. | Section 6.1 |
| | Removal of the service road will also remove property access and parking for residents. | Properties on Prospect Highway will continue to be accessible after the service road is removed. On street parking will be removed from Prospect Highway as part of the proposal. Parking would be available within private properties and the local surrounding road network. Changes to parking arrangements have been considered as part of the Traffic and Transport assessment for the Review of Environmental Factors. | Section 6.1 |
| | A second driveway access should be provided to ensure property owners can enter and exit their properties safely. | Roads and Maritime will investigate the need for turning facilities within affected private properties to facilitate safe entry and exit to properties to and from Prospect Highway. Changes to driveway facilities would be discussed with affected property owners during detail design. | Detail design stage |
| | Keep right out access at Roger Place to allow trucks and other large vehicles to leave the street. Trucks cannot travel on the proposed detour due to vehicle load restrictions. | Right turn access out of Roger Place is not considered a safe traffic movement once the road is upgraded to two lanes in each direction. All access changes have been reviewed as part of the Traffic and Transport assessment for the Review of Environmental Factors. | Section 6.1 |
| | The proposed bus lane will make it difficult to enter and exit properties. | Drivers turning left to enter a street, property or intersection can enter via a bus lane up to 100 metres before where they intend to turn. This also applies when entering a road with a bus lane. Roads and Maritime's website has more information on how to use bus lanes www.rms.nsw.gov.au/usingroads/buses/buslanes/ . | Section 6.1 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|-------|--|--|--|
| | The removal of the right turn from Ponds Road onto Prospect Highway restricts access to areas east of the Great Western Highway when travelling west. | The proposed concept design includes a two way link road from the Great Western Highway to Prospect Highway which would replace the removed right turn from Ponds Road on to Prospect Highway. | Section 3 Section 6.1 |
| | A ramp should be included in the plans to allow vehicles travelling east on the Great Western Highway to join Prospect Highway to go south to Pemulwuy and Greystanes. The existing exit at Reservoir Road is already congested. | The proposed concept design includes a two way link road , which would replace the existing eastbound exit ramp for the Great Western Highway. This two way link road would provide a right turn south onto Prospect Highway from the Great Western Highway for vehicles wanting to access Pemulwuy, Greystanes and Wetherill Park. | Section 3 |
| | Access needs to be maintained for garbage trucks at Shelley Public School. Trucks currently access school via Prospect Highway. | The traffic and transport assessment, has been prepared as part of the Review of Environmental Factors, is reviewing access arrangements to Shelley Public School during construction and operation of the proposal. Access arrangements to Shelley Public School are being discussed with the school and Department of Education. Access for garbage trucks would be maintained during construction and after the upgrade is finished. | Section 6.1 |
| | Very few trucks turn right onto Prospect Highway from Great Western Highway/Ponds Road. Creating turning ramp off Great Western Highway will encourage trucks onto Prospect Highway. | Prospect Highway is currently a secondary freight route (<i>Metropolitan Road Freight Hierarchy on the State Road Network Practice Note</i> , Transport for New South Wales 2011) and a B-Double Route. The Prospect Highway links to freight activity precincts at the north and south of the corridor (NSW Freight And Ports Strategy, NSW Government, 2013). The traffic and transport assessment, was prepared as part of the Review of Environmental Factors, is reviewing all access arrangements for vehicles in the proposal. | Section 6.1 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|----------------------------|--|---|---|
| | Close the right turn to Tudor Avenue and expand the intersection at Keyworth Avenue to include a right turn lane and arrow. | The proposal is to remove the right turn into Tudor Avenue with the intersection becoming left in/left out. Right in access into Tudor Avenue is proposed to be via the Keyworth Drive intersection which would be upgraded with a right turn bay for southbound traffic and a right turn signal phase to facilitate safe movements. The Traffic and Transport assessment, was prepared as part of the Review of Environmental Factors, is reviewing access arrangements. | Section 6.1 |
| Design – Traffic | Too many signalised intersections in the plan. | The proposed new traffic lights would improve intersection operation, safety and access for road users. An assessment of the impact of the proposed traffic lights was carried out as part of the Traffic and Transport assessment for the Review of Environmental Factors. | Section 6.1 |
| Design – Two way link road | Re-align lanes on the Great Western Highway and reduce median to move two way link road away from houses and Timbertop bushland. Build two way link road on the other side where there are no houses or impact to bushland. Shorten the exit off the Great Western Highway onto Prospect Highway to minimise impact on bushland and homes. | Roads and Maritime is currently investigating options to minimise the impact of the two way link road on bushland and homes. The results of this investigation and subsequent design refinements is included in the Review of Environmental Factors. | Section 2.4 Section 2.5 Section 6.1 |
| Design – Drainage | Stormwater drainage including kerb and guttering should be included in the upgrade. | Kerb and gutter is expected to be included for the whole length of the upgrade. The proposed concept design is being displayed in 2014 for the community's review and comment in conjunction with the Review of Environmental Factors. | Section 3.2 |
| | Blacktown Road floods with a small amount of rain. | Roads and Maritime is carrying out drainage and utility investigations as part of the design process. Any drainage issues identified within the proposal footprint would be addressed as part of the proposed upgrade. | Section 6.5.2 |
| Flora and Fauna | Minimise impacts on Timbertop Reserve. | Roads and Maritime is currently investigating options to minimise the impact of the two way link road on bushland and homes. The results from this investigation and the options assessed are included in the Review of Environmental Factors. | Section 2.4.2 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|---------------------|--|--|--|
| | Minimise loss of existing trees and shrubbery between Hampton Crescent and the Great Western Highway. | Roads and Maritime is currently investigating options to minimise the impact of the two way link road on bushland and homes. The results from this investigation and the options assessed are included in the Review of Environmental Factors. A landscaping strategy is being developed to address the removal of existing vegetation. | Section 2.4.2 |
| Heavy vehicles | What measures are being taken by Roads and Maritime to deter heavy vehicles from avoiding the M7 Motorway and making Seven Hills and Blacktown a preferred north/south route? | Prospect Highway is currently a secondary freight route (<i>Metropolitan Road Freight Hierarchy on the State Road Network Practice Note</i> , Transport for New South Wales 2011) and a B-Double Route. The Prospect Highway links to freight activity precincts at the north and south of the corridor (NSW Freight And Ports Strategy, NSW Government, 2013). The Traffic and Transport assessment, completed as part of the Review of Environmental Factors, considers access arrangements for heavy vehicles. | Section 2.1.1 |
| | Would like truck inspection stations, corridor audits and patrols of heavy vehicles. | A truck inspection facility has not been identified as part of this proposal. The project team is working with the Vehicle Regulation section of Roads and Maritime on a strategy to identify the need for truck inspection facilities. | Not considered as part of the proposal |
| Local road network | Increased traffic will use the residential streets to avoid delays and road work. Can temporary measures to reduce speed be placed on side roads to deter drivers from using them as an alternate route? | An assessment of the impact of the proposal on the road network during was carried out as part of the Traffic and Transport assessment for the Review of Environmental Factors. A traffic management plan would be prepared during detail design detailing proposed safety and control measures to be used during construction. | Section 6.1.4 Section 6.1.5 |
| Noise and vibration | Will residents be given a choice of noise treatments? | The results of the noise assessment and proposed treatment strategy would be discussed with affected property owners. The detailed design process would consider which noise mitigation measures are feasible and reasonable. Urban design would be considered in the design of any noise mitigation measures. | Section 6.2.1 |
| | Upgrade will increase traffic noise in rural areas. | A noise and vibration specialist study has been completed as part of the Review of Environmental Factors. The noise study would consider properties directly adjacent to and surrounding the proposal and identify properties that would be further investigated for noise mitigation measures during detail design. Properties along the corridor already impacted by traffic noise are, and can be, placed on the Roads and Maritime Noise Abatement Program for investigation and treatment. | Section 6.2.1 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|-------|---|---|--|
| | What will be done to mitigate the increase in noise? | Roads and Maritime commissioned a noise and vibration specialist study as part of the Review of Environmental Factors. The noise study has considered properties directly adjacent to and surrounding the proposal and identified properties that would be further investigated for noise mitigation measures during detail design. Properties along the corridor already impacted by traffic noise are, and can be, placed on the Roads and Maritime Noise Abatement Program for investigation and treatment. For more information about noise mitigation measures see the Roads and Maritime 'How is Noise Addressed?' information brochure, at http://www.rta.nsw.gov.au/roadprojects/resources/factsheets.html . | Section 6.2.4 |
| | Noise walls should be built to mitigate noise impacts. | The results of the noise and vibration specialist study and proposed treatment strategy, completed as part of the Review of Environmental Factors, would be discussed with affected property owners. The detailed design process would consider which noise mitigation measures are feasible and reasonable. Urban design would be considered in the design of any noise mitigation measures. For more information about noise mitigation measures see the Roads and Maritime 'How is Noise Addressed?' information brochure, at http://www.rta.nsw.gov.au/roadprojects/resources/factsheets.html . | Section 6.2.4 |
| | What will be done to limit noise from stop-start traffic on the two way link road directly outside homes? | The results of the noise and vibration specialist study and proposed treatment strategy, completed as part of the Review of Environmental Factors, will be discussed with affected property owners. The detailed design process would consider which noise mitigation measures are feasible and reasonable. Urban design would be considered in the design of any noise mitigation measures. For more information about noise mitigation measures see the Roads and Maritime 'How is Noise Addressed?' information brochure, at http://www.rta.nsw.gov.au/roadprojects/resources/factsheets.html | Section 6.2.4 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|---------------------------|---|--|---|
| Pedestrians and cyclists | Concerned with the safety of adults and school children crossing the highway to access Shelley Public School, Mitchell High School and Children's First Childcare Centre. | Crossing facilities are currently provided at Lancelot Street and Keyworth Drive at the traffic lights. This would be maintained as part of the proposal. | Section 3.2.4 |
| | Concerned about the lack of footpath from Roger Place to the traffic lights near Shelley Public School. | As a result of feedback during community consultation a pedestrian footpath would be included from Roger Place to Keyworth Drive on the eastern side of Prospect Highway. | Section 3.2.15 |
| | Upgrade should provide more cycleway infrastructure. | The temporary shared path between Harrod Street and the M4 westbound entry ramp would be upgraded as part of the proposal. A shared path on the western side is provided for the length of the proposed concept design. | Section 3.2.14 |
| | Upgrade will remove access for students who walk to school and currently use the emergency gate at the eastern side of the school property. | The Traffic and Transport assessment, completed as part of the Review of Environmental Factors, has reviewed the access arrangements to Shelley Public School. Emergency access would be maintained as part of the proposal. Access arrangements for Shelley Public School are being discussed with the school and the Department of Education. | Section 6.1 |
| Pollution | Project will cause an increase in pollution and a decrease in air quality. | The Review of Environmental Factors reviews the potential impacts that the proposal could cause while being built and in the long term, and examine where these can be avoided, minimised or mitigated. Air quality in the Sydney Region is managed by the NSW Environment & Heritage government department who monitors across the Sydney Basin and provide health warnings to the community. For information about this please go to the Environment & Heritage website http://www.environment.nsw.gov.au/air/index.htm | Section 6.10.3 Section 6.10.4 |
| | Two way link road will increase dust, soot and fumes in nearby homes. | | |
| | There will be an increase in health implications due to increased exhaust fumes. | | |
| Other issues out of scope | Connect the M2 Hills Motorway and Seven Hills while you have the infrastructure in the area. | The Prospect Highway extension through to Seven Hills is not part of this proposal and there are no plans to construct this link. This project may be investigated in the future. | Not considered as part of the proposal |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|--------------------|---|--|--|
| | Construct the intersection halfway between Keyworth Drive and Roger Place in anticipation of the Seven Hills extension. | | |
| Property | Concerned that property values will decrease. | If a property is adjacent to a new or upgraded road, Roads and Maritime has identified potential impacts as part of the Review of Environmental Factors for the proposal and is seeking to avoid or minimise impacts where possible. If a property is adjacent to a new or upgraded road and would potentially decrease in value, Roads and Maritime does not provide financial compensation. | Section 6.8 |
| | Roads and Maritime should buy out all properties affected. | Roads and Maritime would purchase properties directly required for the upgrade. Roads and Maritime is governed by the <i>Land Acquisition (Just Terms Compensation) Act 1991</i> , together with the <i>Roads Act 1993</i> . For more information please refer to the Roads and Maritime Services land acquisition: information guide (February 2012). http://www.rms.nsw.gov.au/roadprojects/resources/documents/rms_land_acquisition_info_guide.pdf . | Section 6.8 |
| | Concerned that front yard will be lost due to upgrade. | The proposal does not impact on any existing front yards along Prospect Highway. The proposed upgrade is within the existing road corridor boundaries. | Section 3.2 Section 6.1 Section 6.6 |
| Road safety | Safety barriers should be built between new road upgrade, intersection and properties to protect people and property. | Road safety is considered as part of the design and approval for the proposal. | Section 6.14 |
| Traffic congestion | Additional traffic lights will interrupt traffic flow. | Traffic lights along the corridor would be coordinated to provide optimal traffic flow along the route. Traffic modelling completed for the access strategy has indicated operation of the existing and proposed traffic lights as a result of the proposal would be better than existing conditions. | Section 6.1 |
| | Road already at capacity. Upgrade will attract more traffic making road even more congested. | The proposal will provide more capacity to cater for current and future traffic volumes to 2031. The Traffic and Transport assessment models the impact of 'no build' and the proposal to assess the two options for capacity to handle the future traffic volumes. | Section 6.1 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|--------------|---|---|---|
| | Wet 'n' Wild Sydney will generate additional traffic in the area. | Additional traffic volumes associated with Wet 'n' Wild Sydney have been included in the Traffic and Transport assessment traffic model as part of the Review of Environmental Factors. | Section 6.1 |
| | The removal of informal parking spaces on Prospect Highway will add to traffic congestion on Hadrian Avenue during school drop off and pick up times. | The Traffic and Transport assessment, completed as part of the Review of Environmental Factors, reviews access arrangements to Shelley Public School during construction and operation of the proposal. It is safer and more appropriate for school access to be via the local road network. Access arrangements to Shelley Public School are being discussed with the school and Department of Education. | Section 6.1 Section 6.8 |
| Other | Project should cover the whole of Prospect Highway, not be treated in sections. | The proposed project is for the section of Prospect Highway between Reservoir Road at Prospect and St Martins Crescent at Blacktown. Roads and Maritime is committed to carrying out a corridor study of the Prospect Highway (including Reconciliation Road) between the M2 Hills Motorway / Abbott Road intersection (Seven Hills) and Victoria Street (Wetherill Park) after Reconciliation Road opens to traffic. The study will highlight corridor priorities in the short, medium and long term. | Section 6.1 |
| | Two way link road from Great Western Highway to Prospect Highway destroys visual and serenity values. | An urban design and visual impact assessment has been carried out as part of the Review of Environmental Factors and is available for the community to review and comment on. | Section 6.4 |
| | Proposed upgrade will destroy quality of life and serenity for landowners. | The proposal would reduce congestion and provide more capacity to cater for current and 2031 traffic volumes. A Traffic and Transport assessment has modelled the impact of 'no build' and the proposal to assess the two options for capacity to handle the future traffic volumes. | Section 6.1 |
| | When will construction begin, how long will it take and what will be the impacts of construction? | There is no confirmed timetable for construction of the proposed Prospect Highway upgrade. The proposal is in the planning phase. As part of the Review of Environmental Factors, the impact of construction has been assessed and confirmed during detailed design phase. Throughout this project, Roads and Maritime would provide regular information to the community to keep them informed of progress. | Section 1.1.1 |

| Issue | Summary of community comment | Roads and Maritime's comments | Relevant section in REF (where applicable) |
|-------|---|---|--|
| | Will houses be inspected before construction work begins? | Roads and Maritime would inspect all structures and buildings to document the current condition for future reference before construction of the proposal begins | Section 7.2 |

5.3 Aboriginal community involvement

Roads and Maritime's Aboriginal Cultural Heritage Advisor, Sydney Region, was consulted about the proposal and undertook a site inspection and assessment on 23 July 2013 in line with the requirements of the Procedure for Aboriginal Heritage Consultation and Investigation (PACHCI) (Roads and Maritime 2011).

A search of the Aboriginal Heritage Information Management System (AHIMS) database was carried out on in June 2013 as part of this REF. A further search of the database in December 2013 was undertaken to check that the previous search results were up to date. The results of this database search confirmed that there are no known Aboriginal heritage sites within or immediately adjacent to the proposal area.

If any potential Aboriginal objects (including skeletal remains) are discovered during the course of the proposal, all work in the vicinity of the find must cease and the steps outlined in the Roads and Maritime Unexpected Archaeological Finds Procedure would be followed.

On the basis of the investigations undertaken, Roads and Maritime has formed the view that an Aboriginal Heritage Impact Permit under the *National Parks and Wildlife Act, 1974* would not be required in this case and that it is not necessary to proceed beyond Stage 1 of the PACHCI. Aboriginal cultural heritage impacts are not anticipated as a result of the proposal.

Refer to Section 6.7 for further details.

5.4 ISEPP consultation

Roads and Maritime has consulted with Blacktown City Council and Holroyd City Council as required under the State Environmental Planning Policy (Infrastructure) 2007.

Clause 13 of the ISEPP (refer to Section 4.1) requires consultation with council for development that would impact on council-related infrastructure or services. Roads and Maritime is required to consult with Blacktown and Holroyd City Councils under clause 13(1)(a), 13(1)(b) and 13(1)(f) due to the potential impacts of the proposal on stormwater, traffic, road and footpath infrastructure. In particular, the proposal requires partial acquisition of a small area of Blacktown Council land north of the proposed two way link between the Great Western Highway and Prospect Highway, currently used as a drainage easement (Lot 91/DP803853).

Consultation under Clause 14 of the ISEPP was not carried out because impacts on local heritage from the proposal are minor (refer to Section 6.6.3). Consultation under Clause 15 of the ISEPP was not carried out because the proposal is not likely to have a substantial impact on flood liable land.

Roads and Maritime consulted with Blacktown City Council and Holroyd Council via letter on 12 September 2013. A copy of the Councils' letter responses dated 11 October 2013 (Blacktown) and 28 October 2013 (Holroyd) are included in Appendix C. The issues raised by Blacktown and Holroyd councils, how they have been considered as part of the proposal and relevant REF sections (where applicable) are identified in Table 5-2.

Roads and Maritime has had a number of meetings with Blacktown City Council to discuss the proposal and identify key issues to be addressed in design and construction. Further discussions with Blacktown City Council took place in October and November 2013 to discuss the preliminary concept design and to provide an update about the proposal. In addition, Blacktown City Council representatives have been invited to workshops for the proposal during its development.

Roads and Maritime would also provide the councils with copies of this REF for information. Should Roads and Maritime determine that the proposal can proceed, consultation with the councils would continue throughout the detailed design and construction phase.

Table 5-2 Council responses to ISEPP notification

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|----------------|---|---|---|---|
| Blacktown City | Provision of road infrastructure | Council acknowledges that the proposed upgrade of Prospect Highway will provide the road infrastructure required to cater for travel demands generated by recreational and residential developments, particularly Wet 'n' Wild` Sydney, and employment in Prospect and it will reduce congestion in peak traffic periods. | Noted | Section 3.1 |
| | Improves safety, access and journey times | In general, Council supports the proposal as it would improve safety, access and journey times for pedestrians, cyclists, buses and motorists. The following key features of the proposal are supported: <ul style="list-style-type: none"> • Prospect Highway: upgrade to two lanes in each direction with central median including duplication of bridge over M4 Motorway and Great Western Highway • Replacing eastbound off-load ramp from Great Western Highway connecting to Prospect Highway with a new two way road with central median • Upgrading three existing signalised intersections with Prospect Highway at: <ul style="list-style-type: none"> - M4 Motorway westbound entry and exit ramps - Harrod Street - Keyworth Drive • Construction of four new signalised intersections at: <ul style="list-style-type: none"> - Reservoir Road / Reconciliation Road and Prospect Highway intersection - Prospect Highway at its intersection with M4 Motorway eastbound exit and entry ramps - Prospect Highway at its intersection with Great Western Highway eastbound exit and entry ramps - Stoddart Road and Prospect Highway intersection • Construction of a shared path on the western side of Prospect Highway to connect existing paths. | Noted | Section 3.1 |
| | Traffic impact study and modelling | The proposal's impact on the existing and planned road network in the area cannot be fully understood without assessing a traffic impact study and traffic modelling details. Council had previously requested that Roads and Maritime | A traffic impact study is provided as Appendix D to the | Section 6.1 Section 6.8 Section 6.9 |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|---------|------------------------------------|---|--|--|
| | | provide a copy of supporting study documents as a matter of urgency so that the full extent of the impact of the proposal can be assessed before the closing date for the comments. Unfortunately to date a copy of the report has not been provided and this has prevented Council from completing the full assessment of the proposal. However, Blacktown City Council has provided the following interim comments on the proposal. Further comments will be provided on the proposal once Council receives the supporting traffic study from Roads and Maritime. | REF. | |
| | Ponds Road / Prospect Highway | Ponds Road is under Roads and Maritime's care and control, providing a link between Prospect Highway and Great Western Highway. Restricting traffic movements to left in, left out will not directly affect residents as there is no property access provided from this street. Impact of the left in, left out restriction is considered minor as an alternative link between Prospect Highway and Great Western Highway will be provided as part of this proposal. | Noted | Section 3.1 Section 6.1 Section 6.8 Section 6.9 |
| | Vesuvius Street / Prospect Highway | Restricting traffic movement to left in, left out will affect residents living mainly along Vesuvius Street and to a lesser extent to Everest Street and Himalaya Crescent. All streets are local residential streets under Council's care and control providing access to the properties fronting them. Impact of the left in, left out restriction is considered significant on the basis that residents are required to travel an extra distance of about 1.4 kilometres to gain access to Prospect Highway if they wish to travel north. Residents will be required to travel along Columbia Road and Blacktown Road before they can turn in and out at the signalised intersection of Prospect Highway and Blacktown Road. This restriction will increase traffic volume along Columbia Road and Blacktown Road. The junction of Columbia Road with Blacktown Road is a T-intersection with priority control only. Additional traffic may create road safety issues at this junction. Consequently further investigations are needed and should be identified in the Review of Environmental Factors (REF) for Prospect Highway Upgrade. | A traffic impact study is provided as Appendix D to the REF. | Section 6.1 Section 6.8 Section 6.9 |
| | Tudor Avenue / Prospect Highway | Restricting traffic movements to left in, left out will affect residents living mainly along Tudor Avenue and to a lesser extent residents living along Beaufort Road. Both streets are local residential streets under Council's care and control providing access to the properties fronting them. Impact of the left in, left out | Noted | Section 6.1 Section 6.8 Section 6.9 |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|---------|---|---|---|--|
| | | <p>restriction is considered minor on the residents as there is an existing alternative access point in the form of a signalised intersection at Keyworth Drive and Prospect Highway. At this intersection residents would be able to benefit from all movements.</p> <p>Although Tudor Avenue left in, left out restrictions will inconvenience some residents, the impact of the restrictions is not considered significant as an alternative route is available for southbound motorists via Beaufort Road and Keyworth Drive.</p> | | |
| | Roger Place / Prospect Highway | Roger Place is a local residential street under Council's care and control providing access to 34 properties with a cul-de-sac at the other end. Access to Roger Place can only be achieved via its junction with the Prospect Highway. The proposal restricts right out movement from the Roger Place which will affect residents who wish to travel north along the Prospect Highway. The impact of banning the right out movement is considered moderate on the basis that it would only affect northbound traffic from Roger Place and there is no direct alternative available for the northbound traffic from the Roger Place to continue their journey north. Drivers wish to travel north would need to use Keyworth Drive to make a right turn and then use Beaufort Road and Tudor Avenue to continue their journey to the north. | Noted | Section 6.1 Section 6.8 Section 6.9 |
| | Seven Hills extension | Council is disappointed that the Prospect Highway extension through Seven Hills is not included in the proposal despite the fact that Blacktown Hospital is undergoing major expansion that would attract more staff and patients. No justification is given as to why the extension is not part of the investigation. | The Seven Hills extension is outside the scope of the proposal. | Outside proposal scope. |
| | Delivery timetable and funding availability | It is concerning that no time frame and funding has been assigned to the project whereas it is acknowledged by Roads and Maritime that the main driver for this project is reduction in congestion during peak traffic periods along Prospect Highway. | The cost of the proposal would be subject to detailed design. Funding to complete the proposal would be sought from the | Section 1.1 Section 2.1 |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|----------------------|---------------------------------|--|--|--|
| | | | NSW State Government. Subject to approval, construction work is expected to take around two years to complete. | |
| | Traffic movement restrictions | Traffic movement restrictions along various intersections as identified in the proposal would impact local community accessibility. It would also impact on amenity on some streets which will take additional traffic due to the turning restrictions proposed. The primary impact is expected along Colombia Road, Prospect which will be used by both inbound and outbound traffic resulting from restricting traffic movements to left in, left out at the intersection of Vesuvius Street and Prospect Highway. | A traffic impact study is provided as Appendix D to this REF. | Section 6.8 Section 6.9 |
| Holroyd City Council | Widening of Reconciliation Road | <p>The road upgrade should include the widening (to four lanes) of Reconciliation Road (Prospect Highway extension) from Reservoir Road, Prospect to Bellevue Circuit, Pemulwuy. Upgrading this section will ensure that traffic flow is not restricted.</p> <p>The upgrading of Reconciliation Road will ensure the full benefit of the Prospect Highway upgrade is realised. It is noted that the road reserve on Reconciliation Road (including the drainage system) has been designed to cater for widening.</p> | Roads and Maritime is responsible for state roads. Reconciliation Road is a local council road under the care and control of Holroyd City Council. | Section 2.1 Section 6.8 Section 6.9 |
| | Bus priority treatments | <p>Bus priority treatments and bus lanes proposed should be extended to Reconciliation Road.</p> <p>Transport for New South Wales has proposed new bus routes along Reconciliation Road. To encourage the use of alternative transport in the area, bus priority treatments and bus lanes should be implemented.</p> | The proposal would allow for an increase and further bus movement through Prospect Highway and onto Reconciliation | Section 2.1 Section 6.9 |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|---------|-----------------------------------|---|---|--|
| | | | Drive. Roads and Maritime would continue to investigate options during the detail design process and would consult with the Council. Two new bus stops are proposed at the intersection between Reconciliation Road and Reservoir Road. | |
| | Regional and local cycleway links | Proposed regional and local cycleway links should be included as part of the project. This includes extension of the cycleway along Clunies Ross Street, Pemulwuy and connections to Pemulwuy Employment Lands. | Outside scope of the proposal, however the proposal would address the goals of Sydney's Cycling Future by upgrading the existing shared path recently built by the Roads and Maritime Cycleway Alliance. | Outside proposal scope. |
| | Traffic modelling | The final road widening and intersection treatment layouts should be based on traffic modelling, which considers all future growth including new employment lands, residential land releases, major traffic generators/attractors (eg Wet "n" | The proposal's design has been informed by traffic | Section 6.1 Section 6.9 |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|---------|-----------------------|---|---|---|
| | | <p>Wild Sydney) and transport infrastructure upgrades (such as M4 Motorway Clearway Project, West Connex, M5 Widening, opening of the southern section of Reconciliation Road).</p> <p>All assumptions and modelling results should be referred to Holroyd City Council for further comments prior to the release of the REF.</p> | <p>modelling and the traffic impact study on this design is included in Appendix D of this REF.</p> | |
| | Environmental impacts | <p>The REF should review the impact of the proposal on noise, contamination, stormwater, existing trees, traffic (during and post construction), cycleways and public transport. The final REF shall be referred to Holroyd City Council for further comments if there are any impacts within Holroyd LGA.</p> | <p>The REF has considered environmental impacts based on the Environmental Impact Assessment Guidance Note – Preparing a project review of environmental factors (Roads and Maritime, 2012). The final REF and its supporting documentation is to be made available to Council as part of the public display.</p> | <p>Section 6.1 Section 6.2 Section 6.3 Section 6.9 Section 6.10</p> |
| | Regular consultation | <p>Regular consultation should be carried out with residents, business owners and other stakeholders within Holroyd LGA particularly during the construction period.</p> | <p>Roads and Maritime would continue to consult residents, business owners and relevant stakeholders during</p> | <p>Section 5.5 Section 5.6</p> |

| Council | Issue | Issues raised | Roads and Maritime response | Relevant section in the REF (where applicable) |
|---------|-------|---------------|--|--|
| | | | the detail design process and, subject to approval, throughout the construction of the proposal. | |

5.5 Government agency and stakeholder involvement

Consultation with Transport for New South Wales (TfNSW) was undertaken during the preliminary concept planning phase of the proposal. TfNSW was approached by Roads and Maritime with plans to provide additional bus lanes between Lancelot Street and St Martins Crescent as it was noted by TfNSW that the corridor, as a whole, was currently underperforming against bus targets. In response to this proposal, and following further discussions with TfNSW regarding the proposal's design, Roads and Maritime has extended the length of the bus lanes to about 200 metres north of St Martins Crescent.

Further, due to the location of constraints along the corridor, including the location of existing infrastructure, the proposed alignment of the proposal is within 15 metres of two high voltage electricity towers: one is located just south of Harrod Street and the other immediately north-west of the western exit ramp of the M4 Western Motorway. These two Endeavour Energy assets were identified early in the development of the concept design to be a risk to the proposal. Therefore, Roads and Maritime has consulted with Endeavour Energy from the proposal's inception to identify a design solution that meets the requirements of both parties.

The design of the proposal has been refined to avoid direct impacts on the Endeavour Energy assets. A 900 mm high concrete barrier has been included in the proposal design alongside the kerb adjacent to the tower south of Harrod Street in response to discussions with Endeavour Energy.

5.6 Ongoing or future consultation

This REF has been placed on public display and community comments are invited. All comments received will be considered before finalising the proposal's concept design. The community would be kept informed of any further changes to the proposal resulting from this and any future consultation process.

Information sessions will be held during the REF public display period. Details of these information dates and locations will be advertised prior to the events and issued in a Roads and Maritime community update.

In addition, the following ongoing consultation would be carried out:

- Current proposal information provided through the proposal website, http://www.rms.nsw.gov.au/roadprojects/projects/sydney_region/western_sydney/prospect_highway/index.html
- Ongoing meetings with Blacktown City Council, Holroyd City Council, utility providers including Endeavour Energy, Transport for New South Wales and other stakeholders as required
- Ongoing updates to the immediately affected community during the detailed design phase and the construction period
- Consultation with community stakeholders to assist in managing impacts during construction
- Follow-up meetings to discuss access arrangements with directly affected landowners prior to construction
- The construction contractor would develop a communication plan to keep residents and road users up to date about construction progress. This would include:
 - Notifying residents when work is proposed to start
 - Notifying residents of night-work
 - Notifying residents of access issues
 - Providing contact details and a helpline for further information and to enable potential concerns to be addressed during construction
 - A 24 hour project information telephone number established for the construction phase.

6 Environmental assessment

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

6.1 Traffic, transport and access

SMEC Australia Pty Ltd (SMEC) undertook a traffic and transport assessment for the proposal in October 2013 to identify the current transport patterns and conditions of the highway and assess the construction and operational impacts of the proposal. The assessment is provided in Appendix D and a summary is provided below.

6.1.1 Assessment methodology

The process undertaken in the traffic and transport assessment was to:

- Examine and assess the traffic and transport patterns and conditions along the existing Prospect Highway corridor and connections with the M4 Western Motorway and Great Western Highway
- Consider previous traffic and transport studies and investigations along the corridor
- Review historic traffic volume and crash data for the proposal corridor
- Conduct modelling to assess road network performance
- Assess public transport performance along the corridor
- Determine the proposal's impacts during the construction and operation phases for all road users
- Develop mitigation and management measures to minimise the impacts identified.

SMEC developed a micro-simulation model in the AIMSUN traffic modelling program between Reservoir Road at Prospect and Leabons Lane at Blacktown to evaluate the traffic benefits of the proposed Prospect Highway upgrade against the no build option. Micro-simulation was nominated as a preferred modelling method as it models the behaviour of individual drivers and replicates details of road features, traffic operations and traffic control, including signals. Data was provided by Roads and Maritime to develop the demand matrices and calibrate the traffic model. These were:

- Demand matrices from the Roads and Maritime strategic model (EMME)
- Classified traffic counts (October 2013)
- Turning movement counts from SCATS (October 2013).

SMEC reviewed and verified the modelling inputs, assumptions, methodology and outputs against current configuration of the highway which can be reviewed in the traffic and transport assessment in Appendix D. The model was then updated with the concept design and construction staging strategy as described in Chapter 3.

As part of the traffic impact assessment three future years were assessed:

- 2018 (potential opening year)
- 2028 (ten years after opening)
- 2038 (20 years after opening).

The two network scenarios described in Section 2 were modelled for peak daily periods of each of the above future years:

- Do nothing scenario which includes:
 - Road network as per October 2013 with no modifications, except for the connection of Reconciliation Road through to Wetherill Park and Wet 'n' Wild Sydney open

- Forecast increases in traffic, based on the future modelling, using Roads and Maritime strategic network forecasts
 - Increased public transport in line with future growth
 - Optimised operation of existing traffic signals to accommodate traffic
- The proposed upgrade scenario which includes:
 - Proposed road network upgrades as per the design in Section 3, including the connection of Reconciliation Road through to Wetherill Park and Wet 'n' Wild Sydney open
 - Forecast increases in traffic, based on the future upgrade strategic modelling, using Roads and Maritime strategic network forecasts
 - Increased public transport in line with future growth
 - Optimised operation of traffic signals to accommodate traffic.

6.1.2 Existing environment

The existing road environment has been described in Section 2.2 while characteristics of the existing road that are relevant to the proposal need are discussed in Section 2.1 and 3.1. Key traffic and transport characteristics of the existing corridor are summarised below.

Existing road

Prospect Highway is an eight kilometre south to north corridor linking the suburbs of Prospect, Blacktown and Seven Hills and forms a connection between the M4 Western Motorway and M2 Hills Motorway. The proposal comprises the 3.6 kilometre section from Reservoir Road at Prospect to 200 metres north of St Martins Crescent at Blacktown.

Prospect Highway provides access to:

- M4 Western Motorway and limited access to the Great Western Highway
- Local road network of Prospect, Blacktown and Seven Hills between Reservoir Road and St Martins Crescent
- Wet 'n' Wild Sydney via Reservoir Road
- Industrial, commercial and shopping centres off Reconciliation Road, Reservoir Road, Stoddart Road and St Martins Crescent
- Residential properties on Prospect Highway and within the surrounding local road network
- Community and education facilities such as Shelley Public School, Medlife medical centre and places of worship.

The key features of the existing road are:

- Prospect Highway is generally an undivided two-lane road with additional lanes at some intersections for turning and through movements
- The highway does not have property accesses south of the Blacktown Road intersection, with the exception of the one property at 501 Prospect Highway
- Four lane bridge over the M4 Western Motorway
- Two lane bridge over the Great Western Highway
- An informal service road along the western side of the Prospect Highway between Lancelot Street and about 60 metres south of St Martins Crescent
- Existing bus stops at Stoddart Road, Lancelot Street, Keyworth Drive, Roger Place (southbound only), Tudor Avenue and St Martins Crescent
- An informal stopping area outside Shelley Public School

- Bus priority lanes are located at the approaches and departures of the Lancelot Street intersection
- Pedestrian underpass between Old Church Lane and Keyne Street, about 330 meters south of Blacktown Road intersection
- Shared path along the western side of the highway. There is a shared traffic zone for about 20m along the shared path between Tudor Avenue and St Martins Crescent
- Pedestrian paths on the eastern side of the highway between Stoddart Road and Harrod Street, Blacktown Road and Keyworth Drive, Roger Place and northern limit of the proposal area
- Speed limit of 60 km/h.

Existing traffic volumes

Prospect Highway currently caters for about 35,000 annual average daily traffic (AADT). Roads and Maritime SCATS data was provided at eight locations at intersections to identify and confirm traffic volumes.

To support the data collected at the various traffic signals in the study area, Roads and Maritime commissioned traffic composition surveys between 8 and 14 October 2013. The surveys recorded the traffic volume in both directions at 15-minute intervals and included traffic composition breakdowns. The traffic profile results for two locations along Prospect Highway, 200 metres north of the Great Western Highway and south of Roger Place, are presented in Figure 6-1 and Figure 6-2. These two survey locations were chosen to represent the two different road usage patterns along the proposal corridor.

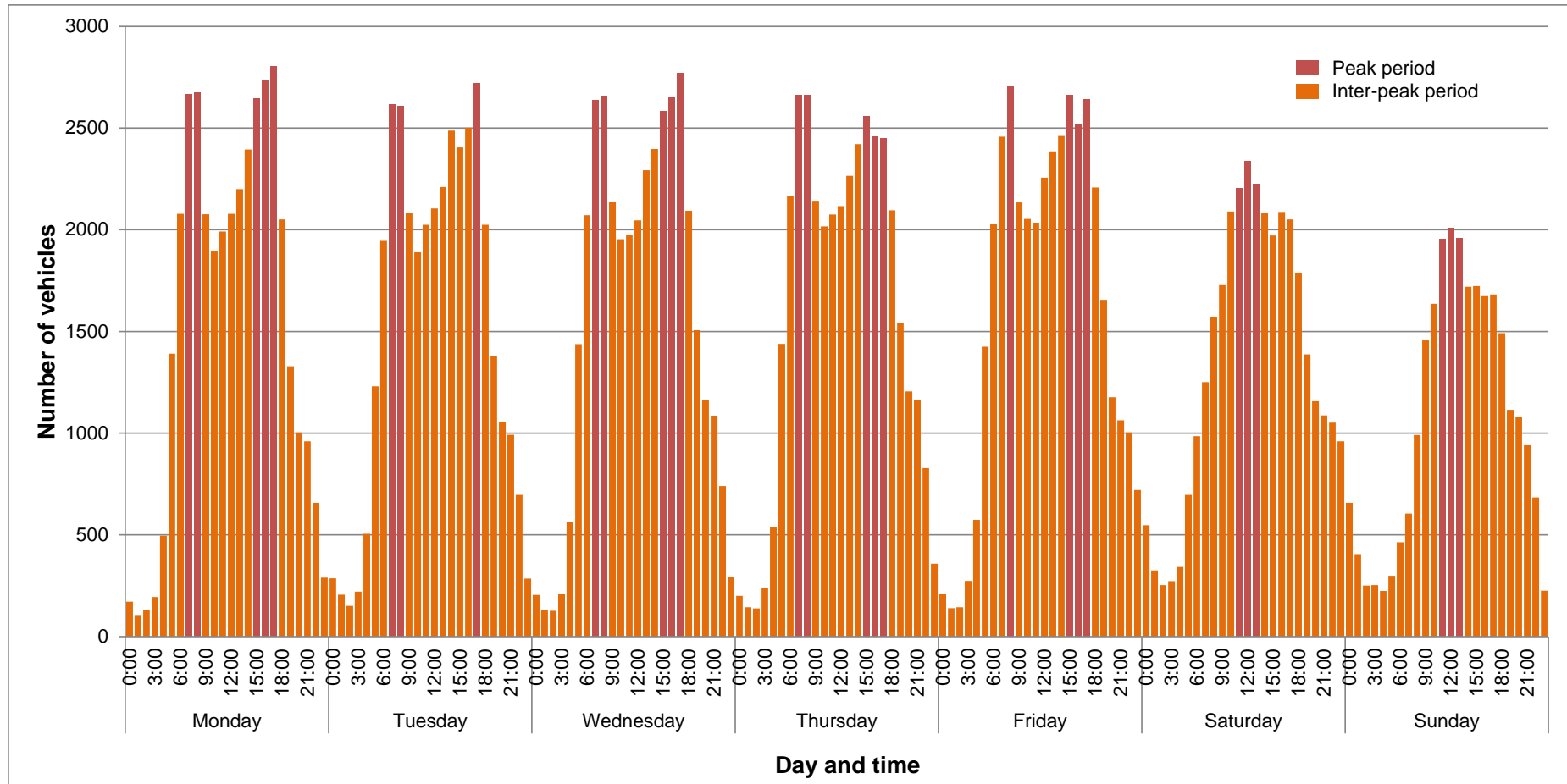


Figure 6-1 Weekly traffic volume profile, Prospect Highway, 200 metres north of Great Western Highway

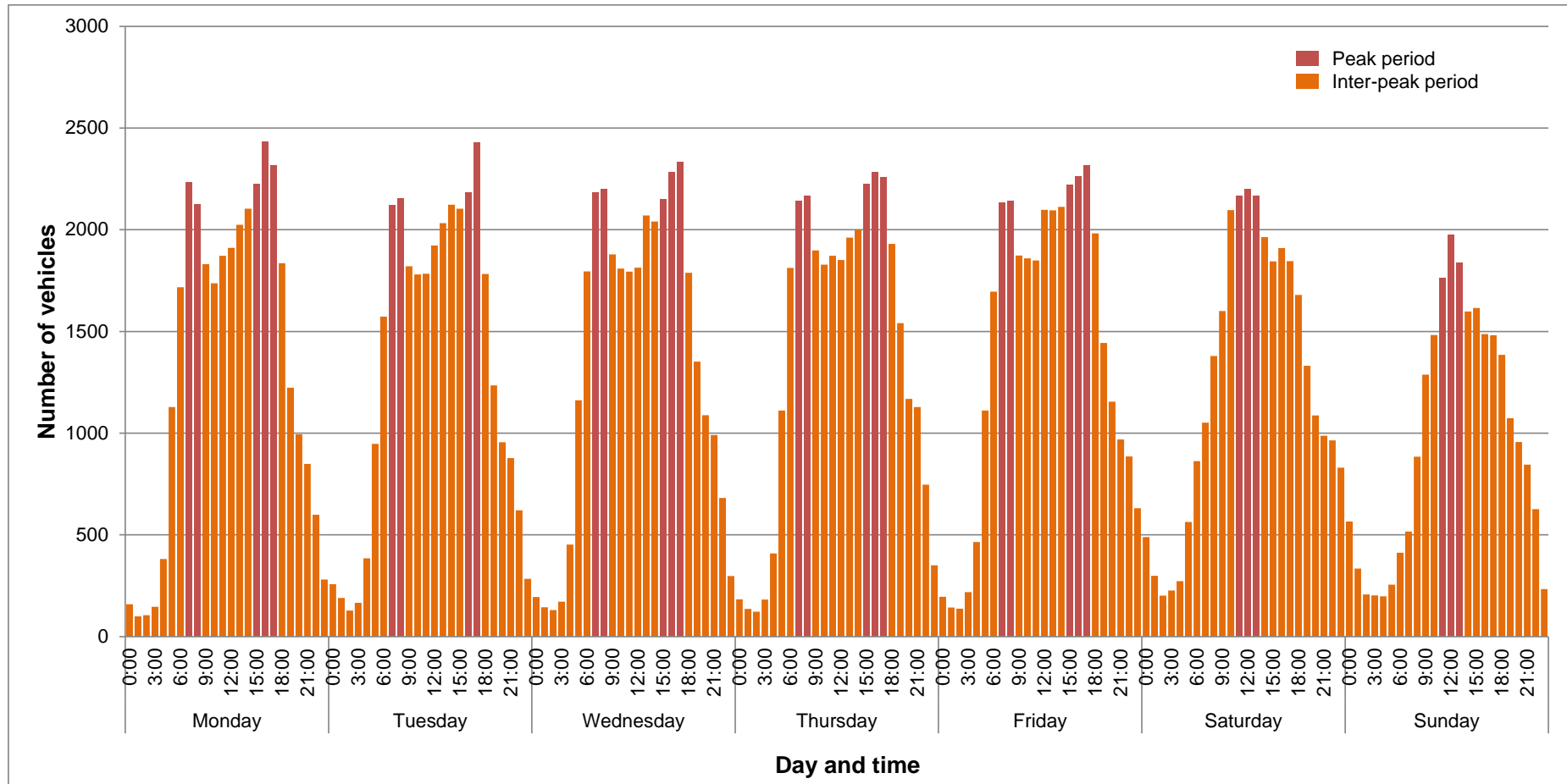


Figure 6-2 Weekly traffic volume profile, Prospect Highway, south of Roger Place

The weekly profiles indicate that:

- There are defined morning and afternoon peaks during weekdays
- During weekends, traffic volumes are generally lower with peaks evident around the middle of the day
- Traffic volumes are higher on Prospect Highway 200 metres north of the Great Western Highway and exhibit more defined peaks compared with Prospect Highway, south of Roger Place.

Surveys of the daily profile for the two survey locations indicate:

- The AM peak period occurs between 7am and 9am on weekdays
- The PM peak period occurs between 3pm and 6pm on weekdays
- The AM peak is more defined than the PM peak period, which tends to be spread over a longer period.

Traffic queuing and extensive delays have been observed and experienced at these locations and along Prospect Highway which is shown by the extended duration of the peak traffic period.

Table 6-1 outlines the volume and volume / capacity ratio on the Prospect Highway corridor at two key locations under the existing conditions. It shows that the existing road volume is at capacity in both peaks at both locations in both directions. The exception is northbound in the PM peak (0.9) and southbound in the AM peak (0.8).

Table 6-1 Existing volume / capacity ratio assessment*

| Location along Prospect Highway | Direction | AM | | PM | |
|---------------------------------|------------|-------------------|-----------------------|-------------------|-----------------------|
| | | Volume (vehicles) | Volume capacity ratio | Volume (vehicles) | Volume capacity ratio |
| North of Great Western Highway | Northbound | 1,401 | 1.0 | 1,349 | 1.0 |
| North of Great Western Highway | Southbound | 1,260 | 1.0 | 1,329 | 1.0 |
| South of Roger Place | Northbound | 1,195 | 1.0 | 1,127 | 0.9 |
| South of Roger Place | Southbound | 962 | 0.8 | 1,203 | 1.0 |

* A volume / capacity ratio of 1.0 indicates that a road corridor is operating at its capacity. It is not possible to operate above a capacity of 1.0

Existing intersections and performance

Within the proposal corridor there are 14 intersections with most allowing all movements due to the predominantly undivided 2 lane configuration of the highway. Table 6-2 summarises the existing intersections and permitted movements along the proposal corridor. Current intersection control method can be found in Section 3.2.11 and Table 3-3.

Table 6-2 Intersections and permitted movements along the proposal corridor

| Intersection | Movements permitted |
|---|--|
| Reservoir Road / Reconciliation Road | All movements permitted |
| M4 Western Motorway, westbound exit and entry ramps | All movements permitted, except eastbound |
| M4 Western Motorway, eastbound exit and entry ramps | All movements permitted, except westbound |
| Ponds Road | All movements permitted |
| Great Western Highway, eastbound exit and entry ramps | Left turn northbound onto Prospect Highway only |
| Stoddart Road | All movements permitted except right turn out of Stoddart Road |
| Harrod Street | All movements permitted |
| Blacktown Road | All movements permitted |
| Lancelot Street | All movements permitted |
| Vesuvius Street | All movements permitted, right turn in restricted weekdays from 7am to 10am and 3pm to 7pm |
| Keyworth Drive | All movements permitted |
| Roger Place | All movements permitted |
| Tudor Avenue | All movements permitted |
| St Martins Crescent | All movements permitted |

The performance of the road network is largely dependent on the operating performance of intersections which form critical capacity control points on the road network.

Table 6-3 shows the results of traffic surveys undertaken in October 2013 in terms of the peak hour traffic volumes for Prospect Highway and the intersecting roads.

Table 6-3 Existing traffic volumes

| Intersection | AM peak hour | | | PM peak hour | | |
|---|----------------|-------------------------|-------------------|----------------|-------------------------|-------------------|
| | Total vehicles | Average delay (seconds) | Level of service | Total vehicles | Average delay (seconds) | Level of service |
| Reservoir Road / Reconciliation Road | 870 | 5 | A (north through) | 530 | 2 | A (south through) |
| M4 Western Motorway, westbound exit and entry ramps | 1,740 | 19 | B (north right) | 1,870 | 25 | B (east right) |
| M4 Western Motorway, eastbound exit and entry ramps | 2,750 | 8 | A (north through) | 2,340 | 8 | A (west through) |
| Ponds Road | 2,680 | 35 | C (east left) | 2,420 | 41 | C (east right) |
| Great Western Highway, eastbound exit and entry ramps | 1,470 | 63 | E (west left) | 1,150 | 15 | B (west left) |
| Stoddart Road | 2,810 | 29 | C (south right) | 2,330 | 2 | A (south through) |
| Harrod Street | 2,600 | 16 | B | 2,360 | 9 | A |
| Blacktown Road | 2,850 | 16 | B | 2,720 | 14 | A |
| Lancelot Street | 2,560 | 14 | A | 2,580 | 10 | A |
| Vesuvius Street | 2,380 | >200 | F (east left) | 2,530 | >200 | F (east right) |
| Keyworth Drive | 2,360 | 7 | A | 2,540 | 7 | A |
| Roger Place | 2,200 | 42 | C (east right) | 2,500 | 22 | B (east left) |
| Tudor Avenue | 2,310 | 39 | C (west right) | 2,440 | 48 | D (west right) |
| St Martins Crescent | 2,550 | 20 | B | 2,740 | 21 | B |

The level of service is the standard measure used to assess the operational performance of the network and intersections. There are six levels of service, ranging from level of service A to level of service F. Level of service A represents the best performance, and level of service F the worst. A level of service D or better is considered to be an acceptable level of service during peak periods.

The results show that all of the intersections currently operate at an acceptable level of service of D or better, except for:

- The Great Western Highway exit ramp merge with Prospect Highway in the AM peak, which operates at level of service E with an average delay of 63 seconds for vehicles on the Great Western Highway eastbound exit ramp
- The Vesuvius Street intersection, vehicles turning from Vesuvius Street wait longer than 200 seconds in both peak hours. The intersection operates at level of service F. There are only a small number of vehicles currently exiting Vesuvius Street and waiting for this period of time. Other vehicles leaving Vesuvius Street are using alternative routes.

Observation of the operation of the AM peak model showed that for a majority of turning movements the queues are adequately contained within existing turning lanes, or clear within a single traffic signal cycle, with the exception of:

- Vehicles on the Great Western Highway eastbound exit ramp attempting to merge left onto the Prospect Highway with queue lengths around 75 metres
- Vehicles on Vesuvius Street turning right or left onto Prospect Highway with queue lengths around 130 metres. Due to the extended delays at this intersection traffic use alternate routes to access Prospect Highway.

Observation of the operation of the PM peak model showed that for a majority of turning movements the queues are adequately contained within existing turning lanes, or clear within a single traffic signal cycle, with the exception of:

- Vehicles on Vesuvius Street turning right or left onto Blacktown Road, at around 100 metres. Due to the extended delays at this intersection traffic use alternate routes to access Prospect Highway.

Access and parking

Prospect Highway does not provide direct access to properties or parking south of the Blacktown Road intersection, with the exception of one property north of Harrod Street, 501 Prospect Highway.

Property accesses and parking along Prospect Highway occur between Lancelot Street and the northern extent of the proposal. The accesses along Prospect Highway are summarised below.

On the Western side of Prospect Highway between Lancelot and 200m north of St Martins Crescent:

- Five residential driveway access between Lancelot and Shelley Public School
- Shelley Public School – a maintenance and garbage collection driveway access. An emergency pedestrian access to the school located at the northern section of the school property which connects to the shared path
- Six residential driveway accesses along the informal service road between Shelley Public School and Keyworth Drive
- 24 residential driveway accesses along the informal service road between Keyworth Drive and Tudor Avenue
- Medlife Medical Centre – which has dual driveway access about 70 metres south of Tudor Avenue. Medlife Medical Centre has about 5 off street parking spaces
- Three residential driveway accesses along the informal service road between Tudor Avenue and St Martins Crescent with two residences using the shared traffic zone along the shared path to access their properties
- St Martins Village and Blacktown Mega Centre using a slip lane on the western side of the proposal corridor about 150 metres north of St Martins Crescent.

Eastern Side of Prospect Highway between Lancelot Street and 200m north of St Martins Crescent:

- 1 residential driveway access between Harrod Street and Blacktown Road
- 17 residential driveway accesses between Blacktown Road and Vesuvius Street
- Three Residential driveway accesses between Vesuvius Street and Keyworth Drive
- 17 Residential driveway accesses between Keyworth Drive and 200m north of St Martins Crescent
- Blacktown Road Children's Centre. The access includes a 40 metre left turn slip lane into the centre and about 20 off-street parking spaces
- Army cadet base (Safe Base Bravo) – located on the eastern side of Prospect Highway, south of St Martins Crescent. Parking spaces on site unknown.

All properties that front the highway have off street parking provisions.

The informal service road provides access to properties along this section of the highway and parking unrestricted parking provisions. To evaluate usage of the informal service road SMEC commissioned a survey on Thursday 28 November 2013 from 6am to 8pm along the informal service road to determine the number of vehicles currently using the informal service road for residential parking and to access Medlife Medical Centre.

The key findings from the parking survey of the informal service road are:

- Excluding the vehicles parked to access the school and the Medlife Medical Centre, a maximum of five vehicles were parked within the informal service road, peaking at around 7:45pm
- The vehicles parked at the southern section of the informal service road were primarily associated with school pick-up and set-down of the Shelley Public School
- A maximum of eight vehicles at a given time were observed to be parked for access to the Medlife Medical Centre with parking between 7:30am-6:30pm peaking at 9:30am. The distribution of time spent parked were: less than 15 minutes, 30 minutes to one hour and one to two hours with each time duration having about the same percentage of cars parked for each.

Shelley Public School Access

Shelley Public school has two main and one emergency access points for students, their carers and staff as shown in Figure 6-3.

SMEC commissioned a survey between 21 November and 4 December 2013 from 6am to 8pm to assess the pick-up and set-down arrangements at Shelley Public School to determine how the students currently travel and access the school. The survey looked at the Prospect Highway emergency access gate via the informal service road and the formal school entry points on Hadrian Avenue and Pelleas Street. The analysis of the survey data found that that majority of the students walked to school (at 54%) with other students driven to school by car as the main second option (at about 44%). Access to the school was predominately via Hadrian Avenue and Peallas Street (42% and 43% respectively).

For the students driven to school the drop off and pick-ups were mainly at Hadrian Avenue and Peallas Street (40% and 52% respectively) with the remaining preferring drop off and pick up via Prospect Highway. To review the survey results refer to Appendix D for the Traffic and Transport assessment.

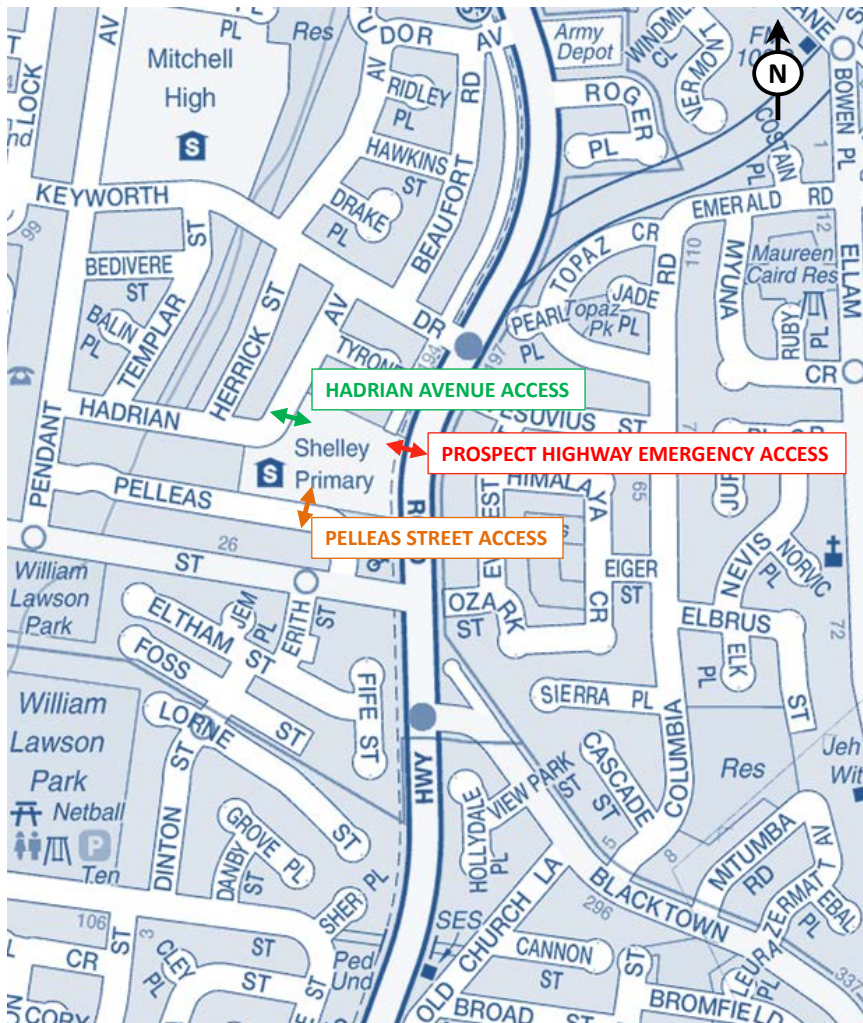


Figure 6-3 Shelley Public School access points

Pedestrian and cyclist facilities

Cyclists and pedestrian facilities along the highway include:

- A shared user path along the western side of proposal corridor with the provision of pedestrian controlled signalised crossings at major intersections including the Great Western Highway and M4 Western Motorway
- Pedestrian footpaths on the eastern side between Stoddard Road and Harrod Street, Blacktown Road and Keyworth Drive and Roger Place to north of the proposal
- A pedestrian underpass about 330 metres south of Blacktown Road connecting Old Church Lane and Keyne Street. This pedestrian provides an east–west link across the highway in Prospect.

Buses

Prospect Highway, as a TfNSW strategic bus route, has a number of public bus routes. These includes bus routes 700 (Blacktown to Parramatta, via Prospect Highway), 800 (Blacktown to Fairfield via Pemulway and Wetherill Park) and 812 (Blacktown to Fairfield, via Prospect). The frequency of bus services for each route is generally every 15-60 minutes during the peak hours.

The existing bus stops along the proposal corridor are located adjacent to:

- Stoddart Road (in both directions)
- Lancelot Street (in both directions)
- Keyworth Drive (in both directions)
- Roger Place (southbound only)
- Tudor Avenue (in both directions)
- Blacktown Mega Centre (in both directions).

Bus priority lanes are provided along Prospect Highway at the approaches and departures to the Lancelot Street intersection.

Freight

Prospect Highway and Blacktown Road are dedicated B-double routes and function as secondary freight routes. The Prospect Highway corridor links a number of industrial areas and significant freight origin and destinations within the region. Within the Transport for NSW guidance for freight routes, secondary freight routes are expected to carry 1,000 to 5,000 heavy vehicles per day and comprise four or more lanes.

B-double and high vehicle routes are shown in Figure 6-4.

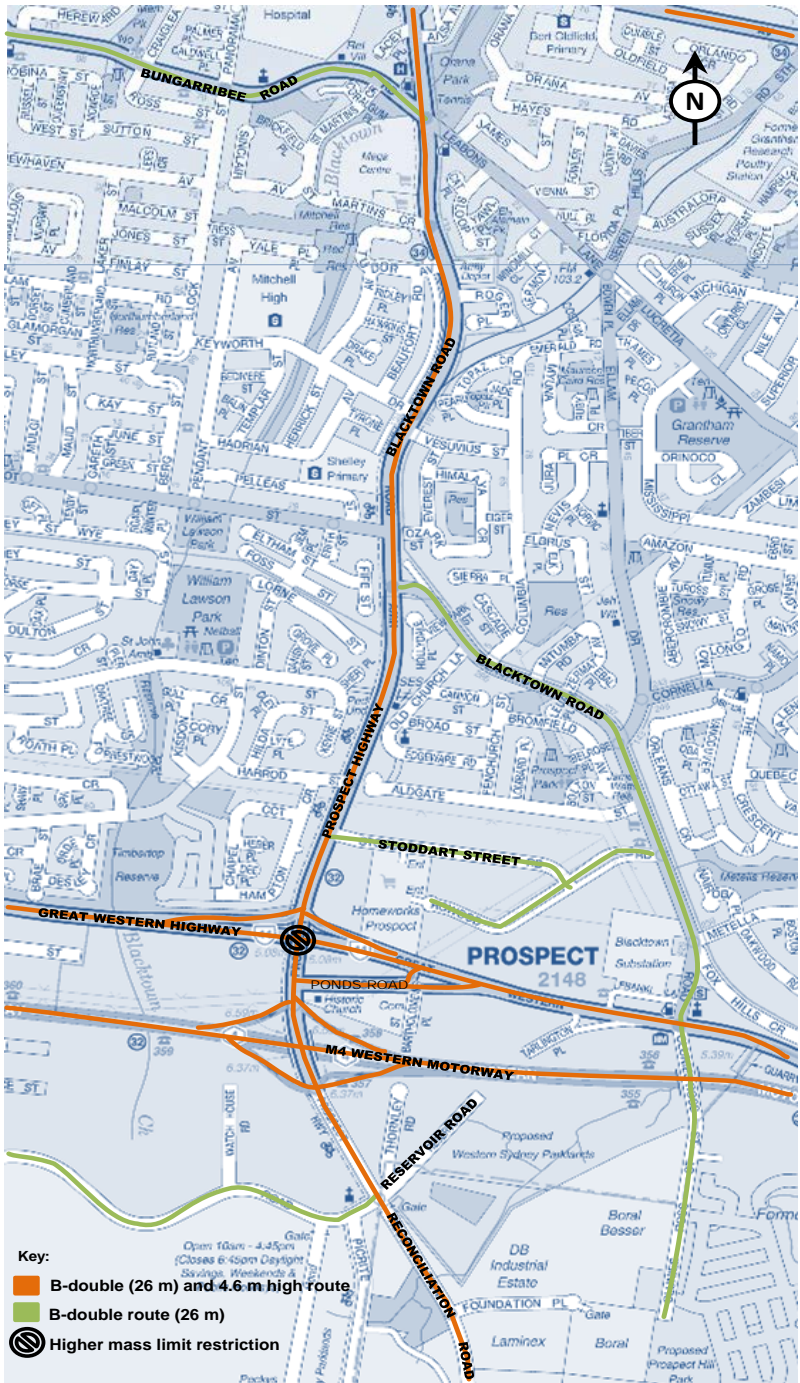


Figure 6-4 B-double and high vehicle routes

The traffic composition survey between 8 and 14 October 2013 captured the proportion of heavy vehicles on the Prospect Highway corridor. It was found that the existing heavy vehicle volumes south of Blacktown Road were about 4,500 vehicles per weekday (at about 18 percent of the traffic volume) and north of Blacktown Road are about 3,600 vehicles per weekday (at about 11 percent of the traffic volume).

The hourly heavy vehicle rate peaks at 47 per cent in the along Reconciliation Road at about 10am and is at its lowest at 10% at 9pm north of the Great Western Highway. Table 6-4 shows the average percentage of heavy vehicles on a weekday over 24 hours at three key locations along the highway. The survey data supports the origin and destination role that the industrial precinct at the southern end of the corridor plays for the freight industry and the role M4 Western Motorway plays in linking in the industrial precincts within the corridor to the greater road network of Sydney and NSW.

Table 6-4 Heavy vehicle percentage summary

| Location | Average daily traffic % | Average weekday traffic | | | | |
|---------------------|-------------------------|-------------------------|-----------|-----------|------------------|------------------|
| | | Daily % | AM peak % | PM peak % | Maximum % (hour) | Minimum % (hour) |
| Reconciliation Road | 17 | 18 | 25 | 14 | 47 (10am) | 10 (10pm) |
| Prospect Highway | 10 | 12 | 10 | 6 | 20 (2am) | 4 (9pm) |
| Blacktown Road | 9 | 11 | 10 | 6 | 17 (11am) | 4 (10pm) |

Crash history

There were a total of 223 crashes, including 87 crashes that resulted in injury for the five year period between 1 January 2008 to 31 December 2012 there were a total of 223 crashes, 87 of which resulted in injury, along the proposal corridor. There were no fatal crashes recorded along the proposal corridor during this period.

The majority of the crashes (at about 67%) occurred at intersections with rear-end crashes the predominate crash type at about 46%. Crashes that involved opposing vehicles turning represented about 18 % of crash types. A review of the crash locations found that a substantial proportion of crashes occurred at unsignalised intersections, namely Ponds Road, the Great Western Highway eastbound exit ramp and Stoddart Road. This indicates that drivers are turning onto Prospect Highway with insufficient gap acceptance causing crashes with approaching vehicles and that vehicles approaching the intersection are stopping suddenly to potentially avoid turning vehicles.

Head-on collisions accounted for 2.7 per cent of crashes which is most likely due to the undivided carriageway of Prospect Highway.

6.1.3 The proposal

The proposal described in Section 3.1. Key traffic and transport characteristics of the proposal corridor are summarised below.

- New northbound bridge over the M4 Western Motorway with four lanes
- New northbound bridge over Great Western Highway with two lanes
- New two way link road between Prospect Highway and Great Western Highway as described in section 2.5.1
- Upgrading of intersections as outlined in Section 3.2.11 and Table 3-3
- Kerbside bus lanes between Lancelot Road and north of St Martins Crescent
- Central median along Prospect Highway
- Upgrade of pedestrian underpass between Old Church Lane and Keyne Street, about 330 meters south of Blacktown Road intersection
- New pedestrian path on the eastern side of the highway between Keyworth Drive and Roger Place
- New pedestrian crossings provided at southern side of Blacktown Road intersection and an additional signalised crossing for southern side of St Martins crescent intersection.

6.1.4 Potential impacts

Construction

Construction traffic volumes and impacts to the local road network

Traffic impacts during construction would occur due to the movement of construction vehicles along Prospect Highway and along surrounding roads, for the hauling of construction materials and movement of construction equipment and personnel. These movements would be along Prospect Highway to construction gates and along Ponds Road, Reservoir Road and Thornley Road to potential construction compound sites.

During the construction phase there would be about 100 construction vehicle movements per day. Therefore, the additional heavy vehicle movements associated with construction is within the daily variation of heavy vehicle volumes and is not expected to have a substantial impact on existing traffic volumes along Prospect Highway.

Access for local roads and property

Under the construction staging proposal developed by Roads and Maritime, access to existing properties along the Prospect Highway corridor would be maintained during all stages of construction. However, access routes to individual properties may be temporarily affected by construction activities, either through the loss or alteration of existing access arrangements. Residents and property owners would be consulted about upcoming access changes if such impacts cannot be avoided.

During stage four of construction (refer to Table 3-5 for construction staging), the garbage collection site for Shelley Public School currently accessed via the informal service road would need to be temporarily relocated. A temporary location would be identified in consultation with the school and Blacktown City Council.

Local road access is likely to be impacted during construction as follows:

- During stage two works:
 - Traffic using Ponds Road to access Prospect Highway would be detoured to the newly constructed two-way link road to access Prospect Highway

- During stage four works:
 - Traffic accessing Tudor Avenue would be detoured to Keyworth Drive whilst Tudor Avenue intersection is closed for upgrade works
 - Traffic accessing Keyworth Drive would be detoured to Tudor Avenue whilst Keyworth Drive intersection is closed for upgrade works. Both intersection upgrades would not occur simultaneously to maintain local road connectivity.

Walking and cycling

Pedestrian and cyclist access would be maintained or alternate routes provided throughout the construction phase. Provisions for pedestrian and cyclist access to Shelley Public School, Blacktown Children's Centre, Medlife Medical Centre and bus stops would be maintained for all stages of construction.

Where there is a possible interaction between construction traffic and pedestrians (eg at work site/compound access points) mitigation measures would be introduced to provide adequate protection to pedestrians. Measures to reduce the impact on pedestrians would be addressed in a traffic management plan developed for the works during the detail design stage.

Buses and public transport

A number of bus stops are likely to be relocated or temporarily removed during construction, these include:

- Temporarily relocate northbound bus stop at Stoddart Road to the temporary verge area just north of Harrod Street (stage one)
- Temporarily relocate southbound bus stop south of Stoddart Road to the temporary verge area (stage two)
- Temporarily relocate existing northbound bus stops, north of Keyworth Drive and north of Tudor Avenue to temporary verge area (stage four)
- Temporarily relocate the southbound bus stop north of Keyworth Drive to the temporary verge area (stage five)
- Temporarily remove the southbound bus stop adjacent to Roger Place (stage five)
- Temporarily relocate southbound bus stop opposite Tudor Avenue, about 50 metres south (stage five).

The bus stops that are temporarily removed or relocated are within appropriate walking distance, 200 metres or less from their existing locations.

During construction buses would continue to use the Prospect Highway corridor. Apart from removal and relocation of some bus stops, the impacts on bus services during construction are likely to result from decreased travel speeds.

Operation

Intersections

Table 6-5 and Table 6-6 summarise the modelled performance of the intersections along Prospect Highway during the AM and PM peak periods in the 2038 year with and without the proposed upgrade. Performance is focused on the 2038 future year scenario as this meets the proposal objective of providing for traffic flows to at least 2031.

Table 6-5 AM peak intersection performance summary (2038)

| Intersections (Prospect Highway) | Without Proposal | | With proposal | |
|--|-------------------------|------------------|-------------------------|------------------|
| | Average delay (seconds) | Level of service | Average delay (seconds) | Level of service |
| Prospect Highway / Reservoir Road | 91 | F | 19 | B |
| Prospect Highway / M4 Western Motorway westbound ramps | 62 | E | 35 | C |
| Prospect Highway / M4 Western Motorway eastbound ramps | 94 | F | 37 | C |
| Prospect Highway / Ponds Road | 190 | F | 9 | A |
| Prospect Highway / Great Western Highway eastbound exit ramp (two way link road with proposal) | 370 | F | 52 | D |
| Prospect Highway / Stoddart Street | 71 | F | 11 | A |
| Prospect Highway / Harrod Street | 75 | F | 19 | B |
| Prospect Highway / Blacktown Road | 38 | C | 19 | B |
| Blacktown Road / Lancelot Street | 34 | C | 17 | B |
| Blacktown Road / Vesuvius Street | 1779 | F | 16 | B |
| Blacktown Road / Keyworth Drive | 31 | C | 15 | B |
| Blacktown Road / Roger Place | 90 | F | 12 | A |
| Blacktown Road / Tudor Avenue | 145 | F | 18 | B |
| Blacktown Road / St Martins Crescent | 67 | E | 18 | B |

Table 6-6 PM peak intersection performance summary (2038)

| Intersections (Prospect Highway) | Existing | | With proposal | |
|--|-------------------------|------------------|-------------------------|------------------|
| | Average delay (seconds) | Level of service | Average delay (seconds) | Level of service |
| Prospect Highway / Reservoir Road | 134 | F | 37 | C |
| Prospect Highway / M4 Western Motorway westbound ramps | 65 | E | 51 | D |
| Prospect Highway / M4 Western Motorway eastbound ramps | 16 | B | 52 | D |
| Prospect Highway / Ponds Road | 82 | F | 1 | A |
| Prospect Highway / Great Western Highway eastbound exit ramp (two way link road) | 31 | C | 45 | D |

| Intersections (Prospect with proposal) | Existing | | With proposal | |
|--|----------|---|---------------|---|
| Prospect Highway / Stoddart Street | 26 | B | 43 | D |
| Prospect Highway / Harrod Street | 28 | A | 28 | B |
| Prospect Highway / Blacktown Road | 25 | B | 24 | B |
| Blacktown Road / Lancelot Street | 14 | A | 19 | B |
| Blacktown Road / Vesuvius Street | 522 | F | 19 | B |
| Blacktown Road / Keyworth Drive | 15 | B | 16 | B |
| Blacktown Road / Roger Place | 21 | B | 34 | C |
| Blacktown Road / Tudor Avenue | 28 | B | 25 | B |
| Blacktown Road / St Martins Crescent | 45 | D | 27 | B |

The analysis of intersection performance with the proposed upgrade shows that all of the intersections operate at an acceptable level of service D or better during the AM and PM peak hours up to 2038.

For 2038 without the proposal:

- The operation of a number of intersections deteriorates to a level of service F with extensive delays and queuing.

For 2038 with the proposal:

- The performance of most intersections would improve and all intersections would operate at a level of service D or better.

In addition, observations of the operation of the AM and PM peak model with the proposed upgrade showed that for a majority of turning movements the queues are adequately contained within the proposed turning lanes

Mid-block capacity

The volume / capacity ratio on Prospect Highway indicate that the volumes exceed lane capacity in almost all future years and peak periods without the proposal. However, under the proposal in 2038, the volume-capacity ratios are reduced substantially. The highest ratio in the proposed upgrade scenario is the 2038 AM peak at the Prospect Highway, north of the Great Western Highway, which has a volume capacity ratio of 0.9. The result of the analysis of mid-block performance indicates the Prospect Highway corridor improves substantially with the proposal under forecast traffic volumes, compared with the do nothing scenario which has a volume capacity ratio of up to 1.4 in 2038. This meets the proposal objective to provide increased capacity and improved performance for forecast traffic growth to at least 2031 along the corridor.

Safety

By formalising the intersections and providing signalised intersections, the proposal would help reduce existing crash rates along the corridor, in particular at the Ponds Road, Great Western Highway eastbound exit ramp (becomes two way link road as part of proposal) and Stoddart Road intersections. The proposal is also expected to reduce the number of rear-end collisions with the formalisation of intersections. Head-on collisions which accounted for 2.7 per cent of crashes between 2008 and 2012, would be reduced with the introduction of the divided carriageway.

Additional signalised pedestrian crossings proposed along the Prospect Highway corridor, would facilitate safe crossing opportunities to connect pedestrians between residential areas, bus stops and shared user path facilities.

Freight

The proposal would support the neighbouring industrial areas and logistics hubs by providing an improved link to the M4 Western Motorway and Great Western Highway. The proposal would improve safety and travel times along the Prospect Highway corridor for freight by providing a divided carriageway, improved road alignment and formalised intersections. There would be no impacts to the existing B-double and 4.6 metre high vehicle route network surrounding the proposal.

Access

The proposal would result in changes to existing turning operations. The introduction of a central median along Prospect Highway would prevent vehicles from turning right into and out of properties fronting Prospect Highway. This would mean that some traffic would need to travel longer distances to access and/or leave residential and commercial properties fronting Prospect Highway.

The access arrangements for the following local road intersections would be altered as a result of the proposal:

- Ponds Road would become left-in / left-out only
- Vesuvius Street would become left-in / left-out only
- Roger Place would become left-in / right-in and left-out only
- Tudor Avenue would become left-in / left-out only.

Ponds Road Access

The proposal would change access at Ponds Road to left in and left out only to Prospect Highway. Vehicles currently use the right turn into Ponds Road to travel west on the Great Western Highway and the right turn out of Ponds Road to travel north along Prospect Highway. The removal of the right turn in and out of Ponds Road would be offset by the proposed two way link road that would allow westbound traffic on the Great Western Highway to travel northbound on Prospect Highway and northbound traffic on Prospect Highway to travel west on the Great Western Highway. The proposed travel routes along the two way link road are comparable in travel time and length to the existing Ponds Road routes.

Vesuvius Street Access

The proposal would result in the Vesuvius Street intersection becoming left in and left out only. Vehicles that currently perform a right turn out of Vesuvius Street would be required to:

- Travel northbound on Columbia Road
- Continue along Emerald Road
- Turn left into Ellam Drive / Bowen Place
- Turn left into Leabons Lane.

This results in a travel distance increase of about 500m to reach the Prospect Highway / Leabons Lane intersection.

Vehicles can also travel southbound on Columbia Road and turn right onto Blacktown Road to then turn right onto Prospect Highway and travel north. Vehicles that currently perform a right turn into Vesuvius Street from Prospect Highway would be required to:

- Turn right earlier at Blacktown Road
- Turn left into Columbia Road
- Turn left into Vesuvius Street.

This alternate route into and out of Vesuvius Street results in a travel distance increase of about 600m to exit / reach Vesuvius Street.

The alternate routes into and out of Vesuvius Street are shown in Figure 6-5.

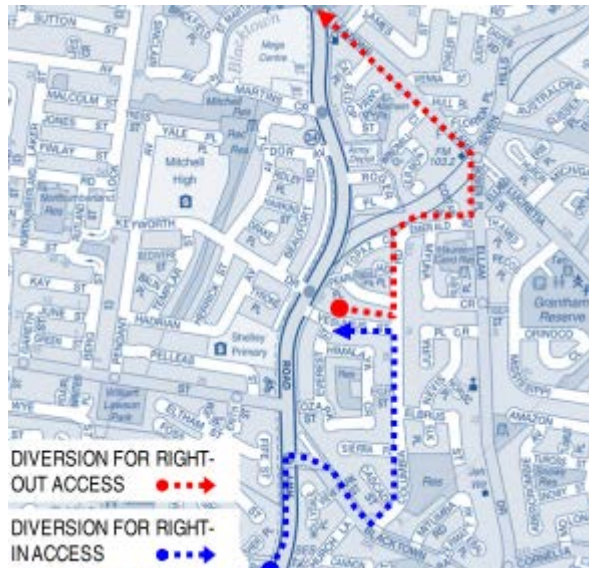


Figure 6-5 Alternate routes into and out of Vesuvius Street

Roger Place Access

The proposal would result in the Roger Place intersection becoming left in, right in and left out only. Vehicles that currently perform a right turn out of Roger Place would be required to:

- Turn left out of Roger Place
- Turn right at Keyworth Drive
- Turn right into Beaufort Road
- Turn right into Tudor Avenue
- Turn left onto Prospect Highway.

This results in a travel distance increase of about one kilometre to reach the northbound carriageway of Prospect Highway.

The alternate route to the existing right turn out of Roger Place is shown in Figure 6-6.

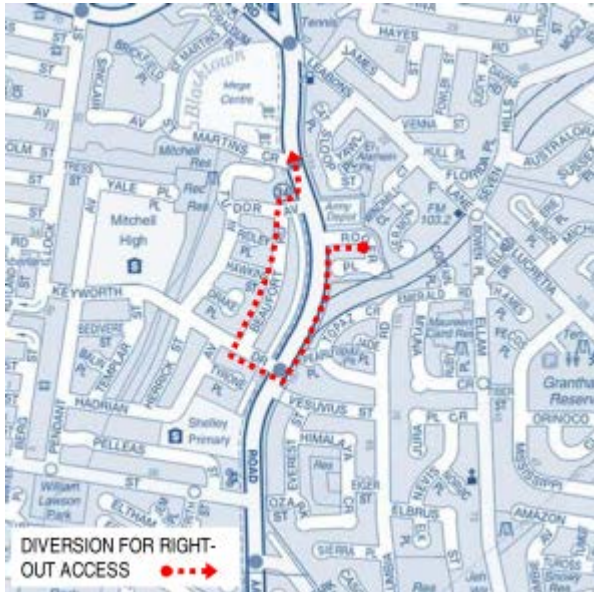


Figure 6-6 Alternate routes into and out of Roger Place

The right turn out of Roger Place has been restricted under the proposal since it is unsafe for vehicles to turn right across three lanes of traffic and merge with the northbound three lane carriageway with the close proximity of Tudor Avenue traffic entering and the signalised intersection queues that would occur at St Martins Crescent.

Tudor Avenue Access

The proposal would result in the Tudor Avenue intersection becoming left in and left out only. Vehicles that currently perform a right turn out of Tudor Avenue would be required to:

- Travel southbound along Cavendish Avenue or Beaufort Avenue
- Turn left into Keyworth Drive
- Turn right onto Prospect Highway.

This results in a travel distance increase of about 200 metres to reach the southbound carriageway of Prospect Highway..

Vehicles that currently perform a right turn into Tudor Avenue from Prospect Highway would be required to:

- Turn right at the signalised intersection at Keyworth Drive
- Turn right into Cavendish Avenue or Beaufort Avenue.

This results in a travel distance increase of about one kilometre to reach Tudor Avenue.

The alternate routes into and out of Tudor Avenue are shown in Figure 6-7.

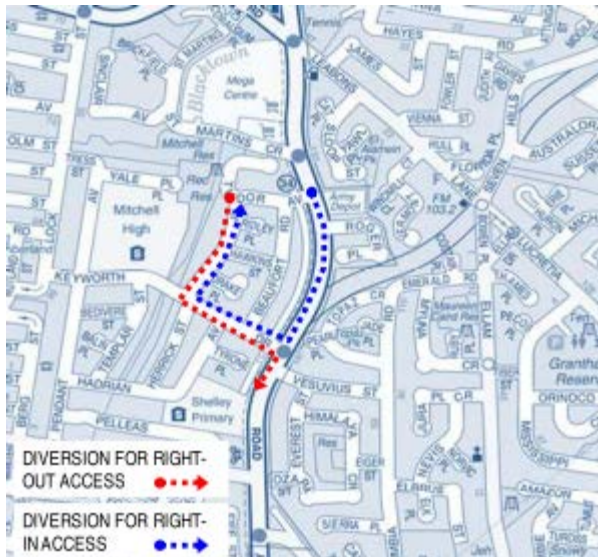


Figure 6-7 Alternate routes into and out of Tudor Avenue

Access for properties along Prospect Highway

The residential properties with existing accesses on Prospect Highway would no longer have direct access to both carriageways of Prospect Highway, due to the introduction of a central median which prevents right turn movements.

Properties on the eastern side of Prospect Highway between Lancelot Street and Vesuvius Street

Traffic wishing to turn right out and travel north would be:

- Turn left out of the driveway
- Turn right into Lancelot Street
- Perform a U-turn at the roundabout at Lancelot Street / Edith Street
- Turn left onto Prospect Highway.

Alternatively traffic could also take the following route to travel north:

- Turn left out of the driveway
- Turn left into Blacktown Road
- Turn left into Columbia Road
- Continue along Emerald Road
- Turn left into Ellam Drive / Bowen Place
- Turn left into Leabons Lane.

The route for traffic approaching from the south currently turning right into properties would be:

- Turn right earlier at the signalised intersection at Blacktown Road
- Turn left into Columbia Road
- Turn left into Vesuvius Street
- Turn left onto Prospect Highway
- Turn left into the driveway.

Properties on the eastern side of Prospect Highway between Vesuvius Street and Keyworth Drive

Traffic wishing to turn right out and travel south would be:

- Turn left out of the driveway
- Turn left at Vesuvius Street
- Turn left into Columbia Road
- Continue along Emerald Road
- Turn left into Ellam Drive / Bowen Place
- Turn left into Leabons Lane.

The route for traffic approaching from the south currently turning right into properties would be:

- Turn left at Tudor Avenue
- Turn left into Beaufort Road
- Turn left into Keyworth Drive
- Turn right onto Prospect Highway
- Turn left into the driveway.

Properties on the eastern side of Prospect Highway between Keyworth Drive and north of St Martins Crescent

Traffic wishing to turn right out and travel south would be:

- Turn left out of the driveway
- Turn right at the signalised intersection at Keyworth Drive
- Turn right into Beaufort Road
- Turn right into Tudor Avenue
- Turn left onto Prospect Highway.

All existing properties north of Roger Place on the eastern side of Prospect Highway are currently prevented from right turn entry and exit from their properties due to the existing section of divided carriageway. The only property impacted by the divided carriageway along this section north of Roger Place would be the army cadet base.

The alternate route for vehicles approaching from the south currently turning right from Prospect Highway into the army cadet base would be:

- Turn right at the signalised intersection at Blacktown Road
- Turn left into Columbia Road
- Continue along Emerald Road
- Turn left into Ellam Drive / Bowen Place
- Turn left into Leabons Lane
- Turn left onto Prospect Highway
- Turn left into the driveway.

Properties on the western side of Prospect Highway between Lancelot Street and Keyworth Drive

Traffic wishing to turn right out and travel south would be:

- Turn left out of the driveway
- Turn left at Keyworth Drive

- Turn around using the local road network and return to the Keyworth Drive / Prospect Highway intersection
- Turn right onto Prospect Highway.

The route for traffic approaching from the north currently turning right into properties would be:

- Turn right at the Lancelot Street signalised intersection
- Perform a U-turn at the roundabout at Lancelot Street / Edith Street
- Turn left onto Prospect Highway
- Turn right into driveway.

Properties on the western side of Prospect Highway between Keyworth Drive and Tudor Avenue

Traffic wishing to turn right out and travel south would be:

- Turn left out of the driveway
- Turn left at Tudor Avenue
- Turn left onto Beaufort Road
- Turn left onto Keyworth Drive
- Turn right onto Prospect Highway.

The route for traffic approaching from the north currently turning right into properties would be:

- Turn right at Keyworth Drive
- Turn around using the local road network and return to the Keyworth Drive / Prospect Highway intersection
- Turn left onto Prospect Highway
- Turn left into driveway.

Properties on the western side of Prospect Highway between Tudor Avenue and St Martins Crescent

Traffic wishing to turn right out and travel south would be:

- Turn left out of the driveway
- Turn left at Bungaribee Road
- Turn left onto St Martins Crescent
- Turn right onto Prospect Highway.

The route for traffic approaching from the north currently turning right into properties would be:

- Turn right at Keyworth Drive
- Turn right onto Beaufort Road
- Turn right at Tudor Avenue
- Turn left onto Prospect Highway
- Turn left into driveway.

An assessment of the impacts of the changed access arrangements was conducted and indicated that residents would be required to travel further to reach their destination. This corresponds to a delay, however, since the 'do nothing' scenarios show severe congestion along Prospect Highway with limited gaps in traffic streams. A substantial reduction in travel

time would be realised for the residents impacted by the revised access arrangements due to the improvement in travel times and traffic flow along Prospect Highway.

Shelley public school access

Under the proposal, the informal service road would not be available to use as a pick-up and set-down location for the school and the existing school accesses would need to be utilised. The vehicles that are currently using the informal service road could be accommodated within Hadrian Avenue and Pelleas Street with the implementation of a school pick-up and set-down zones. Roads and Maritime would discuss this with Blacktown Council and Shelley Public School during detail design.

Parking

An informal service road runs from north of Lancelot Street to south of St Martins Crescent on the western side of Prospect Highway. The service road is currently used for school pick-up and set-down, residential parking and to access Medlife Medical Centre. Traffic surveys indicated that up to five vehicles parking within the existing informal service road access the residential properties. In addition, up to eight vehicles parked within the informal service road to access the medical centre at a given time.

The Medlife Medical Centre currently does not meet the current Blacktown City development control plan requirements for parking provisions for staff and patients within its existing site. The proposal would result in the removal of the parking currently provided by the informal service road directly out the front of the medical centre as Roads and Maritime or Blacktown City Council would not provide on-street parking along the Prospect Highway road corridor due to the reasons outlined in Section 2.4.2.

Medlife Medical centre would be required to provide parking within its existing site in accordance with Blacktown City Council development control plan requirements. The remaining parking needed by staff and patients could be accommodated within the local road network. The impact to the staff and patients of the medical centre would be an extra walking distance of about 120m (to Tudor Avenue and/or Beaufort Road).

All the properties located elsewhere along the informal service road have off-street parking. Although the proposal would result in a loss of on street informal car parking the current utilisation of the informal service road for parking was observed to be low. In addition the surrounding local roads have unrestricted kerbside parking provisions which were observed to have sufficient capacity to accommodate the additional vehicles for parking.

Pedestrian and cycling

The proposal will provide new and upgraded pedestrian and cyclist infrastructure along Prospect Highway. The proposed new/ upgraded infrastructure and its benefits are:

- Prospect Highway / Reservoir Road / Reconciliation Road: Pedestrian crossings would be provided allowing pedestrian movements between the proposed bus stops as well as pedestrian access to Wet 'n' Wild Sydney
- Shared path on the western side of Prospect Highway: The proposal will upgrade the temporary shared path between the M4 Western Motorway westbound exit ramp and Harrod Street. It will also realign the existing shared path between Harrod Street and Blacktown Road to accommodate the proposed road alignment
- Stoddart Road intersection: a new signalised pedestrian crossing is proposed on the southern side of the upgraded intersection connecting Stoddart Road with the shared path on the western side of the Prospect Highway corridor. This is an improvement on

the existing arrangement at Prospect Highway / Stoddart Road intersection, which has no pedestrian or cyclist crossing facilities

- A new pedestrian crossing is provided across Prospect Highway at southern side of the Prospect Highway / Blacktown Road intersection
- A new pedestrian path between Keyworth Drive and Roger Place on the eastern side of the Prospect Highway
- St Martins Crescent: a signalised pedestrian crossing is proposed across the southern side of the intersection. This is an improvement to the existing arrangement, which will provide safe crossing facilities on all sides of the signalised intersection
- Upgrading of the pedestrian underpass of the Prospect Highway between Old Church Lane and Keyne Street to incorporate crime prevention and environmental design principles as far as practicable to improve user safety.

In summary, the proposal would improve pedestrian and cyclist connectivity and amenity along the Prospect Highway corridor, providing safer crossing provisions at signalised intersections and implementing additional shared path facilities.

Buses and public transport

The proposal will provide new bus stops, relocate some existing bus stops and introduce bus lanes on the kerbside of the highway between Lancelot Street and 200m north of St Martins Crescent.

Under the proposal the modelling indicates that in the AM peak, bus travel speeds and travel times improve in all forecast years with the proposed upgrade compared with the do nothing scenario. In the PM peak, the bus travel speeds and travel times improve for the majority of bus routes along the proposal corridor. Bus route 812 is the exception, which has travel times increase by up to one minute and the average travel speed reduce slightly in both directions in 2018 and in the southbound direction in 2028 and 2038.

The proposed road upgrade includes additional bus stops and changes to the road corridor which impact bus travel patterns. The majority of the additional journey time is caused at the southern extent of the proposal with the new bus stops requiring additional dwell times compared to the do nothing scenario which does not factor the additional dwell time.

The proposal would modify existing bus stops, with the following bus stop arrangement proposed:

- Two new bus stops (one each direction) are proposed adjacent to the intersection of Prospect Highway / Reservoir Road / Reconciliation Road
- The existing northbound bus stop adjacent to Stoddart Road is proposed for relocation to north of Harrod Street
- The existing northbound bus stops north of Keyworth Drive and north of Tudor Avenue are proposed to be relocated from the existing informal service road to the shared user path within the proposal corridor
- The existing northbound and southbound bus stops north of St Martins Crescent, adjacent to the St Martins Village shopping centre and pedestrian link on the eastern side of the Prospect Highway, respectively would be relocated south towards St Martins Crescent intersection.

The proposed bus stop locations provide the Prospect Highway corridor with additional bus stops to service Wet 'n' Wild Sydney. The removal of the northbound bus stop at Stoddart Road would be replaced by the bus stop north of Harrod Street, which is less than 150 metres from the existing bus stop, resulting in an appropriate walking distance for passengers currently using the existing bus stop.

6.1.5 Safeguards and management measures

Measures to manage impacts associated with traffic, transport and access are included in Table 6-7 below.

Table 6-7 Summary of safeguards and management measures for traffic and transport

| Impact | Environmental safeguards | Responsibility | Timing |
|--------------------------|---|---|------------------|
| Traffic management | A construction traffic management plan would be prepared and implemented in accordance with the <i>Traffic Control and Worksites</i> , version 4.0 (Roads and Maritime, June 2010). The construction traffic management plan would enable the safe management of traffic, provide for the safety of construction personnel and minimise impacts on the local community. | Construction contractor | Pre-construction |
| Emergency services | Consultation with emergency service authorities would be undertaken during development of the detailed design. | Roads and Maritime | Detailed Design |
| Property access | Vehicular property access would be maintained where possible including pre-schools, places of worship and all commercial premises. Consultation with property owners would be undertaken prior to any changes to property accesses. | Roads and Maritime Construction contractor | Construction |
| Shelley Public School | Temporarily relocate maintenance access and garbage collection at Shelley Public School in consultation with the school | Roads and Maritime Construction contractor | Construction |
| Pedestrians and cyclists | Pedestrian and cyclist access is to be maintained throughout construction. Provision of signposting outlining the pedestrians and cyclists diversion routes would be displayed during construction. There will be advance notification of any construction works that affect pedestrians and cyclists. | Construction contractor | Construction |
| Bus services | Access to appropriate bus stop locations would be maintained during construction in consultation with bus operators. | Construction contractor | Construction |
| Bus services | Ongoing updates on locations and access to bus stops would be provided to the community during construction period to ensure that disruption is minimised. | Construction contractor | Construction |

6.2 Noise and vibration

An assessment was carried out to identify the extent and magnitude of potential noise and vibration impacts of the proposal on residential and other sensitive receivers such as schools, day-care centres and churches. The assessment is described in the Operational Traffic and Construction Noise and Vibration Assessment Report (SKM, 2013), which is provided in Appendix E and summarised below.

6.2.1 Methodology

Study area

The noise assessment was carried out for sensitive receivers such as residences and schools, up to 300 metres from the proposal (this is the proposal's noise study area). For receivers within the study area, road vehicle noise is the dominant noise source during both the daytime and night time.

Sensitive receivers were grouped into fifteen noise catchment areas (NCAs) based on their location in the study area, proximity to dominant noise sources and likelihood of experiencing similar noise impacts. These NCAs were used to model predicted noise levels in a representative way across the receivers within the study area.

Noise catchment areas within the proposal area are described in Table 6-8 and shown in Figure 6-8.

Table 6-8 Noise catchment areas

| NCA | Location | Description |
|-----|--|---|
| 1 | Reconciliation Road heading north to Ponds Road. | <ul style="list-style-type: none"> Residential receivers bordering the southeast corner. Closest receiver is around 100 metres from the proposed work Residential receiver bordering the western side, around 40 metres from proposed work Commercial receivers bordering the southeast corner, around 50 metres from the proposed work Typical setbacks of around 40-50 metres from the building façade to the road edge St Marks Coptic Catholic Church is included in this catchment. |
| 2 | West of Timbertop Reserve, adjacent to the Great Western Highway. | <ul style="list-style-type: none"> Residential receivers bordering the northern side of Great Western Highway Typical setbacks of 50-60 metres from the building façade to the road edge. Similar elevation to road. |
| 3 | West of Prospect Highway, between Harrod Street and the Great Western Highway. | <ul style="list-style-type: none"> Nearest residential receiver is around 35 metres to the west of Prospect Highway Typical setbacks are around 40-50 metres from the dwellings to the road edge. |
| 4 | East of Prospect Highway. | <ul style="list-style-type: none"> Commercial receivers border the eastern side of Prospect Highway. Typical setbacks are around 35 – 40 metres. |
| 5 | West of Prospect Highway, north of Harrod Street. | <ul style="list-style-type: none"> Large block of residential receivers, located behind NCA 6 |

| NCA | Location | Description |
|-----|---|---|
| 6 | West of Prospect Highway, north of Harrod Street. | <ul style="list-style-type: none"> • Large block of residential receivers • Nearest residential receiver is around 70 metres to the west of Prospect Highway • Shelley Public School is located in this NCA around 45 metres west from Prospect Highway. |
| 7 | East of Prospect Highway | <ul style="list-style-type: none"> • Large block of residential receivers, closest receiver is around 30 metres away • Typical setbacks of 30-40 metres from dwellings to road edge • Blacktown Children's Centre is included in this catchment • Blacktown Church of Christ is included in this catchment (NCA 7). |
| 8 | East of Prospect Highway | <ul style="list-style-type: none"> • Large block of residential receivers, located behind NCA 7. |
| 9 | East of Prospect Highway | <ul style="list-style-type: none"> • Closest residential receiver is around 20 metres away from Prospect Highway • Typical setbacks of 20-30 metres. |
| 10 | East of Prospect Highway. | <ul style="list-style-type: none"> • Closest residential receiver is around 250-300 metres away from Prospect Highway • Located behind NCA 9, NCA 13 and NCA 14. |
| 11 | West of Prospect Highway. | <ul style="list-style-type: none"> • Mitchell High School around 400 metres to the west of Prospect Highway • Includes High School buildings and a small pocket of recreational land • Located behind NCA 12. |
| 12 | West of Prospect Highway. | <ul style="list-style-type: none"> • Closest residential receiver is around 35-40 metres away • Setbacks around 30 metres to nearest building. |
| 13 | East of Prospect Highway. | <ul style="list-style-type: none"> • Nearest residential buildings are set back around 20 metres from the roads edge. |
| 14 | East of Prospect Highway | <ul style="list-style-type: none"> • Closest residential receiver is around 20-25 metres away. |
| 15 | West of Prospect Highway. | <ul style="list-style-type: none"> • St Martins Crescent Shopping Centre / Blacktown Mega Centre, around 30 metres from Prospect Highway. |

A total of 1123 receiver locations were identified in the study area using aerial photography and information from site visits. The locations of each of the identified residences and other sensitive receivers are shown on Figure 6-8 and in more detail in Appendix E. Non-residential sensitive receivers include churches, schools and childcare centres. There are two churches currently used on a regular basis located within the study area: Blacktown Church of Christ (receiver 287) located in Old Church Lane which has been assessed against the non-residential criteria along with Shelley Public School and Blacktown Road Children's Centre. St Mark's Coptic Catholic Church (receiver 4) off Reservoir Road at the southern end of the proposal (also a residence) has been assessed as a residential receiver.

Noise monitoring

Background noise monitoring surveys were carried out during October 2013 to establish the existing noise environment near and along the length of the proposal. Monitoring was carried out at seven locations representative of the wider environment and NCAs, as listed in Table 6-9 and shown on Figure 6-8.

Table 6-9 Noise monitoring locations

| ID | NCA | Receiver | Logger location and description | Noise sources |
|-----------|------------|---------------------|--|---|
| 1 | 1 | 544 Reservoir Road | 200 metres from Prospect Highway 15 metres from Reservoir Road. Located one metre from the building façade. | Local road traffic noise from Reservoir Road. Distant road noise from the M4 Western Motorway and Great Western Highway. |
| 2 | 3 | 31 Hampton Crescent | 67 metres from Prospect Highway. Backyard of property located on the corner of the building one metre from building façade, facing the Prospect Highway. | Road traffic noise from Prospect Highway is dominant with Great Western Highway background noise. Occasional bird noises and traffic movements on local road. |
| 3 | 7 | 83 Aldgate Street | 12 metres from Prospect Highway. Backyard of property located on the corner of the building one metre from the building façade, facing the highway. | Road traffic noise from Prospect Highway is the dominant noise source. |
| 4 | 6 | 10 Fife Street | 46 metres from Prospect Highway. Backyard of property located one metre from the building façade facing the highway. | Road traffic noise from Prospect Highway is the dominant noise source. Some bird noise and other domestic noise sources audible. |
| 5 | 10 | 3 Ozark Street | 125 metres from Prospect Highway. Front yard of property located five metres from the building façade facing the highway. | Local road traffic noise from Ozark Street. Road noise from Prospect Highway clearly audible. |
| 6 | 12 | 170 Blacktown Road | 30 metres from Prospect Highway. Front yard of property at the boundary fence. Located five metres from the building façade facing the highway. | Local road traffic noise from Prospect Highway. |
| 7 | 11 | 24 Cavendish Road | 250 metres from Prospect Highway. Front yard of property one metre from the building façade facing the highway. | Local road traffic noise from Cavendish Road. Distant road noise from Prospect Highway. |

The measured noise levels were analysed to provide more detail of the character of the noise environment over each of the 24-hour periods monitored. This information was separated into representative noise levels for the daytime (7am to 6pm), evening (6pm to 10pm) and night time (10pm to 7am) periods, and used to set construction noise management levels.

For operational traffic noise, results were used in combination with traffic monitoring and counts, completed at the same time as noise monitoring, to validate the predictive noise model. Data was also used to assess maximum noise impacts.

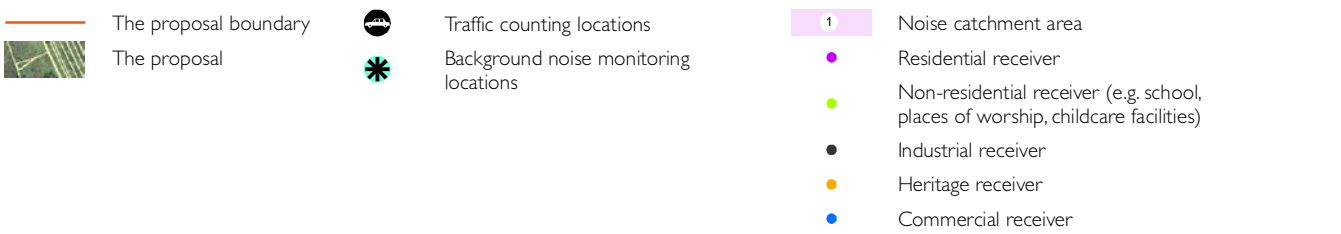
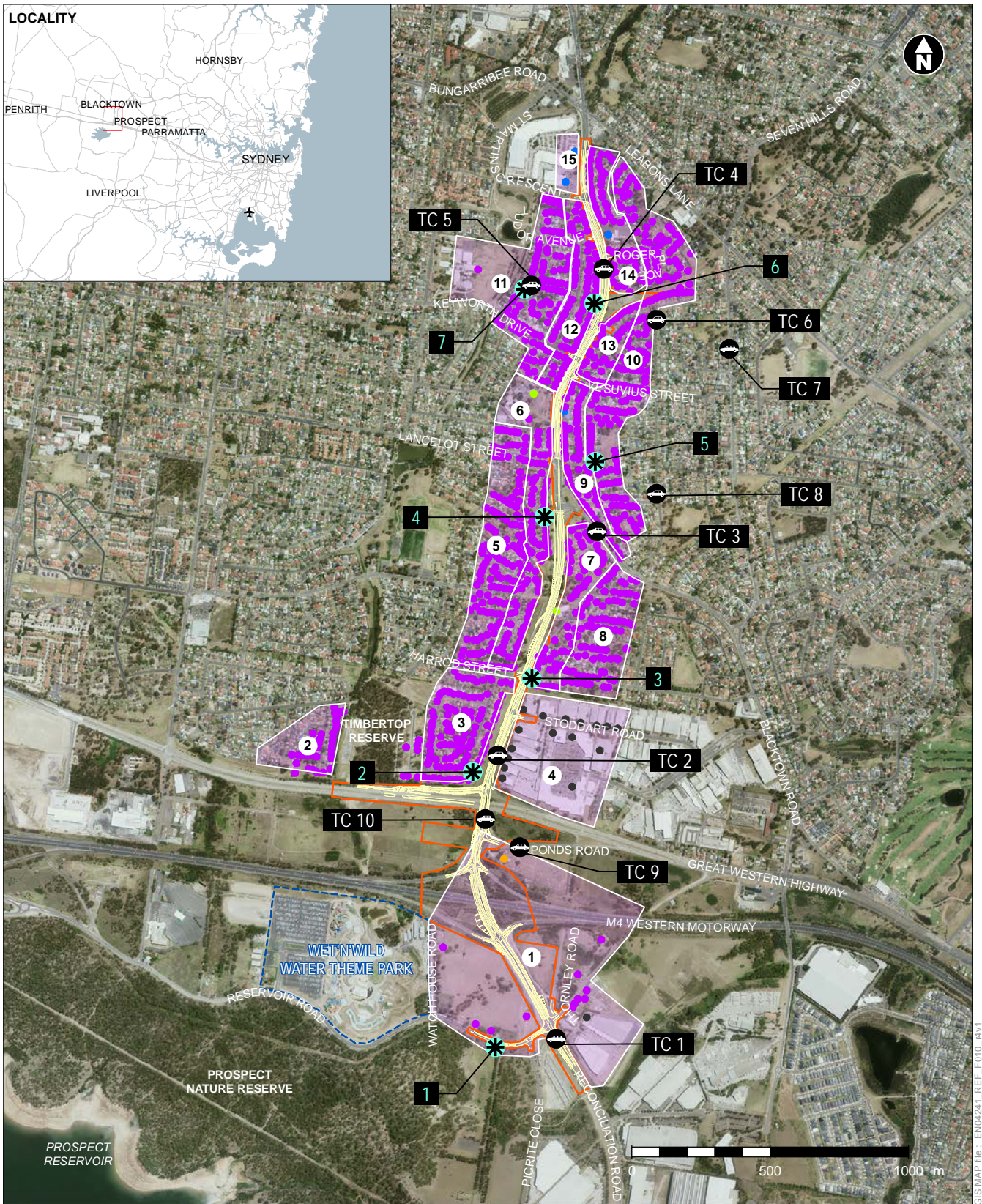


Figure 6-8
Noise and vibration sensitive receivers

6.2.2 Criteria

Construction noise criteria

In line with the Interim Construction Noise Guideline (ICNG) (DECC 2009), noise management levels (NML) from the basis of the criteria for construction noise assessment and management for all residential sensitive receiver locations near the proposal. NMLs are derived from the existing background noise levels (rating background level (RBL)) at representative monitoring locations (refer Figure 6-8), which are then applied to other locations with similar noise environments within the study area. The NMLs for residential receivers are summarised in Table 6-10 below.

Where construction noise is expected to exceed 75 dB(A), affected receivers are classed as 'highly noise affected' and additional limitations on work are applicable, as summarised in Table 6-10.

Table 6-10 Construction NMLs for residential (ICNG, DECC 2009)

| Time of day | Management level (NML) $L_{Aeq} (15 \text{ min})$ | How to apply |
|--|--|--|
| Recommended standard hours Monday to Friday 7.00am to 6.00pm | Noise affected (RBL + 10 dB) | The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq} (15 \text{ min})$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. The proponent should also inform all potentially impacted residents of the nature of work to be carried out, the expected noise levels and the duration, as well as contact details. |
| Saturday 8.00am to 1.00pm No work on Sundays or public holidays | Highly noise affected (75 dB(A)) | The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for work near schools, or mid-morning or mid-afternoon for work near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times. |
| Outside recommended standard hours | Noise affected (RBL + 5 dB) | A strong justification would typically be required for work outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see Section 7.2.2 of the ICNG (DECC, 2009). |

The NCAs and associated NMLs for residential receivers for each assessment period within the study area are shown in Table 6-11. NMLs are applicable to each residential receiver within the NCA and would be assessed at the residential property boundary that is most exposed to construction noise.

Table 6-11 Modelled construction noise management levels – residential

| Noise catchment area | L _{Aeq, 15 minute} RBL | | | L _{Aeq, 15 minute} NML | | |
|----------------------|---------------------------------|---------|------------|---------------------------------|---------|------------|
| | Daytime | Evening | Night-time | Daytime | Evening | Night-time |
| 1 | 45 | 45 | 42 | 55 | 50 | 47 |
| 2 | 45 | 46 | 39 | 55 | 51 | 44 |
| 3 | 45 | 46 | 39 | 55 | 51 | 44 |
| 4 | 50 | 49 | 39 | 60 | 54 | 44 |
| 5 | 38 | 36 | 30 | 48 | 41 | 35 |
| 6 | 47 | 45 | 36 | 57 | 50 | 41 |
| 7 | 50 | 49 | 39 | 60 | 54 | 44 |
| 8 | 42 | 42 | 37 | 52 | 47 | 42 |
| 9 | 47 | 45 | 36 | 57 | 50 | 41 |
| 10 | 42 | 42 | 37 | 52 | 47 | 42 |
| 11 | 38 | 36 | 30 | 48 | 41 | 35 |
| 12 | 54 | 50 | 37 | 64 | 55 | 42 |
| 13 | 54 | 50 | 37 | 64 | 55 | 42 |
| 14 | 54 | 50 | 37 | 64 | 55 | 42 |
| 15 | 54 | 50 | 37 | 64 | 55 | 42 |

For other non-residential land uses within the area of the proposal, the following noise criteria apply:

Classrooms: internal L_{Aeq(15min)} 45 dB(A).
 Places of worship: internal L_{Aeq(15min)} 45 dB(A).
 Passive recreational areas: external L_{Aeq(15min)} 60 dB(A).

Construction vibration criteria

Vibration from construction activities may affect the community in two ways: human comfort and structural damage. To minimise the risk of impacting human comfort, construction vibration should comply with Assessing vibration – A technical guideline (DEC 2006), where it is classified as one of three types:

- Continuous: where vibration occurs uninterrupted and can include sources such as machinery and constant road traffic
- Impulsive: where vibration occurs over a short duration (typically less than two seconds) and occurs less than three times during the assessment period, which is not defined. This may include activities such as occasional dropping of heavy equipment or loading / unloading activities
- Intermittent: occurs where continuous vibration activities are regularly interrupted, or where impulsive activities recur. This may include activities such as rock hammering, drilling, pile driving and heavy vehicle or train pass-bys.

Construction vibration is typically classed as intermittent and relevant criteria for assessing this impact are summarised in Table 6-12.

Table 6-12 Acceptable vibration dose values for intermittent vibration ($\text{ms}^{-1.75}$)

| Locations | Daytime (7.00am – 10.00pm) | | Night-time (10.00pm – 7.00am) | |
|--|----------------------------|----------------|-------------------------------|----------------|
| | Preferred values | Maximum values | Preferred values | Maximum values |
| Critical areas ¹ | 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. Includes operating theatres, precision laboratories and other areas where vibration sensitive activities may occur.

The OEH vibration guideline does not address the potential for damage to structures. Instead, the *Australian Standard AS2187.2-2006 Explosives – Storage, Transport and Use* provides guidance on the assessment of structural damage to buildings caused by vibration. This section of the standard is based on the *British Standard 7385: Part 2 Evaluation and measurement of vibration in buildings* and is used as a guide to assess the likelihood of building damage from ground vibration including piling, compaction, construction equipment and road and rail traffic. The criteria identified in the standard are outlined in Table 6-13.

Table 6-13 BS7385 Structural damage criteria

| Group | Type of structure | Peak particle velocity (PPV) - mm/s | | |
|-------|--|-------------------------------------|--------------|----------------|
| | | 4Hz to 15Hz | 15Hz to 40Hz | 40Hz and above |
| 1 | Reinforced or framed structures. Industrial and heavy commercial buildings | 50 | | |
| 2 | Un-reinforced or light framed structures. Residential or light commercial type buildings | 15 to 20 | 20 to 50 | 50 |

The levels for structural damage outlined in the standard refer to non-continuous vibration sources and are considered ‘safe limits’ up to which no damage from vibration effects are expected to occur for the various building types.

Where heritage structures are present within or near the proposal, the German DIN Standard *4150-3 Structural Vibration, Part 3: Effects of Vibration on Structures* can be used for guidance. This standard recommends guideline values for short term vibration impacts on heritage structures and have been summarised in Table 6-14.

Table 6-14 DIN 4150-3 Vibration guidelines for heritage buildings

| Type of structure | Guideline values for velocity - mm/s | | | |
|--------------------|---|----------------|-----------------|---|
| | Vibration at the foundation at a frequency of | | | Vibration at the horizontal plane of the highest floor at all frequencies |
| | 1 Hz to 10 Hz | 10 Hz to 50 Hz | 50 Hz to 100 Hz | |
| Heritage buildings | 3 | 3 – 8 | 8 – 10 | 8 |

Operational noise criteria

The base criteria for traffic noise are fixed values that consider noise emissions from all types of vehicles on new or upgraded sections of road. These criteria are outlined in the NSW Road Noise Policy (OEH, 2011) and are based on studies of national and international practices for road traffic noise assessment.

The criteria for the assessment of road traffic noise, outlined in the RNP, are also supplemented with ‘interim approaches’ developed by Roads and Maritime to implement the policy provisions of the OEH. These interim approaches outline how the provisions for consideration of mitigation identified in the ENMM apply to the assessment guidelines of the Road Noise Policy. These documents work together to assist in developing feasible and reasonable noise mitigation options where the Proposal noise levels are expected to exceed the RNP assessment criteria.

Under the Road Noise Policy, a road development is classified as either a new road or relating to redevelopment of an existing road. Each classification has a base criteria for both day and night time assessment periods with new roads having a more stringent set of criteria. The consideration of a lower set of criteria for night time in both cases is in recognition of the quality of the noise environment necessary for restful sleep. The proposal specific criteria for each type of road development are listed in Table 6-15.

Due to the existing road traffic noise impact from Prospect Highway and the location of the proposal generally within the existing road reserve, the applicable road assessment category for the proposal would relate to redevelopment of an existing road.

Table 6-15 Road traffic noise base criteria

| Road category | Type of proposal/land use | Daytime noise criteria | Night-time noise criteria |
|-------------------------------------|--|-------------------------------|------------------------------|
| Freeway/arterial/sub-arterial roads | 1. Existing residences affected by noise from new freeway/arterial/sub-arterial road corridors. | $L_{Aeq(15hour)}$ 55 dB(A) | $L_{Aeq(9hour)}$ 50 dB(A) |
| | 2. Existing residences affected by noise from redevelopment of existing freeway/arterial/sub-arterial roads. | $L_{Aeq(15hour)}$ 60 dB(A) | $L_{Aeq(9hour)}$ 55 dB(A) |

In addition to the base criteria, the Environmental Noise Management Manual (ENMM, RTA 2001) identifies a category of highly affected noise sensitive receivers that have been termed “acute”. Where receivers experience noise levels greater than or equal to $L_{Aeq(15hour)}$ 65 dB(A) and $L_{Aeq(9hour)}$ 60 dB(A), from existing or future road

traffic noise, they are classed as 'acute'. In these instances, mitigation would be considered as a priority in line with the ENMM Practice Note IV.

6.2.3 Potential impacts

Construction

Predicted noise levels

Predicted noise levels for each stage of construction indicate that adverse noise impacts to sensitive receivers close to the proposal's construction area would occur. The modelling indicates that receivers located within about 20 metres of the proposed upgrade were generally above the construction noise criteria.

A summary of predicted construction noise levels for each NCA is provided in Table 6-16 and Table 6-17 for construction stages one and four and stages two, three and five respectively. Activities such as earthworks, drainage work, select material placement and demolition of existing infrastructure are likely to result in the greatest number of exceedances of the daytime NML. Some of these exceedances would be more than 25 dB(A) above the daytime NML at receivers that are very close to the work.

The modelling indicates that about 40 receivers are likely to experience noise levels greater than 75 dB(A) at some time during the project. Again, earthworks, demolition and paving are likely to be the activities responsible for these noise levels.

During the delivery of the first and fourth construction stage, works is expected to be largely on the western side of the road corridor and are likely to adversely impact receivers in NCAs 3, 6, 7, 9, 12, 13 and 14, which have receivers positioned near to Prospect Highway. Similarly during the second, third and fifth stages of construction, earthworks on the eastern side of the road corridor are likely to affect NCAs 1, 3, 4, 7, and 14.

The noise from bridge construction over the M4 Western Motorway and Great Western Highway should meet or only slightly exceed the NMLs during the daytime since they would be located several hundred metres from the nearest receivers. If this work is required at night, noise impacts would increase substantially.

It should be noted that predictions are the maximum noise levels, assuming that works occur at the closest point to each receiver. Accordingly, the actual magnitude of predicted noise impacts would vary due to the duration of work at that location, the equipment used, operating methods and the type of construction activity.

Construction is planned to generally be carried out during standard daytime working hours. For work outside normal hours a quantitative noise assessment would occur to address the likelihood of noise levels exceeding 'background noise plus 5 dB(A)' on nearby residences. For noise levels exceeding this criteria management measures would occur to minimise the impact.

Table 6-16 Predicted $L_{Aeq, 15 \text{ minute}}$ construction noise levels for Stage 1 and 4

| NCA | Total Number of receivers in NCA | Distance from road corridor (m) | NML | | | Predicted $L_{Aeq, 15 \text{ minute}}$ noise level, dB(A) | | | | | | | | | | | | | | |
|-----|----------------------------------|---------------------------------|-----|---------|-------|---|--------------|---------------------|---------------------|----------------|----------|------------------|--------------|--------------------|----------------|-------------|-----------------|-----------------|-----------------------------|--------------------|
| | | | Day | Evening | Night | 00. Line marking | 01. Clearing | 02. Safety barriers | 03. Retaining walls | 04. Earthworks | 05. Demo | 06. Dredge basin | 07. Drainage | 08. Bridges piling | 09. Pier place | 10. Girders | 11. Bridge deck | 12. Paving cuts | 13. Paving select placement | 14. Paving asphalt |
| 1 | 14 | 20 - 140 | 55 | 50 | 47 | 35 - 56 | 43 - 59 | 36 - 56 | 26 - 57 | 51 - 68 | 47 - 57 | 0 - 0 | 42 - 59 | 27 - 57 | 22 - 52 | 16 - 46 | 25 - 54 | 18 - 48 | 50 - 67 | 45 - 62 |
| 2 | 34 | 45 - 270 | 55 | 51 | 44 | 27 - 33 | 43 - 52 | 35 - 46 | 39 - 46 | 50 - 61 | 38 - 42 | 0 - 25 | 41 - 52 | 41 - 47 | 36 - 42 | 30 - 36 | 38 - 44 | 32 - 38 | 49 - 60 | 44 - 55 |
| 3 | 112 | 20 - 330 | 55 | 51 | 44 | 26 - 51 | 41 - 72 | 35 - 59 | 33 - 74 | 51 - 80 | 36 - 71 | 6 - 33 | 42 - 71 | 35 - 60 | 30 - 55 | 24 - 49 | 32 - 58 | 26 - 51 | 50 - 79 | 45 - 74 |
| 4 | 16 | 30 - 400 | 60 | 54 | 44 | 27 - 52 | 34 - 57 | 25 - 57 | 29 - 59 | 40 - 70 | 37 - 70 | 8 - 31 | 31 - 61 | 28 - 59 | 23 - 53 | 17 - 47 | 26 - 56 | 19 - 48 | 39 - 69 | 34 - 64 |
| 5 | 141 | 135 - 280 | 48 | 41 | 35 | 33 - 40 | 23 - 53 | 32 - 44 | 0 - 43 | 47 - 60 | 44 - 57 | 13 - 49 | 38 - 51 | 0 - 47 | 0 - 41 | 0 - 35 | 0 - 44 | 0 - 38 | 46 - 59 | 41 - 54 |
| 6 | 102 | 20 - 130 | 57 | 50 | 41 | 35 - 53 | 24 - 64 | 33 - 65 | 0 - 45 | 48 - 84 | 45 - 81 | 14 - 65 | 39 - 75 | 0 - 48 | 0 - 43 | 0 - 37 | 0 - 45 | 0 - 39 | 47 - 83 | 42 - 78 |
| 7 | 68 | 15 - 160 | 60 | 54 | 44 | 36 - 54 | 28 - 68 | 37 - 61 | 16 - 46 | 50 - 74 | 49 - 74 | 14 - 48 | 41 - 65 | 0 - 48 | 0 - 43 | 0 - 37 | 0 - 45 | 0 - 39 | 49 - 73 | 44 - 68 |
| 8 | 83 | 100 - 300 | 52 | 47 | 42 | 32 - 44 | 37 - 55 | 32 - 47 | 25 - 43 | 47 - 62 | 42 - 59 | 18 - 39 | 38 - 53 | 27 - 46 | 21 - 41 | 15 - 35 | 24 - 43 | 18 - 37 | 46 - 61 | 41 - 56 |
| 9 | 66 | 20 - 220 | 57 | 50 | 41 | 36 - 55 | 18 - 48 | 33 - 63 | 0 - 37 | 48 - 74 | 45 - 71 | 9 - 40 | 39 - 65 | 0 - 40 | 0 - 35 | 0 - 29 | 0 - 37 | 0 - 31 | 47 - 73 | 42 - 68 |
| 10 | 200 | 110 - 320 | 52 | 47 | 42 | 33 - 41 | 0 - 42 | 31 - 43 | 0 - 32 | 46 - 58 | 43 - 55 | 0 - 33 | 37 - 49 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 45 - 57 | 40 - 52 |
| 11 | 116 | 90- 430 | 48 | 41 | 35 | 22 - 42 | 0 - 37 | 22 - 48 | 0 - 0 | 36 - 64 | 33 - 61 | 0 - 23 | 27 - 55 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 35 - 63 | 30 - 58 |
| 12 | 92 | 15 - 100 | 64 | 55 | 42 | 37 - 55 | 0 - 38 | 43 - 67 | 0 - 0 | 58 - 84 | 55 - 81 | 0 - 29 | 49 - 75 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 57 - 83 | 52 - 78 |
| 13 | 40 | 20 - 130 | 64 | 55 | 42 | 35 - 55 | 0 - 37 | 38 - 61 | 0 - 0 | 52 - 73 | 49 - 70 | 0 - 28 | 43 - 64 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 51 - 72 | 46 - 67 |
| 14 | 63 | 20 - 120 | 64 | 55 | 42 | 32 - 58 | 0 - 0 | 33 - 66 | 0 - 0 | 47 - 75 | 44 - 72 | 0 - 0 | 38 - 66 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 46 - 74 | 41 - 69 |
| 15 | 2 | 90 - 180 | 64 | 55 | 42 | 32 - 37 | 0 - 0 | 36 - 43 | 0 - 0 | 49 - 55 | 46 - 52 | 0 - 0 | 40 - 46 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 0 - 0 | 48 - 54 | 43 - 49 |

Table 6-17 Predicted $L_{Aeq, 15 \text{ minute}}$ construction noise levels for Stages 2, 3 and 5

| NCA | Total Number of receivers assessed in NCA | Distance from road corridor (m) | NML | | | Predicted $L_{Aeq, 15 \text{ minute}}$ noise level, dB(A) | | | | | | | |
|-----|---|---------------------------------|-----|---------|-------|---|--------------|---------------------|----------------|----------|--------------|-----------------------------|--------------------|
| | | | Day | Evening | Night | 00. Line marking | 01. Clearing | 02. Safety barriers | 04. Earthworks | 05. Demo | 07. Drainage | 13. Paving select placement | 14. Paving asphalt |
| 1 | 14 | 20 - 140 | 55 | 50 | 47 | 37 - 48 | 44 - 58 | 37 - 53 | 52 - 78 | 49 - 75 | 43 - 69 | 51 - 77 | 46 - 72 |
| 2 | 34 | 45 - 270 | 55 | 51 | 44 | 35 - 41 | 35 - 39 | 26 - 30 | 45 - 52 | 41 - 47 | 36 - 43 | 44 - 51 | 39 - 46 |
| 3 | 112 | 20 - 330 | 55 | 51 | 44 | 33 - 51 | 27 - 48 | 35 - 58 | 50 - 70 | 47 - 67 | 41 - 61 | 49 - 69 | 44 - 64 |
| 4 | 16 | 30 - 400 | 60 | 54 | 44 | 27 - 53 | 29 - 45 | 25 - 58 | 40 - 78 | 37 - 75 | 31 - 69 | 39 - 77 | 34 - 72 |
| 5 | 141 | 135 - 280 | 48 | 41 | 35 | 33 - 40 | 0 - 39 | 32 - 43 | 36 - 58 | 33 - 55 | 27 - 49 | 35 - 57 | 30 - 52 |
| 6 | 102 | 20 - 130 | 57 | 50 | 41 | 33 - 56 | 0 - 40 | 33 - 57 | 38 - 67 | 35 - 64 | 29 - 58 | 37 - 66 | 32 - 61 |
| 7 | 68 | 15 - 160 | 60 | 54 | 44 | 36 - 54 | 0 - 40 | 37 - 62 | 51 - 82 | 48 - 79 | 42 - 73 | 50 - 81 | 45 - 76 |
| 8 | 83 | 100 - 300 | 52 | 47 | 42 | 33 - 43 | 0 - 39 | 32 - 47 | 48 - 63 | 45 - 60 | 39 - 54 | 47 - 62 | 42 - 57 |
| 9 | 66 | 20 - 220 | 57 | 50 | 41 | 34 - 52 | 0 - 0 | 33 - 61 | 39 - 65 | 36 - 62 | 30 - 56 | 38 - 64 | 33 - 59 |
| 10 | 200 | 110 - 320 | 52 | 47 | 42 | 32 - 40 | 0 - 0 | 31 - 44 | 40 - 57 | 37 - 54 | 31 - 48 | 39 - 56 | 34 - 51 |
| 11 | 116 | 90- 430 | 48 | 41 | 35 | 22 - 42 | 0 - 0 | 23 - 48 | 31 - 62 | 28 - 59 | 22 - 53 | 30 - 61 | 25 - 56 |
| 12 | 92 | 15 - 100 | 64 | 55 | 42 | 37 - 61 | 0 - 0 | 42 - 64 | 38 - 69 | 35 - 66 | 29 - 60 | 37 - 68 | 32 - 63 |
| 13 | 40 | 20 - 130 | 64 | 55 | 42 | 35 - 51 | 0 - 0 | 37 - 60 | 38 - 51 | 35 - 48 | 29 - 42 | 37 - 50 | 32 - 45 |
| 14 | 63 | 20 - 120 | 64 | 55 | 42 | 31 - 51 | 0 - 0 | 35 - 68 | 40 - 74 | 37 - 71 | 31 - 65 | 39 - 73 | 34 - 68 |
| 15 | 2 | 90 - 180 | 64 | 55 | 42 | 32 - 36 | 0 - 0 | 34 - 41 | 46 - 51 | 43 - 48 | 37 - 42 | 45 - 50 | 40 - 45 |

Operational noise

Model development and calibration

The most significant factors in determining the noise level near a busy road are the types and volumes of vehicles that use the road as well as their speed and the road surface type.

A calibrated noise model was configured to represent four assessment scenarios in accordance with the Road Noise Policy (RNP, OEH 2011): These scenarios include noise modelling:

- Within one year of changed traffic conditions, known as the year of opening
- For a future design year, typically ten years after the proposed upgrade opens.

For each of these two scenarios, a comparison is then made between:

- The road traffic noise levels if the proposal proceeds, known as the 'build option'
- The corresponding road traffic noise levels, if the proposal does not proceed, known as the 'no build option'.

Each of these combinations is also considered for both day and night time noise impacts to account for the differences in general noise levels during these different periods.

These scenarios were assessed using measured and forecast traffic data, the design road alignment and other factors such as speed, road surface type, gradient and topography to predict future noise levels.

The validity of the noise model was confirmed against noise levels measured for a known situation, ie existing traffic and noise monitoring survey results, before being used as a tool to predict future traffic noise impacts from the proposal. The validation of the noise model is shown below in Table 6-18.

Table 6-18 Comparison of measured and modelled road traffic noise levels

| Location ID | Day LAeq (15 hour) dB(A) | | | Night LAeq (9 hour) dB(A) | | |
|--------------------|-----------------------------|----------|------------|------------------------------|----------|------------|
| | Modelled | Measured | Difference | Modelled | Measured | Difference |
| M2 | 56.3 | 54.7 | 1.6 | 51.3 | 49.1 | 2.2 |
| M3 | 66.7 | 68.1 | -1.4 | 61.4 | 61.2 | 0.2 |
| M4 | 59.2 | 57.7 | 1.5 | 53.6 | 53.8 | -0.2 |
| M5 | 53.7 | 53 | 0.7 | 48.6 | 47.7 | 0.9 |
| M6 | 64.0 | 62.1 | 1.9 | 58.4 | 59.0 | -0.6 |
| Median of Results | | | 1.5 | | | 0.2 |
| Standard Deviation | | | 1.3 | | | 1.1 |

The modelled existing noise levels showed an acceptable correlation with the measured levels for the daytime and night time for the current year of operation. The modelled existing noise levels and the measured existing levels were compared. In

accordance with best practices, the median differences between these modelled and measured existing noise levels (1.5 dB(A) day, and 0.2 dB(A) night) has been added to the modelled results to calibrate them for use in future prediction scenarios.

Predicted noise levels

The predicted noise levels for individual receiver locations were calculated using the noise model and compared against the proposal criteria.

The operational noise assessment considered 1123 residential receivers. The outcome of modelling includes:

- Existing noise levels at many properties already exceed the RNP criteria of $L_{Aeq, (15 \text{ hr})}$ 60 dB(A) and/or $L_{Aeq, (9 \text{ hr})}$ 55 dB(A)
- There are no locations where the proposal would cause an increase of more than 12 dB over the existing noise levels
- Existing and design year noise levels were found to be acute at a number of residential receivers. Acute properties are identified in Appendix B of the Noise and Vibration Assessment located in Appendix E of the REF.

A summary of results for each NCA is shown in Table 6-19. Noise impact predictions indicate that 231 residences should be considered for noise mitigation. The majority of these receivers are located adjacent to the existing road corridor and already experience acute noise levels for either the day or night time periods.

The complete assessment of operational noise impacts is included within Appendix E.

Table 6-19 Predicted operational noise impacts by NCA

| NCA | Number of receivers in NCA | Distance from road corridor (m) | Criteria | | Prediction summary | |
|--------------|----------------------------|---------------------------------|-----------------------------|------------------------------|-------------------------------------|--|
| | | | $L_{Aeq 15 \text{ hr}}$ Day | $L_{Aeq 9 \text{ hr}}$ Night | Number of non-residential receivers | Number of properties where further noise mitigation should be considered |
| 1 | 14 | 20 - 140 | 60 | 55 | 3 | 9 |
| 2 | 34 | 45 - 270 | 60 | 55 | 0 | 11 |
| 3 | 112 | 20 - 330 | 60 | 55 | 0 | 16 |
| 4 | 0 | 30 - 400 | 60 | 55 | 0 | 0 |
| 5 | 141 | 135 - 280 | 60 | 55 | 0 | 1 |
| 6 | 102 | 20 - 130 | 60 | 55 | 1 | 19 |
| 7 | 68 | 15 - 160 | 60 | 55 | 2 | 30 |
| 8 | 83 | 100 - 300 | 60 | 55 | 0 | 0 |
| 9 | 66 | 20 - 220 | 60 | 55 | 1 | 35 |
| 10 | 200 | 110 - 320 | 60 | 55 | 0 | 0 |
| 11 | 116 | 90- 430 | 60 | 55 | 0 | 0 |
| 12 | 92 | 15 - 100 | 60 | 55 | 0 | 56 |
| 13 | 40 | 20 - 130 | 60 | 55 | 0 | 17 |
| 14 | 63 | 20 - 120 | 60 | 55 | 1 | 37 |
| 15 | 3 | 90 - 180 | 60 | 55 | 3 | 0 |
| TOTAL | 1150 | - | - | - | 27 | 231 |

Predicted internal noise levels for non-residential receivers have been estimated for windows open and windows closed for a masonry building. A reduction of 10 dB(A) has been applied where windows are open, while with windows closed, a facade reduction of 30 dB(A) is estimated. These receivers include Shelley Public School, Blacktown Church of Christ, Blacktown Children’s Centre and St Marks Coptic Catholic Church.

The predicted noise levels indicate that the non-residential receiver criteria are likely to be exceeded in all instances where windows remain open to allow fresh air ventilation. Where windows are closed noise levels are likely to be within the proposal criteria, with the exception of Blacktown Children’s Centre. Further inspection and assessment of these buildings would be required to confirm the predicted internal noise levels prior to finalising the noise mitigation requirements for the proposal.

Table 6-20 Non-residential operational noise goals

| Receiver ID | Predicted external level | Criteria dB(A) | Internal level | | | |
|-------------|--------------------------|--|----------------|-------------------|----------------|-------------------|
| | | | Windows open | Exceeds criteria? | Windows closed | Exceeds criteria? |
| 668, 698 | 63 | L _{Aeq, (1 hour)} 40 (internal) when in use | 53 | Yes | 33 | No |
| 680 | 73 | L _{Aeq, (1 hour)} 35 (internal) | 63 | Yes | 43 | Yes |
| | 60* | Play area 55 (external) | - | Yes | - | Yes |
| 287 | 63 | L _{Aeq, (1 hour)} 40 (internal) | 53 | Yes | 33 | No |
| 4 | 66 | L _{Aeq, (1 hour)} 40 (internal) | 56 | Yes | 36 | No |

- Outdoor play area only (rear of building)

Non-residential receivers near the proposal that should be considered for further noise mitigation are identified in Appendix E.

Construction noise and vibration mitigation

Based on predicted impacts on the community it is recommended that best practice noise and vibration management be implemented throughout construction of the proposal. Safeguards and management measures that would be implemented to control the proposal’s potential noise and vibration impacts are summarised in Section 6.2.4 below.

Operational noise mitigation options

For road projects, the process of reducing traffic noise impacts is called mitigation. The application of mitigation measures depends on a variety of factors that are often summarised as feasible and reasonable considerations. Practice Note IV of Roads and Maritime’s *Environmental Noise Management Manual* (ENMM) provides guidance in selecting and designing feasible and reasonable treatment. Mitigation options may be applied in three distinct ways:

- At the source: such as reducing vehicle noise emissions, low noise pavements, or reduced speed zones
- In the transmission path: physical barriers such as noise walls or mounds may be located between the source and the receiver
- At the receiver: reducing noise entering into a building by applying architectural acoustic treatments.

Any of these methods or a combination may be applied to a proposal where the noise assessment indicates an exceedance of the guidelines.

Measures to mitigate predicted noise impacts during operation of the proposal would need to be considered for 231 receivers spread over ten NCAs (refer to Table 6-20).

The mitigation options for the proposal are based on the application of feasible and reasonable considerations for receivers in each NCA. Consideration of the cost of implementation of options is based on information available at the concept design stage; however this is subject to review during any subsequent design stages.

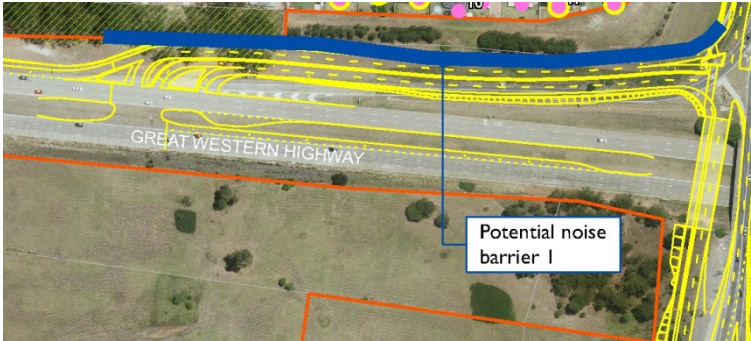

Low noise pavements would not provide any significant noise benefits to residences in areas where vehicle speeds are 60 km/h. This noise mitigation option is therefore not considered feasible or reasonable for this proposal.

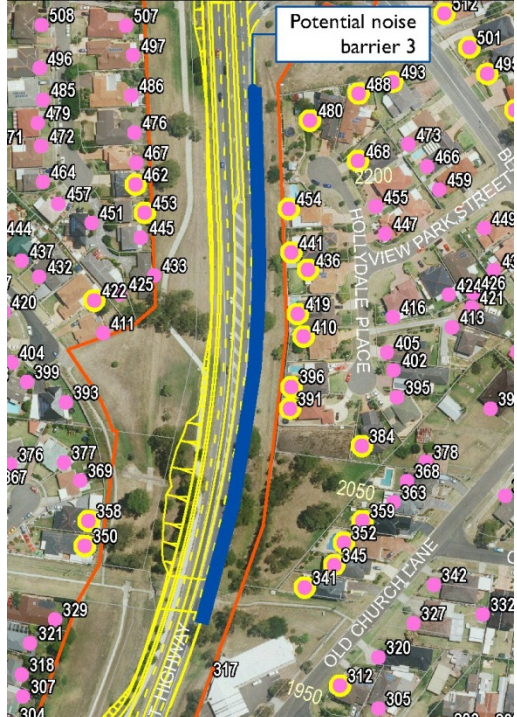
Noise barriers are not a feasible option for all affected receivers for this proposal. The greatest concentration of affected receivers is in NCAs 6, 7, 9, 12, 13, and 14. In these NCAs, some properties have direct vehicle and pedestrian access to their property from Prospect Highway. The application of continuous noise barriers in these instances is not feasible when these barrier performance constraints are also considered.

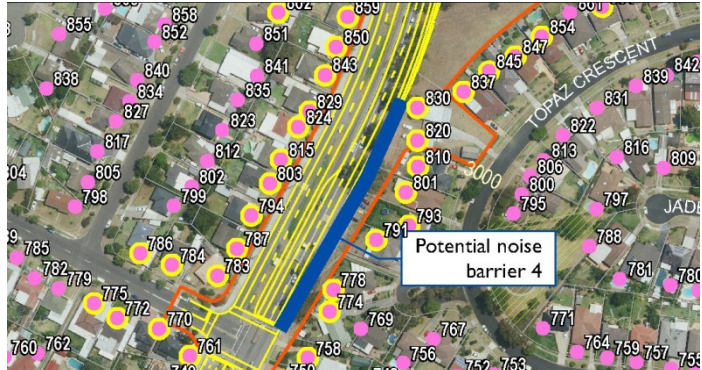
Where residents have access to their property from local roads, ie not fronting Prospect Highway, the implementation of noise barriers may be possible. These locations have been reviewed and a series of potential noise barrier locations have been identified for the proposal. These noise barriers would be subject to further consideration during the detail design phase to assess the feasible and reasonable implementation of this option. The locations of the potential noise barriers are shown in Table 6-21 and would be about 3 metres in height depending on the final design location within the corridor. Table 6-21 presents the potential noise barrier locations with descriptions and approximate locations of the start and finish of the barrier. If required, noise barriers would be designed in accordance with the Roads and Maritime Noise wall design guideline (RTA 2006).

The preferred option for all other noise sensitive receiver locations identified for mitigation for the proposal would be architectural treatments. These treatments aim to reduce noise intrusion into the property through acoustically designed fittings with the details of any property treatments considered and agreed individually with affected home owners.

Table 6-21 Potential noise barrier locations

| Potential noise barrier no. | Location description | Approximate length | Location figure |
|-----------------------------|---|--------------------|--|
| 1 | Along northern side of two way link road. | 310 metres |  |
| 2 | Along eastern side of Prospect Highway from just south of Harrod Street to about 150 metres north of Harrod Street. | 175 metres |  |

| Potential noise barrier no. | Location description | Approximate length | Location figure |
|-----------------------------|---|--------------------|--|
| 3 | Along eastern side of Prospect Highway from Old Church Lane to Keyne Street pedestrian underpass to Blacktown Road. | 305 metres |  |

| Potential noise barrier no. | Location description | Approximate length | Location figure |
|-----------------------------|---|--------------------|---|
| 4 | Along the eastern side of Prospect Highway corridor just north of Keyworth Drive to about 180 metres north of Keyworth Drive. | 160 metres |  |

Sleep disturbance

The assessment of maximum noise level events does not form part of the criteria for the requirement of noise mitigation for a road upgrade. In considering the impact of maximum noise events generated by individual vehicles, the distribution of occurrences and their levels are used to assist in the prioritisation of mitigation.

In reviewing maximum noise level events adjacent to Prospect Highway (monitoring location 3), noise levels within a residence would be expected to range between about 56 and 65 dB(A) for as many as 900 noise events during an average night. These levels exceed the 50-55 dB(A) range that may cause an awakening from sleep but are lower than the 65-70 dB(A) range for one or two maximum internal noise level events.

The proposed upgrade would not result in the closest residential properties being located closer to the road corridor compared to the existing alignment. The proposal would not generate an increase in the current traffic volume on the road. The assessment also indicates that maximum noise levels would not increase as a result of the proposed road upgrade.

6.2.4 Safeguards and management measures

Table 6-22 Summary of safeguards and management measures for noise and vibration

| Impact | Environmental safeguards | Responsibility | Timing |
|--------------------|---|-----------------------|--------------------------------|
| Operational noise | During the detailed design stage of the proposal, further investigations of all feasible and reasonable mitigation options for affected receivers would be subject to assessment in line with the Roads and Maritime Environmental Noise Management Manual (RTA, 2001) and NSW Road Noise Policy (OEH, 2011). | Roads and Maritime | Detailed design |
| Operational noise | Any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase. | Roads and Maritime | Construction |
| Operational noise | A post-construction noise monitoring program (including simultaneous traffic counts) would be undertaken in accordance with the RMS Environmental Noise Management Manual within six to 12 months of opening once traffic flows have stabilised in order to verify the noise assessment. | Roads and Maritime | Post construction |
| Construction noise | <ul style="list-style-type: none"> A Construction Noise and Vibration Management Plan (CNVMP) would be prepared <p>This plan would include but not be limited to:</p> <ul style="list-style-type: none"> A map indicating the locations of sensitive receivers including | Contractor | Pre-construction, construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|--------|--|----------------|--------|
| | <p>residential properties</p> <ul style="list-style-type: none"> • A quantitative noise assessment in accordance with the EPA Interim Construction Noise Guidelines (DECCW, 2009) • Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation of EPA Interim Construction Noise Guidelines (DECCW, 2009) • A risk assessment to determine potential risk for activities likely to affect receivers (for activities undertaken during and outside of standard working hours) • Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements • A process for assessing the performance of the implemented mitigation measures • A process for documenting and resolving issues and complaints • A construction staging program incorporating a program of noise and vibration monitoring for sensitive receivers • A process for updating the plan when activities affecting construction noise and vibration change • Identify in toolbox talks where noise and vibration management is required • Consider construction compound layout so that primary noise sources are at a maximum distance from sensitive receivers (primarily residential receivers) • Locate compressors, generators, pumps and any other fixed plant as far from residences as possible and behind site structures • Vehicle delivery times will be scheduled where feasible to the recommended construction hours to minimise noise impacts from heavy vehicle movements and deliveries • The environmental induction program will include specific noise and vibration issues awareness training including, but not limited to, the following: <ul style="list-style-type: none"> - Avoiding use of radios during | | |

| Impact | Environmental safeguards | Responsibility | Timing |
|----------------------|--|----------------|--------------------------------|
| | <p>work outside normal hours</p> <ul style="list-style-type: none"> - Avoiding shouting and slamming doors - Where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods - Minimising reversing - Avoiding dropping materials from height and avoiding metal to metal contact on material <ul style="list-style-type: none"> • Any out of hours works would comply with the RMS Noise Management Manual – Practice Note VII • All noise complaints will be investigated and appropriate mitigation measures implemented where practicable to minimise further impacts • 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. | | |
| Vibration management | <p>A vibration assessment is to be prepared and included in the NVMP. The vibration assessment is to include (as a minimum):</p> <ul style="list-style-type: none"> - Identification of potentially affected properties/receivers - A risk assessment to determine the potential for discrete work activities to affect receivers - A map indicating the locations considered likely to be impacted and those requiring building condition surveys - Outline a monitoring program - A process for assessing the performance of the implemented mitigation measures - A process for resolving issues and conflicts <ul style="list-style-type: none"> • Where construction activities may cause damage through vibration a Building Condition Inspection of these items must be undertaken • Select alternative, lower-impact equipment or methods where | Contractor | Pre-construction, construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|----------------------|---|----------------|------------------|
| | possible, particularly in the vicinity of dwellings and heritage structures. | | |
| Vibration management | <ul style="list-style-type: none"> • Sensitivity testing for vibration generated by construction equipment will be undertaken in the vicinity of, but not immediately adjacent to, the St Bartholomew's Church • The sensitivity testing will identify targets and safe buffer distances for the use of vibration producing equipment around St Bartholomew's church • The results of the sensitivity testing and any targets or buffer distances identified will be documented in a Management Plan for works adjacent to St Bartholomew's Church • A program of monitoring vibration will be included in the Management Plan, which will form part of the CEMP. | Contractor | Pre Construction |

6.3 Biodiversity

An assessment was prepared to identify the extent and magnitude of the proposal's potential impacts on biodiversity. The assessment is included in the Biodiversity Assessment (SKM, 2014) included in Appendix F. A summary of the assessment is provided in this section.

6.3.1 Methodology

Study area

The biodiversity assessment uses the following terms:

- Study area: this includes the general location around the proposal area and includes adjacent land potentially subject to indirect impacts. It also includes part of the M4 Western Motorway and Great Western Highway road corridors
- Study locality: this refers to the area within a radius of 10 kilometres from the proposal area.

The 'proposal area' is defined in Section 1.1.2 and shown in Figure 1-1.

Review of literature, mapping and databases

Searches of government maintained databases were carried out in August 2013 as part of the initial assessment. The following information was reviewed:

- NSW vegetation types database (OEH 2012)
<http://www.environment.nsw.gov.au/biobanking/vegtypedatabase.htm>
- NSW threatened species profile database (OEH 2013)
<http://www.environment.nsw.gov.au/biobanking/biobankingtspd.htm>
- Native Vegetation of the Cumberland Plain - Final Edition (National Parks and Wildlife Service (NPWS) 2002)
- The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities (Tozer 2003)
- DPI Noxious Weed listings <http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed>
- Atlas of NSW Wildlife maintained by the NSW OEH (OEH April 2013)
- Atlas of Living Australia maintained by CSIRO
- The Protected Matters Search Tool provided under the *Environment Protection Biodiversity Conservation (EPBC) Act 1999* (August 2013).

Field investigations

Terrestrial flora and fauna field surveys were conducted for the study area over a single season in late August 2013. Targeted surveys for all potentially occurring cryptic flora species and the Cumberland Plain Land Snail (*Meridolum corneovirens*) were carried out on 29 November 2013 after rain in suitable areas of habitat.

Vegetation and flora

Surveys of flora and vegetation associations aimed to provide baseline data for the presence of threatened plant species, populations and ecological communities. It included:

- Review of broadscale vegetation mapping, previous specialist reports from nearby projects, threatened species records and available literature and scientific databases to appreciate flora diversity and identify threatened species that potentially occur in the study area
- Classification and mapping of vegetation communities and threatened species habitat using stratified sampling techniques. Flora species were inventoried to identify which species are specific to each vegetation community
- Targeted searches for threatened flora species in suitable habitat for the Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*) and Spiked Rice-flower (*Pimelea spicata*).

Transect sampling was also carried out to identify vegetation community types and boundaries. Sampling techniques were in line with guidelines from Department of Environment and Conservation (DEC 2004).

Standard quadrat based sampling (20 x 20 metre plots) was used with general traverses of the study area. The heights of structural layers, abundance and cover of each species and vegetation layer, landscape and soil features, and geographical coordinates and a photographic record were collected for each quadrat. General traverses included random searches in targeted areas to develop a plant list and to complete searches for threatened species. The distribution of vegetation communities, significant habitat attributes and other features of interest were also opportunistically recorded during general traverses.

Cumberland Plain Woodland Threatened Ecological Community (TEC) (listed as critically endangered under the *Threatened Species Conservation Act* (TSC Act) and areas of high condition vegetation are also listed under the EPBC Act) extents were delineated according to the NSW Scientific Committee (2009) and Federal listing advice (DEWHA 2010). Condition thresholds for the federally listed community were considered as part of this step. Condition thresholds are not provided for the State-listed community.

A vegetation and habitat condition assessment was conducted using the Biobanking Assessment Methodology (DECC, 2008). The assessment aimed to provide a measure of habitat condition for each of the remnant vegetation types impacted by the proposal. It also aimed to identify the floristic diversity, structure of the vegetation, the type and distribution of plant communities present and the density of fauna habitat features in the study area. Two condition assessment plots were carried out in the study area, one in each remnant vegetation community.

Fauna

The fauna field survey was targeted within the road reserve within the proposal area. A combination of aerial photograph interpretation, broad-scale vegetation mapping (NPWS 2002) and elevation data was used to stratify the vegetation and habitats in the study area. The field survey adopted a habitat assessment approach focused on potential habitat for threatened species and identifying habitat usage by threatened fauna. Habitat type and condition was recorded, including:

- Type and structure of the vegetation, including an assessment of the 'naturalness' in terms of the presence of native remnant vegetation or planted and regrowth areas
- Dominant flora species and a subjective assessment of the floristic diversity at different structural layers, flowering and fruiting resources
- Tree species and height of canopy trees including the proportion of each species

- Presence of significant keystone species and critical habitat elements for threatened fauna
- Disturbance regimes including the presence of key threatening processes such as invasion and dominance of exotic species
- The presence of tree hollows, dead stags or hollow logs providing potential shelter for hollow-dependent fauna, including microchiropteran bats and birds
- The presence of artificial structures that may be used by roosting bats or nesting birds, such as concrete culverts or under bridges
- The structure or the habitat in terms of complexity and the presence of shelter and food resources for fauna, in particular threatened species
- The presence and condition of wet areas or waterbodies, and significant aquatic habitats where present
- The size of remnant patches and extent of connectivity to habitats outside the road reserve
- Site photographs and global positioning system (GPS) coordinates.

Opportunistic fauna survey was also used to identify habitats of conservation value for fauna. Opportunistic fauna surveys were based on direct observation, including the use of binoculars, identifying bird and frog calls as well as reptiles encountered during the surveys. Eight habitat assessment plots were prepared for the study area, one in each area of remnant vegetation and six in areas of isolated trees and planted vegetation.

An assessment was made on the potential presence of the Cumberland Plain Snail (*Meridolum corneovirens*) and to rate the value of available habitat within the study area for the species. Targeted surveys were carried out during the initial study period in August 2013 and further survey during more favourable conditions in November 2013.

Threatened species assessment

Likelihood of occurrence

State and nationally listed threatened species identified from the background reviews were considered in terms of their likelihood to occur in the habitats present within the study area based on their identified habitat requirements. The likelihood of occurrence was classified according to the criteria described in Table 6-23. The presence of all potentially occurring threatened species were targeted during the surveys with particular emphasis on those species with a high or moderate likelihood of occurrence. Species with a high or moderate likelihood of occurrence were subject to assessments of significance under the relevant legislation (TSC Act and/or EPBC Act).

Table 6-23 Likelihood of occurrence criteria

| Likelihood of occurrence | Criteria |
|--------------------------|---|
| Unlikely | <ul style="list-style-type: none"> • Species highly restricted to certain geographical areas not within the proposal footprint • Specific habitat requirements are not present in the study area. |
| Low | <p>Species not recorded during field surveys and fit one or more of the following criteria:</p> <ul style="list-style-type: none"> • Have not been recorded previously in the study area/surrounds and for which the study area is beyond the current distribution range • Use specific habitats or resources not present in the study area |

| Likelihood of occurrence | Criteria |
|--------------------------|--|
| | <ul style="list-style-type: none"> Are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded. |
| Moderate | <p>Species not recorded during the field surveys that fit one or more of the following criteria:</p> <ul style="list-style-type: none"> Have infrequently been recorded previously in the study area/surrounds Use specific habitats or resources present in the study area but in a poor or modified condition Are unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration Are cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded. |
| High | <p>Species recorded during the field surveys or species not recorded that fit one or more of the following criteria:</p> <ul style="list-style-type: none"> Have frequently been recorded previously in the study area/surrounds Use habitat types or resources that are present in the study area that are in abundance and/or in good condition within the study area Are known or likely to maintain resident populations surrounding the study area Are known or likely to visit the site during regular seasonal movements or migration. |

Significance assessments

Significance assessments were conducted for species, populations and communities that have been positively identified or that have a moderate or high potential to occur in the study area. These assessments of significance, also known as the '7 part test', consider threatened species assessment detailed in the Department of Environment and Climate Change (DECC 2007) Threatened species assessment guidelines: The assessment of significance. These assessments are located in Appendix D of the Biodiversity assessment (refer to Appendix F).

6.3.2 Existing environment

The study area is located in the Sydney Basin bioregion (Thackway and Cresswell 1995) and within the Sydney Metro Catchment Management Area (CMA) in the Cumberland CMA sub-region. The Cumberland Plain comprises gently undulating plains and low hills. The Cumberland Plain is formed on sediments derived from Wianamatta Shale comprising clay-based soils. On the fringes of the Cumberland Plain these clay soils grade into sandstone-derived soils.

The study area is located within the Sydney Harbour and Parramatta River Catchment. The geology of the area is derived from the Wianamatta Group with the Ashfield Shale underlying most of the proposed expansion.

Vegetation communities

Eight vegetation communities were identified within the study area. These communities comprise one remnant vegetation community type and seven highly modified, planted or exotic vegetation types. Table 6-24 describes each of these vegetation communities. Vegetation communities within the study area are shown on Figure 6-9 to 6-13.

Table 6-24 Vegetation communities within the study area

| Map unit | Biometric vegetation type | Description | Status | Condition | Area in study area (ha) | Cleared estimate [#] |
|---|--|--|---|-----------|-------------------------|-------------------------------|
| Map Unit 1: Remnant Shale Plains Woodland (Cumberland Plain Woodland) | Broad-leaved Ironbark - Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin | <p>Shale Plains Woodland is the most widely distributed community on the Cumberland Plain. It predominantly occurs on soils derived from Wianamatta Shale, but also occurs on Holocene alluvium in well-drained areas.</p> <p>This community is dominated by Grey Box and Forest Red Gum. Trees with other canopy species are generally absent except for some planted Narrow-leaved Ironbark (<i>Eucalyptus crebra</i>) in some areas of the Prospect Highway roadside reserve.</p> <p>The community includes high condition areas in Timbertop Reserve (refer to Photo 6-1), moderate condition patches on the southern side of the Great Western Highway and near to Thornley Road south of the M4 Western Motorway. There are also low condition areas of this community, which comprises remnant trees of Grey Box and Forest Red Gum with a cleared and maintained understorey dominated by exotic species with no or very low abundance of native flora (Photo 6-2).</p> <p>High and moderate condition patches</p> <p>The understorey is dominated by native flora species, which includes a sub-canopy with younger canopy species listed above as well as Cherry Ballart (<i>Exocarpos cupressiformis</i>) and Parramatta Wattle (<i>Acacia parramattensis</i> subsp. <i>parramattensis</i>). A shrub stratum dominated by Blackthorn and <i>Dillwynia sieberi</i> is present as well as several smaller shrub species in some areas, which include <i>Pultenaea microphylla</i> and <i>Phyllanthus virgatus</i>.</p> <p>Ground stratum species include a diversity of grass species such as Weeping Grass, Kangaroo Grass, Three-awned Spear Grass (<i>Aristida</i> spp.), Wallaby Grass (<i>Rytidosperma</i> spp.) and Shorthair Plumegrass (<i>Dichelachne micrantha</i>). Common herb species include Kidney Weed, Pastel Flower, Slender Tick Trefoil (<i>Desmodium varians</i>), <i>Opercularia diphylla</i>, Wattle Mat-</p> | Critically endangered, TSC Act and EPBC Act (high condition only) | High | 0.42 | 95% |
| | | | | Moderate | 0.65 | |
| | | | | Low | 1.11 | |
| | | | | Total | 2.18 | |

| Map unit | Biometric vegetation type | Description | Status | Condition | Area in study area (ha) | Cleared estimate [#] |
|----------|---------------------------|--|--------|-----------|-------------------------|-------------------------------|
| | | <p>rush (<i>Lomandra filiformis</i> subsp. <i>filiformis</i>), Fuzzweed (<i>Vittadinia cuneata</i>), Long-leaf Flax Lily (<i>Dianella longifolia</i> var. <i>longifolia</i>), Vanilla Lily (<i>Arthropodium milleflorum</i>) and Winter Apple (<i>Eremophila debilis</i>).</p> <p>This area provides potential habitat for several threatened flora species, however despite targeted searches no threatened flora species were identified in these areas.</p> <p>The condition of this community varied depending on the degree of soil disturbance and vegetation modification. Intact vegetation in Timbertop Reserve is in a relatively high condition with a condition score of 82 out of 100. The vegetation patch on the southern side of the Great Western Highway is generally in a moderate condition with a condition score of around 69 out of 100.</p> <p>Low condition patches</p> <p>Low condition patches of this community generally consist of canopy species only with no native understorey within the Prospect Highway road reserve. The understorey includes areas of bare ground and maintained exotic grassland.</p> <p>There is a high diversity and abundance of exotic flora present in disturbed examples of this community, which include exotic grasses Rhodes Grass (<i>Chloris gayana</i>) and African Lovegrass (<i>Eragrostis curvula</i>), and shrubs African Olive (<i>Olea europaea</i> subsp. <i>cuspidata</i>), African Boxthorn (<i>Lycium ferocissimum</i>) and Paddy's Lucerne (<i>Sida rhombifolia</i>).</p> <p>These areas have a condition score of around 35 out of 100. These areas comprise only canopy species with an exotic dominated understorey, no ground habitats and no natural regeneration.</p> | | | | |

| Map unit | Biometric vegetation type | Description | Status | Condition | Area in study area (ha) | Cleared estimate [#] |
|---|--|---|--------------------------------|-----------|-------------------------|-------------------------------|
| Map Unit 2: Planted Shale Plains Woodland (Cumberland Plain Woodland) | Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin (restored example of) | <p>This community has been planted in the M4 Western motorway, the Great Western Highway and Prospect Highway road reserves. The age of the plantings varies throughout these areas. These areas rarely support any native groundcovers and often have a sparse planted shrub layer.</p> <p>Experience from rehabilitation projects on the Cumberland Plain Woodland suggests that sites with a history of soil disturbance will be extremely slow to recover. The majority of this community in the road reserve has been subject to significant soil disturbance from former land uses and/or by earthworks and other disturbances from the construction of the M4 Western Motorway. Subsequently this map unit is dominated by exotic flora.</p> <p>Common tree species planted comprise Grey Box, Forest Red Gum and Narrow-leaved Ironbark. Other common planted species include Flax-leaved Paperbark (<i>Melaleuca linariifolia</i>), Tick Bush (<i>Kunzea ambigua</i>), Blackthorn and Falcate Wattle (<i>Acacia falcata</i>).</p> <p>Some areas also include species not typical of Cumberland Plain Woodland such as Mugga Ironbark (<i>Eucalyptus sideroxylon</i>), Weeping Bottlebrush (<i>Callistemon viminalis</i>) and Fringed Wattle (<i>Acacia fimbriata</i>).</p> <p>This map unit was delineated from other map units based on the presence of a mixed planting dominated by Forest Red Gum and Grey Box. These areas support a limited cover of canopy and mid-storey species with an exotic dominated understorey, no ground habitats and no natural regeneration.</p> | Critically endangered, TSC Act | Low | 0.97 | 95% |
| Map Unit 3: Regenerating Wattles | N/A | There is an area of regenerating wattles within one of the proposed compound sites between Ponds Road and the Great Western Highway. This area is dominated by regenerating Parramatta Wattle as well as some areas of Blackthorn and African Olive. The ground layer is dominated by exotic grass species including African Lovegrass and Rhodes Grass. No canopy species are present. | N/A | Low | 0.25 | N/A |

| Map unit | Biometric vegetation type | Description | Status | Condition | Area in study area (ha) | Cleared estimate [#] |
|--------------------------------|---|--|---------------------|-----------|-------------------------|-------------------------------|
| Map Unit 4: Freshwater Wetland | <i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin | <p>There is an area of freshwater wetland community within one of the proposed compound site options between the Prospect Highway and Thornley Road. This community is dominated by a mix of species including Cumbungi (<i>Typha orientalis</i>), Common Rush (<i>Juncus usitatus</i>) and the exotic Spiny Rush (<i>Juncus acutus</i>).</p> <p>As this community is within one of the potential compound site options, this area can be readily avoided and potential direct or indirect impacts will be avoided.</p> | Endangered, TSC Act | Moderate | 0.08 | 70% |
| Map Unit 5: Mixed Plantings | N/A | <p>This map unit consists of mixed plantings of tree and shrub species including Eucalypt species such as Mugga Ironbark, She-oaks (<i>Casuarina</i> spp.) and various native shrub species including Tick Bush, Coastal Rosemary (<i>Westringia fruticosa</i>), Rosemary Grevillea (<i>Grevillea rosmarinifolia</i>), Wattles (<i>Acacia</i> spp.), Paperbarks (<i>Melaleuca</i> spp.) and Bottlebrush (<i>Callistemon</i> spp.). This map unit is the most dominant in the study area and includes a range of planted native species, exotic weeds and horticultural species.</p> <p>The understorey is dominated by exotic flora including a wide range of environmental and noxious weed species.</p> <p>The majority of this map unit is distributed around the intersection with the M4 Western Motorway and Prospect Highway interchange.</p> | N/A | Low | 3.3 | N/A |
| Map Unit 6: Planted Casuarina | N/A | <p>This map unit comprises monoculture plantings of Swamp Oak (<i>Casuarina glauca</i>) and River Oak (<i>Casuarina cunninghamii</i>).</p> <p>This map unit is mainly distributed around the M4 Western Motorway and Prospect Highway interchange. The understorey is dominated by exotic flora, which includes a wide range of environmental and noxious weed species.</p> | N/A | Low | 0.75 | N/A |

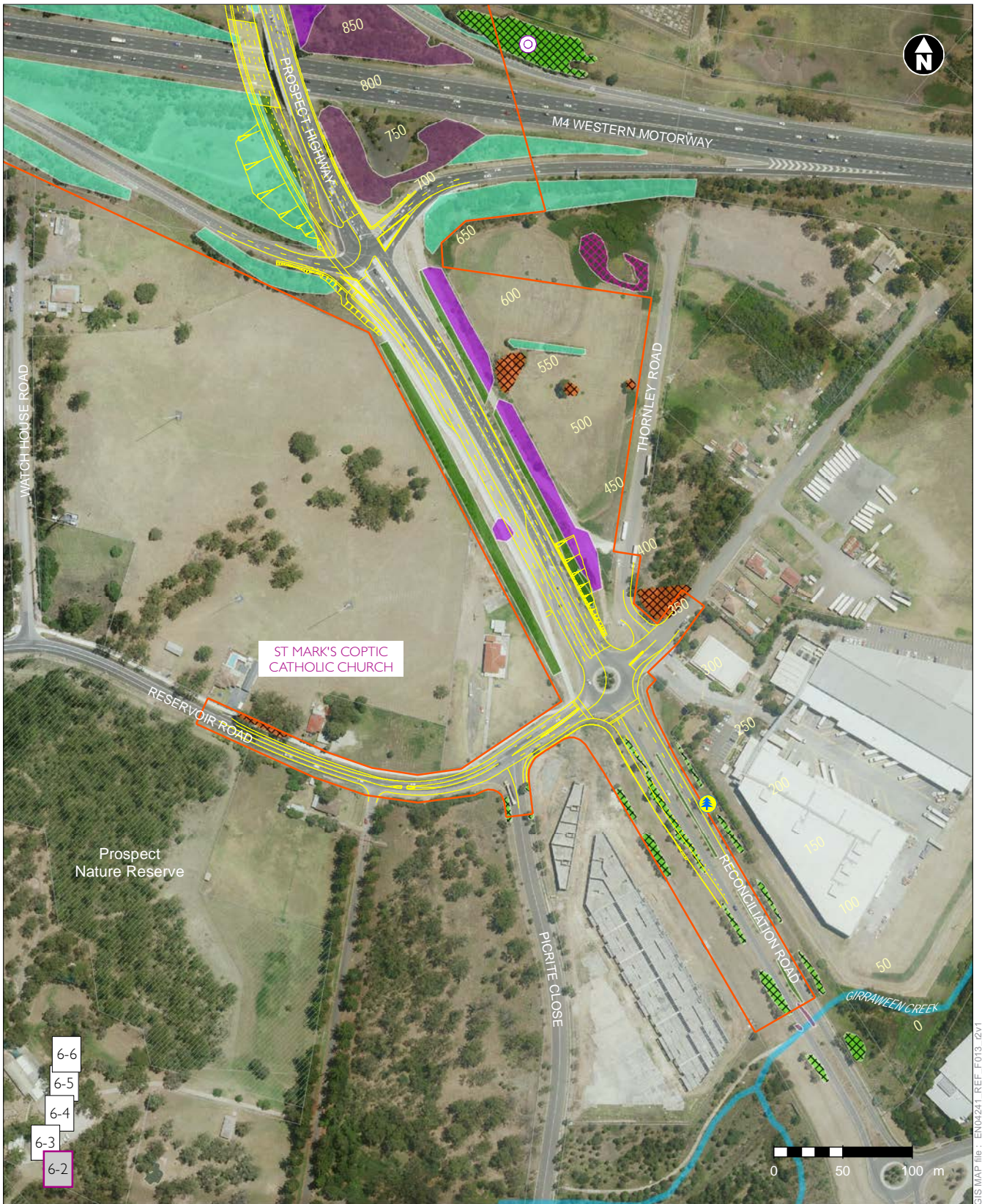
| Map unit | Biometric vegetation type | Description | Status | Condition | Area in study area (ha) | Cleared estimate [#] |
|--------------------------------|---------------------------|---|--------|-----------|-------------------------|-------------------------------|
| Map Unit 7: Planted Pine Trees | N/A | This map unit includes roadside plantings at the southern end of the proposal. It comprises planted rows of Norfolk Island Pines (<i>Araucaria heterophylla</i>). Native understorey species are absent and exotic grasses generally dominate the understorey. | N/A | Very Low | 0.08 | N/A |
| Map Unit 8: Exotic Vegetation | N/A | This map unit includes areas dominated by exotic trees and shrubs. Dominant species vary although common species include African Olive and Blackberry (<i>Rubus fruticosus</i>). Exotic groundcovers mainly include grass species such as Rhodes Grass and African Lovegrass. | N/A | Very Low | 1.17 | N/A |



Photo 6-1 High condition Cumberland Plain Woodland adjacent to Timbertop Reserve



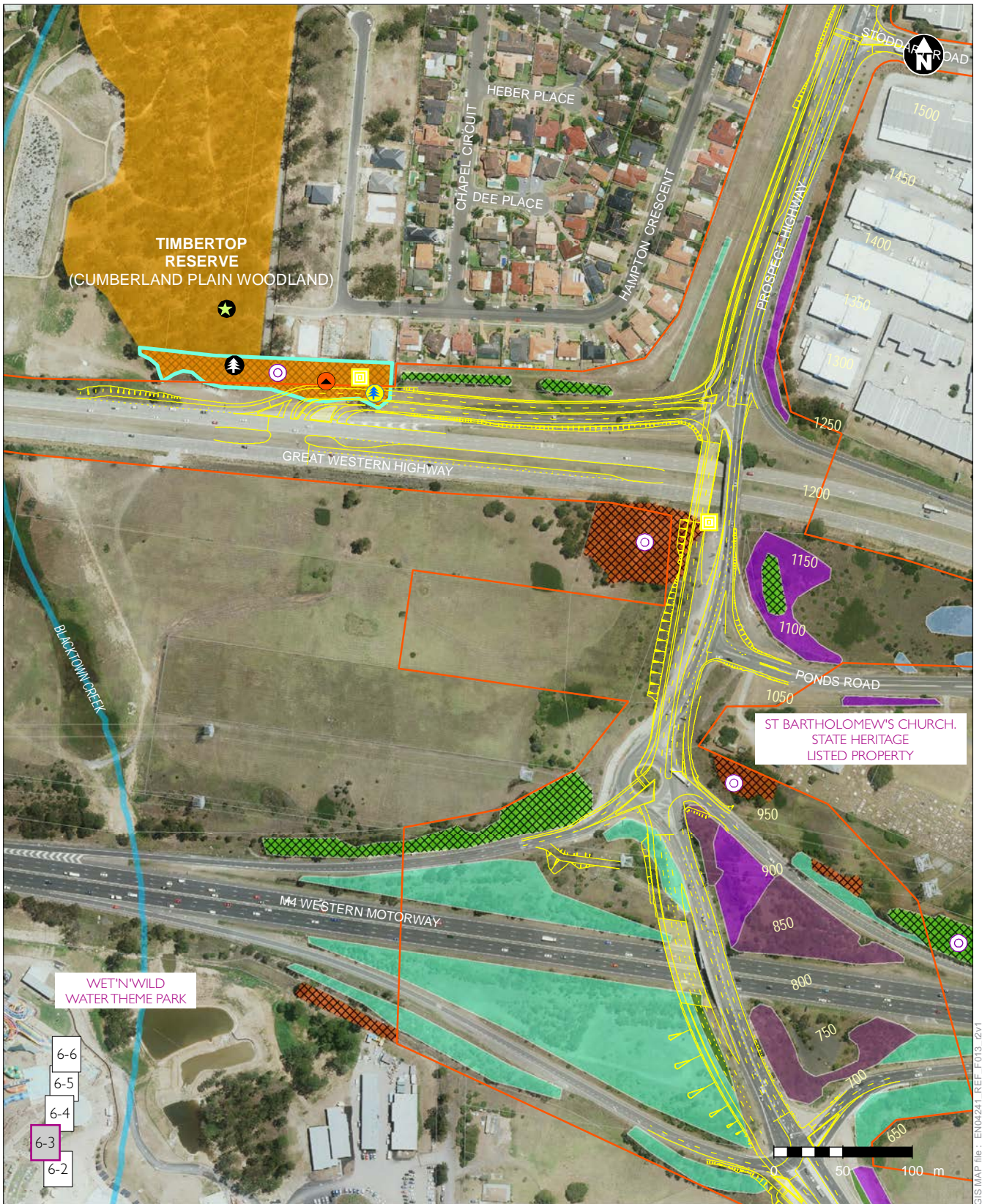
Photo 6-2 Remnant trees in the Prospect Highway road reserve at the northern end of the proposal



GIS MAP file: EN04241_REF_F013_12V1



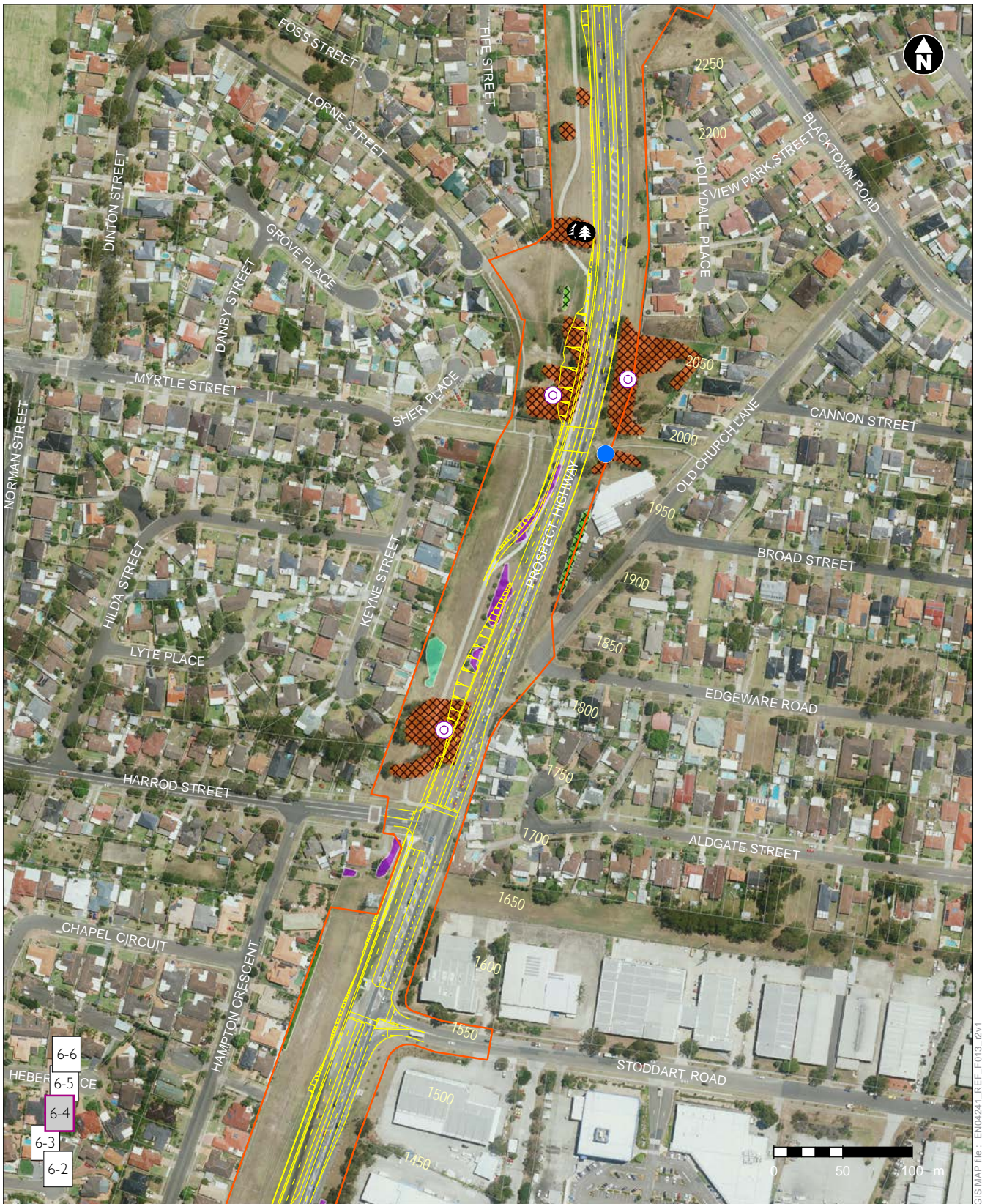
Figure 6-9
Vegetation communities & fauna habitats



GIS MAP file: EN04241_REF_F013_12V1

- | | | | | | | | |
|----------------------|---|-------------------------------|---|--|--|--|-----------------------|
| | The proposal boundary | | The proposal | | Waterway | | National park/reserve |
| | Fauna habitat assessment sites | Vegetation communities | | Endangered ecological communities | | | |
| | Vegetation condition plots | | Map Unit 1: Remnant Shale Plains Woodland | | Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest (EPBC Act) | | |
| | <i>Grevillea juniperina</i> subsp. <i>juniperina</i> (SKM 2013) | | Map Unit 2: Planted Shale Plains Woodland | | Cumberland Plain Woodland in the Sydney Basin Bioregion (TCS Act) | | |
| | Cumberland Plain Land Snail (OEH 2013) | | Map Unit 3: Regenerating Wattles | | Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (TCS Act) | | |
| Fauna habitat | | | Map Unit 4: Freshwater Wetland | | Cumberland Plain Woodland (Critically Endangered, EPBC Act and TSC Act, 5.08 ha) | | |
| | Dead Standing Tree | | Map Unit 5: Mixed Plantings | | | | |
| | Ground Habitats | | Map Unit 6: Planted Casuarina | | | | |
| | Hollow-bearing Tree | | Map Unit 7: Planted Pine Trees | | | | |
| | | | Map Unit 8: Exotic vegetation | | | | |

Figure 6-10
Vegetation communities & fauna habitats



GIS MAP file: EN04241_REF_F013_12V1

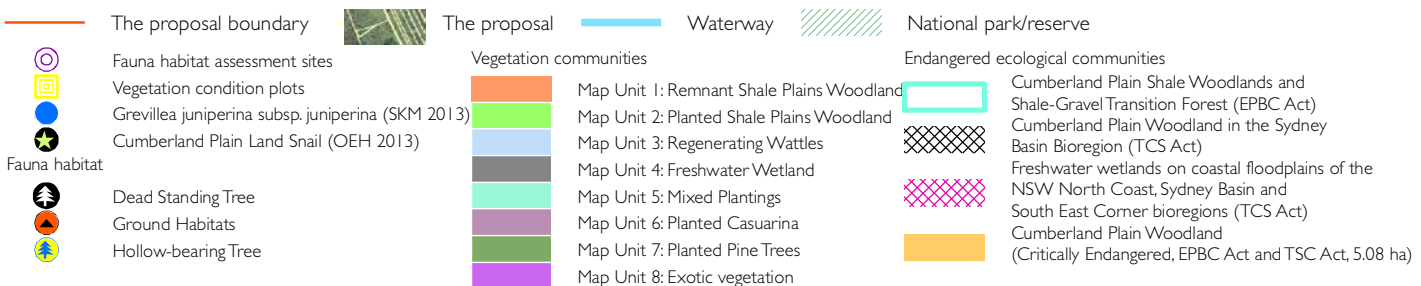


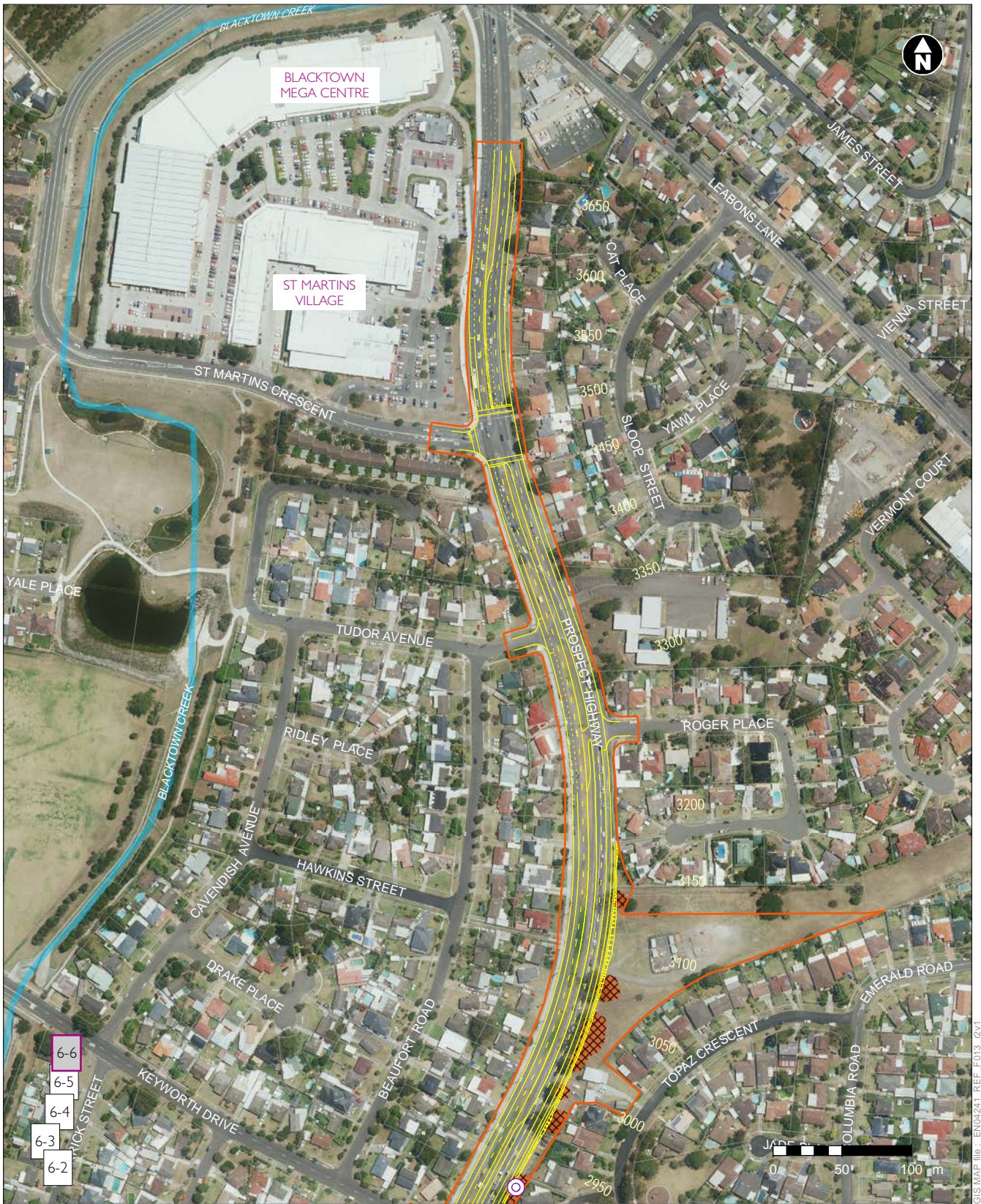
Figure 6-11
Vegetation communities & fauna habitats



GIS MAP file : EN04241_REF_F013.rvt



Figure 6-12
Vegetation communities & fauna habitats



GIS MAP file : EN04241_REF_F013_12V1

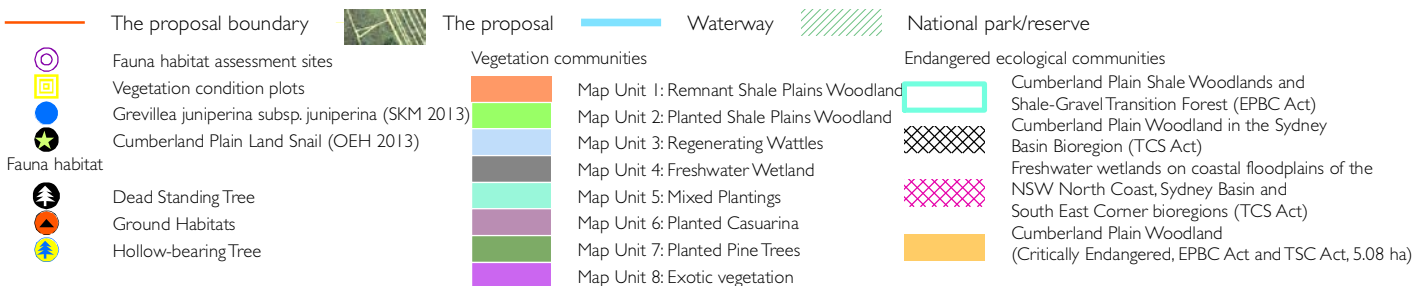


Figure 6-13
Vegetation communities & fauna habitats

Fauna habitat

Most natural habitat for fauna within the study area has been extensively cleared for commercial, industrial and residential development. Remaining patches of habitat are relatively small and comprise grassy woodland, planted vegetation, freshwater wetland, cleared and modified habitats. These fauna habitats are shown on 6-9 to 6-13 and described in Table 6-25. No areas of declared critical habitat under the TSC Act or EPBC Act are present in the study area.

Several hollow-bearing and dead standing trees were observed in areas of grassy woodland which provide limited habitat value for fauna species, with very small hollows and crevices generally suitable for smaller reptiles and amphibians. Some ground habitats were also observed, being limited to minor areas of fallen timber.

Potential habitat for the Cumberland Plain Land Snail is present within the study area. A larger patch of grassy woodland vegetation in and surrounding Timbertop Reserve (about five hectares in size) is in high condition. This woodland has high potential for the potential presence of Cumberland Plain Land Snail (*Meridolum corneovirens*) with a large quantity of leaf and bark ground litter around trees. The Cumberland Plain Land Snail has previously been recorded in this patch. A second patch of grassy woodland vegetation about 0.4 hectares in size located next to the westbound side of the Great Western Highway and the northbound side of Prospect Highway also provides potential Cumberland Plain Land Snail habitat. However, this patch is isolated and affected by edge effects.

Table 6-25 Fauna habitats

| Map unit | Fauna habitat type | Fauna habitat type and characteristics |
|---|--|---|
| Map Unit 1: Remnant Shale Plains Woodland (Cumberland Plain Woodland) | Grassy woodland | Grassy Woodland in the study area is limited to several small isolated patches of habitat and isolated remnant trees surrounded by urban development. Moderate to high quality habitat is present as small fragmented habitat patches. Generally moderate to high structural diversity with large mature trees scattered throughout in medium density and occasional logs. Presence of mature trees provides food resources for nectivorous birds, bats and insects as well as occasional tree hollows for hollow dependent fauna. Density of native shrubs and groundcovers are present, which provide habitat for a range of smaller birds, including woodland bird species. General habitat condition varies from moderate to high. This depends on the size of the patch and disturbance in the groundcover. Suitable resources exist for a range of threatened fauna, in particularly woodland birds, nectivorous species and insectivorous bats. |
| Map Unit 2: Planted Shale Plains Woodland (Cumberland Plain Woodland) | Low quality cleared and modified habitat | Low quality habitat. These areas rarely support any native groundcovers and often have a sparse planted shrub layer dominated by dense tall exotic grasses, such that there are little to no open patches in the ground cover and no leaf litter present. Common tree species planted comprise Grey Box, Forest Red Gum and Narrow-leaved Ironbark with tree height uniform throughout and generally ranging from only 5-10 metres in height. The habitat structure is simplistic and lacks structural maturity or important features such as hollows, timber on the ground and shrubs or tall canopy. |

| Map unit | Fauna habitat type | Fauna habitat type and characteristics |
|--|--------------------------------|--|
| | | Habitat for Cumberland Plain Snail is typically low to very low and influenced by the dense cover of exotic grasses, lack of microhabitat features, small patch size and lack of connectivity. Common fauna species include the introduced Spotted Turtle-dove (<i>Streptopelia chinensis</i>) and Common Myna (<i>Acridotheres tristis</i>) as well as Australian Magpie (<i>Cracticus tibicen</i>), and Garden Sunskink (<i>Lampropholis guichenoti</i>). |
| Map Unit 3: Regenerating Wattles | Planted vegetation | This area of habitat consists of highly isolated areas of regenerating shrubs which provides limited value for native fauna species. When wattles are in flower these nectar and pollen resources are likely to be utilised by a range of nectivorous fauna species and insectivorous bats may also forage over this area. |
| Map Unit 4: Freshwater Wetland | Low quality freshwater wetland | Low quality habitat. Occupies a natural drainage channel where there is continuous moisture in open situations. Dominated almost exclusively by Broadleaf Cumbungi (<i>Typha orientalis</i>) and Spiky Rush (<i>Juncus acutus</i>). No native riparian vegetation present and no trees. Habitat for common frogs, such as Brown Toadlet (<i>Pseudophyrne bibroni</i>), Red-groined Toadlet (<i>Uperoleia laevigata</i>) and Common Eastern Froglet (<i>Crinia signifera</i>) and also the Eastern Water Skink (<i>Eulamprus quoyii</i>). Common birds in this habitat include the Superb Fairy-wren (<i>Malurus cyaneus</i>) and Red-browed Finch (<i>Neochmia temporalis</i>). |
| Map Unit 5: Mixed Plantings Map Unit 6: Planted Casuarina Map Unit 7: Planted Pine Trees | Planted vegetation | Planted forest/woodland habitats rarely support any native groundcovers and often have a sparse planted shrub layer. The understorey is dominated by dense tall exotic grasses, such that there is little to no open areas in the ground cover and minimal leaf litter present. The habitat structure is simplified and lacks structural maturity or important features such as hollows, timber on the ground and shrubs or tall canopy. Habitat for Cumberland Plain Snail is typically low to very low and influenced by the dense cover of exotic grasses; lack of microhabitat features, small patch size and lack of connectivity. Common fauna species include the introduced Spotted Turtle-dove (<i>Streptopelia chinensis</i>) and Common Myna (<i>Acridotheres tristis</i>) as well as Australian Magpie (<i>Cracticus tibicen</i>), Crested Pigeon (<i>Ocyphaps lophotes</i>) and Garden Sunskink (<i>Lampropholis guichenoti</i>). |
| Map Unit 8: Exotic Vegetation | Exotic vegetation | Exotic vegetation provides poor habitat value for fauna. These areas generally have a lack of food resources to attract foragers and limited nesting/roosting habitat. May be used by a range of introduced fauna and wide-ranging common fauna only. |

Threatened ecological communities

Three threatened ecological communities listed under the TSC Act and the EPBC Act were identified for the study area. A brief description of each TEC is provided in Table 6-26. These TECs are shown in Figure 6-9 to Figure 6-13.

Table 6-26 Threatened ecological communities recorded in the study area

| Threatened ecological community | Status | Description | Area in study area (ha) |
|--|---------------------------------|---|-------------------------|
| Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest | Critically Endangered, EPBC Act | This federally listed threatened ecological community is present in and near to Timbertop Reserve on the northern side of the Great Western Highway, which comprises high condition areas of Map Unit 1. This area meets the condition thresholds for the federally listed community as it is greater than 0.5 hectares in area with a canopy cover greater than 10 per cent and an understorey dominated by native flora species. | 0.42 |
| Cumberland Plain Woodland in the Sydney Basin Bioregion | Critically Endangered, TSC Act | The state-listed community occurs in several areas of the study area, which includes high condition areas of Map Unit 1 near to Timbertop Reserve as described above (EPBC Act), a moderate condition patch of Map Unit 1 on the southern side of the Great Western Highway which is less than 0.5 hectares in area, isolated remnant trees in the road reserve (low condition areas of Map Unit 1) and areas planted with characteristic Cumberland Plain Woodland species (Map Unit 2). The areas of remnant trees and planted trees have been subject to significant disturbances as evidenced by the highly depleted floristic diversity and dominance of exotic flora in understorey. | 3.15 |
| Freshwater wetlands on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions | Endangered, TSC Act | There is an area of freshwater wetland (Map Unit 4) within one of the proposed compound sites between the Prospect Highway and Thornley Road. This occupies a natural drainage channel where there is continuous moisture in open situations. Dominated almost exclusively by Broadleaf Cumbungi and Spiky Rush. No native riparian vegetation present and no trees. | 0.08 |

Groundwater dependent ecosystems

Groundwater dependence levels were identified for each ecological community within the study area. These were identified in line with the Risk Assessment Guidelines for Groundwater Dependent Ecosystems (Kuginis *et al.* 2012). The remnant vegetation communities in the study area are considered to have a high level of potential groundwater dependence (refer to Table 6-27). Shale Plains Woodland (Map Unit 1) potentially has a high-level of groundwater dependence as identified by Kuginis *et al.* (2012). The remaining planted and exotic map units are considered unlikely to be dependent on groundwater.

Table 6-27 Groundwater dependent ecosystems

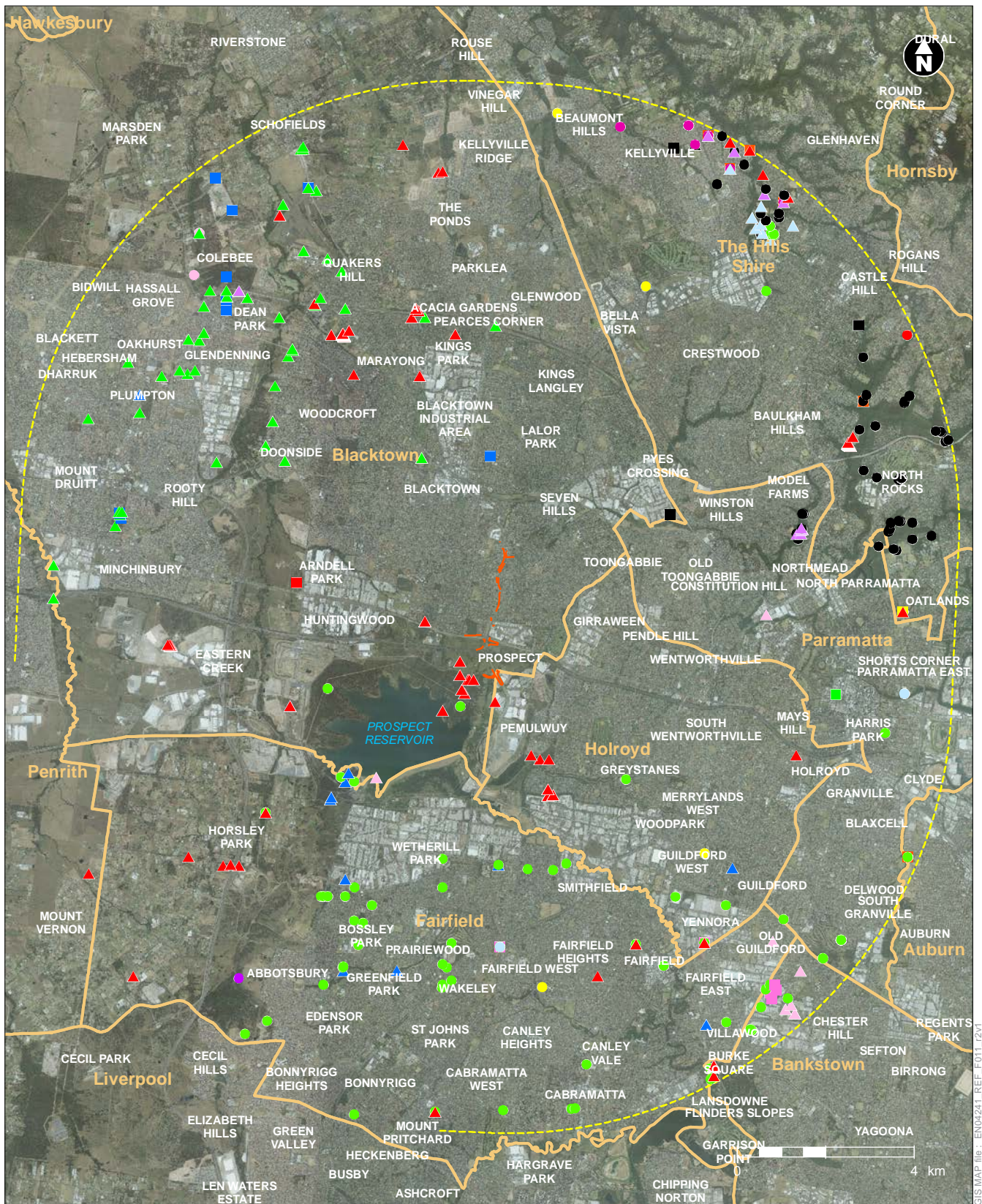
| Map unit | Level of groundwater dependence (Kuginis <i>et al.</i> 2012) |
|---|---|
| Map Unit 1: Remnant Shale Plains Woodland | High |
| Map Unit 2: Planted Shale Plains Woodland | Unlikely |
| Map Unit 3: Regenerating Wattles | Unlikely |
| Map Unit 4: Freshwater Wetland | Obligate |
| Map Unit 5: Mixed Plantings | Unlikely |
| Map Unit 6: Planted Casuarina | Unlikely |
| Map Unit 7: Planted Pine Trees | Unlikely |
| Map Unit 8: Exotic vegetation | Unlikely |

Threatened flora species

A search of threatened flora database records in August 2013 found that 29 threatened flora species have been previously recorded or are listed as having potential to occur within the locality. Of these, 28 species are considered to have a low or unlikely chance of occurring in the study area. One species, Juniper-leaved Grevillea (*Grevillea juniperina* subsp. *juniperina*) is considered to have a moderate chance of occurring in the study area (it is known to occur in high abundance in similar, highly disturbed environments). Field surveys identified one individual Juniper-leaved Grevillea in highly modified habitat of Cumberland Plain Woodland on the eastern side of Prospect Highway outside the construction footprint (refer to Figure 6-14).

Targeted searches in spring (29 November 2013) during known flowering time for Spiked Rice-flower (*Pimelea spicata*) did not identify any individuals within the study area. The Spiked Rice-flower (*Pimelea spicata*) is therefore considered to have a low potential to occur within the proposal area.

Figure 6-14 provides an overview of threatened flora recorded within the surrounding area.



GIS MAP file: EN04241_REF_F011_12V1

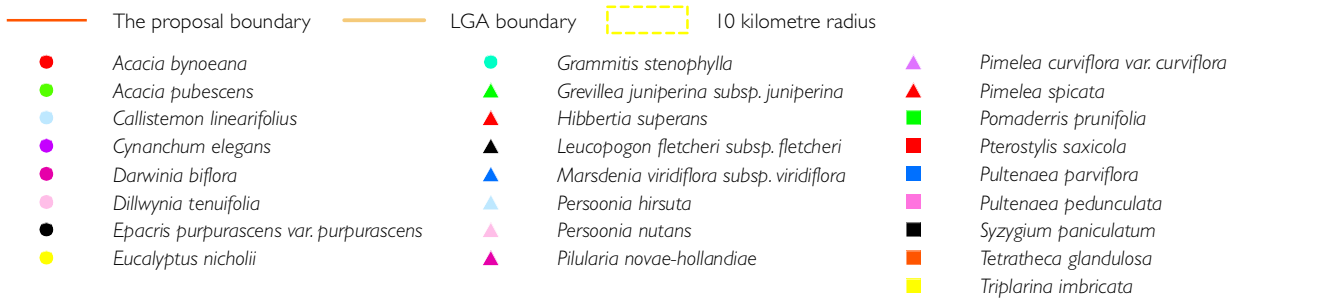


Figure 6-14
Threatened flora records in the locality

Threatened fauna species

A search of threatened fauna database records in August 2013 found that 47 threatened fauna species have been previously recorded or are listed as having potential to occur within the locality. Of these, one species, the Cumberland Plain Land Snail was considered to have a high likelihood of occurring within the study area. Thirteen species, comprising eight mammals, five birds and one invertebrate species were considered to have a moderate chance of occurring. Threatened species with a moderate to high likelihood of occurring within the study area, and potential habitat for these species is listed in Table 6-28. Figure 6-15 provides an overview of the threatened fauna recorded in the surrounding area.

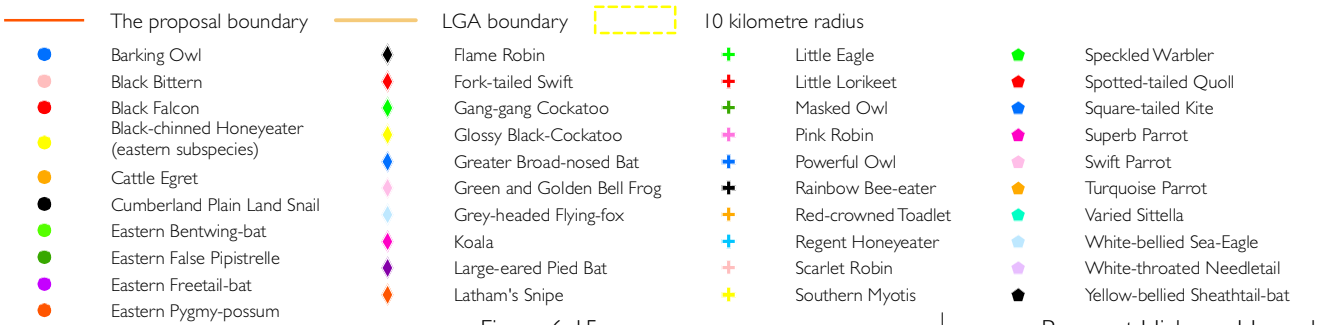
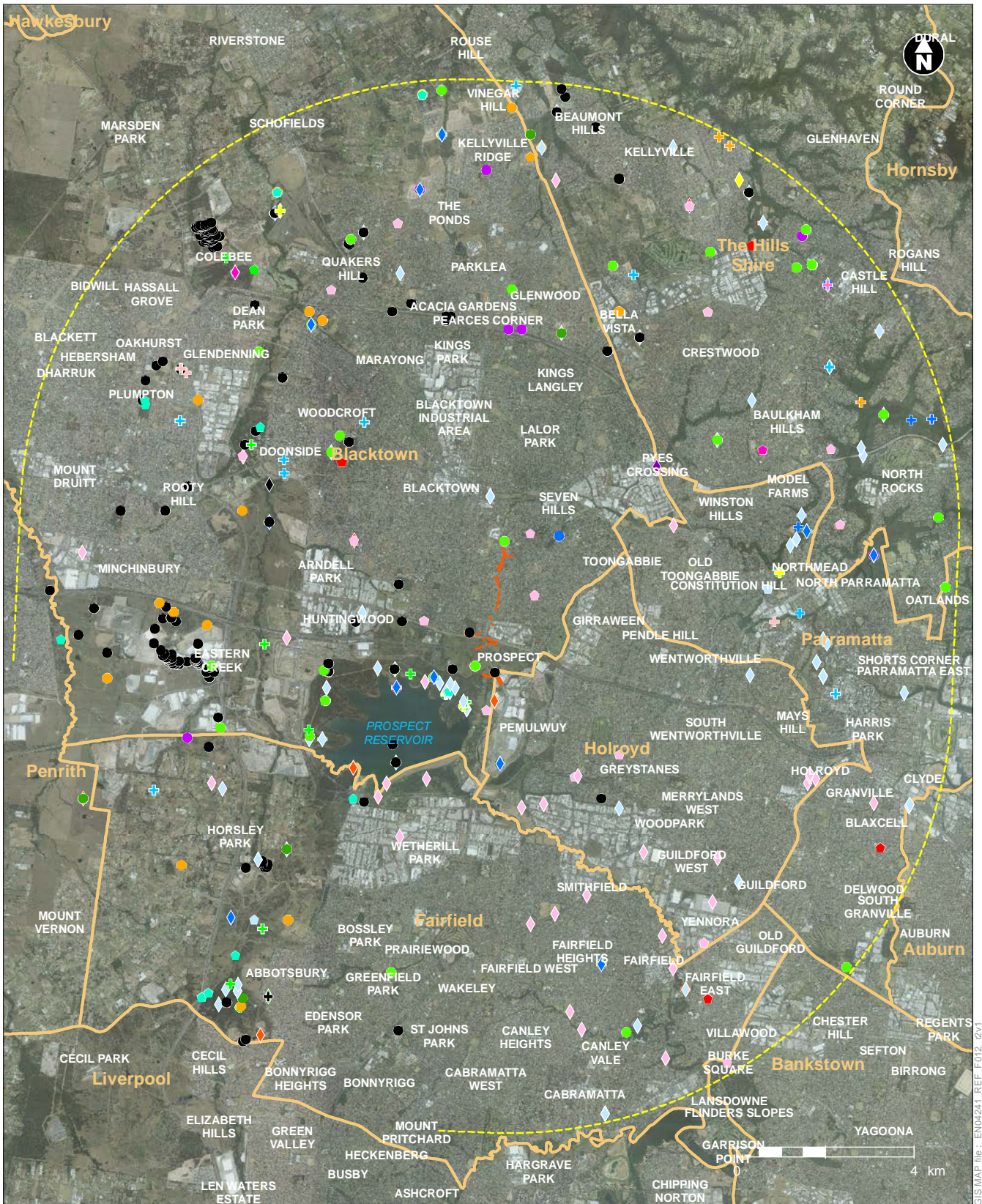


Figure 6-15
Threatened fauna records in the locality

Table 6-28 Threatened flora and fauna species with moderate to high likelihood of occurring in the construction footprint

| Species | Status | | Habitat in study area (refer to Figure 6-9 to Figure 6-13) | Likelihood of occurrence |
|--|----------|---------|--|--------------------------|
| | EPBC Act | TSC Act | | |
| FLORA | | | | |
| Juniper-leaved Grevillea (<i>Grevillea juniperina</i>) | - | V | Map Unit 1 and 2 | Moderate |
| Spiked Rice-flower (<i>Pimelea spicata</i>) | E | E | Map Unit 1 | Moderate |
| MAMMALS | | | | |
| Eastern Bent-wing Bat (<i>Miniopterus schreibersii oceanensis</i>) | - | V | All map units | Moderate |
| Eastern False Pipistrelle (<i>Falsistrellus tasmaniensis</i>) | - | V | All map units | Moderate |
| Eastern Freetail Bat (<i>Mormopterus norfolkensis</i>) | - | V | All map units | Moderate |
| Greater Broad-nosed Bat (<i>Scoteanax rueppellii</i>) | - | V | All map units | Moderate |
| Grey-headed Flying-fox (<i>Pteropus poliocephalus</i>) | V | V | Map Unit 1 and 2 | Moderate |
| Large-eared Pied Bat (<i>Chalinolobus dwyeri</i>) | V | V | All map units | Moderate |
| Southern Myotis (<i>Myotis macropus</i>) | - | V | All map units | Moderate |
| Yellow-bellied Sheath-tail-bat (<i>Saccolaimus flaviventris</i>) | - | V | All map units | Moderate |
| BIRDS | | | | |
| Black-chinned Honeyeater (<i>Melithreptus gularis</i>) | - | V | Map Unit 1 and 2 | Moderate |
| Little Lorikeet (<i>Glossopsitta pusilla</i>) | - | V | Map Unit 1 and 2 | Moderate |
| Powerful Owl (<i>Ninox strenua</i>) | - | V | Map Unit 1 and 2 | Moderate |
| Speckled Warbler (<i>Pyrrholaemus sagittatus</i>) | - | V | Map Unit 1 and 2 | Moderate |
| Varied Sittella (<i>Daphoenositta chrysoptera</i>) | - | V | Map Unit 1 and 2 | Moderate |
| INVERTEBRATE | | | | |
| Cumberland Land Snail (<i>Meridolum corneovirens</i>) | - | E | High and moderate condition areas of Map Unit 1 | High |

V: Vulnerable, E: Endangered

No threatened fauna species were observed during surveys. However, potential habitat for some woodland birds, microchiropteran bats and the Cumberland Plain Land Snail was recorded in remnant woodland and in areas of planted or landscaped vegetation. Culverts under the highway were inspected, however, no microbats were recorded and potential roosting habitats were considered to be marginal.

Cumberland Plain Land Snail

Surveys in August 2013 and November 2013 did not identify any Cumberland Plain Land Snail individuals within or near the proposal area. A record of the Cumberland Plain Land Snail is located in Timbertop Reserve from 1999 (refer to Figure 6-10), and a viable population may still persist within this patch. Habitat for the Cumberland Plain Land Snail in and near the proposal area is limited to intact patches of habitat near to Timbertop Reserve on the northern side of the Great Western Highway and a smaller patch adjoining the southern side of the Great Western Highway and western side of the Prospect Highway. These areas are considered to provide moderate condition habitat for the species, while remaining planted and highly modified habitats are considered to provide poor quality habitats.

Migratory species

Thirteen migratory fauna species listed under the EPBC Act potentially occur in the locality. While 11 of these species have a low or unlikely potential to occur, two species have a moderate potential to occur. These are the wide-ranging bird species Fork-tailed Swift (*Apus pacificus*) and White-throated Needletail (*Hirundapus caudacutus*).

The main areas of potential habitat for migratory species are moderate and high condition remnant grassy woodland habitats along the Great Western Highway. The freshwater wetland habitats in the study area provide limited habitat such as overhanging trees for breeding and roosting. These habitats are likely to be used for foraging by several listed migratory species commonly observed in the locality including the Great Egret (*Ardea alba*) and Cattle Egret (*Ardea ibis*).

Wildlife connectivity corridors

Landscape connectivity in the study area is very limited where vegetation patches are isolated between the highways. Mammals, reptiles and amphibians would have difficulty in connecting to remaining patches. However, the patches of habitat could potentially be used as stepping stones for mobile fauna species dispersing throughout the landscape. Some minor connectivity has been maintained in suburbs between Timbertop Reserve and a wetland near William Lawson Park. In addition, woodland birds and some microbats would potentially forage from the Prospect Nature Reserve to vegetation patches in the study area.

Weeds

Weeds are already prevalent in the roadside habitats within the study area. Seven noxious weed species were recorded as part of surveys. These are described in Table 6-29.

Table 6-29 Noxious weed species

| Species | Prevalence on Site | Noxious Class |
|---|---|---|
| African Boxthorn <i>Lycium ferocissimum</i> | Low abundance on the edges of remnant vegetation patches. | Class 4 weed Weed of national significance |
| African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> | Widespread in high to moderate abundance throughout the study area. | Class 4 weed |

| Species | Prevalence on Site | Noxious Class |
|---|--|---|
| Blackberry (<i>Rubus fruticosus agg</i>) | High abundance in open paddock areas forming large thickets. | Class 4 weed |
| Bridal Creeper <i>Asparagus asparagoides</i> | Occurs in low abundance in areas of remnant vegetation. | Class 4 weed Weed of national significance |
| Lantana <i>Lantana camara</i> | Low abundance in areas of planted vegetation. | Class 4 weed Weed of national significance |
| Privet species <i>Ligustrum sinense</i> <i>L. lucidum</i> | Low abundance on the edges of remnant vegetation patches. | Class 4 weed |

Class 4: The growth of the plant must be managed in a manner that reduces its numbers, spread and incidence and continuously inhibits its flowering and reproduction.

6.3.3 Potential impacts

Construction

Construction of the proposal would result in a number of impacts and potential impacts on native flora and fauna. These impacts are described below.

Loss of vegetation and habitat

The proposal would directly and indirectly impact on a total of about 1.49 hectares of native and modified vegetation. This comprises 1.42 hectares of direct impact from the construction footprint and 0.07 hectares of indirect impact (considered to be an area five metres from the construction footprint, except in areas of high conservation or good condition Cumberland Plain Woodland. Indirect impacts have been included in the calculations for areas of moderate and high condition vegetation.

Threatened ecological communities comprises about 0.69 hectares (about 46 per cent) of the total vegetation to be impacted by the proposal (refer to Table 6-30). The remaining vegetation to be removed comprises planted and exotic vegetation.

Table 6-30 Direct and indirect impacts on vegetation and fauna habitat during construction

| Vegetation community type | Fauna habitat type | Biometric vegetation type | Conservation status | Condition | Area of indirect impact (ha) | Area of direct impact (ha) |
|--|-------------------------------|--|---|-----------|------------------------------|----------------------------|
| Map Unit 1: Remnant Shale Plains Woodland (Cumberland Plain Shale Woodlands and Cumberland Plain Woodland TEC) | Grassy woodland | Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin | Critically endangered, TSC Act and EPBC Act (high condition only) | High | 0.04 | 0.08 |
| | | | | Moderate | 0.03 | 0.08 |
| | | | | Low | N/A | 0.32 |
| Map Unit 2: Planted Shale Plains Woodland (Cumberland Plain Woodland TEC) | Grassy woodland | Grey Box - <i>Melaleuca decora</i> grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin | Critically endangered, TSC Act | Low | N/A | 0.14 |
| Map Unit 3: Regenerating Wattles | Cleared and modified habitats | N/A | N/A | Low | N/A | 0.0 |
| Map Unit 4: Freshwater Wetland Freshwater wetlands of the coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregion TEC. | Freshwater wetland | <i>Phragmites australis</i> and <i>Typha orientalis</i> coastal freshwater wetlands of the Sydney Basin | Endangered, TSC Act | Moderate | N/A | 0.0 |
| Map Unit 5: Mixed Plantings | Planted vegetation | N/A | N/A | Low | N/A | 0.47 |
| Map Unit 6: Planted Casuarina | Planted vegetation | N/A | N/A | Low | N/A | 0.06 |
| Map Unit 7: Planted Pine | Cleared and | N/A | N/A | Very low | N/A | 0.13 |

| Vegetation community type | Fauna habitat type | Biometric vegetation type | Conservation status | Condition | Area of indirect impact (ha) | Area of direct impact (ha) |
|-------------------------------|-------------------------------|---------------------------|---------------------|-----------|------------------------------|----------------------------|
| Trees | modified habitats | | | | | |
| Map Unit 8: Exotic vegetation | Cleared and modified habitats | N/A | N/A | Very low | N/A | 0.14 |
| TOTAL | | | | | 0.07 | 1.42 |

Several hollow-bearing and dead standing trees would be removed as part of the proposal. These provide limited habitat value for fauna species. The small hollows and crevices are generally only suitable for reptiles and amphibians. Limited ground habitats of fallen timber were also observed, however, the impact to fauna habitat from the removal of these habitats is considered to be minor.

As a result of proposed utility relocation works a small number of trees and vegetation would require removal. This would be further assessed during detail design once the exact extent of utility relocations is known. It is unlikely that the removal of trees and vegetation for utility relocation works would be significant.

Threatened ecological communities

The proposal would result in the direct and indirect impact of about 0.69 hectares of the ecological community Cumberland Plain Woodland which occurs as a planted and remnant community within the proposal area. This threatened ecological community is listed as Critically Endangered under the TSC Act (Map Unit 1 and 2). High condition vegetation from this TEC is also listed under the EPBC Act (about 0.12 hectares of Map Unit 1, of which 0.08 hectares would be directly impacted).

Clearing of a small area of TEC would be required next to Timbertop Reserve (high condition) and on the southern side of the Great Western Highway (moderate condition). Vegetation clearing would also be required in the area of widening between the two way link road and the Great Western Highway. Low condition areas that would be cleared comprise isolated trees and planted vegetation with affinities to the TEC community along the proposal. Several mature trees would also be removed within the road reserve.

The proposal would also result in indirect impacts to about 0.07 hectares of the Cumberland Plain Woodland TEC, which occur between Hampton Crescent and the Great Western Highway. Impacts to this vegetation are considered to be minor as this patch of vegetation is unlikely to be viable in the long term due to ongoing edge effects and weed invasion.

The potential impact represents a small proportion of the overall distribution of the vegetation community mapped within a 10 kilometre radius of the proposal by NPWS (2002). The proposed direct and indirect impact to this community represents around 0.007 per cent of the local distribution and is unlikely to result in the local occurrence being placed at risk of extinction. The remaining areas of Cumberland Plain Woodland greater than 10 metres from the proposal are considered unlikely to be substantially modified from indirect impacts such as edge effects and altered hydrology. As shown in Appendix F, the assessment of significance ('7 part test') for

the Cumberland Plain Woodland revealed that the proposal is unlikely to result in significant impacts to the TEC.

The proposal would not have an impact on the area of Freshwater Wetland TEC within the ancillary facility next to Reservoir Road and Thornley Road, as any ancillary activities would be located further than 50 metres from the freshwater wetland.

Groundwater dependent ecosystems

The impact to groundwater dependent ecosystems is considered to be negligible because the proposal is not expected to intersect the groundwater table or result in groundwater drawdown.

Threatened flora

Despite targeted searches during specific flowering periods (eg Spiked Rice-flower), no threatened flora individuals were identified within the proposal area. A Juniper-leaved Grevillea (*Grevillea juniperina subsp. juniperina*) individual (listed as vulnerable under the TSC Act) was identified during field surveys, but was outside of the proposal area and would not be affected by the proposal's construction.

Assessments of significance or '7 part tests' for threatened flora such as the Juniper-leaved Grevillea and the Spike Rice-flower concluded that significant impacts are unlikely given the small proportion of potential habitat being impacted by the proposal and the modified nature of these habitats.

Threatened fauna

No threatened fauna individuals were identified during field surveys. However, potential habitat for several species was identified (as outlined in Table 6-28). The proposal may have an impact on threatened fauna by affecting their habitat. Potentially occurring threatened fauna include the Cumberland Plain Land Snail and highly mobile species which may forage in the study area's habitats. These include microbat species which potentially forage throughout the study area, woodland birds which potentially forage in Cumberland Plain Woodland such as Timbertop Reserve and nectar-feeding birds and bat species such as Little Lorikeet, Swift Parrot and Grey-headed Flying-fox. The Powerful Owl may potentially forage in and on the edge of grassy woodland habitats hunting prey such as arboreal mammals such as Common Ringtail Possum (*Pseudocheirus peregrinus*) and Common Brushtail Possum (*Trichosurus vulpecula*).

Wildlife connectivity and habitat fragmentation

Vegetation within the study area is already highly fragmented due to roads and urban development within the study area. The proposal would not result in fragmentation of habitats. However, it would impact the edge of existing vegetation patches and would remove single standing trees which may lead to minor increases in the extent of fragmentation.

Injury and mortality

Construction of the proposal has the potential to result in the injury or death of fauna from the clearing of vegetation. This would affect fauna species that take refuge in trees, are ground dwelling, or are less mobile. This is not expected to be a major

impact due to the lack of suitable habitat (from the highly urbanised environment and limited sheltering opportunities such as hollow trees and fallen timber) within the construction footprint.

Pests and pathogens

Increased levels of predation on native fauna from European Red Foxes (*Vulpes vulpes*) may occur. This would result from habitat clearing, leading to the displacement of resident native fauna. Clearing of vegetation may increase the value of the habitat for rabbits (*Oryctolagus cuniculus*) in the study area over the long term, as rabbits tend to colonise disturbed and modified open habitats. This may have an impact on native fauna tolerant of modified habitats. However, revegetation of redundant sections of highway would assist in reducing the potential habitat for rabbits in the study area.

Pathogens have the potential to affect biodiversity from their movement and/or infection during construction. While EPBC Act and TSC Act listed pathogens *Phytophthora* (*Phytophthora cinnamomi*) and Myrtle rust (*Uredo rangellii*) were not observed or tested in the study area, the potential for them to occur would be treated as a risk during construction.

Noise, vibration and light

Construction noise, vibration and lighting could have impacts on local fauna, which may result in fauna temporarily avoiding habitats next to the proposal during construction.

Impact on relevant key threatening processes

Key threatening processes associated with the proposal are those causing habitat degradation. Habitat degradation includes vegetation clearing, potential loss of hollow-bearing trees and the removal of dead wood and dead trees. There is also potential for other key threatening processes to be increased, such as the introduction of pests, pathogens and weeds.

The proposal includes mitigation measures to minimise the impact of these key threatening processes (refer to Section 6.3.4).

Operation

Injury and mortality

Fauna mortality from vehicle collision along the proposal's length would be rare. This is because there is a low abundance of fauna species prone to vehicle strike in the study area. Impacts to mobile species such as birds are unlikely to be substantially increased.

Changed hydrology

The highly urbanised environment within the study area has large areas of impermeable land, modified slopes, flood storage areas and concentrated flows. While the proposal would increase the impermeable surface area within the study area, the existing surface water controls and drainage behaviour would essentially remain the same. Accordingly, changes to surface hydrology are unlikely to result in a substantial modification to any areas of native vegetation in the study area.

Noise, vibration and light

The study area experiences high levels of noise, vibration and artificial lighting from Prospect Highway, the Great Western Highway, M4 Western Motorway and surrounding local roads, industrial and commercial properties. Therefore, the proposal is not likely to significantly add to the existing levels of noise, vibration and lighting already present within the study area. Noise, vibration and lighting are not likely to result in additional impacts to flora and fauna from the proposal's operation.

6.3.4 Safeguards and management measures

Table 6-31 identifies safeguards and management measures that would be implemented to address potential impacts from the proposal on biodiversity.

Table 6-31 Summary of safeguards and management measures for biodiversity

| Impact | Environmental safeguards | Responsibility | Timing |
|--|--|-------------------------|------------------|
| Removal or modification of native vegetation | <p>A Biodiversity Management Plan (BMP) is to be prepared and included within the CEMP. The BMP is to include (but not be limited to) the following:</p> <ul style="list-style-type: none">• A site walk with appropriate site personnel including RMS representatives to confirm clearing boundaries and sensitive location prior to commencement of works• Identification (marking) of the clearing boundary and identification (marking) of habitat features to be protected. Eg. – use of flagging tape• A map which clearly shows vegetation clearing boundaries and sensitive areas/no go zones• Incorporation of management measures identified as a result of the pre-clearing survey report, completed by an ecologist, (G40, section 2.4) and nomination of | Construction contractor | Pre-Construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|--|---|-------------------------|------------------|
| | <p>actions to respond to the recommendations made. This should include details of measures to be implemented to protect clearing limits and no go areas</p> <ul style="list-style-type: none"> • A detailed clearing process in accordance with RMS Biodiversity Guidelines (2011) including requirements of Guide 1,2, 4 & 9 • Identify in toolbox talks where biodiversity would be included such as vegetation clearing or works in or adjacent to sensitive locations • Identify control/mitigations measures to prevent impacts on sensitive locations or no go zones • The management measures required if threatened flora and fauna species such as the Spiked Rice flower, Juniper-leaved Grevillea and/or Cumberland Plain Land Snail are found during the pre-clearance surveys • A stop works procedure in the event of identification of unidentified species, habitats or populations. | | |
| Spread of weeds | <p>A weed management plan would be prepared in accordance with RMS Biodiversity Guidelines (Guide 6) and incorporated into the BMP and would address:</p> <ul style="list-style-type: none"> • Identification of the weeds on site (confirm during ecologist pre-clearing inspection) • Weed management priorities and objectives • Sensitive environmental areas within or adjacent to the site • Location of weed infested areas • Weed control methods • Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements • A monitoring program to measure the success of weed management • Communication with local Council noxious weed representative. | Construction contractor | Pre-Construction |
| Introduction or spread of pests and diseases | <p>If the detailed design risk assessment determines that hygiene procedures are required on site, the BMP is to include hygiene protocols to prevent the introduction and spread of such pathogens as specified in Biodiversity Guidelines: Protecting and managing biodiversity on RMS projects (RMS, 2011).</p> | Construction contractor | Pre-Construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|--|--|-------------------------|------------------|
| | All pathogens (eg Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the RTA Biodiversity Guidelines - Guide 7 (Pathogen Management) and DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora). | | |
| General impacts on threatened species and ecological communities | If unexpected threatened flora or fauna are discovered, works would stop immediately and the RMS Unexpected Threatened Species Find Procedure in the RMS Biodiversity Guideline 2011 implemented. | Construction contractor | Construction |
| Re-establishment of native vegetation | Offsets would be considered where reasonable and feasible for the impact to 0.69 hectares of Cumberland Plain Woodland in accordance with the Roads and Maritime offset policy (2011). | Construction contractor | Pre-Construction |
| Removal or modification of native vegetation | An exclusion zone would be established around the Freshwater Wetland adjacent to the proposed compound site on Thornley Road. | Construction contractor | Pre-Construction |
| Removal or modification of native vegetation | Identify known Cumberland Plain Woodland areas and exclusion zones during induction of all site personnel. | Construction contractor | Pre-Construction |
| Removal or modification of native vegetation outside the construction footprint | The construction footprint would be identified and marked before construction and exclusion zones established in retained areas of habitat particularly in remnant vegetation areas. | Construction contractor | Pre-construction |
| Accidental removal or modification of native vegetation not within the proposal area | Permanent fencing would be established along the edges of the high condition Cumberland Plain Woodland remnant next to Timbertop Reserve before construction. This would help to avoid impacts to this area during construction and operation. | Construction contractor | Pre-construction |
| Minimising fauna injury and mortality | In circumstances where the handling of fauna is completely unavoidable, best practice methods would be followed as outlined in the Roads and Maritime Biodiversity Guidelines – Guide 9: Fauna Handling (RTA 2011). | Construction contractor | Construction |

6.4 Landscape, visual amenity and urban design

HBO+EMTB Urban and Landscape Design prepared a Landscape Character / Visual Impact Assessment and Urban Design Study for the proposal in January 2014. A copy of the assessment is provided in Appendix G and a summary is provided below.

6.4.1 Methodology

The assessment adopted an iterative process where key issues, constraints and mitigation from the landscape character and visual assessment were integrated into the engineering, urban and landscape concept design.

The methodology used was consistent with the Roads and Maritime Environmental Impact Assessment Guidance Note: Guidelines for landscape character and visual impact assessment.

Landscape character

Landscape character zones were first identified to indicate areas of distinct and consistent character. Two primary factors were used to determine landscape character impacts:

- Sensitivity of the character zone
- Magnitude of the proposal in that zone.

Visual sensitivity is a measure of how critically a change to the existing landscape would be viewed from various locations. People using recreation areas, for example, would consider the surrounding landscape as part of their leisure experience and may view changes to the landscape more critically than others.

The visual magnitude of the proposal is the expression of the visual interaction between it and the existing visual environment along Prospect Highway. It can also be expressed as a level of visual contrast between new work and the visual setting within which it is placed. Landscape character impacts from the proposal have been determined in line with the matrix shown in Figure 6-16.

| | | Magnitude | | | |
|-------------|------------|---------------|---------------|--------------|------------|
| | | HIGH | MODERATE | LOW | NEGLIGIBLE |
| Sensitivity | HIGH | HIGH IMPACT | MODERATE-HIGH | MODERATE | NEGLIGIBLE |
| | MODERATE | MODERATE-HIGH | MODERATE | MODERATE-LOW | NEGLIGIBLE |
| | LOW | MODERATE | MODERATE-LOW | LOW IMPACT | NEGLIGIBLE |
| | NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE | NEGLIGIBLE |

Figure 6-16 Landscape character and visual impact grading matrix, Roads and Maritime 2013

Visual impact assessment

The likely visual impacts of the proposal were assessed via the following tasks:

- A desktop analysis to define the proposal area's visual catchment and potential visual impact receptors. This considered a topographic analysis and Google Maps to provide the basis for the establishment of the Visual Envelope Map (VEM), view corridors, and key viewpoints
- An on-site field inspection to confirm the visual catchment, gain an understanding of the proposal within the context of the study area and to identify and confirm key viewpoints and the sensitivity of potential visual receptors. This task included the taking of photographs to inform the viewpoint analysis
- The sensitivity of each viewpoint was determined based on the sensitivity ranking of the landscape character zone in which it is located
- The magnitude of the proposal relative to the existing conditions was ranked on a six point scale from negligible to high. This sought to capture the change a view might undergo as a result of the proposal
- In a process similar to that used for landscape character impact assessment, the visual impact was assessed by combining the viewpoint sensitivity and the magnitude of the proposal in the matrix in Figure 6-16 above.

6.4.2 Existing environment

Prospect Highway is a key south-north arterial road providing direct access to the residential, employment and industrial areas within the suburbs of Blacktown, Prospect, Seven Hills and Pemulwuy. The proposal traverses the catchments of Blacktown Creek and Greystanes Creek. Prospect Reservoir is located southwest of the proposal.

The proposal area can be described in three main sections, southern, central and northern. The southern section between Reservoir Road and the Great Western Highway is typically a more rural landscape characterised by open paddocks and trees with rolling pasture, remnant and regrowth woodland, houses or heritage buildings with deep front setbacks and scattered farm infrastructure. This southern section of Prospect Highway is raised in parts which provides some broad views over the surrounding commercial/residential areas and along the motorway corridors.

A new outdoor water theme park, Wet 'n' Wild Sydney has added a significant amount of built structure to views looking southwest from Prospect Highway. These views are currently dominated by significant utilities located in this area which include an array of large radio masts and electricity lines and towers.

The central section of the proposal, from the northern edge of the Great Western Highway to Lancelot Street, contrasts strongly with the area to the south. This central section passes through mainly suburban residential areas of Prospect to the east and west, with a wide, open grassed drainage corridor adjacent to the western side of Prospect Highway. The majority of residential properties through this area back onto the Prospect Highway corridor with rear fences.

A ridgeline runs north-south and slightly to the east of Prospect Highway, creating a dominant western aspect and restricting views to the east. Mixed urban form including light industrial, warehousing, commercial and homeware/retail uses characterise the area to the east of the Prospect Highway corridor near the approach to the Great Western Highway.

The northern section of the proposal, between Lancelot Street to St Martins Crescent/Blacktown Mega Centre sits within a mix of suburban residential, small scale commercial and educational land uses. A key difference between the northern and central sections of the proposal is the more enclosed character of the road alignment with residences and other built form having an active street address to Prospect Highway and a more limited corridor width. There are several large exotic and remnant native trees on both sides of the corridor in close proximity and in some instances overhanging the carriageway.

Landscape character zones

Analysis of the existing character of the Prospect Highway corridor identified eight landscape character zones that are relatively consistent in terms of their combination of landform, vegetation and land uses, while containing a degree of variation in visual landscape character. These are listed below and shown by Figure 6-17.

Zone 1 – Prospect Reservoir

This zone is characterised by a gently undulating landscape with remnant woodland that extends from the Prospect Reservoir to the south side of Reservoir Road and east to Picrite Close. The area has a predominantly southern aspect, with some intermittent views to the M4 Western Motorway and Prospect Highway Bridge to the north.

Zone 2 – Wet ‘n’ Wild Sydney

Zone 2 is characterised by a gently undulating landform which has been extensively modified with typically gradual level changes and flat open space. This includes broad flat parking areas open drainage areas with public recreational infrastructure.

Zone 3 – Greystanes industrial estate

Zone 3 is generally flat with a rise to the south further along Reconciliation Road to enclose the former quarry, forming a man-made semi-circular escarpment that encloses additional industrial development. It generally includes one and two storey industrial/commercial storage/manufacture large footprint big-box buildings. Spatially, Zone 3 has a broad, open road corridor appearance with some long distance views.

Zone 4 – M4 Western Motorway and Great Western Highway corridor

This zone generally comprises open pasture with scattered remnant native trees and scrub and some exotic screening vegetation. There are a few scattered low density rural-residential dwellings along or adjacent to the road corridor. Development along the M4 Western Motorway corridor is set well back from the highway and accessed from adjacent local roads.

Zone 5 – Prospect Hill – St Bartholomew’s Church and Cemetery

This zone is a heritage conservation area that comprises St Bartholomew’s Church and Cemetery, which is situated at the top of Prospect Hill and surrounded by an historic cemetery. The church building is highly visually prominent, being visible from both the M4 Western Motorway to the south and the Great Western Highway to the north.

Zone 6 – Prospect industrial and commercial centre

Sloping gently to the southeast from Stoddart Road to Great Western Highway, zone 6 comprises the HomeBase low-rise retail / commercial centre and neighbouring industrial precinct. The area is dominated by 'big box' 1-2 story commercial and industrial buildings with large flat areas of car park throughout.

Zone 7 – Prospect East/West residential areas

Zone 7 is a gently undulating highly modified arterial road landscape consisting of residential, urban parkland and electricity transmission uses. Properties mainly back onto the Prospect Highway corridor, and are accessible by local roads and cul-de-sacs. The highway is generally a wide and open road corridor. It has some elevated views west across built-up residential areas and a drainage corridor that runs parallel on the western side of the highway.

Zone 8 – Blacktown and Seven Hills residential areas

This zone shares similar characteristics to zone 7, with a gently undulating highly modified road landscape surrounded primarily by residential properties. However, properties within this zone mainly face the highway with driveways face Prospect Highway directly or through informal service roads.

Zone 9 – St Martins Village Shopping Centre / Blacktown Mega Centre

This landscape zone is defined by large footprint commercial buildings with extensive areas of flat car parking facilities. Tall semi-mature native trees are present along the boundary with Prospect Highway and an open drainage swale is contained within a twenty metre wide grassed swale that runs along the rear of the commercial buildings.

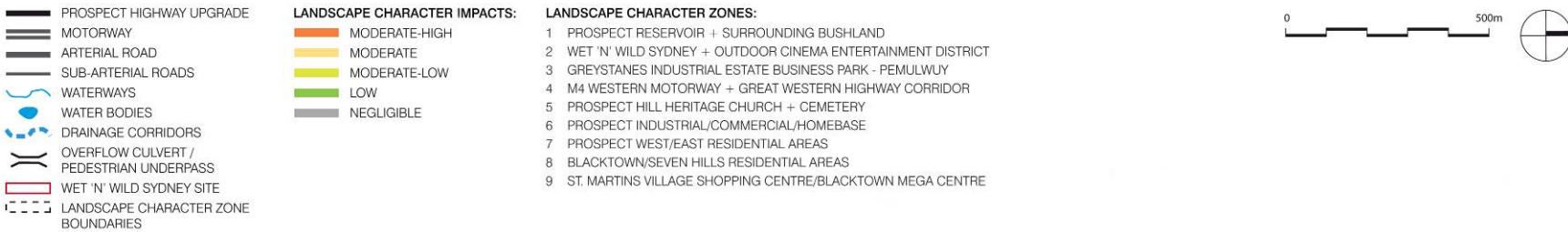


Figure 6-17 Landscape character zones

6.4.3 Potential impacts

Landscape character impact assessment

The outcomes of the landscape character impact assessment are shown in Table 6-32.

Table 6-32 Landscape character impacts

| Landscape character zone | Sensitivity | Magnitude | Impact |
|--|-------------|------------|-----------------|
| 1 – Prospect Reservoir | High | Negligible | Negligible |
| 2 – Wet ‘n’ Wild Sydney | Low | Negligible | Negligible |
| 3 – Greystanes industrial estate | Low | Moderate | Moderate – Low |
| 4 – M4 Western Motorway and Great Western Highway corridor | Moderate | Moderate | Moderate |
| 5 – Prospect Hill – St Bartholomew’s Church and Cemetery | High | Moderate | Moderate - High |
| 6 – Prospect industrial and commercial centre | Low | Low | Low |
| 7 – Prospect East/West residential areas | Moderate | High | Moderate – High |
| 8 – Blacktown and Seven Hills residential areas | Moderate | Moderate | Moderate |
| 9 – St Martins Village Shopping Centre | Low | Negligible | Negligible |

The sensitivity of the landscape character zones varies from Low to High. Landscapes that are considered more sensitive are those which are less modified, have a higher degree of consistency, and often have a degree of cultural importance, such as Prospect Reservoir and St Bartholomew’s Church and Cemetery. Similarly, the magnitude of the proposal in each zone varies from Low to High. The single ‘High’ ranking in zone 7 reflects the scope of the proposal as being an upgrade to an existing arterial road.

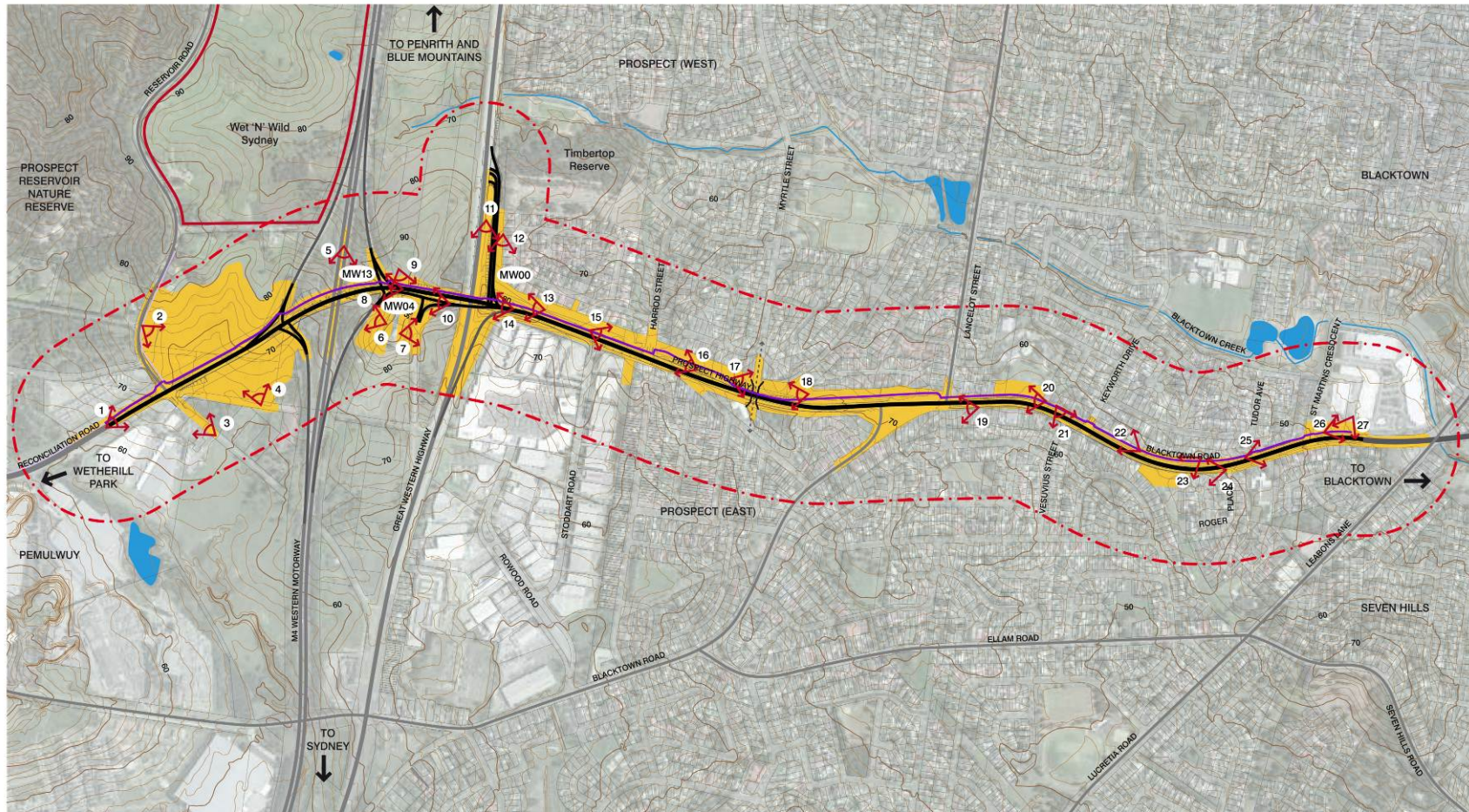
The overall landscape character zone impacts vary from Low to Moderate-High. St Bartholomew’s Church and Cemetery, Prospect Hill has a moderate to high impact due to the high sensitivity and moderate magnitude of the work which include

widening of an adjacent road cutting and new retaining wall up to 5.8 metres high and 60 metres long, to the west of the zone. Zone 7, Prospect East/West residential area has a Moderate-High impact because of its moderate sensitivity and high magnitude. Work involved in this zone includes the establishment of the two way link road, a large new retaining structure, widening of the existing Prospect Highway alignment and some tree removal.

Visual impact assessment

The visual envelope illustrates the likely visual catchment of the proposal. It generally describes the extent of the views possible from any given place within the proposal area. Based on existing landforms, the visual catchment also takes into account vegetation, land uses and structures.

Site investigations were undertaken to review the visual catchment and take into consideration the screening effect of vegetation. The visual envelope, including the 27 viewpoints that were assessed, is shown in Figure 6-18. Table 6-33 shows the visual impact assessment of each viewpoint within the study area.



- STUDY AREA
- == PROSPECT HIGHWAY UPGRADE
- == MOTORWAY
- == ARTERIAL ROAD
- == SUB-ARTERIAL ROADS
- ~ WATERWAYS
- ~ WATER BODIES
- ~ DRAINAGE CORRIDOR
- ~ 2m CONTOURS
- ~ RIDGELINE
- ▲ HIGH POINT
- PEDESTRIAN UNDERPASS
- VISUAL ENVELOPE
- ▲ VIEWPOINTS
- ▲ (17) SHARED PATH
- RETAINING WALL
- MW00 RETAINING WALL REFERENCE

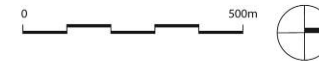






Figure 6-18 Viewpoints



Table 6-33 Visual impact of each viewpoint


| Viewpoint | Impact | Comment |
|-----------|----------------|---|
| 1 | Moderate – Low |  <p>There would be some change to the formal vegetative structure of Reconciliation Road as it transitions with Prospect Highway, requiring potential removal of several semi-mature signature Araucaria trees and avenue planting. Replacement tree planting along road margins and within the central median would further reduce the visual impact at this location.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------------|---|
| 2 | Moderate – Low |  <p>Proposed widening of Prospect Highway in this area would not remove a significant amount of existing vegetation or a substantial area of existing grassed verge. There is a significant amount of existing infrastructure in the view including radio masts and electrical towers that reduce the potential visual effect of the proposal.</p> <p>The visual impact could be further reduced by establishing vegetation screening that would create a defined edge to the highway alignment and maximise screening to the St Mark's Coptic Catholic Church.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------------|--|
| 3 | Moderate – Low |  <p>The existing native trees to the west of Reservoir Road at this location provide effective screening of Prospect Highway. The proposal work would generally only be visible at the intersection with Reservoir Road from Viewpoint 3. The visual impact at this location could be further reduced by providing some street tree planting along Reservoir Road frontages between the intersection and Viewpoint 3.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------------|---|
| 4 | Low |  <p>The Prospect Highway alignment is elevated slightly above Viewpoint 4, restricting the visibility of the proposed widening and additional lanes. The most significant visual change would be from replacing the existing roundabouts with signal controlled intersections.</p> <p>The visual impact at this location could be further reduced by providing replacement tree planting along the road margin embankments and within the central median to partially screen traffic.</p> |
| 5 | Moderate – Low |  <p>The proposed additional M4 Western Motorway bridge structure would visually complement the existing bridge and would only be visually prominent when approached from the west.</p> <p>The visual impact at this location could be further reduced through replacement tree planting where existing vegetation is to be removed around the abutments during construction.</p> |

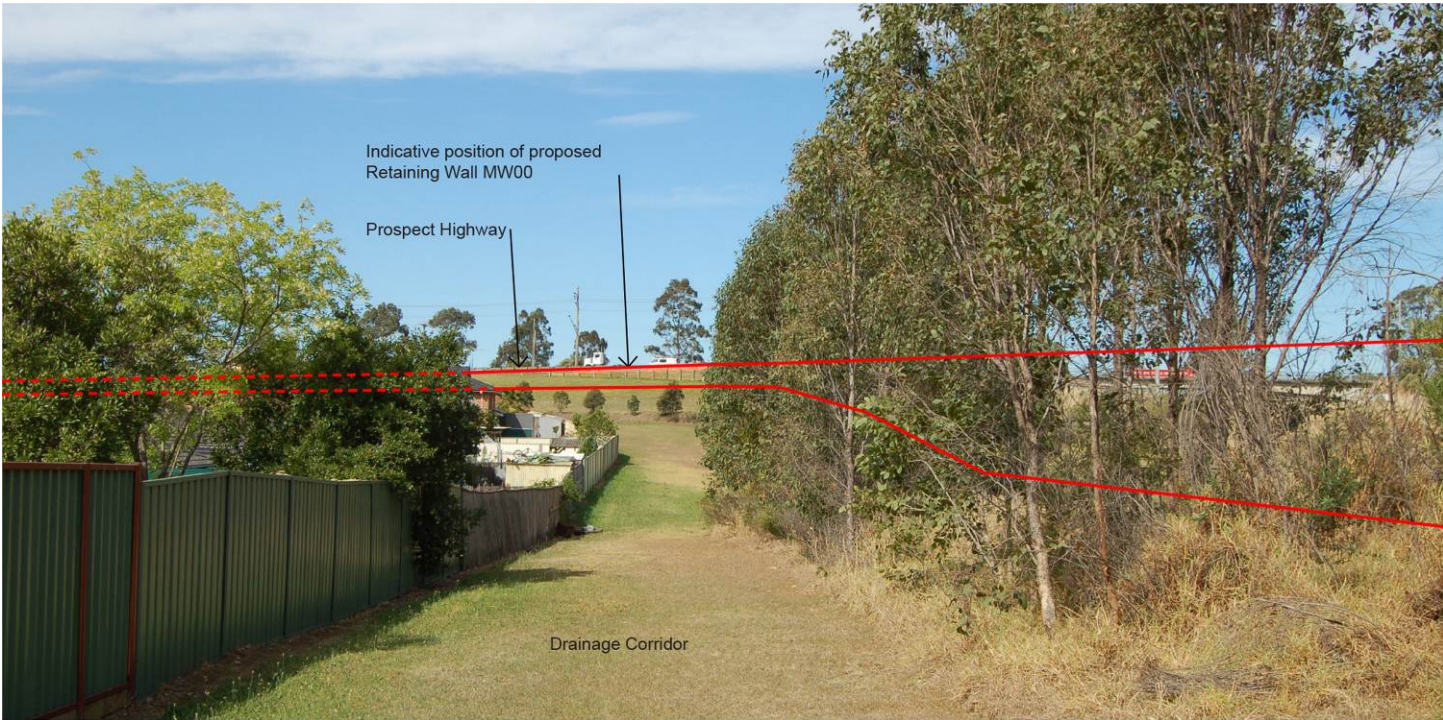
| Viewpoint | Impact | Comment |
|-----------|-----------------|---|
| 6 | Moderate |  <p>A significant amount of scattered vegetation throughout Zone 4 provides intermittent screening of Prospect Highway. The additional M4 Western Motorway bridge and retaining wall structure would be largely visible from Viewpoint 6 however they would be seen in the context of the existing alignment and the large steel structures of the radio masts, Wet 'n' Wild Sydney structures and high voltage electrical towers in the background.</p> |
| 7 | Moderate – High |  <p>The amount of visual change would be moderate, due to the relatively close proximity of the alignment and the extensive extra widening, earthworks and removal of vegetation required to accommodate the approach for the new Great Western Highway bridge structure.</p> |


| Viewpoint | Impact | Comment |
|-----------|-----------------|---|
| 8 | Moderate – High | <p>Indicative position of proposed Retaining Wall MW13</p>  <p>The amount of visual change would be high due to the close proximity to and broad view of the proposed retaining wall and the approach to the additional M4 Western Motorway bridge structure.</p> <p>Existing screening vegetation along the west side of Prospect Highway below the electricity tower would be removed and the widening and extra lanes for the M4 Western Motorway exit-ramp would accentuate the modified landscape and visible built form.</p> <p>The visual impact at this location could be further reduced by providing replacement tree planting along road verges and embankments and within the central island separating the M4 Western Motorway eastbound exit ramp to partially screen traffic and the retaining wall.</p> |


| Viewpoint | Impact | Comment |
|-----------|-----------------|---|
| 9 | Moderate – High |  <p>Indicative position of proposed Retaining Wall MW04</p> <p>The amount of visual change would be high due to the close proximity to and broad view of the proposed retaining wall and the realignment of northbound lanes on Prospect Highway to the additional Great Western Highway bridge structure.</p> <p>The visual impact at this location could be further reduced by providing appropriate detailing to the retaining wall structure and planting along road margins to screen the wall as far as practicable given space limitations and clear zone requirements.</p> |

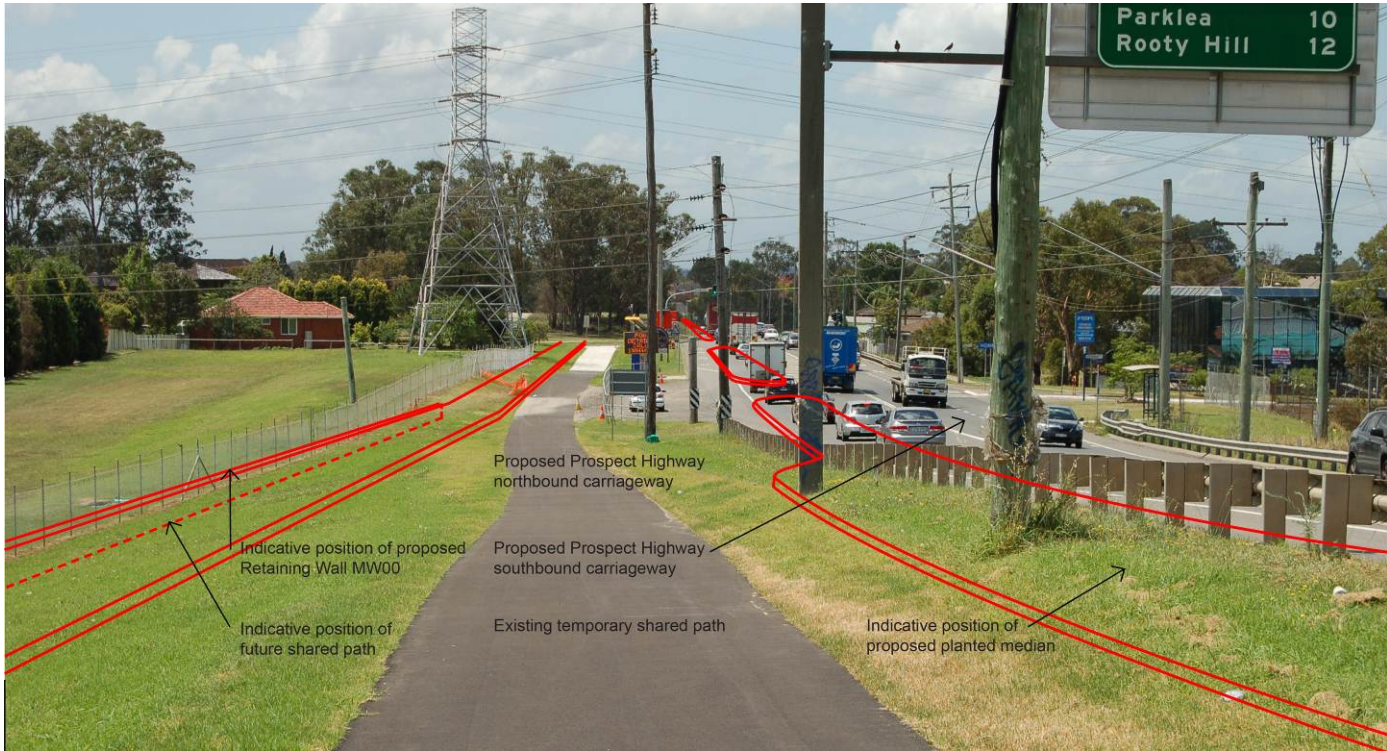
| Viewpoint | Impact | Comment |
|-----------|-----------------|--|
| 10 | Moderate – High |  <p>Indicative position of proposed Retaining Wall MW04</p> <p>The amount of visual change would be high due to the significant widening of the alignment and close proximity to the additional Great Western Highway bridge structure and proposed retaining wall.</p> <p>The visual impact at this location could be further reduced by providing appropriate detailing to the retaining wall structure and planting on embankments and road margins to screen the retaining wall as far as practicable given space limitations and clear zone requirements.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 11 | Moderate |  <p>The proposed additional bridge structure would visually complement the existing structure and would only be visually prominent when approached from the west. Several existing large native trees adjoining Timbertop Reserve would be removed to allow the widening of the exit ramp to a four lane, two way link road.</p> <p>The visual impact at this location could be further reduced through feature and screen planting along the two way link road embankments and around bridge abutments while maintaining clear zone requirements.</p> |



| Viewpoint | Impact | Comment |
|-----------|-----------------|---|
| 12 | Moderate – High |  <p>The amount of visual change would be moderate once replacement screen planting within the drainage corridor, with council permission, is established and would limit views of the proposed retaining wall and two way link road. Existing screening trees are to be retained within the drainage corridor as part of the proposals landscape strategy where possible to provide more immediate and effective screening of the proposal from residential properties.</p> <p>The visual impact at this location could be further reduced through the architectural design of the retaining wall and additional screen planting where drainage requirements permit.</p> |


| Viewpoint | Impact | Comment |
|-----------|-----------------|--|
| 13 | Moderate – High |  <p>Due to the close proximity of backyards of adjacent residential properties and the pedestrian access connection to Hampton Crescent the sensitivity of Viewpoint 13 is high. The proposed widening of Prospect Highway would reduce the distance between traffic lanes and residential properties. Proposed screen planting within the drainage corridor would limit views of the proposed retaining wall and two way link road. Existing screening trees within the drainage corridor would be retained where possible. The visual impact at this location could be further reduced through the architectural design of the retaining wall and additional screen planting where drainage requirements permit.</p> |

| Viewpoint | Impact | Comment |
|-----------|-----------------|---|
| 14 | Moderate – High |  <p> Prospect Hill - St Bartholomew's Heritage Church and Cemetery Great Western Highway Bridge Prospect Highway Temporary shared path Existing eastbound access ramp Indicative position of proposed Retaining Wall MW00 Great Western Highway </p> <p> The amount of visual change would be high due to the significant widening of the alignment to accommodate the additional northbound lanes and the approach to the Great Western Highway bridge structure. A retaining wall would be up to 5.4 metres high to the right of this view. </p> <p> The visual impact at this location could be further reduced by providing additional screening trees and planting to embankments in the drainage corridor to screen the new retaining wall as far as practicable. </p> |

| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 15 | Moderate |  <p>The amount of visual change would be high due to the widening of the alignment to accommodate the additional northbound lanes. However, receptors would be generally limited to vehicles travelling north along Prospect Highway and shared path users, thus reducing the sensitivity of this view.</p> <p>The visual impact at this location could be further reduced by providing additional screening trees and planting on embankments in the drainage corridor to screen the carriageways, shared path and retaining wall from the residential area.</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 16 | Moderate |  <p>Removal of the existing large native trees near the intersection of Prospect Highway and Harrod Street and considerable widening of the alignment would potentially create a significant visual change. This relates to views from adjacent properties, shared path users and southbound traffic. Replacement tree planting within the drainage corridor where clear zone requirements permit would potentially reduce the visual impact.</p> <p>The visual impact at this location could be further reduced by providing tree planting on embankments along the road and drainage corridor to screen the carriageways from the shared path and residential area as far as practicable.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------------|--|
| 17 | Moderate |  <p>The drainage corridor would be significantly reduced in width to accommodate the widening of the alignment requiring the removal of several large native trees near the culvert/underpass below Prospect Highway.</p> <p>The visual impact at this location could be further reduced by replacement tree planting and feature planting on embankments to screen the carriageways from the drainage corridor as far as practicable.</p> |
| 18 | Moderate – Low |  <p>The drainage corridor would be reduced in width by several metres to accommodate the widening of the alignment and realignment of the shared path. This would require the removal of several large native trees near the culvert/underpass below Prospect Highway between Old Church Lane and Keyne Street. The visual impact at this location could be further reduced by replacement tree planting and feature planting on embankments to screen the carriageways from the drainage corridor while maintaining drainage requirements.</p> |


| Viewpoint | Impact | Comment | |
|-----------|----------|--|---|
| 19 | Moderate | <p>Visual changes include the removal of the existing grass verge, allowing traffic closer to the footpath and residential frontages. Due to the width constraints there is no ability to provide additional landscaping in the road corridor.</p> <p>Due to width constraints there is no opportunity to provide additional landscaping in the road corridor.</p> <p>Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |  <p>Prospect Highway/ Lancelot Street intersection</p> <p>← Indicative position of proposed kerbline</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 20 | Moderate |  <p>The removal of the existing barrier and gravel informal service road area and the addition of traffic lanes would result in a moderate visual change. Low groundcover and feature tree planting would help to retain visual amenity and improve landscape character along the corridor.</p> <p>There is potential for additional screen planting to be established on the school property if required, in consultation with the land owner.</p> |


| Viewpoint | Impact | Comment |
|-----------|----------|---|
| 21 | Moderate |  <p>Shared path to remain</p> <p>Informal service road to be replaced by traffic lanes</p> <p>Prospect Highway</p> <p>Visual changes would include the removal of the existing barrier, informal service road and the existing large native trees in the far distance along the eastern side of Prospect Highway and the addition of traffic lanes. Visual amenity would be maintained through low screen planting and native grasses in the central median where permitted.</p> <p>Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|---|
| 22 | Moderate |  <p>Visual changes would include the removal of the informal service road and some of the existing large native trees in the middle distance along the eastern side of Prospect Highway and the addition of traffic lanes. Low groundcover and feature tree planting would help to retain visual amenity and improve landscape character along the corridor.</p> <p>Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|---|
| 23 | Moderate |  <p>Visual change at this location would result from the removal of the adjacent informal service road and the existing mature native trees opposite along the eastern side of Prospect Highway and additional traffic lanes. Visual amenity would be maintained through low shrubs and native grass planting in the central median where permitted.</p> <p>Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 24 | Moderate |  <p>Visual change at this location would result from the removal of the informal service road opposite and the existing large native trees in the distance along the eastern side of Prospect Highway and additional traffic lanes. Visual amenity would be maintained through low shrubs and native grass planting in the central median where permitted. Small feature trees opposite along the western side of the highway would provide shade and some privacy to residential properties. Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |

| Viewpoint | Impact | Comment |
|-----------|----------|--|
| 25 | Moderate |  <p>The removal of the grassed median and informal service road has a moderate visual effect. Additional screen planting could be established on private properties if required, in consultation with the land owners.</p> |

| Viewpoint | Impact | Comment |
|-----------|--------|--|
| 26 | Low |  <p>Visual change to this location would be minimal as the location is already a four lane road with no major infrastructure changes required.</p> <p>Additional low shrub and native grass planting in the central median where clear zone requirements permit would help to maintain visual amenity for residents and shared path users.</p> |

| Viewpoint | Impact | Comment |
|-----------|--------|--|
| 27 | Low |  <p>The amount of visual change would be low, as it is not proposed to widen the highway adjacent to St Martins Village Shopping Centre. The addition of low shrubs and native grass planting in the central median where permitted would maintain visual amenity.</p> |

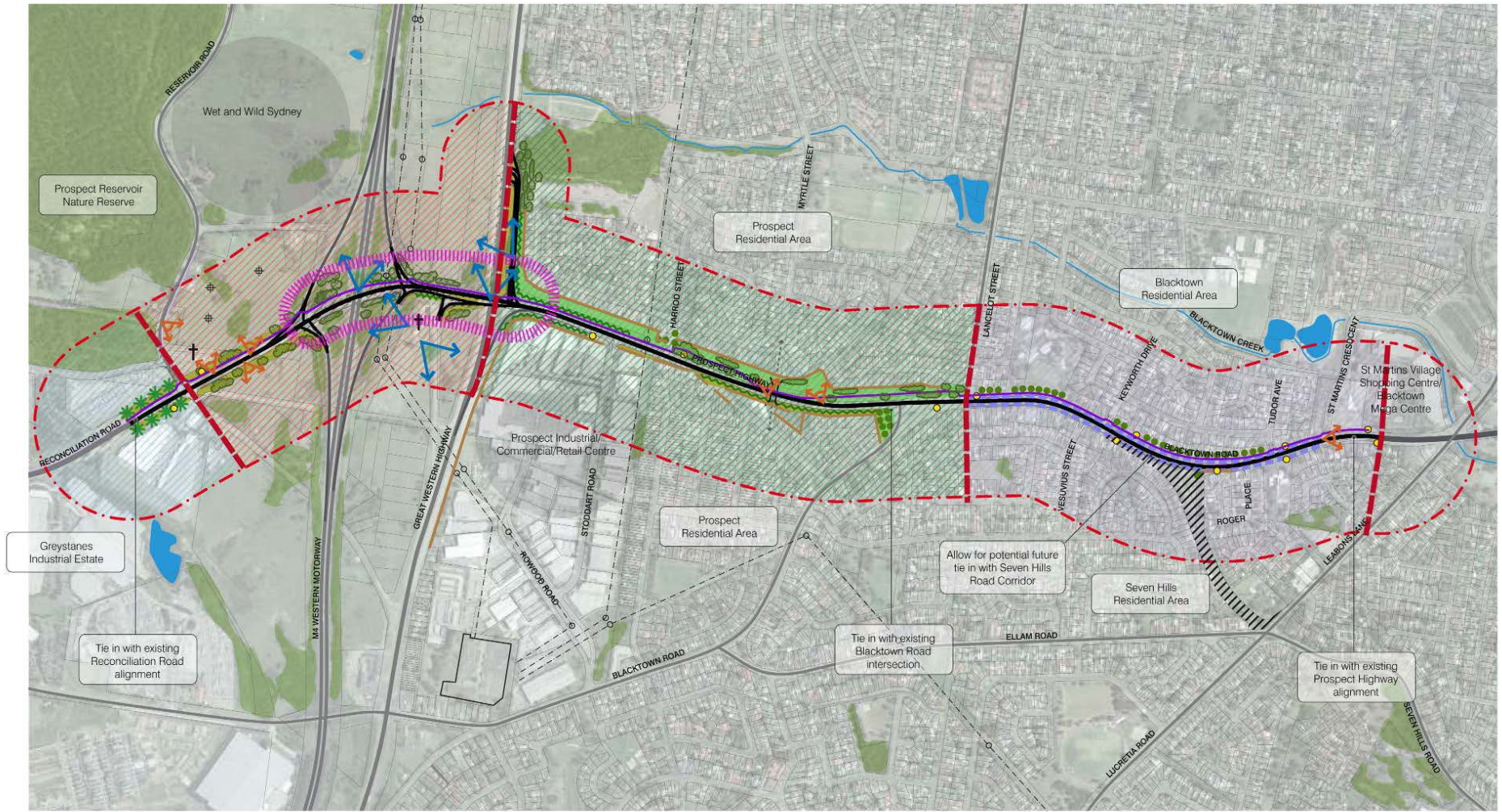
6.4.4 Safeguards and management measures

An urban design strategy has been developed for the proposed upgrade of the Prospect Highway corridor. This strategy reinforces the existing landscape character and builds on this character by providing new landscape treatments. The urban design strategy has been based on the objectives included in Table 6-34.

Table 6-34 Objectives of the urban design strategy

| Objective | |
|-------------|--|
| Objective 1 | Reinforce the roads role as an arterial road within the Blacktown City/Seven Hills region connecting Wetherill Park and Pemulwuy and the M4 Western Motorway to the south with Blacktown and the M2 Hills Motorway to the north. |
| Objective 2 | Improve the appearance and character of the road corridor and create a recognisable identity for the Prospect Highway. |
| Objective 3 | Protect, maintain and enhance existing views, heritage, cultural and roadside landmarks and values. |
| Objective 4 | Provide a simple and unified suite of road and roadside elements and details that contribute to establishing a desired future character for Prospect Highway and that are easily maintained. |

Figure 6-19 provides an overview of the urban design strategy for the proposal. Figure 6-20 provides an example of the urban design and landscaping planned as part of the urban design strategy for a section of the proposal adjacent to Blacktown Road. The complete set of urban design and landscaping plans for the proposal are located in Appendix G.



EXISTING FEATURES

- - - STUDY AREA
- PROSPECT HIGHWAY UPGRADE
- MOTORWAY
- ARTERIAL ROAD
- SUB-ARTERIAL ROADS
- SHARED PATH ROUTE
- - - 132KV ELECTRICITY LINES
- + RADIO MASTS
- WATER BODIES
- BUS STOPS

- A VIEWS - LONG DISTANCE
- A VIEWS - LOCAL
- + CHURCH
- * EXISTING SIGNATURE TREES (ARAUCARIA SPP)
- SIGNIFICANT REMNANT VEGETATION
- RESIDENTIAL PROPERTIES BACKING ONTO PROSPECT HIGHWAY

PROPOSED FEATURES

- SCATTERED NATIVE TREE PLANTING
- STREET TREE PLANTING
- ~ SCREENING VEGETATION
- NATIVE GRASSES
- DRAINAGE CORRIDOR/OPEN SPACE
- - - PROPOSED DEDICATED BUS LANES
- /// POTENTIAL SEVEN HILLS ROAD CORRIDOR LINK
- - - LANDSCAPE CHARACTER ZONE BOUNDARY

- ENTRY TREATMENT
- TRANSITION ZONE FROM GREYSTANES INDUSTRIAL ESTATE
- SOUTHERN ZONE - SEMI-RURAL LANDSCAPE
- CENTRAL ZONE - GREEN CORRIDOR
- NORTHERN ZONE - RESIDENTIAL CORRIDOR
- UPGRADED CULVERT/PEDESTRIAN UNDERPASS

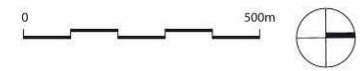


Figure 6-19 Urban Design Strategy



Figure 6-20 Urban design and landscaping – Blacktown Road

Safeguards and mitigation measures have been derived from the urban design strategy and are presented in Table 6-35.

Table 6-35 Safeguards and mitigation measures, including urban design strategy

| Impact | Environmental safeguards | Responsibility | Timing |
|--|--|---------------------------------------|-----------------|
| Landscape character and visual impacts | During detailed design, the landscape design principles and streetscape (planting) would be reviewed to ensure that they are consistent with the outcomes of the biodiversity assessment. This would be done in consultation with RMS environment staff. | Roads and Maritime, design contractor | Detailed design |
| Landscape character and visual impacts | During detailed design, the design including landscape plans are to incorporate the design principles outlined in the Landscape Character, Visual Impact Assessment and Urban Design Report. These include: <ul style="list-style-type: none"> • To ensure that the design reinforces the identity and functionality of an arterial road type • To ensure that existing land uses is considered and integrated in to the design of the road alignment • To contribute to the future urban planning of the adjoining development precincts including its transport and access needs • To respond to natural patterns including creek lines and drainage corridors and vegetation communities. This includes the use of local plants consistent with the existing communities either side of the alignment in order to unify the crossing with the existing corridor, and, use of advance stock to escalate the revegetation where appropriate • To provide a unified and consistent approach to the design of bridges along the corridor • The consideration of landscaping treatment to reduce the incidence of graffiti • To achieve an integrated, safe and minimal maintenance design. | Roads and Maritime, design contractor | Detailed design |
| Landscape character and visual impacts | An urban design contractor from the Roads and Maritime panel would be engaged for the detailed design phase to ensure adequate consideration of urban design principles and objectives, and to ensure appropriate mitigation of identified impacts. | Roads and Maritime, design contractor | Detailed design |
| Landscape | The design of vegetative screening would occur in consultation with | Roads and | Detailed design |

| Impact | Environmental safeguards | Responsibility | Timing |
|--|--|---------------------------------------|-----------------|
| character and visual impacts | adjoining land owners. | Maritime, design contractor | |
| Landscape character and visual impacts | The footprint for construction work would be kept to a minimum to ensure existing stands of vegetation remain intact wherever possible and to screen adjoining sensitive receivers. | Roads and Maritime, design contractor | Detailed design |
| Landscape character and visual impacts | The design of potential noise barriers will be undertaken during detailed design and will take into consideration the RMS Noise Wall Design Guidelines (RTA 2007). The following principles will be considered during the design of the noise barriers: <ul style="list-style-type: none"> • Materials, colours and textures will be selected to break up the dominant nature of the noise barrier • Transparent panels will be incorporated into sections of the noise barrier where it has potential to block solar access to adjacent residential properties. | Roads and Maritime, design contractor | Detailed design |
| Construction related visual impacts | Fencing with material attached (for example, shade cloth) would be provided around the construction compounds and other areas to screen views of the construction compounds from adjoining properties. | Construction contractor | Construction |

6.5 Water quality and hydrology

A drainage investigation for the proposal was undertaken in February 2014. A copy of the assessment is provided in Appendix H and a summary is provided below.

6.5.1 Methodology

The drainage investigation involved the following tasks in the development of the proposed drainage strategy.

- A hydrology investigation of the proposal area and areas in the vicinity of the proposal potentially affected by the proposed work, including using DRAINS software to model the existing hydrological environment and drainage systems within the proposal area
- Site inspections to identify existing drainage arrangements and identify site constraints
- Review of previous studies and available data along the proposal corridor
- Pavement drainage investigation and concept design based on the proposed road design including measures to eliminate and or reduce potential impact of the proposed work
- Determine the erosion and sediment control requirements for the construction stage.

6.5.2 Existing environment

Catchments

The Prospect Highway road corridor runs in close proximity to the catchment boundary of Greystanes Creek and Blacktown Creek. Greystanes Creek Catchment is generally located to the east of the proposal corridor and Blacktown Creek catchment to the west. Within the proposal area, there are 28 individual local catchment areas that flow into either the Greystanes Creek or Blacktown Creek catchments via existing drainage infrastructure. The proposal does not cross major waterways and is not impacted by regional flooding. Girraween Creek is located south of proposal boundary and Blacktown Creek is located west of the two way link road and north of the proposal boundary. The proposal is not expected to impact or be impacted by major flooding from nearby waterways.

The proposal is not within the Prospect Reservoir catchment, and runoff from the existing Prospect Highway does not discharge to Prospect Reservoir. An overview of the regional catchments and drainage features within the proposal area is shown in Figure 6-21.

A full description and map of each sub-catchment within the proposal footprint is contained in the Drainage Investigation Report (Hyder 2014) located in Appendix H.



Figure 6-21 Regional drainage catchments surrounding the proposal

Drainage

The existing corridor has minimal drainage infrastructure to capture and control stormwater runoff from the road. Many sections of road pavement runoff flow overland into road shoulders and verges without adequate channelization and control.

There are kerb and gutter controls between the existing Reservoir Road intersection and Great Western Highway Bridge. North of the Great Western Highway there is minimal kerb and gutter along the corridor until St Martins Crescent.

Runoff generated within the road corridor catchments discharge to four cross drainage structures and to Blacktown City Council's drainage lines located along the route. These structures carry overland flow across the road corridor and are listed in Table 6-36.

Along the section of the proposal located north of the Great Western Highway, some road runoff escapes the road corridor through several side streets. Two stormwater detention basins are located both upstream (eastern side of the road) and downstream (western side) of the cross drainage culvert about 300 metres south of the Blacktown Road / Prospect Highway intersection. The discharge through this cross drainage culvert is controlled by a complex inlet structure.

The drainage overflow culvert/pedestrian underpass is located about 55 metres south of the cross drainage culvert. In large storm events (greater than 100 year ARI) this underpass provides an emergency flow path for surface water drainage to the detention basin located on the eastern side of Prospect Highway.

Table 6-36 Cross drainage structures

| Catchment | Design road location | Size/Type (mm) | Upstream invert level (m AHD) | Downstream invert level (m AHD) | Adjacent road level (m AHD) |
|------------------|--|----------------|-------------------------------|---------------------------------|-----------------------------|
| Greystanes Creek | About 150 metres north of Reservoir Road | 1350 RCP | 65.32 | 63.86 | 72.41 |
| Blacktown Creek | Across the Great Western Highway about 100 metres west of Prospect Highway | 750 RCP | 74.55 | 72.25 | 76.33 |
| | About 270 metres south of Blacktown Road | 900 RCP | 64.75 | 63.14 | 70.11 |
| | About 150 metres south of Roger Place | 450 RCP | 59.94 | 59.54 | 61.06 |

*RCP – reinforced concrete pipe

Water quality

Surrounding land use varies substantially along the length of the proposal. The quality of the water entering local waterways is a function of the runoff from local catchments and contaminants in the stormwater system. Common stormwater pollutants include litter, chemicals (detergents, oils, fertilisers) and organic waste. The existing corridor does not include any water quality treatment infrastructure.

6.5.3 Potential impacts

Construction

During construction of the proposal, excavation, vegetation removal and other surface work could lead to sedimentation of runoff during periods of rainfall. The highest risk areas for erosion and sedimentation have been identified in Section 6.9.2 while safeguards and management measures have been specified in Section 6.9.4.

There is also potential for site machinery to develop a leak or an accidental spill of chemicals or oil that could enter watercourses and affect downstream water quality. For construction activities within the proposed compound site between Prospect Highway and Thornley Road there is potential for spillages and runoff to enter the adjacent freshwater wetland. Safeguards and management measures have been proposed to address these potential impacts.

During construction of the proposal, existing drainage infrastructure would continue to distribute rainfall runoff through the catchments. Some minor ponding impacts may be experienced during the upgrade work to drainage infrastructure. However, these impacts are likely to be minor and temporary

The proposal is not within the Prospect Reservoir catchment, and runoff from the existing Prospect Highway does not discharge to Prospect Reservoir.

There are no likely impacts on groundwater quantity or quality as no groundwater extraction would be required for construction of the proposal and it is unlikely the water table would be intercepted during excavation work.

Operation

Existing drainage patterns along the road corridor would generally be improved as part of the proposal. There is a minor increase in runoff from the road pavement due to the increased area of road pavement in the upgrade. The proposed drainage system is designed to capture all stormwater runoff during a minimum of 10 year ARI along its length between Reservoir Road and 200 metres north of St Martins Crescent. Proposed drainage infrastructure upgrades include:

- Kerb and gutter along edges of road pavement
- Kerb and gutter around median and traffic islands
- Increased detention basin capacity for the detention basin 270 metres south of Blacktown Road on the western side of Prospect Highway
- Pit and pipe network with formal connections to existing drainage networks
- Increased sizing of crossing drainage culverts where required to provide 100 year flood immunity for corridor.

The proposal includes extending and upgrading two existing cross drainage structures to provide 100 year ARI flood immunity. The remaining two existing culverts located along the proposal are considered to have adequate capacity and

would be retained. Table 6-37 details proposed changes to the cross drainage structures.

Table 6-37 Proposed upgrades to cross drainage structures

| Catchment | Design road location | Size / Type (mm) | Upstream invert level (m AHD) | Downstream invert level (m AHD) | Adjacent road level (m AHD) | Proposed treatment |
|------------------|--|------------------|-------------------------------|---------------------------------|-----------------------------|---|
| Greystanes Creek | About 150 metres north of Reservoir Road | 1350 *RCP | 65.32 | 63.86 | 72.41 | No change |
| Blacktown Creek | Across the Great Western Highway about 100 metres west of Prospect Highway | 750 *RCP | 74.55 | 69.57 | 79.52 | Extension of existing culverts. |
| | About 270 metres south of Blacktown Road | 900 *RCP | 64.75 | 63.14 | 70.11 | No change |
| | About 150 metres south of Roger Place | 675 *RCP | 59.28 | 59.12 | 61.48 | Demolish and replace existing 450 mm *RCP with new 675 mm *RCP. |

*RCP – reinforced concrete pipe

Figure 6-22 to Figure 6-25 show the peak 100 year flood extent at the locations of the existing and proposed cross drainage structures.

The proposal also includes modification of the existing large drainage overflow culvert/pedestrian underpass located adjacent to Old Church Lane from a box culvert to a bridge. The current assessment indicates that the detention basin and the outlet cross drainage culvert (about 55 metres north of the existing underpass) about 270 metres south of the Blacktown Road / Prospect Highway intersection have 100 year ARI capacity. The drainage overflow culvert/pedestrian underpass would therefore continue to only operate as an emergency flood overflow during large to extreme floods (larger than 100 year ARI). Therefore, modification of the drainage overflow culvert/pedestrian underpass is unlikely to change the existing flow regime or create flooding impacts during storm events up to 100 year ARI.

Changes to flows including the redistribution of flows in the proposal area are summarised below:

- A 3.2% increase in peak flows at the outlet of the existing cross drainage structure around 150 metres north of Reservoir Road. This is due to increased road surface runoff discharging to this location. The increase is unlikely to have a substantial effect on the downstream drainage patterns

- A 9.1% reduction in peak flow is expected at the outlet of the existing cross drainage structure across the Great Western Highway about 100 metres west of Prospect Highway. This is due to a minor redistribution of runoff which is related to the proposed two way link road. The storage provided at the outlet of the structure has been reduced slightly. Reduction of storage does not have an adverse impact on flood levels due to the reduction in flow discharging to this location
- A 7.51% increase in peak flows is expected at the outlet of the existing cross drainage structure about 270 metres south of Blacktown Road. This is due to increased road surface runoff discharging to this location. The proposed drainage system would discharge to a Blacktown City Council detention basin adjacent to Lorne Street. 300 m³ metres of additional storage is required to accommodate the increase in peak flows at this outlet. The additional storage would be accommodated within the existing detention basin to avoid increased flood risk
- There is an increase in flows to the drainage network at Vesuvius Street from 0.18 m³/s to 0.64 m³/s. Currently the flows enter Vesuvius Street via Everest Street and flow to the drainage system located within the low point in Vesuvius Street (opposite No. 15 Vesuvius Street). The proposal redistributes flow along the Prospect Highway drainage line connecting to the Vesuvius Street drainage network. The proposed arrangement will not have substantial impact on the total peak flows and flood risk at this connecting location since the runoff increase is contained within the drainage lines
- There is a 0.39 m³/s increase in peak flows to the existing cross drainage structure about 150 metres south of Roger Place. Flows to the inlet of the existing cross drainage structure are currently 0.39 m³/s and surcharge and store on the western side of Prospect Highway. The proposal would upgrade the existing cross drainage structure to reduce the surcharge and storage of water at the inlet. There would be a redistribution of flows from this structure to the drainage network at Tudor Avenue which connects to Blacktown Creek. The increased flows at Tudor Avenue do not increase the flood risk to adjacent development since the runoff increase is contained with the drainage lines.

The impact of the proposed road upgrade works on peak flows in receiving drainage lines would not contribute to increased flood risk in any adjacent development.

In terms of water quality, potential impacts would be associated with the discharge of additional road runoff, the constituents of which commonly include gross pollutants, sediment, toxic organics, nutrients, heavy metals and hydrocarbons. However, the proposal would result in only a minor change to the existing characteristics of the catchments through which the road passes. The existing road does not include any water quality treatment measures. There is no proposal to include water quality treatment measures.



GIS MAP file : EN04241_REF_F026.r3v1







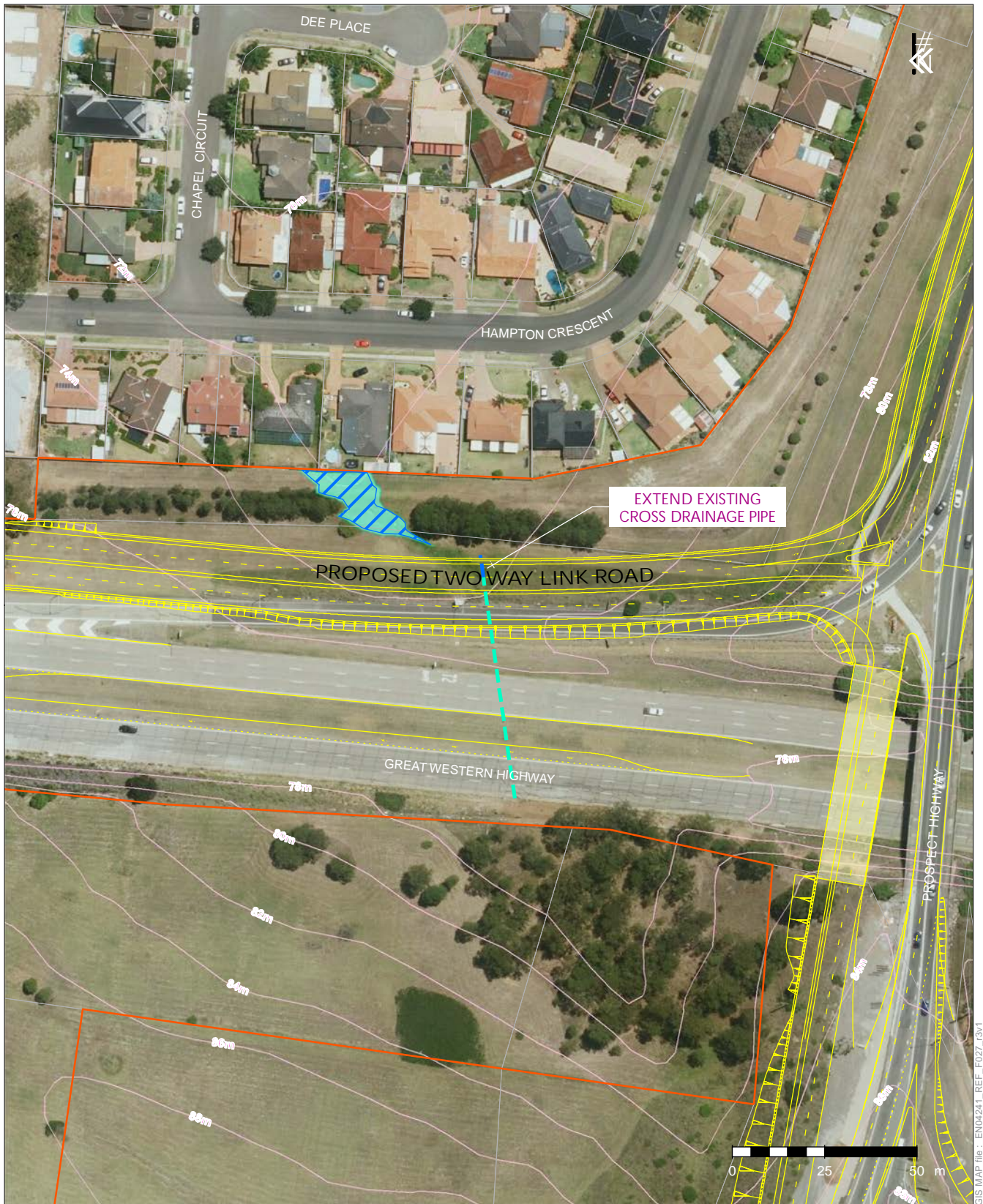
- | | | | | | |
|---|-----------------------|---|----------------------------|---|----------------|
|  | The proposal boundary |  | Pre-upgrade cross drainage |  | Contours at 2m |
|  | The proposal |  | Pre-upgrade flood extent | | |
| | |  | Post-upgrade flood extent | | |

Figure 6-22
Peak 100 year flood extent - north of Reservoir Road



GIS MAP file : EN04241_REF_F027_r3v1








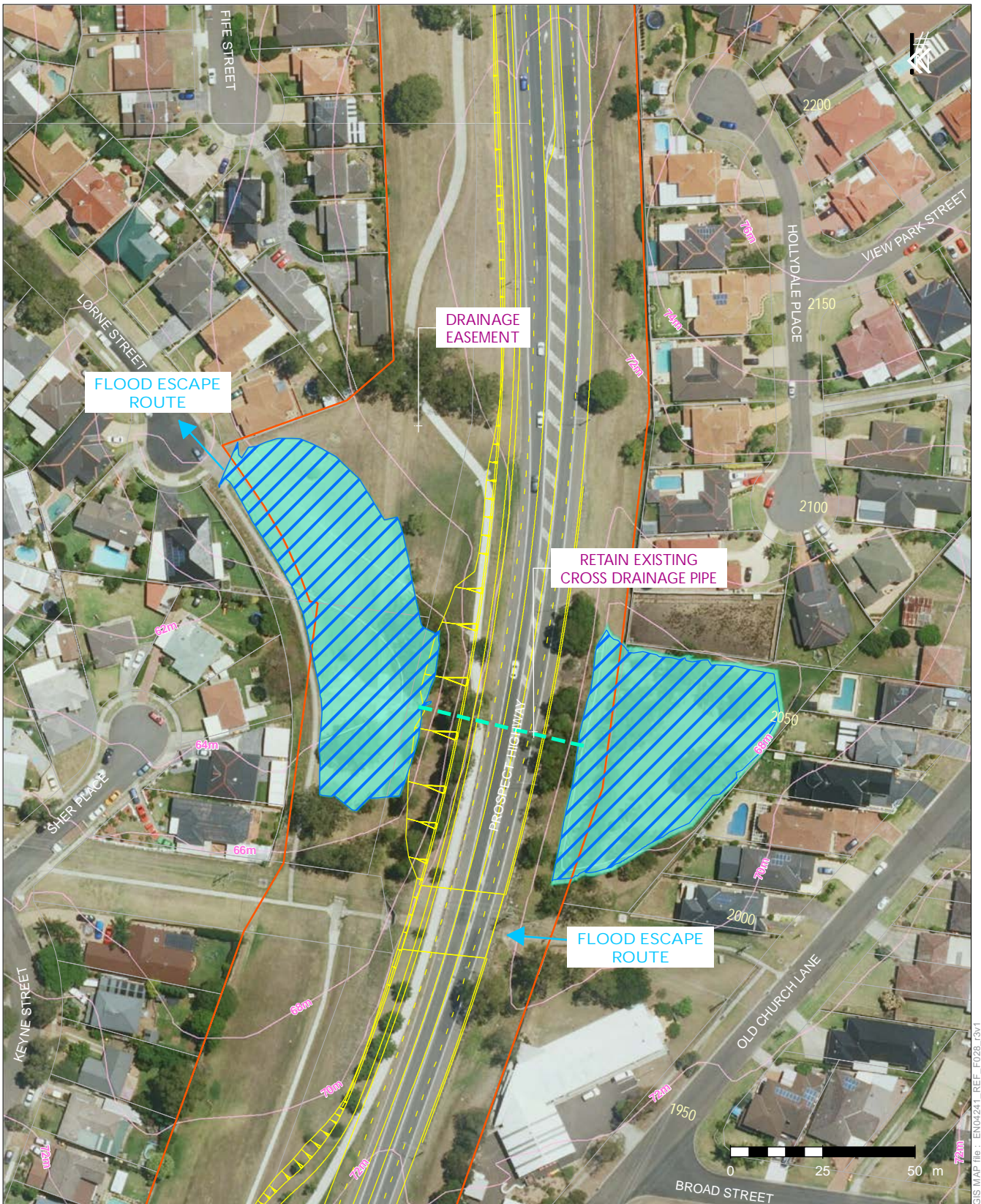
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|---|-----------------------|---|-----------------------------|---|--------------------------|
|  | The proposal boundary |  | Pre-upgrade cross drainage |  | Contours at 2m |
|  | The proposal |  | Post-upgrade cross drainage |  | Pre-upgrade flood extent |
| | |  | Post-upgrade flood extent | | |

Figure 6-23
Peak 100 year flood extent - north of proposed two way link road



GIS MAP file : EN04241_REF_F028.r3v1








- | | | | | | |
|---|-----------------------|---|-----------------------------|---|--------------------------|
|  | The proposal boundary |  | Pre-upgrade cross drainage |  | Contours at 2m |
|  | The proposal |  | Post-upgrade cross drainage |  | Pre-upgrade flood extent |
| | |  | Post-upgrade flood extent | | |

Figure 6-24
Peak 100 year flood extent - north of proposed underpass



GIS MAP file : EN04241_REF_F029_r3v1








- | | | | | | |
|---|-----------------------|---|-----------------------------|---|--------------------------|
|  | The proposal boundary |  | Pre-upgrade cross drainage |  | Contours at 2m |
|  | The proposal |  | Post-upgrade cross drainage |  | Pre-upgrade flood extent |
| | |  | Post-upgrade flood extent | | |

Figure 6-25
Peak 100 year flood extent - north of Keyworth Drive

6.5.4 Safeguards and management measures

Proposed drainage system strategy

The strategy adopted for the development of the proposal's drainage design was to maintain existing drainage patterns as much as possible. The strategy also sought to minimise flow redistributions along the proposal.

Full details of the proposed drainage strategy for each catchment area are included in the Drainage Investigation Report in Appendix H. Table 6-38 shows the proposal hydrological mitigation measures that would be used in the proposal.

Table 6-38 Summary of proposed water quality and hydrological mitigation measures

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------------|---|----------------------------------|------------------|
| Flood and drainage design | Final layout and detail of the drainage system including swale design and scour protection will be refined during detailed design in consultation with the RMS Senior Environmental Officer. | Roads and Maritime and designers | Detailed design |
| Flood and drainage design | Further flood modelling including a detailed afflux assessment would be undertaken during detailed design to confirm impacts to surrounding land uses. | Roads and Maritime and designers | Detailed design |
| Water quality management | <p>A Soil and Water Management Plan (SWMP) will be prepared as part of the CEMP in accordance with the requirements of RMS contract specification G38 prior to the commencement of construction. The SWMP will also address the following:</p> <ul style="list-style-type: none"> • RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011 • RMS Technical Guideline: Environmental Management of Construction Site Dewatering, 2011. <p>The SWMP would detail the following as a minimum:</p> <ul style="list-style-type: none"> • Identification of catchment and sub-catchment areas, high risk areas and sensitive areas • Sizing of each of the above areas and catchment • The likely volume of run-off from each road sub-catchment • Direction of flow of on-site and off-site water • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction • The locations and sizing of sediment traps such as sump or basin as well as associated drainage • Dewatering plan which includes | Construction contractor | Pre-construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|--------------------------|---|-------------------------|--------------|
| | <p>process for monitoring, flocculating and dewatering water from site (ie sediment basin and sumps)</p> <ul style="list-style-type: none"> • The staging plans, location, sizing and details of creek alignment and realignment controls for scour protection and bank and bed stabilisation including those used during construction and long term • A mapped plan identifying the above • A process to routinely monitor the BOM weather forecast • Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. These controls are to be shown on the ESCPs • Provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls. | | |
| Spills | Emergency wet and dry spill kits would be kept on site at all times and all staff would be made aware of the location of the spill kit and trained in its use. | Construction contractor | Construction |
| Spills | The vehicles refuelling process will include a person attending the refuelling facility / vehicle and a spill kit on the vehicle. | Construction contractor | Construction |
| Water quality management | Vehicle wash down and/or cement truck washout is to occur in a designated bunded area and least 50 metres away from water bodies and surface water drains. | Construction contractor | Construction |
| Spills | Any fuel, oils or other liquids stored on site would be stored in an appropriately sized impervious bunded at least 120% larger than the greatest container and in an area least 50 metres away from water bodies. | Construction contractor | Construction |
| Spills | If a spill or incident occurs, the Roads and Maritime Environmental Incident Classification and Management Procedure is to be followed and the Roads and Maritime Contract Manager notified immediately. | Construction contractor | Construction |

6.6 Non-Aboriginal heritage

An assessment was carried out to identify the extent and magnitude of potential impacts from the proposal on non-Aboriginal heritage. This assessment is included in the Statement of Heritage Impacts provided in Appendix I and is summarised below.

6.6.1 Methodology

Review of literature

A search of heritage registers was carried out on 12 August 2013 to identify heritage items previously recorded in the study area. These registers included:

- World Heritage List, which is maintained by the United Nations Educational, Scientific and Cultural Organisation and lists items that are recognised to be of international significance
- National Heritage List, which is administered by the Australian Government under the EPBC Act and lists places of outstanding heritage significance to Australia.
- State Heritage Register (SHR), which is administered by the Heritage Branch of the OEH under the *Heritage Act 1977* and lists places and objects of particular importance to the people of NSW
- Section 170 Heritage and Conservation Registers (s.170 registers), which are created by government agencies under Section 170 of the *Heritage Act 1977* to provide a record of heritage items owned, occupied or managed by those bodies
- Heritage schedules of local government LEPs and Development Control Plans (DCPs), which are administered by local government councils and list all heritage items of National, State and local significance within the respective LGAs. These include the Blacktown Local Environmental Plan 1988, the Draft Blacktown Local Environmental Plan 2013 and the Holroyd Local Environmental Plan 2013
- The Register of the National Estate (RNE), which was originally established as a statutory register but was frozen in 2007, ceased to be a statutory register in 2012, and is now maintained by the Australian Government as a publicly available archive and educational resource listing natural, Indigenous and historic heritage places throughout Australia
- The Register of the National Trust (RNT), which was established in 1949 and is maintained by the National Trust of Australia.

Existing statements of heritage significance were also reviewed for heritage items where available. Where these were not available, brief statements of significance were prepared as part of the assessment, in line with NSW Heritage Assessment guidelines within the NSW Heritage Manual.

Site survey

A site survey was carried out to ground truth the desktop assessment on 14 August 2013. The survey included physical inspections of all heritage listed items within 200 metres of the proposal area.

Study area

The study area includes the section of the Prospect Highway corridor between Reservoir Road, Prospect, and 200 metres to the north of St Martins Crescent, Blacktown.

The study area also includes entry and exit ramps of the Great Western Highway and the M4 Western Motorway and short sections of Reconciliation Road, Reservoir Road, Prospect Reservoir Access Road, Picrite Close, Thornley Road, Ponds Road, Stoddart Road, Harrod Street, Blacktown Road, Lancelot Street, Vesuvius Street, Keyworth Drive, Roger Place and Tudor Avenue. Listed items within 200 metres of the study area were included in the Statement of Heritage Impact (refer to Appendix I) to ensure that all potential impacts to the context and setting of the listed heritage items were taken into consideration.

The study area falls within the LGAs of Blacktown and Holroyd.

6.6.2 Existing environment

Historical context

The search by settlers for suitable farming land resulted in exploration west of coastal Sydney. Initially, the Parramatta River provided the main form of transport to and from Parramatta and areas to the west. An overland track between Parramatta and Sydney (now known as Parramatta Road) was built between 1789 and 1791, and became a major east-west thoroughfare for the colony by the early 19th century (Wotherspoon, 2010).

Governor Phillip chose the site of Prospect Hill for a number of relatively small land grants in 1791 and 1792. The site of Prospect Reservoir was later included within the largest grants in the area, which were made to William Lawson (500 acres) and John Barbyn (1200 acres). William Lawson had a residence named Veteran Hall built on his grant during the early 19th century (demolished in 1929).

The settlement at Prospect Hill had a varied success, with only six of the original 20 settlers remaining in the area by 1798. This land was used for cereal cultivation for the next 50 years. The arrival of the railway about 3.5 kilometres to the north of Prospect in the 1850s prompted subdivision and development in areas along the railway line, but not directly within Prospect. Instead the development of the Prospect area in the early 20th century was shaped by quarrying industries and creation of the Prospect Reservoir.

Following 1945, there was a large increase in motor traffic, which led to increasing congestion along Parramatta Road and the Great Western Road, as it was called then. Planning for a Western Expressway began in 1947 and a corridor for the road was reserved in 1951. The first section of the M4 Western Motorway was located between Prospect and Penrith and was completed by the Department of Main Roads in the early 1970s. During the 1980s, the second section between Concord and Parramatta was constructed in various stages. Until 1992, there was a 'missing link' between the two sections. In 1989, Statewide Roads Limited won the right to finance, build and maintain the motorway, and by 1992 they had constructed the ten kilometre long 'missing link' as well as widening and upgrading the six kilometre section between Homebush Bay Drive and James Ruse Drive. Between 1996 and 1998, the motorway was upgraded and widened between Parramatta and Penrith.

Today, the Prospect Highway is the main transport corridor which connects the city of Blacktown with the M4 Western Motorway.

Heritage items

Ten heritage items and places were identified within 200 metres of the proposal area. Of these, three items are listed on the State Heritage Register. These heritage items and places are listed in Table 6-39 and are shown on Figure 6-26. No previously unknown or unlisted heritage items or areas of archaeological potential were identified within the proposal area during the site investigation. A discussion of each item and its significance is also provided below.

Table 6-39 Historical heritage sites located within 200 metres of the proposal area

| Item name | Location | Listing | Listing ID | Heritage significance |
|---|----------|--|--|-----------------------|
| Prospect Reservoir and surrounding area | Prospect | SHR Sydney Water s170 Register RNT | Lot 7 DP 1015294 Part Lot 1 DP 1062094 Lot 2 DP 1062094 Lot 304 DP 1122291 Lot 2 DP 218194 Part Lot 1 DP 270644 Part Lot 18 DP 270644 Part Lot 8 DP 270644 Lot 1 DP 832281 Lot 2 DP 832281 Lot 4 DP 832281 Lot 1 DP 845354 Lot 5 DP 861815 | State |
| Former Great Western Road, Prospect | Prospect | SHR nominated | Various | State |
| Church and cemetery – St Bartholomew's | Prospect | SHR Blacktown LEP 1988 / Draft LEP 2013 RNE RNT | Lots 221-224, DP 812455 and Lot 1, DP 325874 | State |
| House – Bridestowe – 568 Reservoir Road, Prospect | Prospect | Blacktown LEP 1988 / Draft LEP 2013 | Lot C, DP 374323 | Local |

| Item name | Location | Listing | Listing ID | Heritage significance |
|---|---|--|---------------------------|------------------------------|
| Hicks Dairy – Reservoir Road (east of Prospect Highway), Prospect | Prospect | Blacktown LEP 1988 / Draft LEP 2013 | Part Lot 19, DP 802753 | Local |
| Seven Milestones (one milestone is located within 200 metres of the study area) | Prospect, Huntingwood, Minchinbury and Mount Druitt | Blacktown LEP 1988 / Draft LEP 2013 | Unknown | State |
| House 8 Edgeware Road, Prospect | Prospect | Blacktown LEP 1988 / Draft LEP 2013 | Lot 2, DP 801792 | Local |
| House 29 Old Church Lane, Prospect | Prospect | Blacktown LEP 1988 / Draft LEP 2013 | Lot 4, Section G, DP 1645 | Local |
| House 2 Erith Street (also known as 17 Lancelot Street), Blacktown | Blacktown | Blacktown LEP 1988 / Draft LEP 2013 | Lot 12, DP 627441 | Local |
| Dayton House – 37-39 Roger Place, Blacktown | Blacktown | SHR Blacktown LEP 1988 / Draft LEP 2013 | Lots 1 and 2, DP 711182 | State |



- The proposal boundary
- The proposal
- Heritage item (LEP)
- Nominated Heritage item (SHR)
- Heritage item (s170)
- Heritage item (LEP)
- Heritage item (SHR)
- Heritage item (SHR and LEP)

Figure 6-26
Non-Aboriginal heritage

Prospect Reservoir and surrounding area

The Prospect Reservoir and its curtilage (listed on the SHR, Sydney Water s170 register and RNT) are located to the south of Reservoir Road (refer to Figure 6-26 and Photo 6-3).

The Prospect Hill Reservoir and surrounding area was constructed as part of the original Upper Nepean Scheme. The Upper Canal incorporated a system of tunnels, canals and aqueducts that directed water towards Prospect Reservoir from where it was taken via the Lower Canal to Pipehead Basin located near Guildford. Today Prospect Reservoir is used as a back-up water supply only. The heritage listing encompasses the reservoir, landscape elements and all associated structures within the property boundary, including examples of 1920s and 30s pumping stations, a residence, the archaeological site of Veteran Hall and the 72 inch main, constructed between the Upper Canal and Pipe Head in 1937.



Photo 6-3 View south-east to Prospect Reservoir from section of study area along Reservoir Road. Note vegetation screening blocks view to the item

Former Great Western Road, Prospect

The Former Great Western Road, Prospect (nominated for SHR listing) is aligned along the undulating ground to the north of Prospect Hill and Prospect Reservoir (refer to Figure 6-26 and Photo 6-4) and a section of the old road is now called Reservoir Road.

The Former Great Western Road comprises a two-lane asphalted pavement for most of its length, with mostly unformed edges flanked by wide gravelled and grassed shoulders. The Former Great Western Road, Prospect has significance as the only surviving original alignment of the 1818 Great Western Road that itself most likely followed an earlier Aboriginal track for a route over Prospect Hill. Sections of the Former Great Western Road (Reservoir Road) to the west and east of the roundabout at the intersection with Prospect Highway would be directly impacted by the proposal, comprising a combined total length of about 400 metres. A section of Reservoir Road to the east of the roundabout, measuring around 60 metres, would be directly impacted by the proposal. However, this section has already been affected by traffic work at the roundabout.

The Former Great Western Road, Prospect nomination for listing on the SHR will include a series of site specific exemptions under section 57(2) of the *Heritage Act 1977* primarily relating to the archaeological potential of the area that would be impacted by the proposal.



Photo 6-4 Section of study area that includes the Former Great Western Road, view to west.

St Bartholomew's Church and Cemetery

St Bartholomew's Church and Cemetery (listed on the SHR) are located on a hill overlooking the M4 Western Motorway with the property bounded by Ponds Road to the north and Prospect Highway to the west (refer to Figure 6-26 and Photo 6-5). This is the highest point of the site and significant impacts to views and setting have already occurred with the installation of existing roads and infrastructure. The south-western boundary of the item is screened from the M4 Western Motorway by vegetation.

The church and cemetery were consecrated in 1841. The church is no longer used for services, with the last service held in 1967. Blacktown City Council acquired the property from the Anglican Church in late 2000. The St Bartholomew's site is considered significant because it is closely linked with the development and history of the surrounding area and contains the graves of a considerable number of prominent families from the area since the 1840s.



Photo 6-5 St Bartholomew's Church and Cemetery

'Bridestowe' and Hicks' Dairy

Bridestowe and Hicks' Dairy (listed on the Blacktown LEP) are located about 40 metres from the southern extent of the study area along Reservoir Road and around 100 metres east of Thornley Road (refer to Figure 6-26 and Photo 6-6).

Bridestowe and Hicks' Dairy front Reservoir Road and were built in 1889. The original house on the property is still standing and is known as Bridestowe. It is a single storey late Victorian weatherboard building. Some of the early dairy buildings still stand on the site. These buildings were operated as a combined dairy farm and orchard, while barley, oats and maize were also grown there. In 1942 the Hicks Brothers operated a dairy while living in the house at Bridestowe. The brothers owned 188 acres and leased a further 170 acres of land owned by the Water Board and 99 acres from adjacent land owners. Bridestowe is significant because it is an example of residential development in the Victoria era in Prospect.

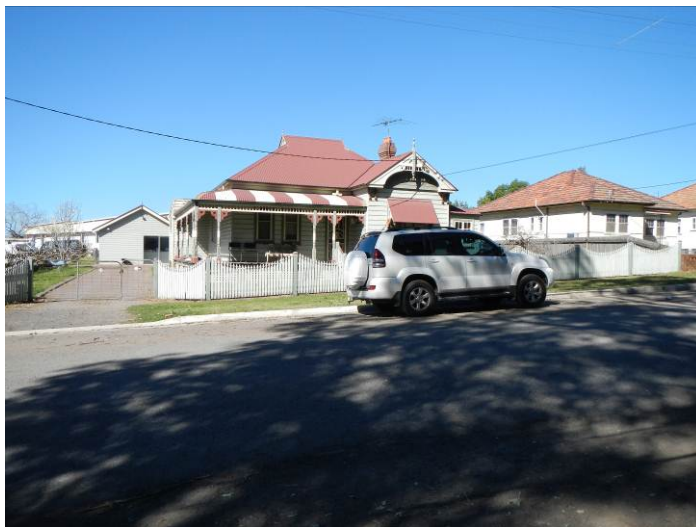


Photo 6-6 Bridestowe house, view to south-east across Reservoir Road.

Milestone

A milestone (listed on the SHR) is located around 60 metres to the east of the proposal area along Ponds Road (refer to Figure 6-26 and Photo 6-7).

Milestones are small sandstone obelisks with notations embedded in the stone indicating distances in Roman numerals. They are significant because they mark the highway between Sydney and Penrith and the distance to and from each. It is likely these milestones are part of a series that were erected along the Great Western Road under instruction from Governor Macquarie between 1810 and 1825.



Photo 6-7 Milestone (circled orange) along southern edge of the Great Western Highway, view to north-east (taken from Ponds Road)

House at 8 Edgeware Road, Prospect

The house at 8 Edgeware Road (listed on the Blacktown LEP) is located around 80 metres to the east of the study area along Prospect Highway (refer to Figure 6-26 and Photo 6-8).

The house at 8 Edgeware Street is significant because it is one of only three or four remaining Victorian era homes from the initial subdivision of the Church and Schools Lands at Prospect to form the Winter Estate bounded by Blacktown Road, Prospect Highway and the Great Western Highway. The house is a four roomed timber framed cottage; it has a front veranda, hipped roof and chimneys. Original regency style timber windows and doors remain. The item is screened from the study area by neighbouring houses.



Photo 6-8 House at 8 Edgeware Road, view to south-west. Note neighbouring houses screening the item from the study area

House at 29 Old Church Lane, Prospect

The house at 29 Church Lane (listed on the Blacktown LEP) is located around 15 metres to the east of the study area along Prospect Highway (refer to Figure 6-26 and Photo 6-9).

The house at 29 Old Church Lane is significant because it is one of only three or four remaining Victorian era homes from the initial subdivision of the Church and School Lands at Prospect to form the Winter Estate, bounded by Blacktown Road, Prospect Highway and the Great Western Highway. The house is a two-roomed weatherboard cottage, with an iron roof, simple gable, skillion veranda and rear lean-to. More recent modifications are evident in the windows and metal posts along the veranda.



Photo 6-9 House at 29 Old Church Lane, Prospect, view to south-west

House at 2 Erith Street (or 17 Lancelot Street), Blacktown

The house at 2 Erith Street (listed on the SHR) is located around 130 metres to the west of the study area along Prospect Highway (refer to Figure 6-26 and Photo 6-10).

The house at 2 Erith Street is a single storey masonry house and is significant because it is an example of local residential development in Blacktown. It has a

hipped galvanised iron roof and bull nose veranda along the front and side. Full height colonial Georgian shutters surrounding double hung French doors are contained in the front section of the house.



Photo 6-10 House at 2 Erith Street, view to south-east. Note neighbouring house screens the item from the study area

Dayton House

Dayton House (listed on the SHR) is located around 70 metres to the east of the study area along Blacktown Road (refer to Figure 6-26 and Photo 6-11).

Dayton House is a late Georgian House and was possibly built in the early 1830s. The house has been substantially altered however it is significant because its planning is an example of the archetypal verandahed two storeyed, double-pile late Georgian houses built in rural Australia. The place is associated with James Bates, a successful ex-convict settler, whose family retained an interest in the Blacktown area for at least one hundred years.



Photo 6-11 View south-east to Dayton House from Roger Place

6.6.3 Potential impacts

Potential impacts of the proposal during construction and operation on non-Aboriginal heritage are discussed in Table 6-40 and shown on Figure 6-26. Impacts that are not specific to individual heritage items are discussed in further detail below and discussed in Appendix I.

Table 6-40 Potential impacts of the proposal on non-Aboriginal heritage items

| Item name | Significance | Potential impacts | Impact summary |
|---|--------------|--|----------------|
| Prospect Reservoir and surrounding area | State | Due to the physical work being within existing road reserves that are screened by planted and regrowth vegetation, the proposal would not involve any physical impacts to the item and would not affect its views and setting. The proposal would not have a negative impact on the heritage significance of the item. | None |

| Item name | Significance | Potential impacts | Impact summary |
|---|--------------|---|---|
| Former Great Western Road, Prospect (now called Reservoir Road) | State | <p>Sections of Reservoir Road to the west and east of the roundabout at the intersection with Prospect Highway/Reconciliation Road would be directly physically impacted by the proposal. These sections have already been affected by road improvement work at the intersection of Prospect Highway/Reconciliation Road.</p> <p>The section of Reservoir Road to the west of the roundabout, measuring around 300 metres, has already been heavily modified by resurfacing of the road and the installation of infrastructure such as power lines and footpaths. These features, along with transmission towers located in the paddocks immediately to the north, and the Wet 'n' Wild Sydney development visible on the skyline to the west, have already substantially altered the views and setting of the heritage item. The proposal would not have any further negative impact on the views and setting of this section of the road. The statement of significance emphasises the views to the Blue Mountains and Blacktown hills offered at the highest point of the route, just west of the intersection with Watch House Road. This location is well outside of the area of proposed impact along Reservoir Road.</p> <p>A section of Reservoir Road to the east of the intersection with Prospect Highway, measuring around 60 metres, would be directly physically impacted by the proposal. However, this section has already been affected by road improvement work at the roundabout. The remainder of the road that runs northeast towards the M4 Western Motorway would not be directly impacted. The proposal would not have a negative impact on the views and setting of this section of the heritage item.</p> <p>The alignment of Reconciliation Road would remain unchanged after the construction of the proposal, which is a feature highlighted within the statement of significance included in the Non-Aboriginal Heritage Assessment in Appendix I.</p> <p>Overall, the proposal would not have a negative impact on the heritage significance of the Former Great Western Road, Prospect in terms of aesthetics, view and setting. The proposal will have a direct physical impact on small sections of the heritage item that have low archaeological potential and a low potential for any relics that are likely to have state or local heritage significance.</p> | <p>Direct physical impacts to the item.</p> <p>If direct physical impacts cannot be avoided, and dependent on the status of the heritage listing, an exemption from approval under Section 57(2) of the <i>Heritage Act 1977</i> should be requested and/or the Heritage Division would be consulted prior to works commencing. The Section 57(2) notification would be made under site specific exemption.</p> |

| Item name | Significance | Potential impacts | Impact summary |
|---|--------------|---|--|
| St Bartholomew's Church and cemetery – St Bartholomew's | State | No physical impacts would occur within the curtilage of St Bartholomew's Church and Cemetery. It is anticipated that the proposal would not have any significant negative impact on the views and setting of the heritage item due to the work being on the western side, well below and obscured from predominant views to and from St Bartholomew's Church and cemetery. The proposal is from 5.2 metres to around 25 metres from the western curtilage of the heritage item. It is possible there may be vibration impacts during construction work near the item although the risk is considered low. | Possible vibration impacts. Impacts would be managed within a Construction Noise and Vibration Management Plan as discussed in Section 6.2.4 |
| 'Bridestowe' and 'Hicks' Dairy | Local | Bridestowe and Hicks' Dairy are located around 40 metres from the northern extent of the study area along Reservoir Road and at least 100 metres from the western extent of the proposal area bordered by Thornley Road. The items are screened from the proposal area by neighbouring buildings and vegetation. The proposal would have no impact on the heritage significance of these items. | None |
| Milestones | Local | The milestone is located around 60 metres to the east of the proposal area along Ponds Road. The setting of the milestone has already been significantly impacted by surrounding development and upgrades to the Great Western Highway. The proposal would have no impact on the heritage significance of this item. | None |
| House at 8 Edgeware Road | Local | The house at 8 Edgeware Road is located around 80 metres to the east of the proposal area along Prospect Highway. The item is screened from the proposal area by neighbouring houses. The proposal would have no impact on the heritage significance of this item. | None |
| House at 29 Old Church Lane | Local | The house at 29 Old Church Lane is located around 15 metres to the east of the proposal area along Prospect Highway. The views and setting of this item have already been substantially impacted by the construction of Prospect Highway. It is anticipated the proposal would not have any significant negative impact on the views and setting of the heritage item. The proposal would have no impact on the heritage significance of this item. It is possible there may be vibration impacts during construction work along Prospect Highway. | Possible vibration impacts. Impacts would be managed within a Construction Noise and Vibration Management Plan as discussed in Section 6.2.4 |

| Item name | Significance | Potential impacts | Impact summary |
|--|--------------|--|----------------|
| House at 2 Erith Street (also known as 17 Lancelot Street) | Local | The house at 2 Erith Street is located around 130 metres to the west of the proposal area along Prospect Highway. The item is screened from the proposal area by neighbouring houses. The proposal would have no impact on the heritage significance of this item. | None |
| Dayton House | State | <p>Dayton House is located around 70 metres to the east of the proposal area along Blacktown Road. The item is screened from the proposal area by neighbouring single storey houses. The proposal would have no impact on the heritage significance of this item.</p> <p>A section of the proposal area runs parallel to the southern curtilage of the heritage item, at a distance of around 20 metres. The proposal area does not encroach on the area of archaeological potential and therefore would not impact on it.</p> <p>A proposed site compound is located to the east of the alignment and around 100 metres to the south of Roger Place (shown on Figure 6-26). The site compound would result in minor temporary impacts to the views and setting of Dayton House during construction.</p> | None |

6.6.4 Safeguards and management measures

Safeguards and management measures to address the proposal's potential impacts on non-Aboriginal heritage are summarised in Table 6-41. Management strategies would also be applied to mitigate vibration and visual impacts on heritage items. These are outlined in Section 6.2 and Section 6.4 respectively.

Table 6-41 Summary of mitigation measures for non-Aboriginal heritage

| Impact | Environmental safeguards | Responsibility | Timing |
|---|--|--|--------------------------------|
| Potential physical impact on non-Aboriginal heritage items during construction. | <p>A Non-Aboriginal Heritage Management plan would be prepared and included in the CEMP. This plan would include but not be limited to the following:</p> <ul style="list-style-type: none"> • A map identifying locations of items or sites (including curtilages) which are to be protected and those which are to be destroyed/impacted and no-go zones • Identification of potential environmental risks/impacts due to the works/activities • Management measures to minimise the potential risk • Mitigation measures to avoid risk of harm and the interface with work activities on site • Implementation of mitigation measures to protect identified heritage items or areas • Identify in toolbox talks where management of non-aboriginal heritage is required such as identification of no go zones and responsibilities under the <i>Heritage Act 1977</i> and any obtained permits or exemptions • A stop works procedure in the event of actual or suspected potential harm to a heritage feature/place • Requirement to comply with RMS Standard Management Procedure -Unexpected Archaeological Finds, 2012. | Roads and Maritime and construction contractor | Pre-construction, construction |
| Potential physical impact on non-Aboriginal heritage items during construction. | A condition survey would be undertaken before the start of work by a qualified contractor and a building condition report prepared for heritage structures. | Roads and Maritime and construction contractor | Pre-construction, construction |
| Potential vibration impacts to St | Vibration management procedures would be developed and implemented where works resulting in vibration are | Construction contractor | Pre-construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|---|--|--|--------------------------------|
| Bartholomew's Church and Cemetery and the house at 29 Old Church Lane, Prospect | undertaken within the vicinity of identified heritage items. | | |
| Unexpected heritage find during construction. | 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 RMS Standard Management Procedure - Unexpected Archaeological Finds 2012 would be followed. | Roads and Maritime and construction contractor | Pre-construction, construction |
| Physical impacts to the Former Great Western Road, Prospect. | Direct physical impacts to the Former Great Western Road would be avoided, if possible, and dependent on the status of the heritage listing, an exemption from approval under Section 57(2) of the Heritage Act 1977 would be requested and/or the Heritage Division would be consulted before work start. | Roads and Maritime | Pre-construction |

6.7 Aboriginal heritage

6.7.1 Methodology

A search of the OEH Aboriginal Heritage Information Management System (AHIMS) database was carried out in June 2013. The results of this database search confirmed that there are no known Aboriginal heritage sites within or immediately adjacent to the proposal area.

As described in Section 5.3, Roads and Maritime's Aboriginal Cultural Heritage Advisor, Sydney Region, undertook a site inspection and assessment on 23 July 2013 in line with the requirements of the Procedure for Aboriginal Heritage Consultation and Investigation (PACHCI) (Roads and Maritime 2011).

6.7.2 Existing environment

Due to its history of agricultural land use followed by residential, commercial and light industrial land use, the proposal area has been extensively disturbed.

The AHIMS records are located in undisturbed areas close to, but not within the proposal area. These records are shown on Figure 6-27. The closest AHIMS recorded sites to the proposal are site 45-5-3689 located about 25 metres south of the proposal boundary along the proposed two way link road and site 45-5-2548 located about 150 metres southwest of the Reservoir Road / Picrite Road intersection.

There are no declared Aboriginal places within either Blacktown or Holroyd LGAs.

6.7.3 Potential impacts

Aboriginal heritage impacts are not expected from the proposal. A clearance letter was issued by Roads and Maritime on 5 August 2013 to confirm that:

- The physical site inspection has not identified any Aboriginal objects
- The proposal is unlikely to harm known Aboriginal objects of places
- The AHIMS search did not indicate moderate to high concentrations of Aboriginal objects or places in the proposal area
- The proposal area does not contain landscape features that indicate the presence of Aboriginal objects, based on the OEH Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW, and the Roads and Maritime Procedure for Aboriginal Cultural Heritage Consultation and Investigation
- The cultural heritage potential of the proposal area appears to have been reduced due to past disturbance
- Construction compounds would be located on existing ancillary sites previously used as construction compounds, and therefore is unlikely to harm known Aboriginal heritage.



- The proposal boundary
- The proposal
- ★ Aboriginal Heritage Information Management System locations

Figure 6-27
Aboriginal heritage

6.7.4 Safeguards and management measures

Safeguards and management measures to address the proposal's potential impacts on Aboriginal heritage are summarised in Table 6-42.

Table 6-42 Summary of mitigation measures for Aboriginal heritage

| Impact | Environmental safeguards | Responsibility | Timing |
|---|---|--|--------------------------------|
| Unexpected heritage find during construction. | If unexpected Aboriginal 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 RMS Standard Management Procedure - Unexpected Archaeological Finds 2012 would be followed. | Roads and Maritime and construction contractor | Pre-construction, construction |

6.8 Socio-economic and land use

This section assesses the socio-economic benefits and impacts of the construction and operation of the proposal and outlines management measures to manage the proposal's impacts.

6.8.1 Methodology

The proposal is located within the Blacktown City and Holroyd City LGAs in western Sydney.

The assessment of socio-economic impacts involved:

- Reviewing existing land use and planning policies for the Blacktown and Holroyd LGAs, such as the Blacktown local environmental plan (LEP) and Holroyd LEP
- Describing the existing socio-economic conditions of communities near the proposal, including:
 - Population and demographic characteristics based on the Australian Bureau of Statistics (ABS) Seven Hills/Toongabbie Statistical Area (Level 2) and Blacktown (South) Statistical Area (Level 2)
 - Existing social infrastructure near the proposal, such as schools and open space
 - Local business, industry and employment characteristics
 - Local access and connectivity, including road, public transport, walking and cycling facilities
- Assessing the proposal's impacts (both positive and negative) on such things as existing land uses, property, local amenity, business and industry, social infrastructure and access and connectivity
- Identifying measures to manage or mitigate potential negative impacts.

The assessment of socio-economic impacts has been informed by:

- Existing literature, policies and strategies, and website information for the Blacktown and Holroyd LGAs
- Mapping and aerial photos of the local and regional study area
- Observations made by the project team during a site visit in July 2013
- Information provided by Roads and Maritime including on property acquisition and the concept design
- Roads and Maritime Environmental Impact Assessment Practice Note: Socio-economic assessment (EIA-N05) (Roads and Maritime 2013).

6.8.2 Existing environment

This section describes existing land use, property and socio-economic conditions of local and regional communities potentially affected by the proposal.

In 2012, Blacktown City had a population of about 317,575 people, while Holroyd City had a population of about 105,772 people. Blacktown City comprises predominantly residential uses, although the LGA also includes significant areas of rural farming land and substantial industrial and commercial land uses. Holroyd City also comprises predominantly residential uses, as well as substantial industrial areas and some commercial areas.

Existing land uses

Land uses surrounding the proposal are shown in Figure 6-28. The corridor is contained within the Blacktown LGA and located within the Roads and Maritime Sydney Region. The north-south route links major urban, commercial and industrial areas to the M4 Western Motorway, M7 Motorway and M2 Hills Motorway and is a main connector road through the suburbs of Prospect, Blacktown and Seven Hills and also services nearby Pemulwuy.

The Prospect Highway corridor is a key link for the local community, providing vehicle, pedestrian and cycle access between low density residential neighbourhoods. The Prospect Highway also directly services commercial and industrial centres, educational institutions including a primary school and an early learning childcare centre, the State Emergency Services Blacktown Unit Facility, Army Reserve Depot, St Mark's Coptic Catholic Church and the historic St Bartholomew's Church and cemetery. Additionally, a new water theme park known as Wet 'n' Wild Sydney is located at the southern end of the proposal and opened in late 2013. Prospect Reservoir is located south west of the proposal area.

The road reserve for the Prospect Highway / Blacktown Road includes areas of open space, informal parking areas and the Prospect to Blacktown cycleway, which extends along the corridor. An informal service road is also located within parts of the road reserve providing parking and access for existing residential uses adjacent to the proposal. This runs along the western side of the Prospect Highway, between about 70 metres south of Vesuvius Street and 60 metres south of St Martins Crescent. Existing bus lanes are located at the approaches and departures from the Lancelot Street intersection.

Existing land uses and features in the study area include:

- Residential uses north of the Great Western Highway, comprising mainly low density residential dwellings adjacent to the Prospect Highway, Blacktown Road and within surrounding local streets
- Educational uses, such as Shelley Public School, located to the west of the corridor between Keyworth Drive and Lancelot Street, and Mitchell High School on Keyworth Drive
- Retail and commercial uses, including large bulky goods retail near St Martins Crescent at the northern end of the corridor and at the southern end at the intersection of Prospect Highway and Great Western Highway (Homebase Prospect)
- Community and cultural uses, including St Bartholomew's Church and Cemetery (former) at Thornley Road, St Mark's Coptic Catholic Church at Reservoir Road, Blacktown Children's Centre on Blacktown Road (between Ozark and Vesuvius streets), and Medlife Medical Centre located on the western side, about 70 metres south of Tudor Avenue
- Recreation and open space areas, including Wet 'n' Wild Sydney to the south-west on Reservoir Road, as well as Blacktown City Council Reserve, on Blacktown Road
- Public infrastructure such as:
 - Shared cycle and pedestrian pathway on the western side of Prospect Highway
 - Pedestrian pathway on the eastern side between Stoddart Road and Harrod Street, Blacktown Road and Keyworth Drive and between Roger Place and north of the proposal

- Roads, including Prospect Highway, Great Western Highway and several local streets
- Overhead power lines and easements
- Drainage easement land
- Army Depot, located on the eastern side of Prospect Highway, north of Roger Place
 - Residential property accesses on both sides of the corridor north of Lancelot Street.

Future land use

Future land uses are associated with the Greystanes Employment Lands located south of the proposal. The Greystanes Employment Lands form part of the Western Sydney Employment Area, which is predicted to accommodate:

- About 6,300 hectares of new land for employment uses
- About 57,000 new jobs within the next 30 years, with the potential for up to 212,000 jobs when fully developed
- Two new specialised centres and one local centre
- Possible key public transport corridors to provide access to employment opportunities
- New freight opportunities for Sydney rail freight corridors and possible locations for two intermodal terminals.

In addition, substantial housing development is expected to occur in the Blacktown LGA to meet the region's growing housing demands. Over time, it is expected an additional 21,500 new dwellings will be constructed in established areas by 2031.

Community profile

In 2011, the local study area had a population of about 49,128 people, of which about 26,600 people lived in the Blacktown (South) statistical area and 22,500 people lived in the Seven Hills-Toongabbie statistical area.

At a regional level, Blacktown and Holroyd LGAs had estimated residential populations of about 317,600 people and about 106,000 people respectively in 2012.

Both LGAs experienced significant population growth from 2006 compared to the greater Sydney area, with this expected to continue to 2031. At a wider regional level, the Sydney Metropolitan Plan forecasts the Western Sydney population to grow to about 2.9 million people by 2036.

Table 6-43 provides a summary of key population characteristics for communities in the local study area. This data shows that the study area had:

- A relatively young population compared to NSW, with lower median ages, higher proportions of children aged 14 years or younger and lower proportions of older people aged 65 years or over
- Culturally diverse populations, with higher proportions of people who were born overseas, and households with two or more languages spoken. The main languages spoken at home included Arabic, Tamil, Hindi, Tagalog, Punjabi, Cantonese and Mandarin
- Relatively high levels of unemployment compared to NSW
- Median weekly household incomes similar to or slightly above NSW as a whole
- Higher proportions of owner occupied households and lower proportions of rental households

- Relatively high levels of vehicle ownership, with lower proportions of households without a vehicle and higher proportions of households with two or more vehicles.

Table 6-43 Summary of population characteristics

| Population characteristic | Seven Hills-Toongabbie | Blacktown (South) | New South Wales |
|---|-------------------------------|--------------------------|------------------------|
| Total population | 22,512 | 26,616 | 6,917,658 |
| Median age | 35 years | 34 years | 38 years |
| 0-14 years (per cent) | 20.6 | 22.0 | 19.2 |
| 65 years or over (per cent) | 11.6 | 12.5 | 14.7 |
| Overseas born (per cent) | 43.8 | 46.2 | 31.4 |
| Aboriginal (per cent) | 1.3 | 1.6 | 2.5 |
| Households with two or more languages spoken (per cent) | 43.0 | 47.0 | 24.5 |
| Unemployed (per cent) | 6.2 | 7.5 | 5.9 |
| Median weekly household income | \$1,379 | \$1,246 | \$1,237 |
| Occupied private dwellings (number) | 7,498 | 8,690 | 2,471,299 |
| Owner occupied dwellings | 71.6 | 69.1 | 66.6 |
| Dwellings being rented | 25.6 | 27.8 | 30.1 |
| Households with no motor vehicles | 9.2 | 9.8 | 10.4 |
| Households with two or more motor vehicles | 52.6 | 47.9 | 48.6 |

Source: ABS 2011 Census QuickStats: Blacktown (South); ABS 2011 Census QuickStats: Seven Hills-Toongabbie

Social infrastructure

A number of regional social infrastructure and community facilities are located near the proposal, which serve the needs of communities in the broader region as well as the local area. In particular, the Blacktown commercial business district is located north-west of the proposal, which includes a range of regional level infrastructure including:

- Blacktown Hospital
- Blacktown City Council office
- Blacktown Courthouse
- Educational institutions, including primary schools, secondary schools, private schools and Blacktown Technical and Further Education (TAFE)
- Blacktown central library
- Westpoint Blacktown shopping centre
- Sporting facilities, including Blacktown Olympic Park and Stadium, aquatic centre, sports stadiums
- Blacktown Showground
- Blacktown Arts Centre.

Locally, social infrastructure near to the proposal includes:

- Public transport facilities, including bus stops at Blacktown Road / Prospect Highway, and the Seven Hills train station to the north-east and Blacktown train station to the north-west. Both train stations are on the Western railway line
- Pedestrian and cycle facilities, including the Prospect to Blacktown cycleway developed by Roads and Maritime Cycleway Alliance
- Schools and childcare centres, including Shelley Public School at Hadrian Avenue, Mitchell High School at Pendant Avenue at Blacktown. Also Blacktown Road Children's Centre on Blacktown Road at Seven Hills
- Cultural land uses include St Bartholomew's Church and Cemetery off Ponds Road and St Mark's Coptic Catholic Church off Reservoir Road
- Wet 'n' Wild Sydney at Reservoir Road
- Parks include Topaz Park at Topaz Crescent, Mitchell Reserve, Mujar Bija Reserve and Jamberoo Park at St Martins Crescent, William Lawson Park at Lancelot Street and Timbertop Reserve at Hampton Crescent. Prospect Reservoir is also located south west of the proposal corridor.

Local and regional economy

More broadly, Blacktown is identified as a major centre in the Draft Metropolitan Strategy. Blacktown is identified as a growth centre to provide capacity for growth in office, retail, entertainment, cultural and public administration and health uses and at least 3,000 additional jobs over the next 17 years. The centre is also proposed to be the focus for further residential development. It is also linked to Parramatta through road and rail connections, which is identified as a Regional City for the West Central and North West Subregion of Sydney.

The Homebase homemaker centre is located near to the corner of Prospect Highway and Stoddart Road. This centre mainly comprises bulky goods retail stores, which supports several services and trades. Westpoint Shopping Centre is located to the north-west of the proposal and is a retail and commercial hub within Western Sydney.

Local business and industry in the study area are mainly concentrated at St Martins Crescent to the north (Blacktown Mega Centre) and at the intersection of Prospect Highway and Great Western Highway in the south. Both commercial and retail centres serve local residents with takeaway shops and restaurants, gym facilities and service shops, as well as broader catchments with bulky goods stores. The businesses are likely to serve both local and wider regional catchments

Community values

Community values are those elements considered to be important to quality of life and wellbeing. They include physical elements such as parks, buildings and landscapes, and social elements such as a sense of belonging and community identity.

Community values likely to be important to local residents in the study area are generally categorised as:

- Local character and natural values of the area, which are semi-rural
- Local amenity and sense of place
- Employment and residential growth, supported by local access and connectivity
- Community safety
- Liveability and access to social and community support.

6.8.3 Potential impacts

There would be a range of potential socio-economic related impacts, particularly for owners, occupants and operators of properties located within and near the proposal area. Roads and Maritime has started consultation with property owners and local residents and will continue to consult with affected property owners during the approval and detailed design process.

Land use impacts relating to traffic and access (Section 6.1), noise and vibration (Section 6.2) amenity, such as visual amenity (Section 6.4) are discussed in detail in the relevant sections of this REF. Other land use and property impacts are outlined below.

The proposal has the potential for both wider regional and local benefits in the medium to longer term through reduced traffic congestion, improved access and more efficient connectivity between Blacktown and the M4 Western Motorway. However, the proposal would also result in impacts and changes to the existing socio-economic environment for communities and businesses along the upgraded road corridor.

Construction

Existing land uses

The majority of the proposal would be located within the existing road reserve. During construction temporary land use changes would occur on land within the five main compound sites that would be used for construction plant and machinery. These five sites are proposed to be located on cleared land or open areas within or adjacent to the road corridor. Land uses adjacent to the proposal may also be impacted by temporary access changes. These are discussed in further detail below and in Section 6.1.

Property and access

Access to all properties would be maintained during construction. However, there may be a need to temporarily change access to some properties and local traffic conditions, including access to the highway for properties between Shelley Public School and St Martins Crescent which front the existing informal service road. Where temporary disruptions are required, alternative access would be identified in consultation with property owners. Temporary access requirements would be determined during detailed design and construction staging (as shown in Table 3-5). Under the construction staging strategy developed by Roads and Maritime, access to existing properties along the Prospect Highway corridor would be maintained during all stages of construction, detailed as follows:

- During stages one to three works, property accesses are not impacted by construction
- During stage four works, access to the properties located on the western side of the Prospect Highway corridor would be maintained by providing temporary access via the existing informal service road, with the exception of the existing driveway to the Shelley Public School waste collection which would be temporarily relocated in consultation with Shelley Public School
- During stage five works, access to the properties on the eastern side of the eastern side of the Prospect Highway corridor would be maintained by providing temporary access through the works area. In this stage of works, the left turn lane

into the Blacktown Road Children's Centre would be narrowed and access to this property would be provided under traffic control to maintain safety for vehicles entering and exiting the site.

Local road access is likely to be impacted during construction as follows:

- During stages one to three works, access to all movements into and out of local roads would be maintained
- During stage four works:
 - The radii for turning manoeuvres into and out of Keyworth Drive are likely to be reduced
 - Traffic accessing Tudor Avenue is likely to be detoured to Keyworth Drive
 - Existing access to all other local roads would be maintained
- During stage five works:
 - Traffic accessing Vesuvius Street is likely to be detoured via Blacktown Road, Columbia Road, Ellam Drive, Emerald Road and Leabons Lane
 - Intersection works at Roger Place would be staged so that access is maintained.

Further detail on the potential impacts of the proposal on access and connectivity is provided in Section 6.1.

Impacts associated with property adjustments include property boundary fencing and driveway adjustments particularly between Keyworth Drive and Tudor Avenue and loss of roadside trees and landscaped areas. The extent of property impacts would be refined and confirmed during detailed design in consultation with the property owners.

Local business

The impact of the proposal on local businesses during construction is mainly associated with increased vehicle traffic and resultant traffic delays for workers, customers and pedestrians. For instance, increased vehicle traffic and traffic delays on the Great Western Highway and M4 Western Motorway may lead to workers experiencing delays in accessing their place of employment. Customers accessing the Homebase Centre on Stoddart Road at Prospect and the shops within the Blacktown Mega Centre off St Martins Crescent at Blacktown may experience traffic delays from construction traffic and reduced speed limits. This may result in reduced trade for businesses during construction. Pedestrians may also be delayed or have access disrupted due to kerb and gutter work and the construction of pedestrian and shared pathways.

Some businesses may experience increased trade over the construction period. In particular, construction personnel and consultants may frequent businesses such as food services within the study area.

Local amenity

Local residents, businesses and visitors to the study area may experience impacts on local amenity during construction. These impacts have been discussed in the relevant sections of this REF, including:

- Traffic and access: construction would require temporary changes to traffic routing and access. During these periods, motorists may experience traffic delays. These are discussed in Section 6.1

- Visual amenity: the proposal would affect the visual character of the highway and the character of local roads that would experience an interface with the proposal. These visual impacts are generally not considered to be significant (refer to Section 6.4)
- Noise, vibration and air quality: potential noise, vibration and air quality impacts may be associated with construction activities, road plant and machinery. These have the potential to affect sensitive receivers with properties adjacent to the proposal along the highway including local residents and businesses. Potential noise and vibration impacts are discussed in Section 6.2 and potential air quality impacts in Section 6.10.

Operation

Land use and property

The long term impact on land use would be from the need to acquire residential land and use current Blacktown City Council land to accommodate the proposal. The proposal would require the full acquisition of one private residential property at Topaz Crescent. Partial acquisition of land fronting Prospect Highway and one property owned by Blacktown City Council would be required. The proposal would result in a change from residential and drainage land uses to road transport uses. Roads and Maritime will continue to consult with affected property owners during the approval and detailed design process.

Supporting existing and proposed land use

Wet 'n' Wild Sydney is a significant visitor attraction and traffic generator near the proposal, located off Reservoir Road. The proposal would support the viability and ongoing use of this site by reducing traffic congestion and improving road safety along routes that provide vehicle and pedestrian connections towards the theme park.

The proposal would support future development in areas near the proposal, particularly Greystanes Employment Lands. The proposal would support future commercial, retail and industrial land uses by improving accessibility and connectivity to the employment lands and other areas such as Blacktown. The proposal would deliver efficient freight connections with the M4 Western Motorway, and Great Western Highway.

Visual amenity

Visual amenity of the area would be affected, mainly from the increased paved area and new structures including retaining walls and bridges over the M4 Western Motorway and Great Western Highway. Visual impact of the proposal is assessed in Section 6.4.

Social infrastructure and local business

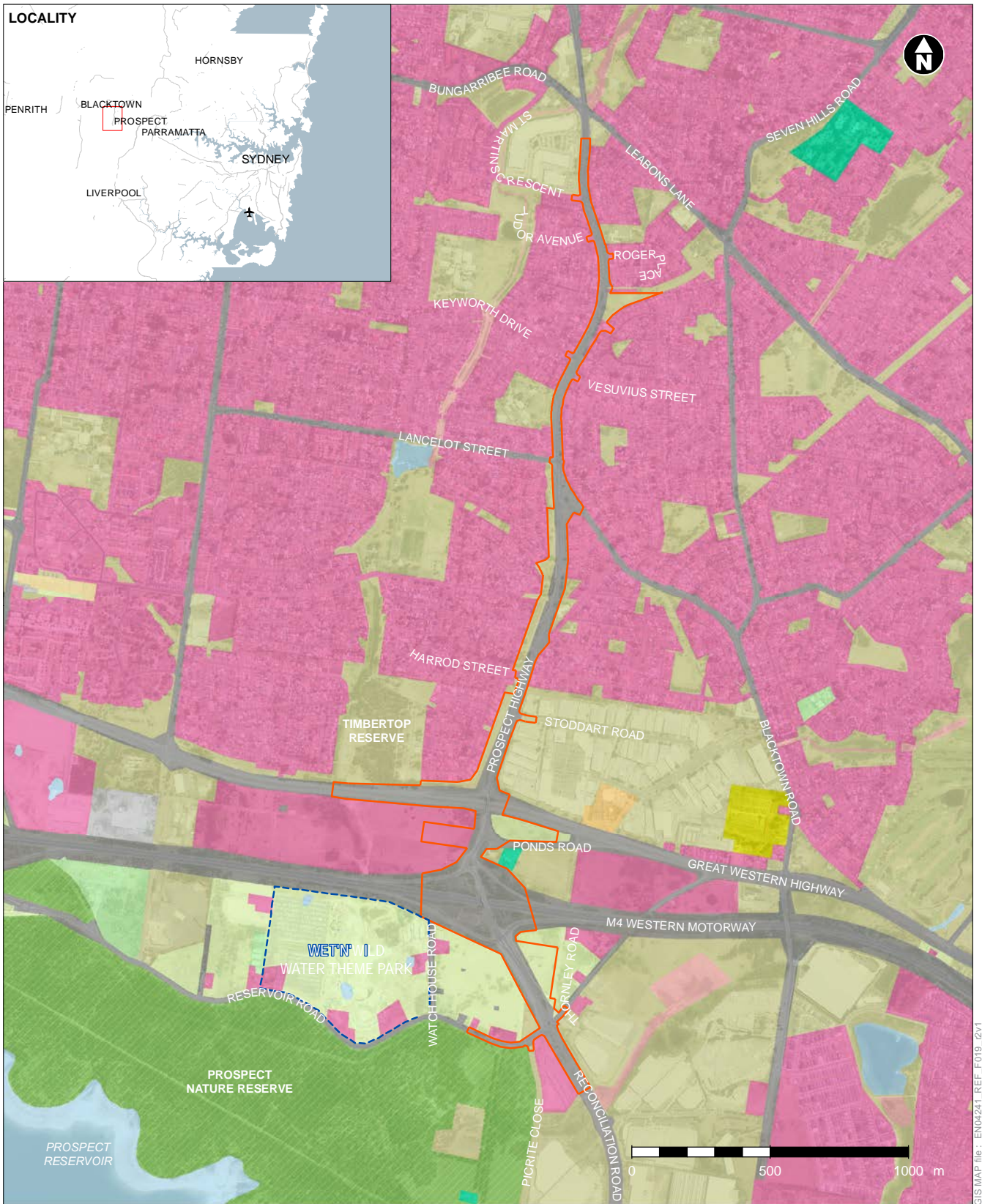
Operation of the proposal would provide social and economic benefits as it would improve safety for local residents, businesses and road users on this section of the highway.

Access and connectivity

During operation, the proposal would have impacts on local and regional communities with changed access for local residents at Tudor Avenue, Roger Place and Vesuvius Street. There would also be changed access arrangements for local residents, school and business facing Prospect Highway between Blacktown Road

and St Martins Crescent particularly Shelley Public School and the Medlife Medical Centre.

Figure 6-28 shows the land use within the proposal area.



— The proposal boundary

Australian Land Use and Management Classification (ALUM)














| | | | | | |
|---|---------------------------------|---|-------------------------------------|--|------------------------------|
|  | Grazing modified pastures |  | Residential and farm infrastructure |  | Manufacturing and industrial |
|  | Intensive animal husbandry |  | Managed resource protection |  | Services |
|  | Intensive horticulture |  | Nature conservation |  | Transport and communication |
|  | Irrigated seasonal horticulture |  | Reservoir/dam |  | Utilities |
| | | | |  | Other minimal use |

Figure 6-28
Land use

GIS MAP file : EN04241_REF_F019_12V1

6.8.4 Safeguards and management measures

Safeguards and management measures to address the proposal's potential impacts on socio-economic issues are summarised in Table 6-44.

Measures to manage impacts associated with traffic and transport, noise and vibration, visual amenity, land use and property and dust are outlined in the following sections:

- Traffic and transport (refer to Section 6.1)
- Noise and vibration (refer to Section 6.2)
- Landscape, visual amenity and urban design (refer to Section 6.4)
- Air quality (refer to Section 6.10).

Table 6-44 Summary of mitigation measures for socio-economic impacts

| Impact | Environmental safeguards | Responsibility | Timing |
|----------------------|---|-------------------------|-----------------------------------|
| Property acquisition | All land acquisitions would be conducted in line with the Roads and Maritime Land Acquisition Policy and the requirements of the Land Acquisition (Just Terms) Compensation Act 1991. | Roads and Maritime | Pre-construction |
| Community | <p>A Communication Plan would be prepared and included in the Construction Environmental Management Plan (CEMP). The Communication Plan would include:</p> <ul style="list-style-type: none"> • Requirements to provide details and timing of proposed activities to affected residents and businesses including St Martins Shopping Village/Blacktown Mega Centre, Medlife Medical Centre, Army cadet base (Safe Base Bravo Shelley Public School, Blacktown Road Children's Centre, Mitchell High School, St Mark's Coptic Catholic Church, Homebase Prospect, Blacktown City Council and Holroyd City Council • Contact name and number for complaints • Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access • The communications plan would be prepared in line with G36 requirements and Roads and Maritime | Construction contractor | Pre-construction and construction |

| | | | |
|-----------|---|-------------------------|--------------------------------|
| | <p>Community Engagement and Communications Manual (2012).</p> <p>The communications plan would include a complaint handling procedure and register and maintained for the duration of the proposal.</p> | | |
| Community | Residents would be informed prior to any interruptions to utility services that may be experienced as a result of utilities relocation. | Construction contractor | Pre-construction, construction |

6.9 Landform, geology, soils

A Phase 1 Environmental Assessment for contaminated land was undertaken as part of this REF and is presented in Appendix J. A summary of the Phase 1 Environmental Assessment is presented in this section as well as an analysis of topography and drainage, geology and soils.

The proposal area specific to the Phase 1 Environmental Assessment generally comprises the area covered in Figure 6-29.

6.9.1 Existing environment

Topography

Topography of the study area is undulating throughout, with a general slope in a northerly direction from the southern end of the study area, where the study area forms a peak between the eastbound entry ramp of the M4 Western Motorway and the Great Western Highway. Topography of the Prospect and Blacktown area has an average elevation of about 70 metres AHD. The height of the study area ranges from 55 metres AHD at the northern end of the site to 95 metres AHD in the area between the Great Western Highway and the M4 Western Motorway.

The majority of the surface water in the study area is expected to be controlled by formalised kerb drainage and guttering on the existing road. Drains from the road discharge to local watercourses including Blacktown Creek to the west of the proposal area. Surface water on the unsealed portions of the study area (ie grass verges) is likely to infiltrate directly into the ground and recharge localised groundwater. Hydrology is further discussed in Section 6.5.

Geology

The Sydney 1:250,000 Geological Series Sheet S1 56-5 (Geological Survey of NSW Department of Mineral Resources, 1966) indicates that the study area is underlain by Bringelly shale, Minchinbury sandstone, and Ashfield Shale (ie shale with some sandstone beds), with 'special clay' mineral deposits of kaolin, fire clay, stoneware and terracotta clay, and a basalt and dolerite dyke located in the north eastern portion of the study area.

Soils

The Penrith 1:100,000 Soil Landscape Series Sheet 9030 (Soil Conservation Service of NSW 1989) indicates that residual soils underlying the study area are of the Blacktown soil landscape group. These soils are found on gently undulating rises on Wianamatta Group shales (Bringelly shale, Minchinbury sandstone and Ashfield shale) with a local relief to 30 metres and slopes of usually less than 5 per cent. The soils of the group consist of shallow to moderately deep hardsetting mottled texture contrast soils, red and brown podzolic soils on crests grading to yellow podzolic soils on lower slopes and in drainage lines.

Acid sulfate soils (ASS) are soils and sediments containing iron sulfides that, when disturbed and exposed to oxygen, generate sulfuric acid and toxic quantities of aluminium and other heavy metals. A search of the acid sulfate soil risk maps from the NSW National Resource Atlas database was undertaken in December 2013 to ascertain the presence of ASS within the study area. This search found no known areas of ASS risk on or immediately adjacent to the proposal area.

An overview of the topography, geology and soil landscape surrounding the proposal is shown in Figure 6-29.

Contamination

The Phase 1 environmental assessment involved a review of background information to identify any known areas of potential site contamination, including:

- NSW Land and Property Management Authority, Land and Property Information Division (LPI) historical aerial photographs for the years 1930, 1956, 1965, 1978, 1986, 1994, and 2004
- Roads and Maritime historical aerial photographs of Sydney in 1943
- NSW Environmental Protection Authority Contaminated Sites Register and Record of Notices
- NSW Natural Resources Atlas database for groundwater bores
- A search of the Protection of the Environment Operations public register of environmental protection licences, applications, notices, audits or pollution studies and reduction programs for the suburbs of Blacktown, Prospect, Seven Hills, Toongabbie, Girraween, Huntingwood and Arndell Park was also undertaken.

In summary, the review indicated that:

- The proposal area has gradually changed from historically agricultural land use to its current use, which is low density residential land use. Noticeable increases in traffic flow are apparent between the 1930s and the 2000s
- Three notices for contaminated land are located within two kilometres of the study area in the surrounding suburbs of Prospect, Blacktown and Seven Hills. The sites present low risks with respect to contamination due to the proximity of the sites to the study area, and potential migration pathways. Details of these sites are provided in Table 6-45
- No registered groundwater wells were identified within the study area. Thirteen wells are registered within a two kilometre radius of the study area.

Table 6-45 Search results for land adjacent to the proposal

| Suburb | Notified site address | Notified activity | Location |
|-------------|-----------------------|--|--------------------------------------|
| Prospect | 354 Flushcombe Road | Service station | 1.27 km west of the study area |
| Seven Hills | 1 Powers Road | Transport Infrastructure Development Corporation (now Transport for NSW) | 1.74 km north-east of the study area |
| Blacktown | Reservoir Road | Unclassified land | 1.90 km west of the study area |

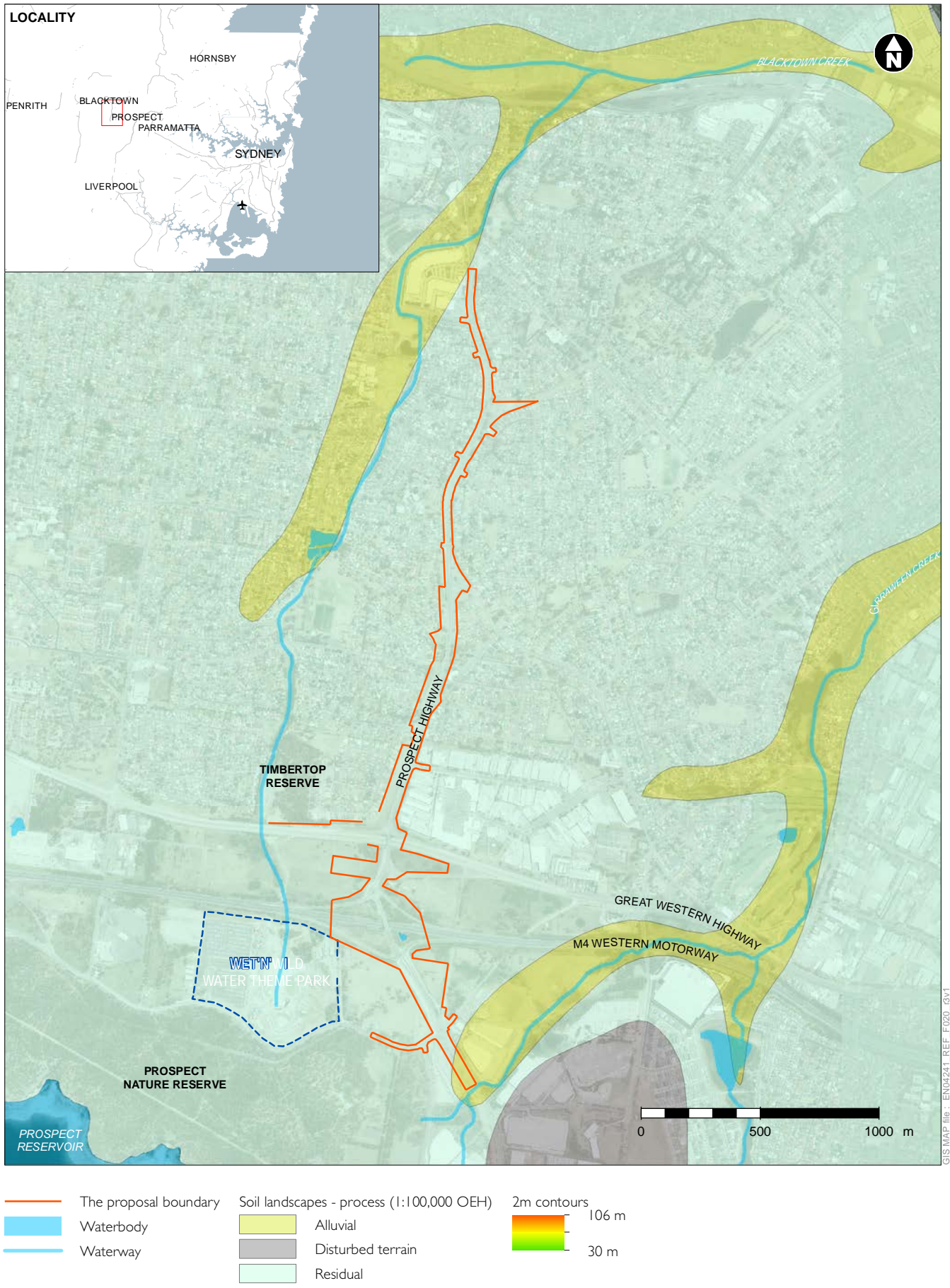


Figure 6-29
Topography, geology and soils

6.9.2 Potential impacts

Landform

The proposal would require some earthworks. The majority of earthworks would occur around the location of the proposed M4 Western Motorway bridge. The existing landform in this area contains large earth mounds. The proposal would include partial removal of this earth to accommodate the northbound carriageway and M4 Western Motorway bridge. This would not be a major change in topography. Potential impacts from runoff resulting from changes to landform would not be significant as changes would be minor. Sufficient environmental safeguards would be in place to manage this risk. Refer to Section 6.9.3.

Soils

The proposal has potential to generate sediment during rainfall events due to ground disturbance, including excavation and vegetation removal. Sediment mobilisation from soil deposited on road pavement during the works is a further potential impact.

The risk associated with erosion and sedimentation is the sedimentation of nearby waterways. This can increase turbidity and have consequential effects on aquatic life. It can also alter drainage line hydrology due to the deposition of sediment over time.

The proposal has been divided into discrete areas (local erosion and sediment control areas). The annual average soil loss from each area has been calculated based on a range of factors including rainfall intensity, rainfall erosivity, sediment type, soil erodibility and soil cover. Those areas with the highest calculated soil loss can be considered highest risk areas for the proposal. These areas and their estimated soil loss and outlet locations are shown in Figures 6-30 to 6-34.

The areas of largest soil loss during construction of the proposal would be:

- At and adjacent to the new Prospect Highway north bound carriageway on the western side of the road between the M4 Western Motorway Westbound Entry Ramp and the M4 Western Motorway
- At and adjacent to the two way link road / Great Western Highway intersection, extending to the west of the intersection
- At and adjacent to the western side of the proposal corridor between the two way link road and 50 metres north of Stoddart Road
- Adjacent to the western verge of the proposal corridor between 50 metres north of the Old Church Lane to Keyne Street pedestrian underpass and Blacktown Road.

Construction catchments that produce an annual soil loss in excess of 150 cubic metres are usually considered to warrant the provision of construction sediment basins. The soil loss calculations undertaken indicate that large scale sediment retention basins would not be necessary. It is assumed that local sediment control measures would be sufficient to control erosion impacts. Refer to section 6.9.3.

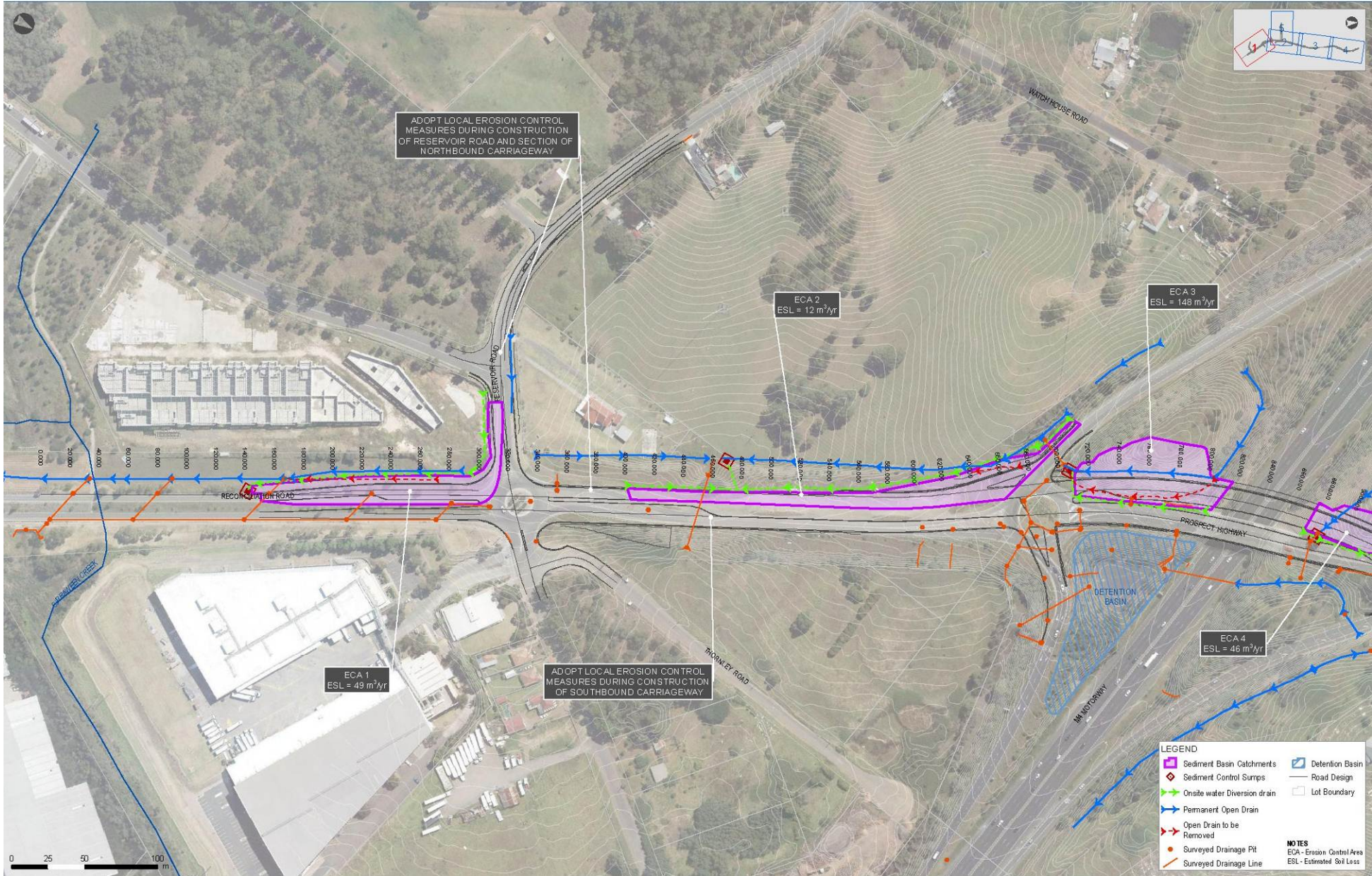


Figure 6-30 Construction erosion and sediment control 1

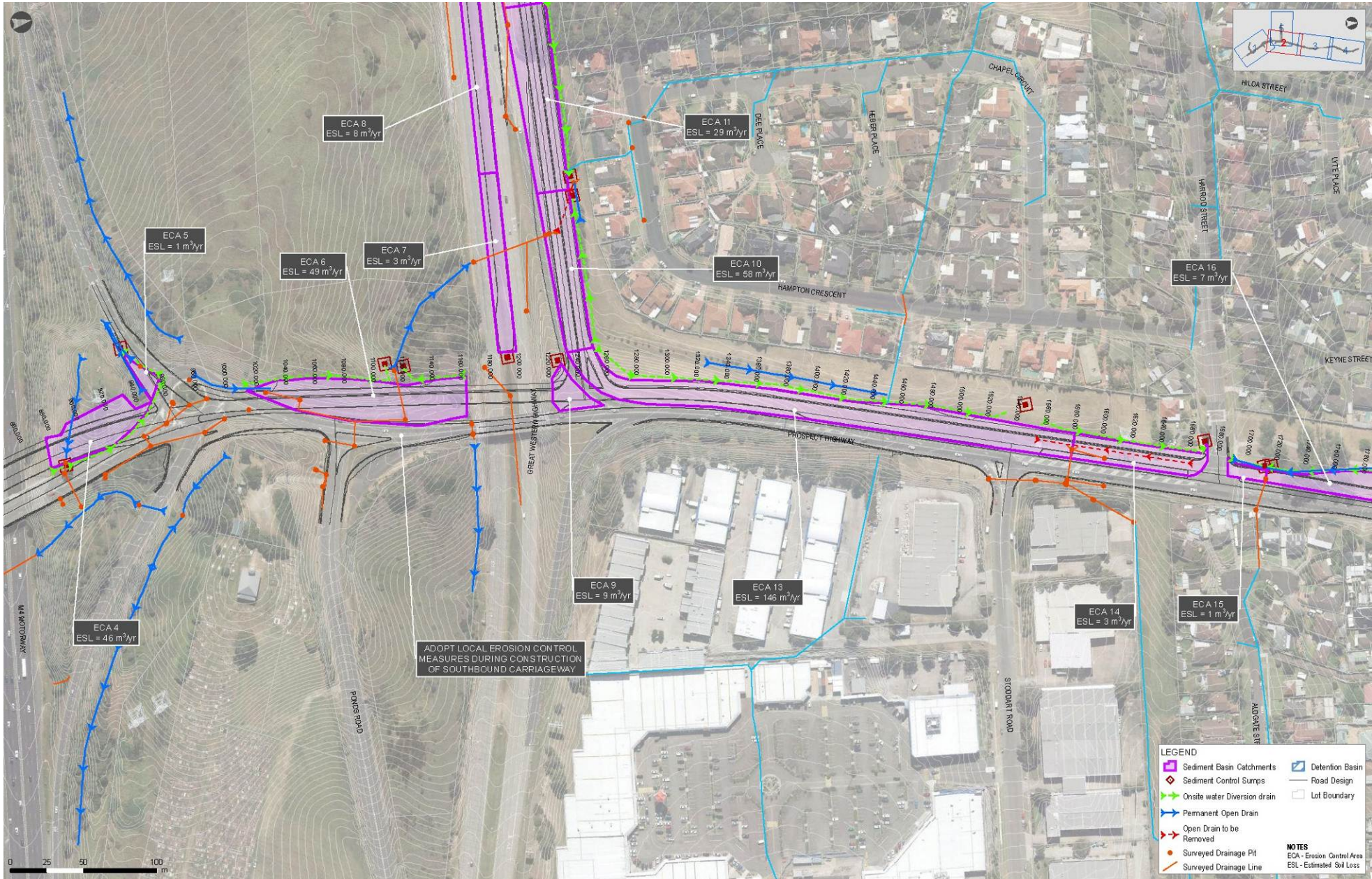


Figure 6-31 Construction erosion and sediment control 2



Figure 6-32 Construction erosion and sediment control 3



Figure 6-33 Construction erosion and sediment control 4

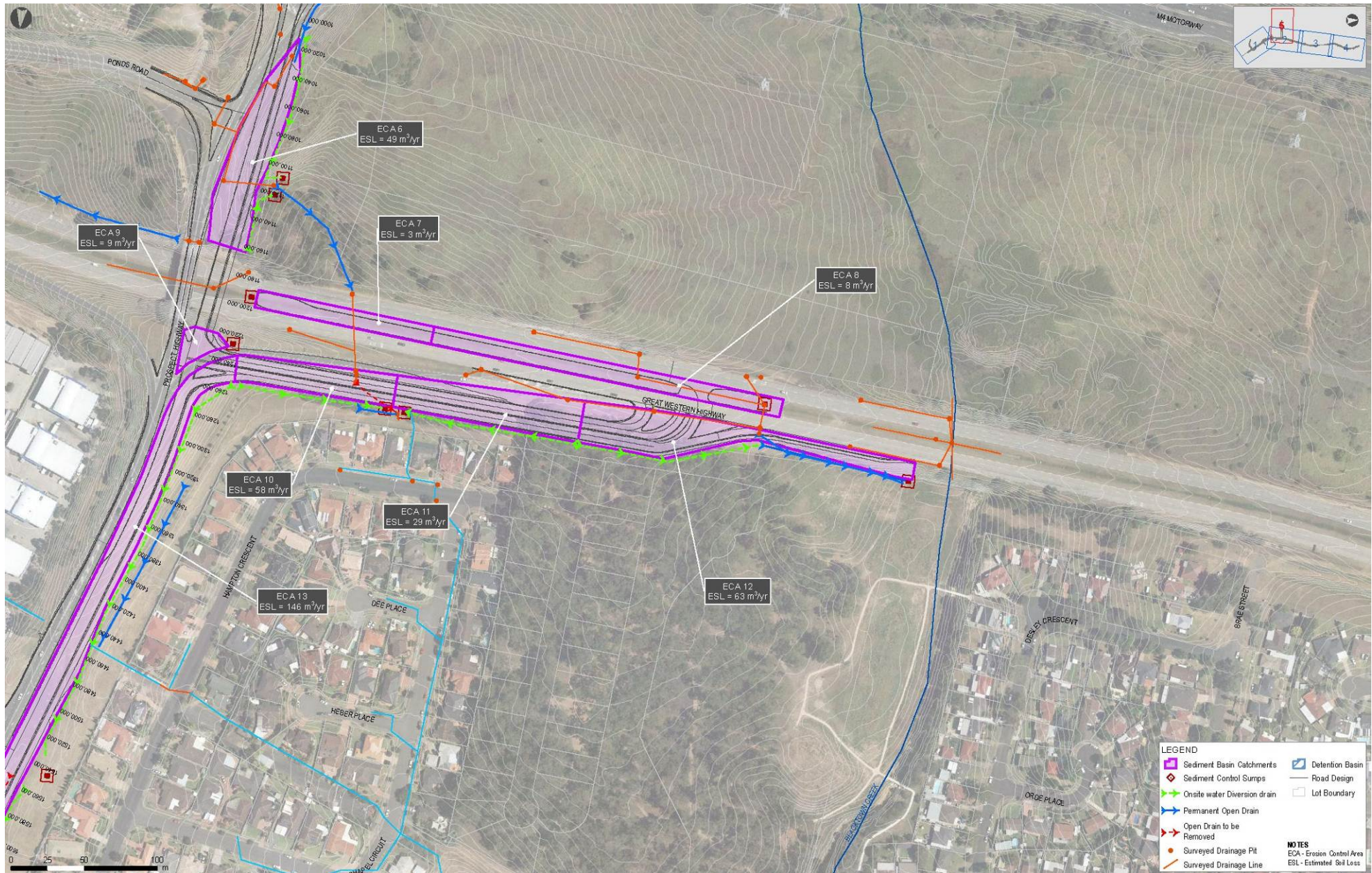


Figure 6-34 Construction erosion and sediment control 5

Contamination

Based on available historical information and identified areas of concerns, land located within the proposal area is generally considered to have a low risk of harm to human health and the environment. Noting the distance to known contaminated sites, it is not expected that contamination would represent a major issue for the proposal. Disposal of excess materials would need to occur in a manner that is consistent with the waste classification system.

6.9.3 Safeguards and management measures

The proposed safeguards and management measures for soils and contaminated land are listed in Table 6-46.

Table 6-46 Summary of mitigation measures for soils and contaminated land

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------------|---|---|-----------------------|
| Erosion and sedimentation | <p>During detailed design an Erosion and Sedimentation Management Report is to be prepared. The report is to include (as a minimum):</p> <ul style="list-style-type: none"> Identify site catchment and sub-catchments, high risk areas and sensitive areas Sizing of each of the above areas and catchments Proposed staging plans for the project to ensure appropriate erosion and sediment controls measures are possible The likely volume of run-off from each catchment and sub-catchment in accordance with the Managing Urban Stormwater: Soils and Construction, Volume 1 and 2 (Landcom, 2004) Direction of water flow, both off and on site Diversion of off-site water around or through the site or details of separation of on-site and off-site water The direction of runoff and drainage points during each stage of construction The locations and sizing of sediment basins / sumps as well as associated drainage to direct site water to the basin or sumps A mapped plan identifying the above at all major construction stages A review process by a soil conservationist and a process for updating the report to address any recommendations. | Roads and Maritime, construction contractor | Detailed design |
| Erosion and sedimentation | The Erosion and Sedimentation Management Report would be provided to Roads and Maritime Environment | Roads and Maritime | Detailed design, pre- |

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------------|--|-------------------------|--------------------------------|
| | Manager for review and verification prior to the construction tender. | | construction |
| Erosion and sedimentation | A soil conservationist from the RMS Erosion, Sedimentation and Soil Conservation Consultancy Services Register is to be engaged to review the Erosion and Sedimentation Management Report and conduct routine inspections of the construction works. | Roads and Maritime | Pre-construction, construction |
| Erosion and sedimentation | An Erosion and Sedimentation Control Plan (ESCP) would be prepared prior to construction and is to include as a minimum: <ul style="list-style-type: none"> • Identify site catchment and sub-catchments, high risk areas and sensitive areas • Sizing of each of the above areas and catchments • The likely run-off from each sub-catchment • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction • Direction of flow of on-site and off-site water • The locations and sizing of sediment basins or sumps and associated catch drains and/or bunds • The locations of other erosion and sediment control measures (eg rock check dams, swales and sediment fences) • Controls/measures to be implemented on wet weather events • A mapped plan identifying the above • A dewatering procedure for onsite water and basins • A process for reviewing and updating the plan on a fortnightly basis and/or when works alter. | Construction contractor | Pre-construction |
| Erosion and sedimentation | Erosion and sediment control measures are to be implemented and maintained to: <ul style="list-style-type: none"> • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets. • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site. (in accordance with the Landcom / Department of Housing <i>Managing Urban</i> | Construction contractor | Construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------------|--|-------------------------|------------------|
| | <i>Stormwater, Soils and Construction Guidelines (the Blue Book)</i>). | | |
| Erosion and sedimentation | All stockpiles will be designed, established, operated and decommissioned in accordance with the RMS Stockpile Site Management Guideline, 2011. | Construction contractor | Construction |
| Erosion and sedimentation | A Stabilisation Plan is to be prepared and included in the SWMP. The stabilisation plan is to include but not be limited to the following: <ul style="list-style-type: none"> • Identification and methodology of techniques for stabilisation of site • Identification of area on site for progressive stabilisation • Stabilisation is to be undertaken of areas, including stockpiles and batters, exposed for a duration of 2 weeks or greater. For example covering with geotextile fabric, stabilised mulch, soil binder or spray grass • Identification of areas on site for progressive permanent stabilisation such as implementation of landscaping. | Construction contractor | Construction |
| Erosion and sedimentation | Erosion and sedimentation controls are to be checked and maintained on a regular basis and after a rain event of 10mm or greater (including clearing of sediment from behind barriers) and records kept and provided on request. | Construction contractor | Construction |
| Erosion and sedimentation | Disturbed surfaces would be compacted and stabilised in anticipation of a rain event to reduce the potential for erosion. | Construction contractor | Construction |
| Erosion and sedimentation | Controls would be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces Any material transported onto pavement surfaces would be swept and removed at the end of each working day and prior to rainfall. | Construction contractor | Construction |
| Erosion and sedimentation | The Soil and Water Management Plan would include a contingency plan for any acid sulfate soils or salinity identified during the construction phase. | Construction contractor | Construction |
| Contamination management | A Contamination Management Plan (CMP) will be prepared in accordance with the Contaminated Land Act 1997 and relevant EPA Guidelines. This plan will be form part of the CEMP and will include at a minimum: <ul style="list-style-type: none"> • Contaminated Land Legislation and guidelines including any relevant licences and approvals to be obtained • Identification of locations of known or | Construction contractor | Pre-construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------|---|--|----------------|
| | <p>potential contamination and preparation of a map showing these locations</p> <ul style="list-style-type: none"> • Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint • Contamination management measures including waste classification and reuse procedures and unexpected finds procedures • Monitoring and sampling procedure for landfill seepage (leachate) • A procedure for dewatering and disposal of potentially contaminated liquid waste • In the event that indications of contamination are encountered (known and unexpected, including odorous or visual indicators), work in the area will immediately cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate • A process for reviewing and updating the plan. <p>The CMP would be reviewed by Roads and Maritime Senior Environment Officer and Roads and Maritime Land Management Specialist prior to the commencement of works.</p> | | |
| Hazardous materials | A hazardous materials assessment would also be carried out before demolishing structures within the proposal area. | Roads and Maritime/ demolition contractor | Pre-demolition |
| Hazardous materials | 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 an contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate. | Construction contractor | Construction |

6.10 Air quality

6.10.1 Existing environment

No air quality monitoring was undertaken for this proposal, however, the Environmental Protection Authority (EPA) operate an air quality monitoring station at Prospect, about 750 metres east of the proposal. The Prospect air quality monitoring station currently records ozone (O₃), nitrogen oxides (NO, NO₂ and NO_x), particulates under 10 microns in size (PM₁₀) and carbon monoxide (CO).

A review of data collected in 2013 from the Prospect air quality monitoring station against EPA assessment criteria (refer to Table 6-47) identified that photochemical oxidants (primarily ozone) exceeded the criteria in October 2013. Ozone's precursor sources include emissions from agricultural activities, bushfires, industrial processes and combustion transport and urban emissions. During October 2013 there were widespread bushfires throughout NSW. PM₁₀ emissions were also exceeded in August, October and November 2013.

6.10.2 Criteria

Air quality criteria are used to assess the potential for ambient air quality to give rise to adverse health or nuisance effects. For this proposal, emissions from construction equipment and vehicles using the roadway have the potential to impact on local amenity. The most significant emissions produced from motor vehicles are:

- Oxides of nitrogen (NO_x)
- Carbon monoxide (CO)
- Particulate matter (PM₁₀).

The EPA has set air quality assessment criteria as part of the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (DEC, 2005). Table 6-47 summarises the EPA air quality assessment criteria relevant to the proposal. Note that while health research identifies particulates under 2.5 microns in size (PM_{2.5}) as a particular concern, there are currently no EPA assessment criteria for PM_{2.5}.

Table 6-47 EPA assessment criteria for relevant air pollutants

| Pollutant | Averaging time | Criterion |
|-----------------------------------|----------------|---------------------------------|
| Carbon monoxide (CO) | 15 minutes | 87ppm 100 mg/m ³ |
| | 1 hour | 25ppm 30 mg/m ³ |
| | 8 hours | 9ppm 10 mg/m ³ |
| Sulfur dioxide (SO ₂) | 10 minutes | 25pphm 712 µg/m ³ |
| | 1 hour | 20pphm 570 µg/m ³ |
| | 24 hours | 8pphm 228 µg/m ³ |

| Pollutant | Averaging time | Criterion |
|---|----------------|---------------------------------|
| | Annual | 2pphm 60 µg/m ³ |
| Nitrogen dioxide (NO ₂) | 1 hour | 12pphm 246 µg/m ³ |
| | Annual | 3pphm 62 µg/m ³ |
| Particulate matter (as PM ₁₀) | 24 hours | 50 µg/m ³ |
| | Annual | 30 µg/m ³ |
| Photochemical oxidants (as ozone) | 1 hour | 10pphm 214µg/m ³ |
| | 4 hours | 8pphm 171 µg/m ³ |

6.10.3 Potential impacts

Construction

Primary sources of emissions of airborne particulate matter from the construction of the proposal would include:

- Clearing of vegetation and topsoil
- Demolition, handling and removal of concrete and pavement materials by excavators and trucks
- Wind erosion from unsealed surfaces and stockpiles
- Vehicle (exhaust) emissions.

There is potential for dust to cause nuisance as residential land uses are located within the proposal area.

Typically, air quality management for road construction activities address the handling of spoil, machinery operating procedures and monitoring of potential impacts. The main focus of air quality management is to control dust emissions and mitigate impacts to ensure the proposal does not result in exceedances of air quality criteria at sensitive receptors. Relevant criteria for air quality management are those specified by the EPA and are outlined in Table 6-47.

Operational

No adverse air quality impacts are expected to result from the proposal's operation. Improved traffic flow and reduced congestion is likely to have a beneficial effect on air quality in the immediate vicinity of the proposal.

6.10.4 Safeguards and management measures

The proposed safeguards and management measures for air quality are listed in Table 6-48.

Table 6-48 Summary of air quality mitigation measures

| Impact | Environmental safeguards | Responsibility | Timing |
|---------------------------------|--|-------------------------|------------------|
| General air quality management | <p>An Air Quality Management plan (AQMP) would be prepared as part of the CEMP. The plan would include but not be limited to:</p> <ul style="list-style-type: none"> • A map identifying locations of sensitive receivers • Identification of potential risks/impacts due to the work/activities as dust generation activities • Management measures to minimise risk including a progressive stabilisation plan • A process for monitoring dust on site and weather conditions • A process for altering management measures as required. | Construction contractor | Pre-construction |
| Air quality during construction | <p>The management measures within the AQMP would include but not limited to the following:</p> <ul style="list-style-type: none"> • Vehicles transporting waste or other materials that have a potential to produce odours or dust are to be covered during transportation • Dust will be suppressed on stockpiles and unsealed or exposed areas using methods such as water trucks, temporary stabilisation methods, soil binders or other appropriate practices • Disturbed areas will be minimised in extent and rehabilitated progressively • Speed limits will be imposed on unsealed surfaces • Stockpiles will be located as far away from residences and other sensitive receivers • 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 • Plant, vehicles and equipment will be maintained in good condition and in accordance with manufacturer's specifications • Plant and machinery will be turned off when not in use • No burning of any timbers or other combustible materials will occur on site | Construction contractor | Pre-construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|-----------------------------------|---|-------------------------|------------------|
| | <ul style="list-style-type: none"> • Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention • Work activities will be reprogrammed if the management measures are not adequately restricting dust generation. | | |
| Dust from construction activities | <p>An air quality management plan would be prepared before any construction or clearing activities, and would provide guidance on the use of appropriate dust suppression methods which would include, but not be limited to:</p> <ul style="list-style-type: none"> • Stabilising of areas with the capacity to cause dust, with water spraying, compaction or progressive revegetation • Covering of stockpile and storage areas • Cessation of dust generating activities in high wind situations where dust cannot be controlled. <p>In addition, local residents and other sensitive receivers (such as schools, churches and local businesses) would be advised of hours of operation and provided with contact details for queries regarding air quality.</p> | Construction contractor | Pre-construction |

6.11 Greenhouse gas emissions and climate change

Greenhouse gases include carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons. These gases have heat absorbing capacity or global warming potential. They absorb heat that is reflected from the earth, which results in warming of the air. This effect is known as the greenhouse effect. The primary human produced greenhouse gas is carbon dioxide. Human activities such as the combustion of carbon-based fuels increase the amount of greenhouse gases in the atmosphere. This leads to an increase in atmospheric temperatures and is known as the enhanced greenhouse effect.

Climate change refers to the projected long-term changes to global climatic patterns from increases in the concentration of greenhouse gases in the atmosphere. There is a need to understand these projected changes to future climatic conditions and the effect they could have on existing and potential projects and infrastructure. Moreover, it is important to understand how the proposal might influence these changes.

Climate change projections detailed in this assessment have considered publicly available information. Table 6-49 provides information on climate change forecasts for the Sydney/ Central Coast region of NSW (an area surrounding Sydney fringed by the Blue Mountains and the Woronora, Yengo and Wollemi plateaus). The table provides details of the climatic change projections for the area surrounding the proposal to the year 2050, adapted from the NSW Climate Impact Profile (DECCW, 2010).

Table 6-49 Projected climatic change predictions for the Sydney/Central Coast region, NSW

| Season | Seasonal rainfall | Temperature | | Evaporation |
|--------|-------------------|-------------|-------------|------------------|
| | | Minimum | Maximum | |
| Spring | ↑ 10-20% | ↑ 2.0-3.0°C | ↑ 2.0-3.0°C | ↑ 10-20% |
| Summer | ↑ 20-50% | ↑ 1.5-3.0°C | ↑ 1.5-2.0°C | ↑ 10-20% |
| Autumn | No change | ↑ 1.5-3.0°C | ↑ 1.5-3.0°C | No clear pattern |
| Winter | ↓ 10-20% | ↑ 1.5-3.0°C | ↑ 2.0-3.0°C | No clear pattern |

Expected regional climatic changes for the Sydney/ Central Coast region of NSW as defined in DECCW (2010) are as follows:

- Increase in average daily minimum and maximum temperatures
- Shifts in current patterns of climate variability, including increased rainfall in summer and decreased rainfall in winter
- Increased intensity of extreme events (like droughts, floods, severe storm events)
- Changes in seasonality and amount of precipitation (the direction and magnitude of changes will vary between geographic locations).

By 2050, the Sydney/ Central Coast region of NSW is expected to experience a hotter climate, with temperatures projected to increase by between 1.5 °C to 3 °C throughout the year. Rainfall is projected to increase in spring and summer, with no change in autumn, and a decrease in winter. Evaporation in spring and summer will increase, with no clear change in evaporation patterns in autumn and winter.

6.11.1 Potential impacts

Construction

Construction of the proposal would occur in stages over a minimum two year period. During this period, greenhouse gas emissions would be produced, including:

- Carbon dioxide, methane and nitrous oxide from liquid fuel use in plant and vehicles (diesel, petrol)
- Embedded emissions from the manufacture and delivery of construction materials
- Methane from land filling any carbon based waste.

Increases in average temperature and heatwaves may affect the integrity of pavement and other construction materials. Direct impacts include more rapid deterioration of infrastructure, which may result in higher operational and maintenance costs. Indirectly, evaporative changes can result in changes to soil moisture content and soil instability, which may impact foundations of structures, cause cracking and/or softening of pavements and road rutting.

The impacts on climate change from construction of the proposal are minimal due to the relatively small size and scale of the proposal.

Operation

Emissions would be generated during maintenance activities and their quantity depends on the frequency and intensity of maintenance activities required. These emissions are expected to be minimal and would be negligible in comparison with the emissions from the road traffic network.

Prospect Highway would continue to operate as a road servicing vehicles. As such, it is not anticipated that there would be a reduction in emissions generated by vehicles during operation of the proposal.

6.11.2 Safeguards and management measures

The proposed safeguards and management measures for climate change are listed in Table 6-50.

Table 6-50 Summary of mitigation measures for climate change

| Impact | Environmental safeguards | Responsibility | Timing |
|--|---|--|-----------------|
| Impacts on climate change from construction activities | Detailed design would take into consideration the potential effect of climate change on the proposal, including drainage requirements. | Roads and Maritime designers and construction contractor | Detailed design |
| Impacts on climate change from construction activities | Establishing operating procedures for site vehicles to increase efficiency of vehicle fuel use. Reducing clearing of vegetation as much as practicable and re-establish vegetation in suitable areas when construction is completed. Reducing site wastage by reusing and recycling wasted material as a preference before disposing to landfill. | Construction contractor | Construction |

6.12 Resource use and waste management

6.12.1 Policy setting

The NSW Government has released the NSW Waste Avoidance and Resource Recovery Strategy 2007 (WARR Strategy) to minimise waste generated across all government sectors and to improve the efficient use of resources. This reflects the community's view that waste should be treated as a resource. The WARR Strategy identifies the following waste avoidance and resource recovery goals and targets:

- Prevent and avoid waste
- Increase recovery and use of secondary materials
- Reducing toxicity in products and materials
- Reducing litter and illegal dumping.

Roads and Maritime is dedicated to the minimisation of waste and the use of recycled products where possible. Roads and Maritime contractors are required to propose recycled-content materials where they are cost and performance competitive.

By adopting the principles of the *Waste Avoidance and Resource Recovery Act 2001*, Roads and Maritime seeks to ensure the most efficient use of resources and reduce cost and environmental harm in line with the principles of ecologically sustainable development, as outlined in Section 8.2 of this REF.

6.12.2 Existing environment

The existing road network within the proposal area currently generates minimal waste. Waste sources are currently limited to roadside litter, some waste material from clearing roadside drainage features and green waste from the maintenance of roadside vegetation.

6.12.3 Potential impacts

Construction

Construction would generate waste streams typical of road construction work, including:

- Green waste from cleared vegetation
- Waste road infrastructure materials (signposts, guard rails, and old signalling equipment)
- Oil, grease and other liquid wastes from the maintenance of construction plant and equipment
- Waste from the demolition of structures
- General wastes and sewage from site compounds and offices
- Packaging materials from items delivered to site, such as pallets, crates, cartons, plastics and wrapping materials
- Potential contaminated material unearthed during construction.

Some spoil may be generated during the construction of retaining walls adjacent to St Bartholomew's Church and Cemetery, the proposed two way link road and

between the M4 Western Motorway proposed bridge and the M4 Western Motorway eastbound exit ramp. Earthworks requirements are identified in Section 3.3.5. Excess material from the construction of retaining walls such as concrete, metal, bricks or stone, would be used to reinstate pathways, garden edges and landscaping where practicable.

Operation

Potential impacts from the proposal's operation include littering by road users, spills of materials, including hazardous materials from vehicle collisions and waste from maintenance activities.

6.12.4 Safeguards and management measures

The proposed safeguards and management measures for resource use and waste are listed in Table 6-51.

Table 6-51 Summary of mitigation measures for resource use and waste management

| Impact | Environmental safeguards | Responsibility | Timing |
|----------------------------------|---|-------------------------|-----------------------------------|
| Generation of construction waste | <p>A Resource and Waste Management Plan (RWMP) would be prepared, which will include the following (as a minimum):</p> <ul style="list-style-type: none"> • The type, classification and volume of all materials to be generated and used on site including identification of recyclable and non-recyclable waste in accordance with EPA Waste Classification Guidelines • Quantity and classification of excavated material generated as a result of the proposal (Refer RMS Waste Management Fact sheets 1-6, 2012) • Interface strategies for cut and fill on site to ensure re-use where possible • Strategies to 'avoid', 'reduce', 'reuse' and 'recycle' materials • Classification and disposal strategies for each type of material • Destinations for each resource/waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility • Details of how material would be stored and treated on-site • Identification of available recycling facilities on and off site • Identification of suitable methods and routes to transport waste • Procedures and disposal arrangements for unsuitable excavated material or contaminated material • Site clean-up for each construction stage. | Construction contractor | Pre-Construction and Construction |

| Impact | Environmental safeguards | Responsibility | Timing |
|----------------------------------|---|--|--|
| Generation of construction waste | Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective. | Construction contractor | Detailed Design & Pre-Construction |
| Generation of construction waste | Cleared weed free vegetation will be chipped and reused onsite as part of the proposed landscaping and to stabilise disturbed soils where possible. | Construction contractor | Construction |
| Generation of construction waste | A dedicated concrete washout facility that is impervious would be provided during construction so that runoff from the washing of concrete machinery, equipment and concrete trucks can be collected and disposed of at an appropriate waste facility. | Construction contractor | Construction |
| Generation of construction waste | All wastes will be managed in accordance with the <i>Protection of the Environment Operations Act 1997</i> . | Construction contractor | Pre-Construction and Construction |
| Generation of construction waste | Types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register. | Construction contractor | Construction |
| Generation of construction waste | Works sites would be maintained, kept free of rubbish and cleaned up at the end of each working day. | Construction contractor | Construction |
| Generation of construction waste | Suitable waste disposal locations would be identified and used to dispose of litter and other wastes on-site. Suitable containers would be provided for waste collection. | Construction contractor | Pre-construction & Construction |
| Generation of construction waste | Resource management hierarchy principles would be followed and are: <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) • Disposal is undertaken as a last resort (in line with the <i>Waste Avoidance and Resource Recovery Act 2001</i>). | Detailed design contractor and Construction contractor | Detailed design, Pre-construction & Construction |
| Generation of construction waste | A Waste Management Plan would be completed in line with the requirements of the Roads and Maritime's QA Specification G36 – Environmental Protection (Management System). | Construction contractor | Construction |
| Generation of construction waste | Housekeeping at construction sites would be addressed regularly. This would include collection and sorting of recycling, general waste and green waste. Waste would be disposed regularly at a licensed waste facility or recycling where available. | Construction contractor | Construction |

6.13 Cumulative environmental impacts

Cumulative impacts have the potential to arise from the interaction of individual elements within the proposal and the additive effects of the proposal with other projects. Roads and Maritime is required under clause 228 (2) of the Environmental Planning and Assessment Regulation 2000, to take into account potential cumulative impacts from the proposal.

6.13.1 Existing environment

Recent road work

Roads and Maritime recently developed two projects along the Prospect Highway corridor:

- Upgrade of the intersection of the M4 Western Motorway westbound entry and exit ramps. This project also included a permanent shared user path between Reservoir Road at Prospect and the bridge over the M4 Western Motorway
- Construction of a temporary shared path along Prospect Highway at Prospect between Harrod Street and the northern side of the bridge over the M4 Western Motorway. This temporary shared path completes a missing link in the Blacktown to Prospect Cycleway until the upgrade is built.

No other medium or large projects are proposed by Roads and Maritime within the region, although minor road maintenance may be required at any time.

Concurrent development

A search of currently advertised development applications (DAs) with Blacktown City Council and Holroyd City Council found no current DAs located near the proposal. A search of the major project register and planning applications with Planning and Infrastructure identified major projects that are currently being constructed or have recently completed construction. These include:

- Blacktown Mount Druitt Hospital: This project is located about 600m north of the proposal along Main Street, Blacktown (near Wall Park Avenue intersection). The project construction is staged with stage one expected to be completed by 2016. Planning is commencing for future stage two works
- Prospect Employment Lands: this project is located on the M4 Western Motorway
- Southern Employment Lands: this project is located directly to the south of the Prospect Highway and M4 Western Motorway intersection, along Reconciliation Drive
- Wet 'n' Wild Sydney: this project is located on Reservoir Road, close to the M4 Western Motorway entry and exit ramps.

6.13.2 Potential impacts

Construction

It is unlikely that any construction associated with the developments identified in Section 6.14.1 would result in cumulative impacts with the proposal, given the proposal's starting date. However, medium to large developments with construction at the same time as the proposal may also result in cumulative impacts.

As a result of multiple construction projects, impacts on traffic and transport are expected to be greater than the individual impacts identified for the proposal. Impacts may include increases in travel times from lane closures and traffic management along the highway and affected local roads.

Construction noise and vibration, pollution, waste and resource use from each of the identified projects would have adverse cumulative impacts. A temporary change to the amenity of the area could also result from ongoing construction activities. There may also be a socio-economic impact on local businesses as a result of prolonged changes in access.

There is the potential for cumulative ecological impacts to occur from additional clearing, loss of habitat and further fragmentation of the natural environment. However, each of the developments identified has been required to include landscaping and revegetation plans, or where relevant to adopt vegetation offset strategies to compensate for the loss of vegetation and habitat as part of the environmental impact approval process. Moreover the extent of the vegetation clearance required for the proposal has been minimised as far as practicable. As such, it is anticipated that ecological impacts have been ameliorated and cumulative impacts are not expected.

Operation

The completed proposal would form an important component of the infrastructure and connectivity objectives for various state plans and strategies, including the NSW Long Term Transport Master Plan, the Draft NSW Freight and Ports Strategy, Draft Metropolitan Strategy for Sydney to 2031 and Sydney's Bus Future. It is expected that the proposal would have an overall positive cumulative effect on the road environment within the proposal area, as traffic and safety conditions for all road users would be improved.

6.13.3 Safeguards and management measures

Measures to manage the potential cumulative risks are summarised in Table 6-52.

Table 6-52 Summary of mitigation measures to manage cumulative impacts

| Impact | Environmental safeguards | Responsibility | Timing |
|---|--|---|---|
| Cumulative impacts due to concurrent construction of multiple road projects | The contractor's environmental management plan would be revised to consider potential cumulative impacts from surrounding developments as they become known. | Roads and Maritime, construction contractor | Detailed design, pre-construction, construction |

6.14 Summary of beneficial effects

On completion, the proposal would provide the following beneficial effects:

- Improved road safety by upgrading infrastructure and changing access arrangements to reduce the likelihood of car crashes in the area. The proposal would provide traffic lights and/or additional lanes for through and turning movements at seven intersections along the proposal including the intersection between the M4 Western Motorway entry and exit ramps (westbound and eastbound) and Prospect Highway. The intersection between Ponds Road and Prospect Highway would also be upgraded to restrict traffic movements to left in and left out to improve road safety
- Improved safety for pedestrians, cyclists and motorists due to the establishment of pedestrian crossing facilities along and across Prospect Highway, including the upgrade of the existing pedestrian underpass between Old Church Lane and Keyne Street
- Reduced traffic congestion and improvement to traffic flow, improving access and connectivity for motorists travelling along Prospect Highway, connecting the M4 Western Motorway and Great Western Highway major transport corridors in the south to the Blacktown town centre and M2 Hills Motorway in the north. Traffic flow would improve for local buses, in particular along Prospect Highway and Blacktown Road
- Improved access, connectivity and reliability for local and regional freight vehicle movements, particularly between Prospect Highway, the Great Western Highway and the M4 Western Motorway
- Improved access and connectivity for pedestrians and cyclists, linking Reconciliation Road south of the M4 Western Motorway north to St Martins Crescent, maintaining Prospect Highway as a major pedestrian and cyclist route in the Blacktown area
- Improved flow and reduced congestion may have beneficial effects on local air quality.

6.15 Summary of adverse effects

Adverse effects of the proposal include:

- Temporary construction impacts including disruptions to traffic, noise and vibration, dust generation, risk of spills and contamination and the occurrence of erosion and sedimentation
- Direct and indirect impacts to about 1.49 hectares of native and modified vegetation, including direct and indirect impacts to 0.12 hectares of high condition Cumberland Plain Woodland listed as critically endangered under the *Commonwealth Environment Protection Biodiversity Conservation (EPBC) Act 1999*
- Altered traffic and access arrangements, particularly during construction, causing some residents and community members to take alternative routes to reach their destinations. It is likely that there would be increased traffic congestion during construction as some lanes would be closed for work
- The Former Great Western Road would be subject to direct impacts to small sections. Although the item is nominated for listing on the State Heritage Register, the listing includes a series of site specific exemptions under section 57(2) of the *Heritage Act 1977* related to the archaeological potential of the area that would be impacted by the proposal. St Bartholomew's Church and Cemetery may experience vibration impacts as the western side of the item would be 5.2 metres away from construction work at some locations
- The proposal would require two partial acquisitions, a residential property and Blacktown City Council drainage easement, and one full acquisition of a residential property (Lot 91 DP803853, Lot 1 DP 563443 and Lot 177 DP 557378 respectively).

7 Environmental management

7.1 Environmental management plans (or system)

A number of safeguards and management measures have been identified to minimise adverse environmental impacts, including social impacts, which could potentially arise from the proposal.

Should the proposal proceed, these management measures would be included in 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) would be prepared to describe proposed safeguards and management measures. These plans would provide a framework for establishing how these measures would be implemented and who would be responsible for their implementation.

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

7.2 Summary of safeguards and mitigation measures

Environmental safeguards from this document would be included in the detailed design, construction and operation of the proposal. These safeguards would minimise any potential adverse impacts arising from the proposed work on the surrounding environment. All safeguards described in this REF would be included in the CEMP. Measures from Section 6 as well as additional general measures are presented in Table 7-1 below.

Table 7-1 Proposed safeguards and mitigation measures

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|--------------------------|---|---|---------------------------|
| 1. | Traffic management | A construction traffic management plan would be prepared and implemented in accordance with the <i>Traffic Control and Worksites</i> , version 4.0 (Roads and Maritime, June 2010). The construction traffic management plan would enable the safe management of traffic, provide for the safety of construction personnel and minimise impacts on the local community. | Construction contractor | Pre-construction |
| 2. | Emergency services | Consultation with emergency service authorities would be undertaken during development of the detailed design. | Roads and Maritime | Detailed Design |
| 3. | Property access | Vehicular property access would be maintained where possible including pre-schools, places of worship and all commercial premises. Consultation with property owners would be undertaken prior to any changes to property accesses. | Roads and Maritime Construction contractor | Construction |
| 4. | Shelley Public School | Temporarily relocate maintenance access and garbage collection at Shelley Public School in consultation with the school | Roads and Maritime Construction contractor | Construction Operation |
| 5. | Pedestrians and cyclists | Pedestrian and cyclist access is to be maintained throughout construction. Provision of signposting outlining the pedestrians and cyclists diversion routes would be displayed during construction. There will be advance notification of any construction works that affect pedestrians and cyclists. | Construction contractor | Construction |
| 6. | Bus services | Access to appropriate bus stop locations would be maintained during construction in consultation with bus operators. | Construction contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|--------------------|---|-------------------------|--------------------------------|
| 7. | Bus services | Ongoing updates on locations and access to bus stops would be provided to the community during construction period to ensure that disruption is minimised. | Construction contractor | Construction |
| 8. | Operational noise | During the detailed design stage of the proposal, further investigations of all feasible and reasonable mitigation options for affected receivers would be subject to assessment in line with the Roads and Maritime Environmental Noise Management Manual (RTA, 2001) and NSW Road Noise Policy (OEH, 2011). | Roads and Maritime | Detailed design |
| 9. | Operational noise | Any mitigation measures provided to control operational noise impacts shall be implemented as early as practicable to also provide a benefit during some of the construction phase. | Roads and Maritime | Construction |
| 10. | Operational noise | A post-construction noise monitoring program (including simultaneous traffic counts) would be undertaken in accordance with the RMS Environmental Noise Management Manual within six to 12 months of opening once traffic flows have stabilised in order to verify the noise assessment. | Roads and Maritime | Post construction |
| 11. | Construction noise | <ul style="list-style-type: none"> A Construction Noise and Vibration Management Plan (CNVMP) would be prepared <p>This plan would include but not be limited to:</p> <ul style="list-style-type: none"> A map indicating the locations of sensitive receivers including residential properties A quantitative noise assessment in accordance with the EPA Interim Construction Noise Guidelines (DECCW, 2009) Management measures to minimise the potential noise impacts from the quantitative noise assessment and for potential works outside of standard working hours (including implementation | Contractor | Pre-construction, construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|--------|--|----------------|--------|
| | | <p>of EPA Interim Construction Noise Guidelines (DECCW, 2009)</p> <ul style="list-style-type: none"> • A risk assessment to determine potential risk for activities likely to affect receivers (for activities undertaken during and outside of standard working hours) • Mitigation measures to avoid noise and vibration impacts during construction activities including those associated with truck movements • A process for assessing the performance of the implemented mitigation measures • A process for documenting and resolving issues and complaints • A construction staging program incorporating a program of noise and vibration monitoring for sensitive receivers • A process for updating the plan when activities affecting construction noise and vibration change • Identify in toolbox talks where noise and vibration management is required • Consider construction compound layout so that primary noise sources are at a maximum distance from sensitive receivers (primarily residential receivers) • Locate compressors, generators, pumps and any other fixed plant as far from residences as possible and behind site structures • Vehicle delivery times will be scheduled where feasible to the recommended construction hours to minimise noise impacts from heavy vehicle movements and deliveries • The environmental induction program will include specific noise and vibration issues awareness training including, but not limited to, the following: | | |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|----------------------|---|----------------|--------------------------------|
| | | <ul style="list-style-type: none"> - Avoiding use of radios during work outside normal hours - Avoiding shouting and slamming doors - Where practical, operating machines at low speed or power and switching off when not being used rather than left idling for prolonged periods - Minimising reversing - Avoiding dropping materials from height and avoiding metal to metal contact on material • Any out of hours works would comply with the RMS Noise Management Manual – Practice Note VII • All noise complaints will be investigated and appropriate mitigation measures implemented where practicable to minimise further impacts • 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. | | |
| 12. | Vibration management | <p>A vibration assessment is to be prepared and included in the NVMP. The vibration assessment is to include (as a minimum):</p> <ul style="list-style-type: none"> - Identification of potentially affected properties/receivers - A risk assessment to determine the potential for discrete work activities to affect receivers - A map indicating the locations considered likely to be impacted and those requiring building condition surveys - Outline a monitoring program | Contractor | Pre-construction, construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|--|---|-------------------------|------------------|
| | | <ul style="list-style-type: none"> - A process for assessing the performance of the implemented mitigation measures - A process for resolving issues and conflicts • Where construction activities may cause damage through vibration a Building Condition Inspection of these items must be undertaken • Select alternative, lower-impact equipment or methods where possible, particularly in the vicinity of dwellings and heritage structures. | | |
| 13. | Vibration management | <ul style="list-style-type: none"> • Sensitivity testing for vibration generated by construction equipment will be undertaken in the vicinity of, but not immediately adjacent to, the St Bartholomew's Church • The sensitivity testing will identify targets and safe buffer distances for the use of vibration producing equipment around St Bartholomew's church • The results of the sensitivity testing and any targets or buffer distances identified will be documented in a Management Plan for works adjacent to St Bartholomew's Church • A program of monitoring vibration will be included in the Management Plan, which will form part of the CEMP. | Contractor | Pre Construction |
| 14. | Removal or modification of native vegetation | <p>A Biodiversity Management Plan (BMP) is to be prepared and included within the CEMP. The BMP is to include (but not be limited to) the following:</p> <ul style="list-style-type: none"> • A site walk with appropriate site personnel including RMS representatives to confirm clearing boundaries and sensitive location prior to commencement of works • Identification (marking) of the clearing boundary and identification (marking) of habitat features to be protected. Eg. – use of flagging tape • A map which clearly shows vegetation clearing | Construction contractor | Pre-Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | boundaries and sensitive areas/no go zones <ul style="list-style-type: none"> • Incorporation of management measures identified as a result of the pre-clearing survey report, completed by an ecologist, (G40, section 2.4) and nomination of actions to respond to the recommendations made. This should include details of measures to be implemented to protect clearing limits and no go areas • A detailed clearing process in accordance with RMS Biodiversity Guidelines (2011) including requirements of Guide 1,2, 4 & 9 • Identify in toolbox talks where biodiversity would be included such as vegetation clearing or works in or adjacent to sensitive locations • Identify control/mitigations measures to prevent impacts on sensitive locations or no go zones • The management measures required if threatened flora and fauna species such as the Spiked Rice flower, Juniper-leaved Grevillea and/or Cumberland Plain Land Snail are found during the pre-clearance surveys • A stop works procedure in the event of identification of unidentified species, habitats or populations. | | |
| 15. | Spread of weeds | A weed management plan would be prepared in accordance with RMS Biodiversity Guidelines (Guide 6) and incorporated into the BMP and would address: <ul style="list-style-type: none"> • Identification of the weeds on site (confirm during ecologist pre-clearing inspection) • Weed management priorities and objectives • Sensitive environmental areas within or adjacent to the site • Location of weed infested areas. | Construction contractor | Pre-Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | <ul style="list-style-type: none"> • Weed control methods • Measures to prevent the spread of weeds, including machinery hygiene procedures and disposal requirements • A monitoring program to measure the success of weed management • Communication with local Council noxious weed representative. | | |
| 16. | Introduction or spread of pests and diseases | <p>If the detailed design risk assessment determines that hygiene procedures are required on site, the BMP is to include hygiene protocols to prevent the introduction and spread of such pathogens as specified in Biodiversity Guidelines: Protecting and managing biodiversity on RMS projects (RMS, 2011).</p> <p>All pathogens (eg Chytid, Myrtle Rust and Phytophthora) are to be managed in accordance with the RTA Biodiversity Guidelines - Guide 7 (Pathogen Management) and DECC Statement of Intent 1: Infection of native plants by Phytophthora cinnamomi (for Phytophthora).</p> | Construction contractor | Pre-Construction |
| 17. | General impacts on threatened species and ecological communities | If unexpected threatened flora or fauna are discovered, works would stop immediately and the RMS Unexpected Threatened Species Find Procedure in the RMS Biodiversity Guideline 2011 implemented. | Construction contractor | Construction |
| 18. | Re-establishment of native vegetation | Offsets would be considered where reasonable and feasible for the impact to 0.69 hectares of Cumberland Plain Woodland in accordance with the Roads and Maritime offset policy (2011). | Construction contractor | Pre-Construction |
| 19. | Removal or modification of native vegetation | An exclusion zone would be established around the Freshwater Wetland adjacent to the proposed compound site on Thornley Road. | Construction contractor | Pre-Construction |
| 20. | Removal or modification | Identify known Cumberland Plain Woodland areas and | Construction contractor | Pre-Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | of native vegetation | exclusion zones during induction of all site personnel. | | |
| 21. | Removal or modification of native vegetation outside the construction footprint | The construction footprint would be identified and marked before construction and exclusion zones established in retained areas of habitat particularly in remnant vegetation areas. | Construction contractor | Pre-construction |
| 22. | Accidental removal or modification of native vegetation not within the proposal area | Permanent fencing would be established along the edges of the high condition Cumberland Plain Woodland remnant next to Timbertop Reserve before construction. This would help to avoid impacts to this area during construction and operation. | Construction contractor | Pre-construction |
| 23. | Minimising fauna injury and mortality | In circumstances where the handling of fauna is completely unavoidable, best practice methods would be followed as outlined in the Roads and Maritime Biodiversity Guidelines – Guide 9: Fauna Handling (RTA 2011). | Construction contractor | Construction |
| 24. | Landscape character and visual impacts | During detailed design, the landscape design principles and streetscape (planting) would be reviewed to ensure that they are consistent with the outcomes of the biodiversity assessment. This would be done in consultation with RMS environment staff. | Roads and Maritime, design contractor | Detailed design |
| 25. | Landscape character and visual impacts | During detailed design, the design including landscape plans are to incorporate the design principles outlined in the Landscape Character, Visual Impact Assessment and Urban Design Report. These include: <ul style="list-style-type: none"> • To ensure that the design reinforces the identity and functionality of an arterial road type • To ensure that existing land uses is considered and integrated in to the design of the road alignment • To contribute to the future urban planning of the adjoining development precincts including its transport and access needs • To respond to natural patterns including creek lines | Roads and Maritime, design contractor | Detailed design |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | <p>and drainage corridors and vegetation communities. This includes the use of local plants consistent with the existing communities either side of the alignment in order to unify the crossing with the existing corridor, and, use of advance stock to escalate the revegetation where appropriate</p> <ul style="list-style-type: none"> • To provide a unified and consistent approach to the design of bridges along the corridor • The consideration of landscaping treatment to reduce the incidence of graffiti • To achieve an integrated, safe and minimal maintenance design. | | |
| 26. | Landscape character and visual impacts | An urban design contractor from the Roads and Maritime panel would be engaged for the detailed design phase to ensure adequate consideration of urban design principles and objectives, and to ensure appropriate mitigation of identified impacts. | Roads and Maritime, design contractor | Detailed design |
| 27. | Landscape character and visual impacts | The design of vegetative screening would occur in consultation with adjoining land owners. | Roads and Maritime, design contractor | Detailed design |
| 28. | Landscape character and visual impacts | The footprint for construction work would be kept to a minimum to ensure existing stands of vegetation remain intact wherever possible and to screen adjoining sensitive receivers. | Roads and Maritime, design contractor | Detailed design |
| 29. | Landscape character and visual impacts | <p>The design of potential noise barriers will be undertaken during detailed design and will take into consideration the RMS Noise Wall Design Guidelines (RTA 2007). The following principles will be considered during the design of the noise barriers:</p> <ul style="list-style-type: none"> • Materials, colours and textures will be selected to break up the dominant nature of the noise barrier • Transparent panels will be incorporated into sections of the noise barrier where it has potential to block solar access to adjacent residential | Roads and Maritime, design contractor | Detailed design |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | properties. | | |
| 30. | Construction related visual impacts | Fencing with material attached (for example, shade cloth) would be provided around the construction compounds and other areas to screen views of the construction compounds from adjoining properties. | Construction contractor | Construction |
| 31. | Flood and drainage design | Final layout and detail of the drainage system including swale design and scour protection will be refined during detailed design in consultation with the RMS Senior Environmental Officer. | Roads and Maritime and designers | Detailed design |
| 32. | Flood and drainage design | Further flood modelling including a detailed afflux assessment would be undertaken during detailed design to confirm impacts to surrounding land uses. | Roads and Maritime and designers | Detailed design |
| 33. | Water quality management | <p>A Soil and Water Management Plan (SWMP) will be prepared as part of the CEMP in accordance with the requirements of RMS contract specification G38 prior to the commencement of construction. The SWMP will also address the following:</p> <ul style="list-style-type: none"> • RMS Technical Guideline: Temporary Stormwater Drainage for Road Construction, 2011 • RMS Technical Guideline: Environmental Management of Construction Site Dewatering, 2011. <p>The SWMP would detail the following as a minimum:</p> <ul style="list-style-type: none"> • Identification of catchment and sub-catchment areas, high risk areas and sensitive areas • Sizing of each of the above areas and catchment • The likely volume of run-off from each road sub-catchment • Direction of flow of on-site and off-site water • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction • The locations and sizing of sediment traps such as | Construction contractor | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|--------------------------|--|-------------------------|--------------|
| | | <p>sump or basin as well as associated drainage</p> <ul style="list-style-type: none"> • Dewatering plan which includes process for monitoring, flocculating and dewatering water from site (ie sediment basin and sumps) • The staging plans, location, sizing and details of creek alignment and realignment controls for scour protection and bank and bed stabilisation including those used during construction and long term • A mapped plan identifying the above • A process to routinely monitor the BOM weather forecast • Preparation of a wet weather (rain event) plan which includes a process for monitoring potential wet weather and identification of controls to be implemented in the event of wet weather. These controls are to be shown on the ESCPs • Provision of an inspection and maintenance schedule for ongoing maintenance of temporary and permanent erosion and sedimentation controls. | | |
| 34. | Spills | Emergency wet and dry spill kits would be kept on site at all times and all staff would be made aware of the location of the spill kit and trained in its use. | Construction contractor | Construction |
| 35. | Spills | The vehicles refuelling process will include a person attending the refuelling facility / vehicle and a spill kit on the vehicle. | Construction contractor | Construction |
| 36. | Water quality management | Vehicle wash down and/or cement truck washout is to occur in a designated bunded area and least 50 metres away from water bodies and surface water drains. | Construction contractor | Construction |
| 37. | Spills | Any fuel, oils or other liquids stored on site would be stored in an appropriately sized impervious bunded at least 120% larger than the greatest container and in an area least 50 metres away from water bodies. | Construction contractor | Construction |
| 38. | Spills | If a spill or incident occurs, the Roads and Maritime | Construction contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | Environmental Incident Classification and Management Procedure is to be followed and the Roads and Maritime Contract Manager notified immediately. | | |
| 39. | Potential physical impact on non-Aboriginal heritage items during construction. | <p>A Non-Aboriginal Heritage Management plan would be prepared and included in the CEMP. This plan would include but not be limited to the following:</p> <ul style="list-style-type: none"> • A map identifying locations of items or sites (including curtilages) which are to be protected and those which are to be destroyed/impacted and no-go zones • Identification of potential environmental risks/impacts due to the works/activities • Management measures to minimise the potential risk • Mitigation measures to avoid risk of harm and the interface with work activities on site • Implementation of mitigation measures to protect identified heritage items or areas • Identify in toolbox talks where management of non-aboriginal heritage is required such as identification of no go zones and responsibilities under the <i>Heritage Act 1977</i> and any obtained permits or exemptions • A stop works procedure in the event of actual or suspected potential harm to a heritage feature/place • Requirement to comply with RMS Standard Management Procedure -Unexpected Archaeological Finds, 2012. | Roads and Maritime and construction contractor | Pre-construction, construction |
| 40. | Potential physical impact on non-Aboriginal heritage items during construction. | A condition survey would be undertaken before the start of work by a qualified contractor and a building condition report prepared for heritage structures. | Roads and Maritime and construction contractor | Pre-construction, construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---|--|--|-----------------------------------|
| 41. | Potential vibration impacts to St Bartholomew's Church and Cemetery and the house at 29 Old Church Lane, Prospect | Vibration management procedures would be developed and implemented where works resulting in vibration are undertaken within the vicinity of identified heritage items. | Construction contractor | Pre-construction |
| 42. | Unexpected heritage find during construction. | 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 RMS Standard Management Procedure - Unexpected Archaeological Finds 2012 would be followed. | Roads and Maritime and construction contractor | Pre-construction, construction |
| 43. | Physical impacts to the Former Great Western Road, Prospect. | Direct physical impacts to the Former Great Western Road would be avoided, if possible, and dependent on the status of the heritage listing, an exemption from approval under Section 57(2) of the Heritage Act 1977 would be requested and/or the Heritage Division would be consulted before work start. | Roads and Maritime | Pre-construction |
| 44. | Unexpected heritage find during construction. | If unexpected Aboriginal 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 RMS Standard Management Procedure - Unexpected Archaeological Finds 2012 would be followed. | Roads and Maritime and construction contractor | Pre-construction, construction |
| 45. | Property acquisition | All land acquisitions would be conducted in line with the Roads and Maritime Land Acquisition Policy and the requirements of the Land Acquisition (Just Terms) Compensation Act 1991. | Roads and Maritime | Pre-construction |
| 46. | Community | A Communication Plan would be prepared and included in the Construction Environmental Management Plan (CEMP). The Communication Plan would include: <ul style="list-style-type: none"> Requirements to provide details and timing of proposed activities to affected residents and | Construction contractor | Pre-construction and construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---------------------------|--|---|--------------------------------|
| | | <p>businesses including St Martins Shopping Village/Blacktown Mega Centre, Medlife Medical Centre, Army cadet base (Safe Base Bravo Shelley Pubic School, Blacktown Road Children's Centre, Mitchell High School, St Mark's Coptic Catholic Church, Homebase Prospect, Blacktown City Council and Holroyd City Council</p> <ul style="list-style-type: none"> • Contact name and number for complaints • Procedure to notify adjacent land users for changed conditions during the construction period such as traffic, pedestrian or driveway access • The communications plan would be prepared in line with G36 requirements and Roads and Maritime Community Engagement and Communications Manual (2012). <p>The communications plan would include a complaint handling procedure and register and maintained for the duration of the proposal.</p> | | |
| 47. | Community | Residents would be informed prior to any interruptions to utility services that may be experienced as a result of utilities relocation. | Construction contractor | Pre-construction, construction |
| 48. | Erosion and sedimentation | <p>During detailed design an Erosion and Sedimentation Management Report is to be prepared. The report is to include (as a minimum):</p> <ul style="list-style-type: none"> • Identify site catchment and sub-catchments, high risk areas and sensitive areas • Sizing of each of the above areas and catchments • Proposed staging plans for the project to ensure appropriate erosion and sediment controls measures are possible • The likely volume of run-off from each catchment and sub-catchment in accordance with the Managing Urban Stormwater: Soils and | Roads and Maritime, construction contractor | Detailed design |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---------------------------|--|-------------------------|-----------------------------------|
| | | <p>Construction, Volume 1 and 2 (Landcom, 2004)</p> <ul style="list-style-type: none"> • Direction of water flow, both off and on site • Diversion of off-site water around or through the site or details of separation of on-site and off-site water • The direction of runoff and drainage points during each stage of construction • The locations and sizing of sediment basins / sumps as well as associated drainage to direct site water to the basin or sumps • A mapped plan identifying the above at all major construction stages • A review process by a soil conservationist and a process for updating the report to address any recommendations. | | |
| 49. | Erosion and sedimentation | The Erosion and Sedimentation Management Report would be provided to Roads and Maritime Environment Manager for review and verification prior to the construction tender. | Roads and Maritime | Detailed design, pre-construction |
| 50. | Erosion and sedimentation | A soil conservationist from the RMS Erosion, Sedimentation and Soil Conservation Consultancy Services Register is to be engaged to review the Erosion and Sedimentation Management Report and conduct routine inspections of the construction works. | Roads and Maritime | Pre-construction, construction |
| 51. | Erosion and sedimentation | <p>An Erosion and Sedimentation Control Plan (ESCP) would be prepared prior to construction and is to include as a minimum:</p> <ul style="list-style-type: none"> • Identify site catchment and sub-catchments, high risk areas and sensitive areas • Sizing of each of the above areas and catchments • The likely run-off from each sub-catchment • Separation of on-site and off-site water • The direction of run-off and drainage points during each stage of construction | Construction contractor | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---------------------------|--|-------------------------|--------------|
| | | <ul style="list-style-type: none"> • Direction of flow of on-site and off-site water • The locations and sizing of sediment basins or sumps and associated catch drains and/or bunds • The locations of other erosion and sediment control measures (eg rock check dams, swales and sediment fences) • Controls/measures to be implemented on wet weather events • A mapped plan identifying the above • A dewatering procedure for onsite water and basins • A process for reviewing and updating the plan on a fortnightly basis and/or when works alter. | | |
| 52. | Erosion and sedimentation | <p>Erosion and sediment control measures are to be implemented and maintained to:</p> <ul style="list-style-type: none"> • Prevent sediment moving off-site and sediment laden water entering any water course, drainage lines, or drain inlets • Reduce water velocity and capture sediment on site • Minimise the amount of material transported from site to surrounding pavement surfaces • Divert clean water around the site. <p>(in accordance with the Landcom / Department of Housing <i>Managing Urban Stormwater, Soils and Construction Guidelines</i> (the Blue Book)).</p> | Construction contractor | Construction |
| 53. | Erosion and sedimentation | All stockpiles will be designed, established, operated and decommissioned in accordance with the RMS Stockpile Site Management Guideline, 2011. | Construction contractor | Construction |
| 54. | Erosion and sedimentation | <p>A Stabilisation Plan is to be prepared and included in the SWMP. The stabilisation plan is to include but not be limited to the following:</p> <ul style="list-style-type: none"> • Identification and methodology of techniques for | Construction contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---------------------------|---|-------------------------|------------------|
| | | stabilisation of site <ul style="list-style-type: none"> • Identification of area on site for progressive stabilisation • Stabilisation is to be undertaken of areas, including stockpiles and batters, exposed for a duration of 2 weeks or greater. For example covering with geotextile fabric, stabilised mulch, soil binder or spray grass • Identification of areas on site for progressive permanent stabilisation such as implementation of landscaping. | | |
| 55. | Erosion and sedimentation | Erosion and sedimentation controls are to be checked and maintained on a regular basis and after a rain event of 10mm or greater (including clearing of sediment from behind barriers) and records kept and provided on request. | Construction contractor | Construction |
| 56. | Erosion and sedimentation | Disturbed surfaces would be compacted and stabilised in anticipation of a rain event to reduce the potential for erosion. | Construction contractor | Construction |
| 57. | Erosion and sedimentation | Controls would be implemented at exit points to minimise the tracking of soil and particulates onto pavement surfaces Any material transported onto pavement surfaces would be swept and removed at the end of each working day and prior to rainfall. | Construction contractor | Construction |
| 58. | Erosion and sedimentation | The Soil and Water Management Plan would include a contingency plan for any acid sulfate soils or salinity identified during the construction phase. | Construction contractor | Construction |
| 59. | Contamination management | A Contamination Management Plan (CMP) will be prepared in accordance with the Contaminated Land Act 1997 and relevant EPA Guidelines. This plan will be form part of the CEMP and will include at a minimum: <ul style="list-style-type: none"> • Contaminated Land Legislation and guidelines | Construction contractor | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---------------------|---|--|----------------|
| | | <p>including any relevant licences and approvals to be obtained</p> <ul style="list-style-type: none"> • Identification of locations of known or potential contamination and preparation of a map showing these locations • Identification of rehabilitation requirements, classification, transport and disposal requirements of any contaminated land within the construction footprint • Contamination management measures including waste classification and reuse procedures and unexpected finds procedures • Monitoring and sampling procedure for landfill seepage (leachate) • A procedure for dewatering and disposal of potentially contaminated liquid waste • In the event that indications of contamination are encountered (known and unexpected, including odorous or visual indicators), work in the area will immediately cease until a contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate • A process for reviewing and updating the plan. <p>The CMP would be reviewed by Roads and Maritime Senior Environment Officer and Roads and Maritime Land Management Specialist prior to the commencement of works.</p> | | |
| 60. | Hazardous materials | A hazardous materials assessment would also be carried out before demolishing structures within the proposal area. | Roads and Maritime/ demolition contractor | Pre-demolition |
| 61. | Hazardous materials | In the event that indications of contamination are | Construction contractor | Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | encountered (known and unexpected, such as odorous or visually contaminated materials), work in the area would cease until an contamination assessment can be prepared to advise on the need for remediation or other action, as deemed appropriate. | | |
| 62. | General air quality management | <p>An Air Quality Management plan (AQMP) would be prepared as part of the CEMP. The plan would include but not be limited to:</p> <ul style="list-style-type: none"> • A map identifying locations of sensitive receivers • Identification of potential risks/impacts due to the work/activities as dust generation activities • Management measures to minimise risk including a progressive stabilisation plan • A process for monitoring dust on site and weather conditions • A process for altering management measures as required. | Construction contractor | Pre-construction |
| 63. | Air quality during construction | <p>The management measures within the AQMP would include but not limited to the following:</p> <ul style="list-style-type: none"> • Vehicles transporting waste or other materials that have a potential to produce odours or dust are to be covered during transportation • Dust will be suppressed on stockpiles and unsealed or exposed areas using methods such as water trucks, temporary stabilisation methods, soil binders or other appropriate practices • Disturbed areas will be minimised in extent and rehabilitated progressively • Speed limits will be imposed on unsealed surfaces • Stockpiles will be located as far away from residences and other sensitive receivers • Works (including the spraying of paint and other materials) will not be carried out during strong | Construction contractor | Pre-construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
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| | | <p>winds or in weather conditions where high levels of dust or air borne particulates are likely</p> <ul style="list-style-type: none"> • Plant, vehicles and equipment will be maintained in good condition and in accordance with manufacturer's specifications • Plant and machinery will be turned off when not in use • No burning of any timbers or other combustible materials will occur on site • Visual monitoring of air quality will be undertaken to verify the effectiveness of controls and enable early intervention • Work activities will be reprogrammed if the management measures are not adequately restricting dust generation. | | |
| 64. | Dust from construction activities | <p>An air quality management plan would be prepared before any construction or clearing activities, and would provide guidance on the use of appropriate dust suppression methods which would include, but not be limited to:</p> <ul style="list-style-type: none"> • Stabilising of areas with the capacity to cause dust, with water spraying, compaction or progressive revegetation • Covering of stockpile and storage areas • Cessation of dust generating activities in high wind situations where dust cannot be controlled. <p>In addition, local residents and other sensitive receivers (such as schools, churches and local businesses) would be advised of hours of operation and provided with contact details for queries regarding air quality.</p> | Construction contractor | Pre-construction |
| 65. | Impacts on climate change from construction | Detailed design would take into consideration the potential effect of climate change on the proposal, | Roads and Maritime designers and construction | Detailed design |

| No. | Impact activities | Environmental safeguards including drainage requirements. | Responsibility contractor | Timing |
|-----|--|---|---------------------------|-----------------------------------|
| 66. | Impacts on climate change from construction activities | <p>Establishing operating procedures for site vehicles to increase efficiency of vehicle fuel use.</p> <p>Reducing clearing of vegetation as much as practicable and re-establish vegetation in suitable areas when construction is completed.</p> <p>Reducing site wastage by reusing and recycling wasted material as a preference before disposing to landfill.</p> | Construction contractor | Construction |
| 67. | Generation of construction waste | <p>A Resource and Waste Management Plan (RWMP) would be prepared, which will include the following (as a minimum):</p> <ul style="list-style-type: none"> • The type, classification and volume of all materials to be generated and used on site including identification of recyclable and non-recyclable waste in accordance with EPA Waste Classification Guidelines • Quantity and classification of excavated material generated as a result of the proposal (Refer RMS Waste Management Fact sheets 1-6, 2012) • Interface strategies for cut and fill on site to ensure re-use where possible • Strategies to 'avoid', 'reduce', 'reuse' and 'recycle' materials • Classification and disposal strategies for each type of material • Destinations for each resource/waste type either for on-site reuse or recycling, offsite reuse or recycling, or disposal at a licensed waste facility • Details of how material would be stored and treated on-site • Identification of available recycling facilities on and | Construction contractor | Pre-Construction and Construction |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|----------------------------------|---|----------------------------|------------------------------------|
| | | <ul style="list-style-type: none"> off site • Identification of suitable methods and routes to transport waste • Procedures and disposal arrangements for unsuitable excavated material or contaminated material • Site clean-up for each construction stage. | | |
| 68. | Generation of construction waste | Procurement will endeavour to use materials and products with a recycled content where that material or product is cost and performance effective. | Construction contractor | Detailed Design & Pre-Construction |
| 69. | Generation of construction waste | Cleared weed free vegetation will be chipped and reused onsite as part of the proposed landscaping and to stabilise disturbed soils where possible. | Construction contractor | Construction |
| 70. | Generation of construction waste | A dedicated concrete washout facility that is impervious would be provided during construction so that runoff from the washing of concrete machinery, equipment and concrete trucks can be collected and disposed of at an appropriate waste facility. | Construction contractor | Construction |
| 71. | Generation of construction waste | All wastes will be managed in accordance with the <i>Protection of the Environment Operations Act 1997</i> . | Construction contractor | Pre-Construction and Construction |
| 72. | Generation of construction waste | Types of waste collected, amounts, date/time and details of disposal are to be recorded in a waste register. | Construction contractor | Construction |
| 73. | Generation of construction waste | Works sites would be maintained, kept free of rubbish and cleaned up at the end of each working day. | Construction contractor | Construction |
| 74. | Generation of construction waste | Suitable waste disposal locations would be identified and used to dispose of litter and other wastes on-site. Suitable containers would be provided for waste collection. | Construction contractor | Pre-construction & Construction |
| 75. | Generation of | Resource management hierarchy principles would be | Detailed design contractor | Detailed design, Pre- |

| No. | Impact | Environmental safeguards | Responsibility | Timing |
|-----|---|--|---|---|
| | construction waste | <p>followed and are:</p> <ul style="list-style-type: none"> • Avoid unnecessary resource consumption as a priority • Avoidance is followed by resource recovery (including reuse of materials, reprocessing, and recycling and energy recovery) • Disposal is undertaken as a last resort (in line with the <i>Waste Avoidance and Resource Recovery Act 2001</i>). | and Construction contractor | construction & Construction |
| 76. | Generation of construction waste | A Waste Management Plan would be completed in line with the requirements of the Roads and Maritime's QA Specification G36 – Environmental Protection (Management System). | Construction contractor | Construction |
| 77. | Generation of construction waste | Housekeeping at construction sites would be addressed regularly. This would include collection and sorting of recycling, general waste and green waste. Waste would be disposed regularly at a licensed waste facility or recycling where available. | Construction contractor | Construction |
| 78. | Cumulative impacts due to concurrent construction of multiple road projects | The contractors environmental management plan would be revised to consider potential cumulative impacts from surrounding developments as they become known. | Roads and Maritime, construction contractor | Detailed design, pre-construction, construction |

7.3 Licensing and approvals

An appropriate road occupancy licence would be in place before the start of construction.

The proposal is a scheduled activity under the *Protection of the Environment Operations (POEO) Act 1997* and so requires an environment protection licence.

The Former Great Western Road, Prospect – Reservoir Road, has been nominated for listing on the State Heritage Register. The listing will include a series of site-specific exemptions under section 57(2) of the *Heritage Act 1977* primarily relating to the archaeological potential of the area that would be impacted by the proposal. If direct physical impacts to the Former Great Western Road, Prospect, cannot be avoided, and if the item is listed on the State Heritage Register before construction starts, an exemption from approval under Section 57(2) of the *Heritage Act 1977* should be requested from the Heritage Council. If the item is not listed on the State Heritage Register before construction starts, the Heritage Council would be consulted prior to any impacts taking place and they would provide advice on how to proceed.

8 Justification and conclusion

8.1 Justification

The proposal has been assessed against and is consistent with strategies and plans including:

- National Road Safety Strategy 2011-2020 (Australian Transport Council 2011)
- NSW Ports and Freight Strategy
- NSW 2021: A plan to make NSW Number One (NSW Government 2011)
- NSW State Infrastructure Strategy (NSW Government 2012)
- NSW Long Term Transport Master Plan (Transport for NSW 2012)
- NSW Bike Plan (NSW Government 2010)
- Sydney's Cycling Future - Cycling for everyday transport 2013
- Draft Metropolitan Strategy for Sydney to 2031 (NSW Government 2013)
- West Central and North West Central Regional Strategy (NSW Government 2013)
- Roads and Maritime Services Corporate Delivery Plan 2012 – 2016 (Roads and Maritime 2012)
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- Sydney's Bus Future (Transport for NSW 2013).

Traffic congestion is currently experienced by motorists on Prospect Highway during the morning and afternoon peak periods. This leads to increased travel times, delays in the movement of freight and poor road safety outcomes.

The proposal would address these issues by:

- Providing additional lanes, which would increase capacity. This would reduce congestion and improve travel times for both commuters and freight
- Reducing stop-start, right in right out, and merging movements and in doing so minimising the risk of crashes, particularly rear end collisions and collisions from crossing traffic
- Improving access to the M4 Western Motorway
- Improving access to the Great Western Highway and Prospect Highway via the proposed two way link road.

While there would be some environmental impacts from the proposal, they have been avoided or minimised where possible through design and site-specific safeguards summarised in Section 7.

The benefits of the proposal are considered to be both long term and wide ranging. These benefits outweigh the adverse impacts that may be generated by the proposal, which are mostly temporary and local in nature.

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.

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 transport network whilst minimising impacts on the natural and built environment. It is consistent with the objective of promoting the social and economic welfare of the community and a better environment. |
| 5(a)(ii) To encourage the promotion and coordination of the orderly economic use and development of land. | The proposal represents an improvement to land uses for arterial road purposes. The continued use of the land for that purpose and the proposed efficiency and road safety improvements represent the orderly economic use and development of land. |
| 5(a)(iii) To encourage the protection, provision and co-ordination of communication and utility services. | The proposal is designed to minimise impacts on communication and utility services. Adjustments would occur in consultation with relevant service providers. |
| 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 would improve an element of the transport network on which the community relies. |
| 5(a)(vi) To encourage the protection of the environment, including the protection and conservation of native animals and plants, including the threatened species, populations and ecological communities, and their habitats. | The proposal would have some impact on the natural environment. Measures have been proposed to reduce that impact. Refer to Chapter 6. |
| 5(a)(vii) To encourage ecologically sustainable development. | Ecologically sustainable development is considered in Section 8.2.1 below. |
| 5(a)(vii) To encourage the provision and maintenance of affordable housing. | Not relevant to proposal. |
| 5(b) To promote the sharing of the responsibility for environmental planning between the different levels of government in the State. | Not relevant to proposal. |
| 5(c) To provided increased opportunity for public involvement and participation in environmental planning and assessment. | Community involvement has occurred during the proposal's development. Refer to Chapter 5. |

8.2.1 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 during the proposal's development.

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.

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.

The threat of serious or irreversible environmental damage is one of the essential preconditions to the engagement of the precautionary principle. In this case impact mitigating safeguards have been adopted even when the impacts are not certain to occur.

Inter-generational 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. Road safety, economic and social benefits would be experienced over a longer period.

Conservation of biological diversity and ecological integrity

The twin principles of biodiversity conservation and conserving ecological integrity have been a consideration during the course of 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. There would be some impact on a small amount of fauna habitat and critically endangered Cumberland Plain Woodland. This impact would be minor and limited to about 0.69 hectares of Cumberland Plain Woodland. Measures have been proposed to minimise and mitigate these impacts. Offsets would also be considered in line with Roads and Maritime offset policy (2011).

Improved valuation and pricing of environmental resources

The principle of internalising environmental costs into decision making requires consideration of all environmental resources which may be affected by a proposal, 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 mitigation measures to prevent adverse environmental impacts.

8.3 Conclusion

The proposed upgrade of Prospect Highway between Reservoir Road, Prospect and St Martins Crescent Blacktown over a length of 3.6 kilometres, 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 NSW *Threatened Species Conservation Act 1995 (TSC Act)* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*, critical habitat, impacts on threatened species, populations and ecological communities and their habitat 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 to native vegetation and fauna habitat. Construction noise, vibration, operational noise, potential heritage impacts and the potential for some traffic delays during construction are other potential impacts. Mitigation measures as detailed in this REF would minimise these expected impacts. The proposal would reduce congestion and improve safety, while also providing improved facilities for pedestrians and cyclists. 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 significantly affect threatened species, populations or ecological or their habitats, within the meaning of the TSC Act or *Fisheries Management Act 1994* and therefore a Species Impact Statement is not required. The proposal is also unlikely to affect Commonwealth land or have a significant impact on any matters of national environmental significance.

9 References

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10 Terms and acronyms used in this REF

| Acronym/Term | Definition |
|--------------|---|
| AHD | Australian Height Datum |
| AHIMS | Aboriginal Heritage Information Management System |
| ARI | Average recurrence interval |
| ASS | Acid Sulphate Soils |
| AusLink | Mechanism to facilitate cooperative transport planning and funding by Commonwealth and state and territory jurisdictions |
| CEMP | Construction environmental management plan |
| CMP | Contamination Management Plan |
| CNVMP | Construction Noise and Vibration Management Plan |
| CO | Carbon monoxide |
| DA | Development Application |
| dB | Decibels |
| DCP | Development Control Plan |
| EIA | Environmental impact assessment |
| EIS | Environmental impact statement |
| ENMM | Environmental Noise Management Manual |
| EPA | Environment Protection Authority |
| 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) |
| ICNG | Interim Construction Noise Guideline |
| ISEPP | State Environmental Planning Policy (Infrastructure) 2007 |
| LALC | Local Aboriginal Land Council |
| LEP | Local Environmental Plan. A type of planning instrument made under Part 3 of the EP&A Act. |
| LGA | Local Government Area |
| LoS | Level of Service. A qualitative measure describing operational conditions within a traffic stream and their perception by motorists and/or passengers. |

| | |
|--------------------|---|
| mg/m3 | Milligrams per metre cubed |
| NCA | Noise Catchment Area |
| NES | Matters of national environmental significance under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999. |
| NML | Noise Management Level |
| Noxious Weeds Act | Noxious Weeds Act 1993 (NSW) |
| NPW Act | National Parks and Wildlife Act 1974 (NSW) |
| NO | Nitrogen Oxides |
| NO2 | Nitrogen Oxides |
| NOx | Nitrogen Oxides |
| OEH | Office of Environment and Heritage |
| O3 | Ozone |
| PACHCI | Procedure for Aboriginal Heritage Consultation and Investigation |
| PEI | Preliminary Environmental Investigation |
| PEMP | Project environmental management plan |
| PM10 | Particulate Matter |
| PM2.5 | Particles under 2.5 microns in size |
| Ppm | Parts Per Million |
| QA Specifications | Specifications developed by Roads and Maritime Services for use with roadwork and bridgework contracts let by Roads and Maritime Services |
| RBL | Rating background level |
| RCP | Reinforced Concrete Pipe |
| REF | Review of Environmental Factors |
| RNT | Register of the National Trust |
| Roads and Maritime | Roads and Maritime Services (replaces former RTA) |
| RTA | Former Roads and Traffic Authority |
| SEPP | State Environmental Planning Policy. A type of planning instrument made under Part 3 of the EP&A Act. |
| SEPP 14 | State Environmental Planning Policy No.14 – Coastal Wetlands |
| SHR | State Heritage Register |
| SIS | Species Impact Statement |
| SWMP | Soil and Water Management Plan |
| TMP | Traffic Management Plan |
| TSC Act | Threatened Species Conservation Act 1995 (NSW) |
| ug/m3 | Micrograms per metre cubed |
| WARR | Waste Avoidance and Resource Recovery Strategy |